Impacts of Trade Facilitation on South Asian Economies

Ahangamage Manel Subashini Perera

Bachelor of Economics (Sri Lanka)

Master of Agricultural Economics (Sri Lanka)

A thesis submitted for the degree of Doctor of Philosophy of the University of New England

October 2018

Abstract

South Asia's trade growth potential has not yet been realized, mainly attributable to the lack of market integration between countries as a result of excessive trade costs and delays which are one of the major determinants of global trade participation. Poor Trade Facilitation (TF) increases trade costs and delays, which prevent connectivity between countries and impair regional trade growth. Poor TF impacts negatively on trade volumes of both exports and imports and increases unemployment by restricting the development of a complete supply chain.

This thesis provides an application of Global Trade Analysis Project (GTAP) model to assess the economy-wide impacts of TF in South Asia, together with a comprehensive evaluation of the World Trade Organisation (WTO) Trade Facilitation Agreement (TFA), in relation to the South Asian region, based on the "iceberg" approach. TF is measured as the changes in border transaction efficiency due to reductions in import and export delays. The Ad Valorem Equivalents (AVEs) of time in trade database, a three-dimensional database comprising per day AVEs of time to trade for each commodity in each country, is used as a supplement to the main GTAP database. This method has not previously been used to quantify the economy-wide impacts of trade delays in South Asia.

Special attention was devoted to determining the impact of timeliness at separate stages in the process of South Asian border transactions, in order to identify the stages that take longer and, consequently, affect trade more adversely. Additionally, the impacts of trade delay reductions and further tariff removals were assessed to compare TF and trade liberalization policies. Emphasis was placed on determining the relationship between TF reforms and outcomes, measured by elasticities, which is an original contribution to the literature in terms of the use of updated TF indicators and time to trade data.

The overall results of this thesis revealed that a facilitated trading system is paramount to expanding trade in South Asia and the successful implementation of the TFA offers the region positive economic gains. The quantitative estimates of this study clarify that a developing country's own TF reforms translate into greater economic gains than those of the export partners. Clearly, the sooner South Asian countries prioritize import time-reduction policies to promote import border transaction efficiency, the better for the region. Policies that accelerate the border clearance process of Agricultural sector imports and intermediate inputs required by

the Manufacturing sector also warrant South Asian national TF priority. The costs-benefits analysis of the Agreement, using the novel method incorporated into the GTAP model, reveals that the expenses incurred in introducing TF reforms do not significantly affect the economy in the case of the majority of countries. The results of this thesis provide decision-makers with options for improving TF while providing a platform for further investigation of the impacts of TF on developing economies, utilizing a modified time and TF reform costs database, together with a restructured GTAP model as a data and modelling framework.

Declaration

I certify that the substance of this thesis has not previously been submitted for any degree and is not currently being submitted for any other degree or qualification. I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.


---
e)

Acknowledgement

This thesis would have not been possible without the guidance and help of several individuals, who extended their valuable assistance throughout the project. Foremost, I would like to thank my supervisors, Professor Mahinda Siriwardana and Dr. Stuart Mounter, who enthusiastically offered suggestions, motivation and guidance to keep me focused and determined throughout the duration of my doctoral research. I am also grateful to Dr. Terrie Walmsley, Managing Director, ImpactEcon, USA. Her remote support and guidance were always available when I needed it most. Her thoughtful advice boosted my confidence and has kept me on track from start to finish. I would also like to express my sincere appreciation to Dr. Perter Miner, Managing Director, ImpactEcon, USA for his initial advice and directions for use of their database in my project.

I have also benefited immensely from participating in the CGE modelling course conducted by Centre for Policy Studies (CoPS) in 2015 in Dubai. I sincerely thank Professor Philip Adams and Dr. Louise Roos for sharing their knowledge on CGE modelling, while my extreme appreciation is extended to Dr. Mary Burfisher, Senior Education Advisor, Centre for Global Trade Analysis, Purdue University, USA for her incredible personal guidance, intellectual support, and practical instruction to improve my knowledge of the Global Trade Analysis Project (GTAP) model, as well as arranging for my participation in the GTAP 101 course and Preferential Trade Agreement (PTA) mini-course conducted by GTAP centre. I wish to thank Dr. Zaki Chahir, Associate Professor of Economics at the Faculty of Economics and Political Science, Cairo University for responding to my email queries and sharing his database. I must also mention those anonymous referees, from whom I received comments and feedback during the publication process of my journal articles, as well as fellow participants at the 20th Annual Conference on Global Economic Analysis, 2017 Australian Conference of Economists, and UNE Post Graduate Conference- 2018 at which I presented papers which now form a part of this thesis. To the UNE Business School, I sincerely thank all academic staff members, but in particular, Professor Oscar Cacho, Alison Sheridan, and Renato Villano from whom I obtained valuable comments and suggestions from time to time, as well as my colleague, Isaac Koomson, and former PhD student, Dr. Duy Nong, for sharing their statistical and GTAP software expertise, respectively.

This project could not have been realized without the Australia Awards-Endeavour Scholarship program funded by the Australian Department of Education and service provided by Scope

Global Pty Ltd. I am grateful for their generous financial support and the monitoring of my academic progress and general wellbeing. Also, I would like to thank you for UNE Higher Degree Research team for funding me with PhD completion scholarship at the final stage of my project and granting me the K&D Mackay Scholarship to travel to the USA for the 20th Annual Conference on Global Economic Analysis.

Thank you very much UNE Business School administrative staff for generously providing me your support whenever it was necessary. To Richard Benjamin, physically remote but dependably contactable online; thank you for your faithful application of your editorial and proof-reading skills which have enabled my chapters to serve a wider audience.

Two further groups have contributed enormously to this thesis; my friends and family. When I arrived to embark on a PhD, I had no idea of the meaningful level of support, loving care, and wholesome fun that was awaiting me. Thank you girls!!

How can one adequately thank one's parents? Mine, Sujatha and Lionel Perera, have devoted incalculable inspiration, encouragement, and commitment to support my academic ambitions and assist in the realization of my dreams throughout my life, together with my two beautiful sisters, Dev and Cham, with whom I enjoy the privilege of being able to share my feelings. Last, though far from least, must go a huge thank you to my lovely boyfriend, Nay, for his unconditional flow of emotional support, patient commitment and, most importantly, his willingness to be there for me throughout this academic endeavour. Thank you!!

Table of contents

List of figures

List of tables

Chapter 1. Introduction

1.1. Trade facilitation and the South Asian economy

South Asia, comprising the nations of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka, is the world's second-fastest region of economic growth and transformation, based on the impressive growth rate of 7% in real regional Gross Domestic Product (GDP) recorded in 2016 (World Bank, 2017a). India, rated as the world's second-largest emerging economy dominates the regional economy, contributing the largest proportion of land area (62%), population (75%) and real GDP (83%). In comparison, the GDP shares of the next largest regional economies, Pakistan and Bangladesh, constitute 7.6% and 5.6% respectively (World Bank, 2017). While trade has escalated rapidly, the region displays a growing economic diversity, reflected in the widening of the gap between the leading and lagging regional economies since 2007 (World Economic Forum, 2016). The lagging regional sector remains rural, relying on low-value activities and lacks economic integration, both regionally and globally. The widening socio-economic inequality, underscored by persisting poverty, presents a massive challenge to the region. The regional population count of those living on an average income of $1.90 per day is approaching 250 million (World Bank, 2013).

South Asia faces enormous developmental challenges and the economic imbalance hinders regional economic development severely. The major development challenges are the need to accelerate overall regional economic development in relation to the socio-economic structures of the past and the need for the smaller economies to match the level of growth of the larger economies (Ahmed, Kelegama, & Ghani, 2010). While economic development through expansion of trade is one of the surest methods of poverty alleviation, the trend in South Asia's external trade performance suggests it is still insufficient to reduce the poverty rate. World Bank (2017a) statistics indicate that the total exports of Europe and Central Asia account for more than 30% of GDP in those regions, demonstrating that trade is the key to economic growth, whereas South Asian exports only contribute about 10% of regional GDP.

South Asia is the least integrated global region in terms of trade and investment which is a critical issue for sustained economic development and poverty reduction. South Asian intra-regional trade comprises only 5% of total trade, while in Europe and East Asia it accounts for 60% and 35%, respectively (World Bank, 2017a). The region's main export destinations are

high-income markets. However, regional exports are limited to a few labour-intensive commodities such as Textile and Wearing Apparel (T&W), while imports include capital-intensive intermediate products. The USA and EU are the leading export markets for the four largest economies of South Asia: India, Pakistan, Bangladesh, and Sri Lanka. This has two negative consequences. Firstly, trade outside the region increases transportation costs, and secondly, the region has a greater vulnerability to global economic recessions since the regional income largely depends on the economic prosperity of these developed countries. World Bank (2017a) indicates that a 1% GDP growth in the US and EU, is followed by a South Asian response of about 0.5% in the following quarter. Perhaps, the most depressing reality of regional trade is that developed countries invest in the labour intensive industries of South Asia to gain a comparative advantage from the use of abundant labour, making the South Asian labour force vulnerable to global economic shocks.

World Bank (2007) emphasized that South Asia's true trade growth potential has not been realized, due to the lack of market integration within and between countries, as a result of excessive trade costs. Despite the gradual elimination of import tariffs and other non-tariff barriers, international trade remains ineffective due to unnecessarily high trade costs, one of the major determinants of global trade participation in South Asia. High trade costs due to poor Trade Facilitation (TF) prevents connectivity between countries and is a fundamental impediment to regional trade growth. World Bank (2017b) shows that Indian-Brazilian bilateral trade is 20% less costly than Indian-Pakistani trade. Arvis, Duval, Shepherd, Utoktham, and Raj (2016), pointed out that it was less expensive to ship goods via Singapore than trade directly between two points in South Asia. While elsewhere intra-regional trade costs less than extra-regional, in South Asia these costs are approximately equal. Arvis et al. (2016) further revealed that trade costs in the South Asian Manufacturing sector amount to 116% of Ad valorem equivalents (AVEs), and 195% of AVEs in the Agricultural sector. Ahmed and Ghani (2008) demonstrated that the trans-border trading costs of India and Bangladesh are nearly double those of China, while for Afghanistan, Bhutan, and Nepal the costs are treble.

Trade delays, often unforeseen, are one of the major drivers of increases in trade costs in South Asia and are a critical factor in global trade competitiveness. Delayed deliveries reduce competitiveness and diminish product values by adding unnecessary trade costs. This becomes more critical in the trading of perishables and other time-sensitive goods. Arnold (2007) asserted that trade competitiveness is dependent, not only on actual product costs and quality

but on time between ordering and receiving, as well as reliability in fulfilling agreed upon delivery times. Exporters understand that the time factor is crucial for maintaining business competitiveness and attempt to deliver the product on time at the costs of maintaining buffer stocks and additional inventories. These costs would equal or exceed the export and import taxes (Freund & Rocha, 2011; Hausman, Lee, & Subramanian, 2013). This may lead exporters to reduce shipment volumes, limit distant export markets, or opt for quicker, but more costly, airfreight.

Trade delays impact not only on trade volume but also on domestic production which is dependent on specific imported parts and components for manufacturing. Supply chain interdependency has developed globally and, hence, delivery delays of imported parts and components equally impede the production cycle. The trade costs are multiplied when parts and components transfer through the global supply chain. The development of segmented production chains renders the temporal element more crucial than in the past; all supply chain disruptions have a negative economic impact (Zaki, 2014). There is a continuous trend to tighten delivery times and increase penalties for missed delivery dates at each level of the supply chain.

Thus, time delay costs can readily exceed those of other tariff and non-tariff barriers in developing countries such as those of South Asia. Trade delays, due to poor TF, impact negatively on trade volumes of both exports and imports but reducing international trade increases unemployment, by restricting the development of a complete supply chain. Further, poor TF systems reduce government revenue received from trade taxes and other trade- related services. Consumers face higher prices and producers suffer in terms of the reduced comparative advantage. Overall, the economy experiences a declining or even negative growth, preserving or enhancing the level of poverty.

Therefore, maintaining minimum trade costs by reducing trade delays is important for South Asian trade growth and levels of competitiveness. TF has proved to be one of the most effective methods of reducing trade costs, enabling countries to participate more competitively in global trade. The objective of TF is to lower trade costs by simplifying border transaction procedures (OECD, 2018). According to the World Trade Organization (WTO), TF refers to the simplification and harmonization of export and import processes. This includes reducing documentation, modernising trade procedures, and harmonizing customs requirements to decrease the time and costs involved in exporting and importing (WTO, 2015). Reducing trans-

border expenses increases returns through faster deliveries and lower costs. Consumers benefit from lower prices, as well as a wider and more diverse range of higher quality goods available timeously on the market. Thus, TF is crucial for enhancing economic growth, both domestically and regionally, promoting connectivity between countries and bridging the gap between leading and lagging economies and considered a second-generation trade issue in South Asia (Ghani & Din, 2006; Otsuki, Honda, & Wilson, 2013; Wilson & Otsuki, 2007). In ratifying the Trade Facilitation Agreement (TFA), WTO member states acknowledged the importance of improving TF in economic development. The TFA includes the necessary provisions that implemented will lead to improved TF and increased border transaction efficiency and there are measures are demanding closer cooperation between customs and other relevant authorities on customs compliance issues, both internally in the one country and externally with the neighbouring country or trading partner. The Agreement is expected to improve efficiency and increase the transparency of trade transaction procedures, strengthening the capacity to participate in global value chains, and reduce trade costs and delays (WTO, 2015). A full, successful implementation of the Agreement offers greater economic benefits to developing countries, making it critical for the South Asian region where economies are weighed down by the costs of poor TF. The Agreement was implemented in early 2017 and South Asian members committed to its provisions. Almost one and a half years after the actual implementation date, it is important to evaluate its economic implications for the South Asian region.

The implementation of the TFA measures involves a substantial outlay beyond the normal budgetary means of most South Asian members and the potential net benefits dependent on the amount of investment required to cover the implementation. The initial and operational costs of implementing TF reforms are relatively more burdensome for developing countries. These costs may involve improvements to infrastructure such as roads and ports, as well as purchasing equipment and upgrading Information and Communication Technology (ICT) to introduce the automated systems required by the provisions to improve transaction times.

1.2. Aims and objectives

This study investigates the economic impacts of TF on South Asian national economies and provides a comprehensive evaluation of the TFA in relation to the South Asian region. Approaches to minimizing trade delays through trade cost reductions are identified. The results of this analysis will provide decision makers with options for improving TF, as well as

providing a platform to explore in greater detail the methodological approaches for developing effective TF policy options in future research.

The main objective of this study is:

To assess the economic impacts of TF on reducing trade costs through faster border transactions and to identify strategies to enhance South Asian trade to mitigate persisting development challenges.

The specific objectives are:

1. To conduct a desk research to understand the current TF status and examine how TF affects trade, economic development, and poverty in South Asia.

2. To review and critique TF related studies, focussing on the techniques employed to estimate trade costs and delays and the methodological approaches used to assess the economic impacts.

3. To assess the impact of regional commitment to trade delay reductions and further tariff removals on economic development and compare the effects of possible trade liberalization policies with TF policies in South Asia.

4. To estimate the economic impact of the WTO Trade Facilitation Agreement (TFA) on South Asian economies.

5. To investigate the cost implications of implementing the TFA measures in South Asia.

6. To provide policy options to reduce trade delays through improved TF in South Asia with the concluding remarks highlighting further research needs and priorities.

1.3. Research context and significance

Trade delays and costs associated with TF are critical determinants of international trade competitiveness, global value chain integration, and regional economic development. Therefore, an estimation of the potential economic benefits of improving border transaction efficiency in South Asia is vital. South Asia, as a partially integrated developing region, has

poor TF regarding border transactions which results in higher trade costs and delays than other developing regions. In theory, the reduction of trade costs and delays increase trade volume and, consequently, national income and economic growth. Therefore, it is fundamental to gain an understanding of TF status within South Asia. The second chapter provides a qualitative assessment of the TF impacts on trade, economic development, and socio-economic inequality in South Asia while compiling up-to-date information on TF performances and reforms. The findings of this chapter reveal that South Asian traders are largely concerned about the impacts of border transaction delays which increase trade costs and reduce border transaction efficiency. Given the importance of these findings, the economic impacts of trade delays in South Asia are investigated.

Trade delays can affect domestic trade volumes and economic growth, the trade volume of trading partners, and due to supply chain linkages, inter-sectoral growth. A number of studies have attempted to estimate the impact of trade delay costs using the partial equilibrium gravity model and the general equilibrium Global Trade Analysis Project (GTAP) model. The former provides sufficient evidence of the contemporary relationship between trade delays and trade flows. The latter model has not been adequately applied to estimations of the economic impact of trade delays in South Asia. The broad South Asian regional economy-wide impacts of trade delay costs induced by poor TF remain unquantified. The lack of research on analysing economy-wide impacts of trade delays is due to the complexity of measuring trade delay costs, as well as the lack of data, and a standard methodological approach to estimate these impacts accurately. However, cross-country, cross-sector assessment is essential to determine the overall economic impact. This study identified the need for an estimation of the economic benefits of TF based on the Computable General Equilibrium (CGE) framework. For this purpose, the GTAP model was chosen since it facilitates the examination of trade-related impacts in a multi-regional and multi-sectoral framework. The GTAP model is also able to capture the TF-related economic interactions among different sectors and regions at the global level.

The incorporation of trade delay costs and associated economic behaviour into the GTAP model is a complex process due to the lack of data and a proper method. The literature reviewed in the study expounds the existing methodological approaches to estimating trade delay costs and the resulting economy-wide impacts. Such a review has not previously been undertaken and thus fills an information gap. The third chapter therefore, reviews and critiques TF-related

CGE studies, focussing on the techniques employed to estimate trade delay costs and the methodological approaches used to assess the economic impacts within the CGE framework, as well as highlighting future research needs.

The fourth chapter use the Ad Valorem Equivalents (AVEs) of time in trade database in the GTAP framework to estimate the economy-wide impacts of trade delays in South Asia, making a threefold original contribution to trade and economic development literature. Firstly, the GTAP model and the AVEs of time in trade database, which comprises per day AVEs for each commodity in each country, have not previously been used to quantify the economy-wide impacts of trade delays in South Asia is unprecedented. This three-dimensional database covers AVEs of time in trade for the exports of each GTAP sector (57 commodities) from 140 countries to the same 140 importing countries. The use of this type of database, together with the main GTAP database, involves a substantial number of technical procedures and offers a valuable ancillary to the GTAP model, as the disaggregated simulations of trade delay reductions facilitate the capture of the overall effects. Secondly, the chapter estimates the impacts of timeliness on South Asian border transactions for separate stages of the process; namely inland transport, customs operations, and port and terminal handling. This facilitates the identification of the stages that take longer and, consequently, affect trade more adversely. This type of analysis supports the prioritization of TF policy creation to accelerate and simplify border transactions, which has not occurred previously in South Asia. Thirdly, the two major time costs databases evident in the literature are compared to evaluate the benefits and limitations of each time costs estimation procedure. Finally, this chapter draws attention to the critical need for TF improvements in South Asia, based on findings that a reduction of trade delays can increase trade volumes and deliver significant welfare improvements. The findings of this chapter, thus, provide a platform for exploring more effective TF policy options and in its examination of the economic impacts of WTO TFA in the South Asian context, qualifies as a valuable addition to the body of literature.

The lack of empirical research on the actual economic impacts of the TFA in South Asia is highlighted in the fifth chapter. The TFA is critical for the region with its composition of developing and least developing economies, together with border trade transaction performances that rate among the weakest globally. A successful implementation of the TFA offers the region positive economic gains. As the literature emphasizes, as much as two-thirds of the global TFA benefits can be acquired by developing and least developing countries. The

empirical contribution of the fifth chapter to the literature is therefore threefold. In order to estimate the economic impacts of the TFA, the relationships between TFA policy measures and its outcomes are initially identified. Elasticities which explain the magnitude of the improvement of TF due to changes in border policies are estimated. These elasticities are original in that there is no literary precedent in the use of updated TF indicators and time to trade data to measure actual current impacts of the TFA on South Asian economies, almost one and half years after the actual implementation date. Secondly, previous TFA-related studies have considered the performances of countries as income-based country groups. In this chapter, South Asia is disaggregated into the individual component nations, while the rest of the world has been aggregated according to income levels. This facilitates the observation of the TFA impacts specifically for South Asia, while making a comparison with the rest of the world. Thirdly, the chapter presents the first realistic simulation using the actual current implementation rates to date, as reported by South Asian members and the rest of the world, which has no precedent in the assessment of the TFA impacts for any single country. Thus, the methodology of the study provides a motivation for further research in assessing the TFA impacts in other developing countries. The simulation results of this chapter illustrate the gains made, to date, in South Asian economies since the enforcement of the TFA provisions, although the potential net benefits of the Agreement depend on the level of investment necessary to cover the capital and operational costs of a full TFA implementation. This identifies the need for further research examining the costs of TFA implementation, to which the sixth chapter is dedicated.

There is a lack of related evidence on which to produce a quantitative assessment of the potential overall costs of TF reforms. This is no easy task given the complexity of differentiating the costs of TF measures, taking into account regional economic diversity and the required level of change in the implementation program of each constituent country. In the sixth chapter, the cost implications of implementing the TFA measures in South Asia are investigated. The original contribution of this chapter is threefold. Firstly, an evaluation of the costs of TFA measures, together with an estimation of its economic benefits based on the GTAP model, has not previously been conducted. Secondly, the study introduces a simple, straightforward method for identifying the economy-wide costs of the TFA within GTAP framework, which has also not previously been executed. Thirdly, as no properly-compiled information on TFA implementation progress exists regarding benefits, costs, and challenges in the South Asian context, the findings of this study are useful for policy-makers in structuring

and prioritizing reforms to optimize the benefits of TF improvements. Finally, the study concludes by providing guidance for policymakers on which to base TF reforms in South Asia, in order to enhance trade and accelerate regional economic growth, as well as highlighting the need for further research on extending the GTAP model and the TF database to fill the theoretical gaps identified in this study.

1.4. Overview of the thesis

This thesis is structured into five research chapters, each chapter having been originally presented as an independent paper for journal submission. The papers have been arranged progressively as chapters 2-6 to research the impacts of TF on the South Asian region and its national economies. This research makes significant empirical and theoretical contributions to the literature. It should be noted that while an effort has been made to minimize repetitive content arising from the standalone requirements of the individual papers, particularly in chapters 2, 3 and 4, it was impossible to remove all repetition from the descriptive and methodological sections, without compromising the integrity of the individual chapters.

Chapter 2: A preliminary overview of the status of South Asian national economies was conducted, illustrating the potential contribution that TF can make to economic development and how this can be achieved in the context of South Asia, where trade levels have yet to fully contribute to economic growth. The findings of desk research conducted into the economic impacts of TF on trade and economic growth in South Asia based reveal that poor TF has restricted trade between regional nations as it has instituted unacceptable delays and hence, a burden of unnecessary costs.

Chapter 3: TF-related CGE studies reviewed placed the focus on the techniques employed to estimate trade delay costs and the methodological approaches used to assess the economic impacts within the CGE framework. The literature survey revealed that two methods have generally been employed in order to incorporate trade delay costs into CGE models which produced variations in their results, when estimating shortfalls. The review further revealed that the economy-wide impacts of South Asian trade delays remain unquantified and demand a comprehensive cross-country, cross-sector assessment.

Chapter 4: The Global Trade Analysis Project (GTAP) model is employed to assess the economic benefits of regional commitment to trade delay reductions, using a scenario analysis

to investigate the effects of trade delay reductions and tariff removal by means of a comparison of TF and trade liberalization policies. The findings of this chapter highlight the need to investigate the most effective TF policy options to enhance trade in the region, while providing evidence of potential benefits of reductions in trade delays.

Chapter 5: The economic impacts of WTO TFA on South Asian economies are estimated using a two-step methodology. In the first step, an econometric model is employed to estimate the elasticities to find the relationship between the TFA policy variables and the implementation outcomes. In the second step, the estimated elasticities are incorporated into the GTAP model to assess the overall economic impacts of the Agreement. The results of this chapter indicate that South Asia has already gained from the TFA, although the net benefits of the Agreement will depend on the amount of investment necessary to cover the costs of TFA implementation.

Chapter 6: The potential costs and challenges of TF reforms are estimated and the conclusion confirms that the financial costs of the TF reforms will not significantly impede the attainment of the benefits of the Agreement for South Asian members. However, South Asia needs greater technical and capacity building support to identify areas requiring improvement and to develop strategic plans for introducing, maintaining, and sustaining these reforms.

Chapter 7: The main findings of the thesis are presented and guidelines offered for continuing the implementation of TF reforms in the region. The study limitations are identified and discussed, together with recommendations for future research based on the potential for extending the GTAP model and associated database, to incorporate TF policies and derive more accurate outcomes.

References

Ahmed, S., & Ghani, E. (2008) Making regional cooperation work for South Asia's poor. *Policy Research Working Paper No. WPS4736*. Washington, DC: World Bank.

Ahmed, S., Kelegama, S., & Ghani, E. (2010). *Promoting Economic Cooperation in South Asia: Beyond SAFTA*. New Delhi, India: SAGE Publications.

Arnold, J. (2007). The role of trade facilitation in export growth. In S. Ahmed & E. Ghani (Eds.), *South Asia growth and regional integration* (pp. 191-235). Washington, DC: World Bank.

Arvis, J.-F., Duval, Y., Shepherd, B., Utoktham, C., & Raj, A. (2016). Trade costs in the developing world: 1996–2010. *World Trade Review, 15*(3), 451-474. doi:https://doi.org/10.1017/S147474561500052X

Freund, C., & Rocha, N. (2011). What constrains Africa's exports? *The World Bank Economic Review, 25*(3), 361-386. doi:http://documents.worldbank.org/curated/en/791201468193750831/What-constrains-Africas-exports

Ghani, E., & Din, M., UD. (2006) Regional trade integration in South Asia: rationale, impediments and the way forward. *ART-NeT Policy Brief, No 7*. Bangkok: Asia Pacific Research and Training Network on Trade (ESCAP).

Hausman, W. H., Lee, H. L., & Subramanian, U. (2013). The impact of logistics performance on trade. *Production and Operations Management, 22*(2), 236-252. doi:https://doi.org/10.1111/j.1937-5956.2011.01312.x

OECD. (2018). *Trade Facilitation and the Global Economy*. OECD Publishing, doi: http://dx.doi.org/10.1787/9789264277571-en.

Otsuki, T., Honda, K., & Wilson, J. (2013). Trade facilitation in South Asia. *South Asian Journal of Global Business Research, Vol. 2,* (No. 2), pp. 172-190. doi:https://doi.org/10.1108/SAJGBR-12-2011-0052

Wilson, J., & Otsuki, T. (2007) Regional integration in South Asia: what role for trade facilitation? *Policy Research Working Paper-WPS 4423*. Washington, DC: World Bank.

World Bank. (2007). *South Asia growth and regional integration*. Washington, DC: World Bank.

World Bank. (2013). The World Developement Indicators World Bank: http://data.worldbank.org/indicator.

World Bank. (2017). The World Developement Indicators World Bank: http://data.worldbank.org/indicator.

World Bank. (2017a). Globalization backlash: *South Asia economic focus spring 2017*. Washington, DC: World Bank.

World Bank. (2017b). The potential of Intra-regional trade for South Asia. World Bank: http://www.worldbank.org/en/news/infographic/2016/05/24/the-potential-of-intra-regional-trade-for-south-asia.

World Economic Forum. (2016). The global competitiveness report 2016–2017. World Economic Forum: http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf.

WTO. (2015) Speeding up trade: benefits and challenges of implementing the WTO Trade Facilitation Agreement. *World Trade Report - 2015*: World Trade Organisation: https://www.wto.org/english/res_e/booksp_e/world_trade_report15_e.pdf.

Zaki, C. (2014). An empirical assessment of the trade facilitation initiative: econometric evidence and global economic effects. *World Trade Review, 13: 1, 103–130*. doi:https://doi.org/10.1017/S1474745613000256

Chapter 2. Trade facilitation, economic development and poverty alleviation: South Asia at a glance [1]

Abstract

South Asia faces enormous economic challenges unmitigated by generally poor economic growth. Increasing economic imbalance between countries hinders regional development. Recently, it has been confirmed that trade liberalisation aimed at expanding trade, has been insufficient in optimising the potential contribution of trade to economic development and reduce poverty. Thus, economists pay attention on Trade Facilitation (TF) which has the potential to contribute to economic development. This has motivated us to examine how TF can achieve this development in South Asia, where trade has yet to make its full contribution to economic growth. The aim of this chapter is to examine the economic impacts of TF on trade and economic growth in South Asia. Our analysis revealed that poor TF restricts trade between countries as it increases Trade Transaction Costs (TTCs). Trade delays are relatively high and affect the region's landlocked countries even more adversely. An efficiently facilitated trading system will enable these countries to participate more actively in global trade. There has been greater focus on TF policies in South Asia, however due to the complexity of TF measures and their investment needs, it is difficult to identify which TF measures have the most significance for the region.

Keywords: trade facilitation, trade transaction costs, economic growth, poverty, South Asia

[1] Perera, S., Siriwardana, M., & Mounter, S. (2017). Trade facilitation, economic development and poverty alleviation: South Asia at a glance. In G. I. Staicu (Ed.), *Poverty, Inequality and Policy*. Rijwka, Croatia: InTech, doi:10.5772/intechopen.69948.

2.1. Introduction

South Asia, as the world's second fastest growing region, demonstrates impressive economic growth and trade is escalating rapidly. The trade and economic growth of the emerging economy of India has contributed immensely to overall regional growth. However, persisting poverty and widening socio-economic inequality presents a massive challenge to the region and the majority of South Asia's poor live in India, despite the nation's impressive economic growth. In effect, researchers have identified that South Asia comprises two economic regions, one leading and one lagging. India has the largest economy, significantly larger than its neighbours in terms of size and growth. By contrast, the landlocked countries in the region display the lowest per capita income and consequently face greater economic challenges. While economic development through expansion of trade is one of the major steps towards poverty alleviation, the trend of South Asia's external trade reflects weaker performance. The region remains one of the least integrated in the world and intra-regional trade is fairly limited, in comparison with trade with external trading partners, although exports are limited to a few commodities. Small and medium enterprises (SMEs) face challenges in competing in foreign markets. However, most tariff and non-tariff impediments to trade have been substantially reduced. Facilitating trade has been recognised as an important policy option for economic growth and poverty alleviation in developing countries and Trade Facilitation (TF) is now considered a second-generation trade issue in South Asia which limits trade growth. Trade economists now focus on addressing the TF, since its potential impacts on economic development are significant.

The main purpose of this chapter is to examine the economic impacts of TF on trade flows and economic growth in South Asia. A desk research comprising two analytical approaches was conducted to meet the objectives of the chapter. Based on current statistics collected from online databases, the relationships between TF and economic growth are analysed. Thereafter, a discussion follows on the impact of TF on economic development based on existing quantitative estimations and the implementation programmes applied in the South Asian region.

The chapter reveals that the major TF issues and bottlenecks in South Asia are insufficient customs procedures and port handling, massive documentation requirements, limited use of information technology, transit barriers in landlocked countries and poor logistics. These have

led to massive trade delays and high transaction costs in South Asia. Hence, traders are facing challenges in competing in international markets, resulting in fragile trade growth. The study reveals that poor TF affects trade and economic development in South Asia. Consequently, the region is still home to a very large number of poor, and most of the benefits of economic growth favour the relatively fewer wealthy households, further increasing regional disparities. The chapter highlights that South Asia needs to stimulate further growth in trade in order to strengthen regional integration and economic development in regional economies. TF is one of the keys to improve regional trade.

The chapter consists of five main sections. In Section 2, the concept and principles of TF and its benefits are discussed. The impact of TF on economic growth is analysed using secondary data and existing literature in Section 3. Section 4 provides an overview of TF implementation programmes in South Asia followed by concluding remarks in Section 5.

2.2. The concept of Trade Facilitation: principles and benefits

2.2.1. What is Trade Facilitation?

There is no firm definition for the term TF. It includes a range of interrelated factors. Therefore, there are different definitions that have been used to approach TF. In the literature, the term tends to be used to refer to issues of trade at the border and/or procedures behind the border, that is, the term TF has been applied to issues that arise when goods and services are moving across borders (narrow focus) and/or within the entire supply chain (wider focus).

During the Singapore ministerial declaration in 1996, factors relating to TF were added to the World Trade Organization (WTO) mandate. According to the WTO, a basic definition of TF refers to the simplification and harmonisation of export and import processes. This includes simplifying documentation, modernising procedures and harmonising customs requirements to reduce the costs and time involved in exports and imports. The WTO further qualified TF as the means of expediting the movement, release and clearance of goods including goods in transit (WTO, 2015). ICC (2007) emphasises that TF is a way of improving efficiency of the processes associated with the trading of goods across national borders. ICC highlighted that TF is not just a matter of improving customs procedures but should also target the efficiency of a growing range of controls implemented at national borders by other authorities. However,

Arnold (2007) argues that improvements in transport and communication services and the advanced use of technology to monitor product flows and supply chain integration constitute additional factors. Portugal-Perez and Wilson (2012) considered TF as a two dimensional: a 'hard' dimension related to tangible infrastructure such as roads, ports, highways and telecommunications and a 'soft' dimension related to transparency, customs management, the business environment and other intangible institutional aspects. Focussing on a basic definition, Persson (2013) states that TF makes it easier for traders to move goods across borders by making cumbersome cross-border trade procedures more efficient. According to this definition, cross-border activities should be undertaken within the shortest time at the minimum costs. This may include both indirect costs (trade delays) and direct monitory costs. Zaki (2014) described TF as a process that encompasses various aspects and deals with a wide range of issues, which is summarised as follows:

i. Simplification of trade procedures and documentation
ii. Harmonisation of trade practices and rules
iii. More transparent information and procedures of international flows
iv. Recourse to new technologies promoting international trade
v. More secure means of payment for international commerce (more reliable and quicker).

Whichever elements are used to define TF, the main focus of TF is to minimise Trade Transaction Costs (TTCs) in the movement of imports and exports. However, complexities of this type of trade barriers and the absences of a precise definition hinder proper quantification of their benefits and the identification of the related steps to lower TTCs (Otsuki, 2011).

2.2.1.1 Trade Transaction Costs

The broad definition of TTCs includes all costs incurred in obtaining a good to a final consumer, excluding production costs. These are transportation costs (both freight costs and time costs), policy barriers (tariffs and non-tariff barriers), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs and local distribution costs (wholesale and retail) (Anderson & Wincoop, 2004). TTCs are generally reported in terms of their Ad-Valorem equivalents (AVEs).

For a number of reasons, TTCs may increase at border crossings. TTCs related to border procedures vary depending on the efficiency and integrity of interacting businesses and administrations, type of goods and size and type of business (OECD, 2003). Shepherd (2009) indicates that TTCs arise from many sources. Some of these may be described as 'natural' in the sense that they reflect inherent factors such as geographical distance or linguistic and cultural differences. Thus, TTCs include both direct and indirect costs. Figure 2.1 describes the elements of TTC, including these direct and indirect costs.

Direct TTCs include charges that are directly applied to trade transactions (Figure 2.1), such as collecting information, costs of providing necessary documentation, charges for logistic services, charges for customs brokers and the customs clearance fees or charges for outsourcing to service providers. Direct TTCs also include charges for trade-related services, such as supporting services (cross-border banking, international transportation, trade insurance, cargo handling and port management) (OECD, 2002). These charges depend on the complexity of market access regulations such as licensing, pricing regulations, competition regulations and infrastructure access regulations. They are measurable in monetary terms and TF improvements can lower such costs.

Indirect costs arise from procedural delays at borders and are difficult to estimate in monitory terms, since they involve transaction time and the unforeseen costs of such time. Hummels and Schaur (2013) stated that time costs include the cost of market depreciation due to delayed deliveries and additional inventories to traders, in order to maintain buffer stocks to avoid inconsistent border clearance time. They argue that excessive shipping time causes increased time costs, which may include spoilage in the case of fresh produce (agricultural products), and rapid technological obsolescence for goods such as consumer electronics (consumers place a high value on purchasing the latest innovations). Therefore, market depreciation, or deterioration of the value of the goods, occurs from delays in deliveries. Additional inventories may be necessary to avoid volatile demand or uncertain supply. This may lead to forgone cash flows and extra costs for storage.

The characteristics of direct and indirect cost components represent the 'iceberg' nature of TTCs. The direct costs are the tip of the iceberg. However, the larger part of the berg is under the waterline and unobservable, representing the indirect cost component. Thus, a large part of the value of traded goods melts away, when they are in transit for a long time as most of the researchers have found that the indirect costs component has a greater impact than direct costs.

Zaki (2014) defined iceberg costs as the costs of transporting goods that take up some fraction of the actual value of the goods. Thus, the iceberg tariff implies that a fraction of the goods melts when a tariff is imposed. These costs are passed on to the end consumers or taxpayers since the effective price of the imported goods is increased. Thus, some studies argue that increases in TTCs due to delays are comparable to taxes on trading. Further, TTCs in landlocked countries are very high because these countries have to bare the additional costs due to more complicated transit procedures.

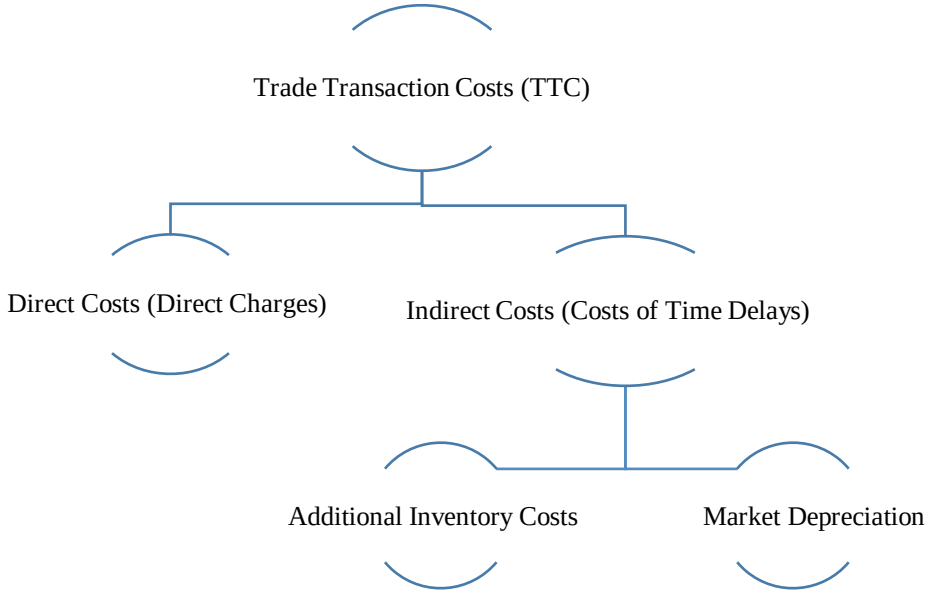


Figure 2.1: Elements of trade transaction cost

In economics analysis, TTCs are considered as AVEs, comprising a percentage of the total value of the traded commodity. Engman (2009) states that there are two categories of effect of AVEs, price effects and efficiency effects. Price effects comprise both direct costs such as customs fees, port handling fees and indirect effects such as delays and unreliability of border transactions due to insufficient TF. The price effect increases the price of traded product and may affect domestic production. Efficiency effects occur due to distortions in the allocation of resources in the economy. Both price and efficiency effects diminish economic welfare in importing and exporting countries.

2.2.2. Trade Facilitation in international trade theory

The theory of TF has been developed gradually. Theories of the impact of TF in international trade are expressed in two structural frameworks: the partial equilibrium framework and the

general equilibrium framework. The TF-related partial equilibrium models are based on the demand and supply theory. However, TF initiatives are highly correlated with economic movements between countries that are linked through international trade. This has led to the development of general equilibrium theoretical frameworks to illustrate the concept of TF in international trade.

2.2.2.1 The theory of 'iceberg'

Consideration of the effects of TF in trade theory began with the development of 'iceberg' method (Samuelson, 1954). Samuelson used this concept to model explicitly transportation costs, in order to analyse the possible effects of transport impediments on trade. Later studies have used the iceberg method to analyse the impacts of trade costs which arise due to insufficient trade procedures (poor TF), using partial equilibrium models as well as general equilibrium models. The following theoretical explanation is based on the WTO (2015).

2.2.2.1.1. The iceberg approach in the partial equilibrium model

This section provides a graphical illustration of the iceberg method and the impact of trade costs on an imported good using the partial equilibrium framework.

Inefficient trade procedures lead to increased TTCs. This could generate a wedge between the producer price and the price paid by consumers, leading to a pure deadweight loss. Samuelson (1954) described this, assuming an iceberg where only a fraction of ice exported reaches its destination as unmelted ice. Figure 2.2 illustrates the demand and supply price of an imported good, assuming that the good is not produced domestically. If D is the import demand and S is the export supply, consumers pay the price P_d^* and exporters receive the price P_s^*, and the quantity imported is Q^0 due to high trade costs at the initial level. However, with TF improvements (assuming TTCs are reduced to zero), the price wedge (P_d^*-P_s^*) slowly reduces and the system adjusts to the equilibrium at the price P* and the quantity imported rises from Q^0 to Q^*. As a results, terms of trade increase in both countries and increase consumer surpluses (a+b) and producer surpluses (d+c).

2.2.2.1.2. The iceberg approach in general equilibrium models

The theoretical developments of the effects of TF in a general equilibrium framework can be discussed in terms of both classical trade and new trade theory. The classical trade theory

consists of the Ricardian model and the Heckscher-Ohlin model. These two models explain that countries produce goods having comparative advantage due to relative productivity differences (comparative technological advances) or endowments of factors of production (use abundant factors of production more intensively), respectively. However, these two models provide similar explanations regarding the impact of TTCs, illustrating that insufficient TF reduces the price wedge between the domestic and the world market price when a country opens to trading.

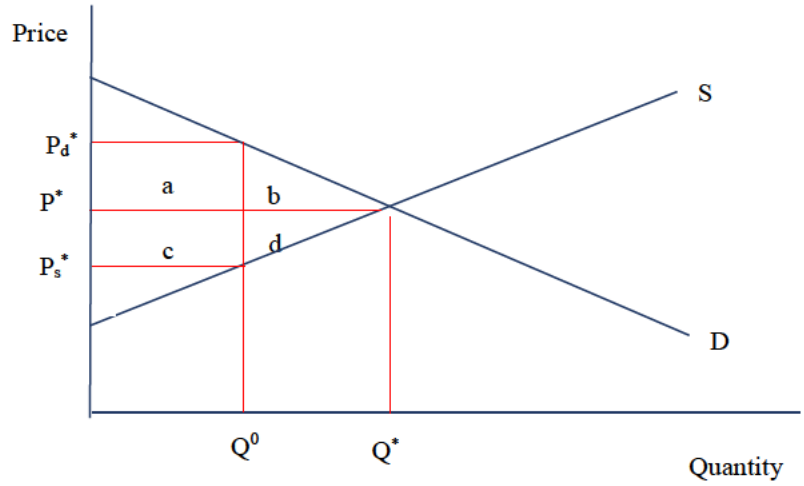


Figure 2.2: The "Iceberg" effects in the partial equilibrium framework
Source: WTO (2015)

In the Ricardian model, if countries do not trade with each other (in autarky), the relative price of one good expressed in terms of the other good differs between them. This motivates the enhancement of bilateral trade, as the world market price exceeds the domestic prices due to the specialised production of the good that has comparative advantage. However, TTCs due to insufficient TF lower the difference between the relative prices faced by both trading partners and the international price moves closer to the autarky price, leading to reduced trade and consumption, as well as economic welfare.

On the other hand, assuming similar productivity in both countries, the Heckscher-Ohlin model describes the differences in factor endowments. The model assumes that there are two factors in production, labour and capital. One country is labour abundant and the other capital abundant. The prices of two goods in two countries differ in autarky due to different factor endowments. The labour-abundant country produces a labour-intensive good with a domestic price lower than the foreign price. Conversely, the capital-abundant country is able to produce

a capital-intensive good at a lower price compared to the foreign country. If the capital-abundant country and the labour-abundant country open to international trade, both can produce more of each good using the abundant factor and export. The labour-abundant country exports labour-intensive products and imports capital-intensive products from the capital-abundant country. The world market price is set between two autarky prices. With free bilateral trade, both countries gain due to comparative advantage. However, TTCs due to poor TF can reduce the gap between the autarky and world market price faced by two countries and this reduces the trade and consumption and economic welfare. The Heckscher-Ohlin model explains how TF improves the real income of the abundant factor of production. If a country is able to reduce TTCs, it can utilise the abundant factor more intensively, increasing the factor demand and thereby increasing the real return of that factor.

Classical trade theories explain inter-industry trade as described earlier. However, new trade theories examine why countries experience intra-industry trade. The new trade theory pioneered by Krugman (1979, 1980) is characterised by the nature of a firm's behaviour such as monopolistic competition, heterogeneous firms and global supply chain theories.

New trade theory explains that the trade costs can have a disproportionately adverse impact on developing countries. Developing countries produce more agricultural or natural resource-related goods with constant returns to scale and a small manufacturing sector. In contrast, developed countries have a large manufacturing sector, which operates under increasing returns to scale. Trade costs can reduce trade in both developed and developing countries, leading to a disproportionate reallocation of manufacturing goods to developed countries and agricultural and natural resources to developing countries. This highlights the importance of reducing trade costs in order to diversify trade in both developed and developing countries.

However, recent trade studies concern the differences of firms with respect to productivity, size of firms and participation in international trade (heterogeneous theory) (Bernard, Redding, & Schott, 2007; Melitz, 2003). According to this theory, only the most productive firms can enter into the export markets. There are two productivity thresholds: the minimum level required for a firm to survive and the level at which the firm can start exporting. The reduction of trade costs can lower the gap between these two threshold levels. This increases a range of firms that are excluded by the competition and range of firms entering into the export markets. As a result, resources are released from the less productive firms and reallocated to the most productive firms. The reduction of trade costs affects export markets positively in two ways. Exporters

can expand their volume of exports (intensive margin) and increase the entry of new firms into the export market (extensive margin).

Classical trade theory assumes that the final good is produced completely within the country, while supply chain models are concerned with trading intermediate goods. The final production of a good comprises the different types of parts and components traded. Thus, trade costs may accumulate through different stages of the value chain, as intermediate goods across borders. If trade costs are too high in the value chain, countries may be reluctant to trade intermediate goods and trade only final goods. This highlights the importance of improving TF in order to strengthen the global value chain, enabling countries to gain comparative advantage by specialising the stages of value chain.

2.2.3. Benefits of Trade Facilitation

Efficient TF measures can eliminate costs and reduce time needed for exporting and importing (TTCs). This is critical as trade costs can be as high as 134% ad valorem tariff on a product in high-income countries and a 219% tariff equivalent in developing countries (WTO, 2015). The benefits of improved TF from reduction of TTCs following trade expansion lead to economic development, with gains accruing at various stages of development process (Figure 2.3).

TF can be improved by lowering TTCs. In practice, improving TF encompasses many inter-related factors which effect the reduction in associated trade costs. For example, improved infrastructure related to transport, ports and customs, and more advanced use of information and communication technology (hard infrastructure) strengthen physical connectivity among countries and also regions within the country, facilitating trade expansion.

Alternatively, trade procedures involve collecting, presenting, communicating and processing data required in cross-border transactions. If these processes are subject to excessive documentation, physical inspections and bureaucratic requirements (red tape) at borders, processing costs and clearance times will increase, leading to increases of both direct and indirect TTCs. Thus, improving soft infrastructure is vital to eliminate TTCs in the accrual of TF benefits, while simplification and harmonisation of trade procedures enable traders to deal more easily with cross-border transactions. Subsequently, international trading systems become more transparent and reliable, with more efficient use of resources, which reduces smuggling and informal trade.

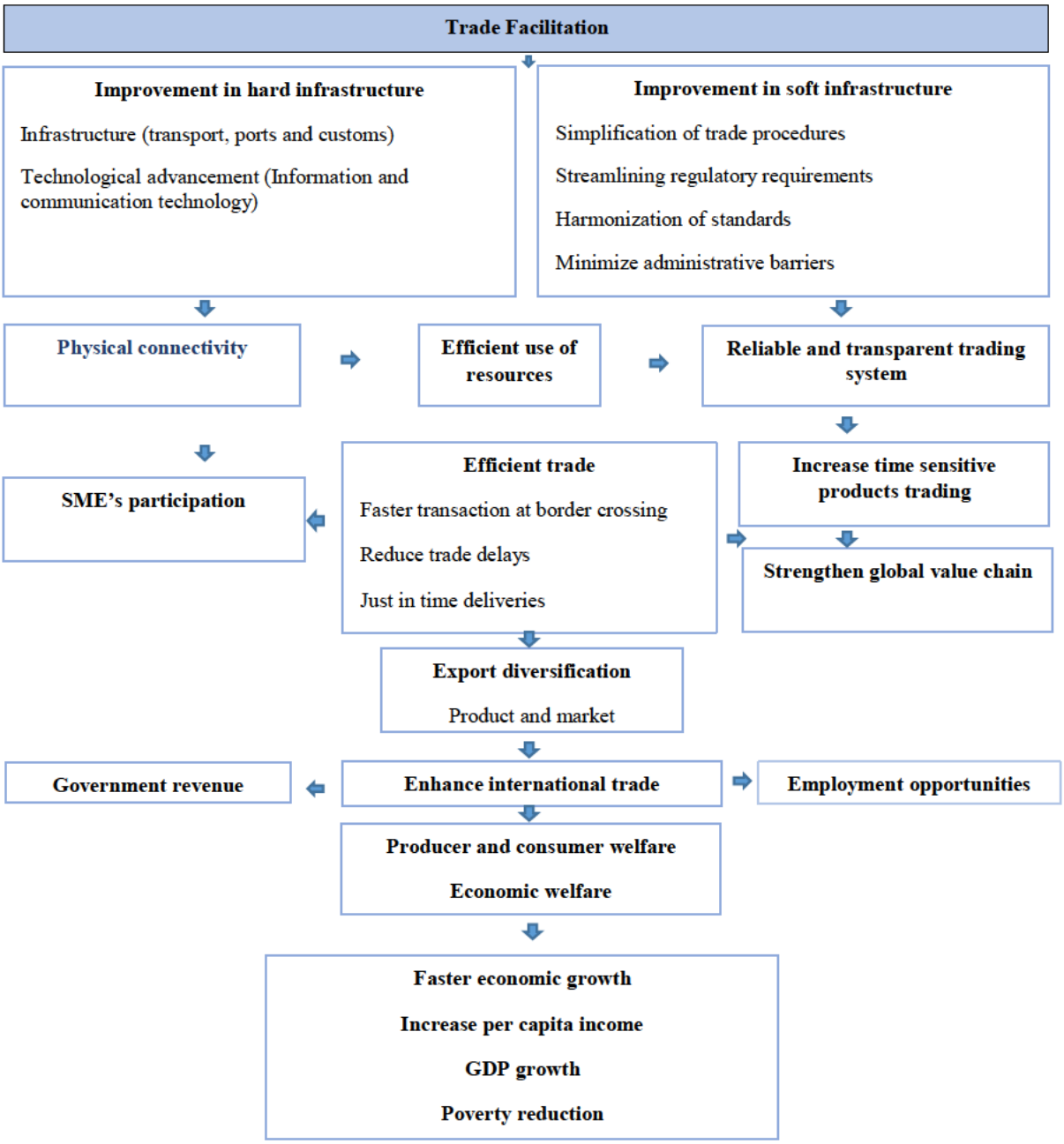


Figure 2.3: Benefits of trade facilitation

Source: Based on the literature review

TF allows countries to speed up trade transactions. This is more important as time is becoming increasingly a critical factor in determining the comparative advantage of trade. The contemporary business environment seeks faster global transactions made possible by globalisation of information technology. In the modern trading environment, consumers are willing to pay more for faster deliveries of goods and services making it essential that firms deliver their products on time. Consequently, firms have the burden of additional costs of

holding a buffer stock to avoid trade delays. These inventory costs include both capital costs of the goods while they are in transit and costs of holding larger quantities of stock to cover variations in arrival time (Hummels, Minor, Reisman, & Endean, 2007). Border transaction inconsistency may affect a firm's competitiveness negatively. Nordas, Enrico, and Geloso (2006) explained that time taken for moving goods to the market affects trade flows in two ways. Firstly, it determines whether or not firms will enter a particular foreign market. Secondly, time affects the volume of trade once a market entry is made. This is more crucial for firms trading time-sensitive commodities. Such products include fresh produce such as agricultural products (fresh fruit and vegetables) and seasonal products such as textiles and wearing apparel. However, minimising trade delays through efficient TF initiatives enables countries to increase volumes of time-sensitive product exports to meet consumer satisfaction.

A majority of TF-related studies have found that potential benefits of TF are greater in developing countries, and more gains are acquired by SMEs. Improved TF encourages more active participation of export-driven SMEs. Improvement in information and communication technology is one of the crucial factors that could prevent asymmetric effects on SMEs. If trade procedures and regulatory requirements are not transparent and reliable, SMEs have difficulty in accessing information, which then demands the use of additional resources and time acquiring information not readily available. Further, a lack of available information reduces the capacity to predict the market behaviour. As additional expenses do not normally vary according to the value of goods or the volume of sales, operational costs per product increase. These costs may also comprise significant indirect costs related to foregone business opportunities which place SMEs in a weaker position (Roy & Bagai, 2005). However, the development of the Internet and E-commerce and simplification of trade regulations can reduce informational and market access barriers faced by SMEs.

A more diversified export sector offers a wider range of products and destinations. A facilitated trading system can deliver positive benefits towards diversifying both export products and markets. Export diversification has two dimensions, product diversification and market diversification. TF generates significant benefits that create new trade flows (Shepherd, 2009). This can be either by the introduction and supply of previously untraded products into the existing markets or by the expansion of trade in existing products to new markets which leads to trade expansion. Some studies have found that there is a significant positive relationship between TF and export diversification. Dennis and Shepherd (2011) concluded that export

costs, international transport costs and domestic market entry costs have a significant negative impact on export diversification. This underlines the importance of reducing TTCs to promote export diversification. Shepherd (2009) also found that a 10% improvement in TF is associated with a 5-6% increase in the number of foreign markets served. Export volume increases as a result of export diversification which generates gains for both producers and consumers.

Improved TF enables governments to benefit from the increased tax revenue of the expansion of international trade. Most developing countries depend heavily on tax revenue to finance public expenditure. Thus, improved TF is likely to increase government revenue since the reduction in TTCs increases the volume of exports and imports. This offsets the large investment necessary to improve TF in a country. Further, improvement in TF in one country can lead to increased exports or imports of partner countries linked through external trade. Thus, bilateral government cooperation, as in the case of tariff reforms, is unnecessary since partner countries can still benefit from unilateral TF reforms.

Several studies have attempted to estimate the potential welfare gains that can be realised from improved TF. Table 2.1 illustrates recent estimations of the benefits of TF. Most of these studies have used Computable General Equilibrium (CGE) models and gravity models to estimate the effects of TF on trade flows and economic welfare. These estimates clearly indicate that there is a positive relationship between TF and trade flows. Even a slight improvement can generate considerable economic welfare and clearly benefits are much greater in developing countries.

It is clear that TF can strengthen the global value chain, encourage SME participation in external trade and improve export diversification. This stimulates trade, generating employment and increasing government revenue through taxation. Eventually, producers and consumers are better off, producing a positive welfare impact on the economy fostering economic growth and development.

This process is also favourable to reduce poverty in two ways. Firstly, TF stimulates trade and expands entrepreneurial activities. Secondly, an increase of tax revenues due to economic growth generates financial resources for the government to develop and implement specific measures to alleviate poverty and reduce social inequalities.

Table 2.1: Impact of trade facilitation on trade flows and welfare effects

Study	Key results	
	Effects on trade flows	Effects on welfare
Francois, Meijl, and Tongeren (2005) (CGE GTAP model) Simulation: A partial reduction of TTCs related to TF	2.7 % of increase in world export volume	0.2 % of increase in world income (GDP)
Wilson and Otsuki (2007) (Using indicator based measurements: Port efficiency, Customs, Regulations and Service sector infrastructure) Simulation: South Asia increase its capacity half away to East Asia with respect to above indicators	Trade expected to rise by USD 2.6 billion	
Decreux and Fontagne (2011) (CGE model) 50% reduction in AVEs of time at the border	World trade increase by 1.9 %	
Dennis and Shepherd [20] (Gravity model) 10 % reduction in costs of exporting, international transport and market entry	Export increase 3% International transport increase 4% Market entry increase 1%	
(Persson, 2013)(Gravity model) 1 % reduction in number of days needed to export	Homogeneous goods increase by 0.3% Differentiated goods increased by 0.6%	
Zaki (2014) (Gravity and CGE models) 25% reduction in AVEs of time to import and export	Increase EU: 10.6% US: 3.9 Japan: 2.1%	Increase Africa: 4.7% Asia: 5.2% Middle East 3.1% North Africa 2.9%

Source: Based on the literature review

2.3. Analysis of the impact of trade facilitation on economic development in South Asia

2.3.1. Methodology

In this section, trade and economic development issues in South Asia are reviewed briefly and analysed the impact of TF on trade growth and economic development. A desk research was conducted to meet this objective and assess the relationship between TF, trade growth and economic development based on statistics collected from online databases and existing available quantitative estimations, confined to the South Asian region. The following TF and development indicators are used for this analysis.

2.3.1.1. Trade facilitation measures

There are various TF indicators which have been used to measure the effects of TF. The most common of these are 'Doing Business' (DB) indicators related to Trading across Borders (TAB), the World Bank's Logistics Performance Index (LPI), the Organisation for Economic Co-Operation and Development's (OECD) TF indicators and the World Economic Forum's Enabling Trade Index (ETI) (WTO, 2015). For the purpose of this analysis, the TAB and the LPI were used to measure TF.

2.3.1.1.1. Doing Business indicators (DB)

According to the 'Doing Business' report, there are 11 DB indicators, comprising mainly indicators for ease of doing business, which rank countries according to their relative performance, and the 'Distance to Frontier' which scores the best performing economy (WTO, 2015). For the purpose of this analysis, we used DB related to Trading across Borders (TAB). These include time and costs to exports and imports. Time and costs (excluding tariffs) include costs for documentary compliance, border compliance and domestic transport within the overall process of exporting or importing a shipment of goods (World Bank, 2015a).

2.3.1.1.2. The Logistics Performance Index (LPI)

The LPI was developed by the World Bank, based on online surveys of operators in charge of moving and trading goods. The LPI measures the logistics friendliness of a country based on six dimensions. These are customs, infrastructure, ease of arranging shipments, quality of logistics services, tracking and tracing and timeliness (WTO, 2015). If country shows low performance, the LPI index value is equal to 1 and for high performance, equal to 5.

2.3.1.1.3. Gross Domestic Product (GDP) per capita growth rate

GDP per capita is calculated using gross domestic product, which is divided by midyear population. GDP at purchaser prices is the sum of gross value added in the economy and product taxes. Subsidies are not included in the value of the products. The GDP per capita growth rate is calculated as an annual percentage based on the constant local currency (World Bank, 2015c).

2.3.2. Economic growth and external trade in South Asia

2.3.2.1. Overview

South Asia is a region of rapid economic growth and transformation, composed of eight economies: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The larger economies are those of India, Pakistan and Bangladesh, with India rated second largest emerging economy in the world, representing the largest economy in the region. India differs significantly from its neighbours, due to the size of its economy, population, land area and diverse socio-economic characteristics. The landlocked countries of Afghanistan, Bhutan and Nepal record the lowest per capita income.

South Asia faces enormous development challenges and economic imbalances affect regional economic development adversely. The major development challenges facing South Asia are the need to accelerate overall regional economic development in relation to the past and the need for the smaller economies to match the level of the growth in larger economies (Ahmed, Kelegama, & Ghani, 2010).

2.3.2.2. Economic growth

There has been a notable economic growth in South Asia during the past 15 years, with the exception of the 2008 economic recession, producing the second fastest growing regional economy in the world. The Indian economy has largely contributed to this growth, with the economic contribution of other regional countries negligible (Figure 2.4). Thus, South Asian economic growth is generally a reflection of the Indian economy.

The rapid growth of external trade has contributed to this economic growth. Arnold (2007) has indicated that a part of this growth can be associated with higher unit prices of basic

commodities, but that the greater part is related to increased volumes of shipments. Panagariya (2007) has illustrated that the steady rise of the Indian economy has largely contributed to this growth trend. South Asia attracts global attention because of this rapid growth, global outsourcing and skill-intensive service exports (Ahmed & Ghani, 2008).

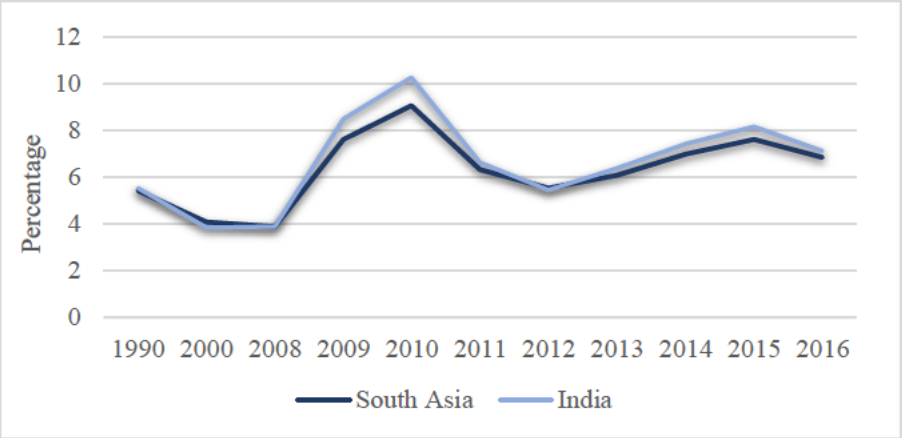


Figure 2.4: Annual percentage of GDP growth in South Asia and India
Source: World Development Indicators online database (World Bank, 2016b)

Table 2.2 illustrates disparities of economic development across countries in South Asia based on a few economic development indicators. Regional per capita income gaps vary significantly. India almost contributes nearly 80% of total South Asian GDP, whereas Pakistan accounts for 10%. Other countries are relatively small in terms of GDP and population, showing only minor contributions to regional GDP.

Table 2.2: South Asian countries' contribution to the regional economic growth

	Share of regional GDP (%)	Share of regional Population (%)	Per capita GDP (current US$)
Afghanistan	0.9	1.8	665
Bangladesh	6.3	9.4	958
Bhutan	0.1	0.05	2,363
India	79.2	74.9	1,498
Maldives	0.1	0.02	6,666
Nepal	0.8	1.6	694
Pakistan	9.8	10.9	1,275
Sri Lanka	2.8	1.2	3,279

Source: World Development Indicators online database (World Bank, 2016b)

Ahmed et al. (2010) have noted that there are two regions within South Asia, one leading and one lagging. The leading region is characterised by faster economic growth, urbanisation and integration into the global economy. The lagging region remains rural, relying on low-value activities and lacks economic integration both regionally and globally.

2.3.2.2.1. Gross domestic product per capita growth rate

GDP per capita growth rates in South Asia vary widely. The leading economy, India has been growing rapidly followed by Bangladesh, Pakistan and Sri Lanka (Figure 2.5). India recorded the highest growth rate in 2010 after a rapid recovery from global economic recession in 2008. Conversely, landlocked countries have shown fragile economic growth during the last decade, with the Maldives showing a similar volatile pattern (Figure 2.5). Regional disparities further ensure these countries remain in poverty. Canut (2013) pointed out that the majority of the world's poor do not live in low-income countries, but in countries with middle levels of per capita income, showing that the geography of poverty exhibits regional concentrations. Two-thirds of the poor live in India and the lagging regions of South Asia.

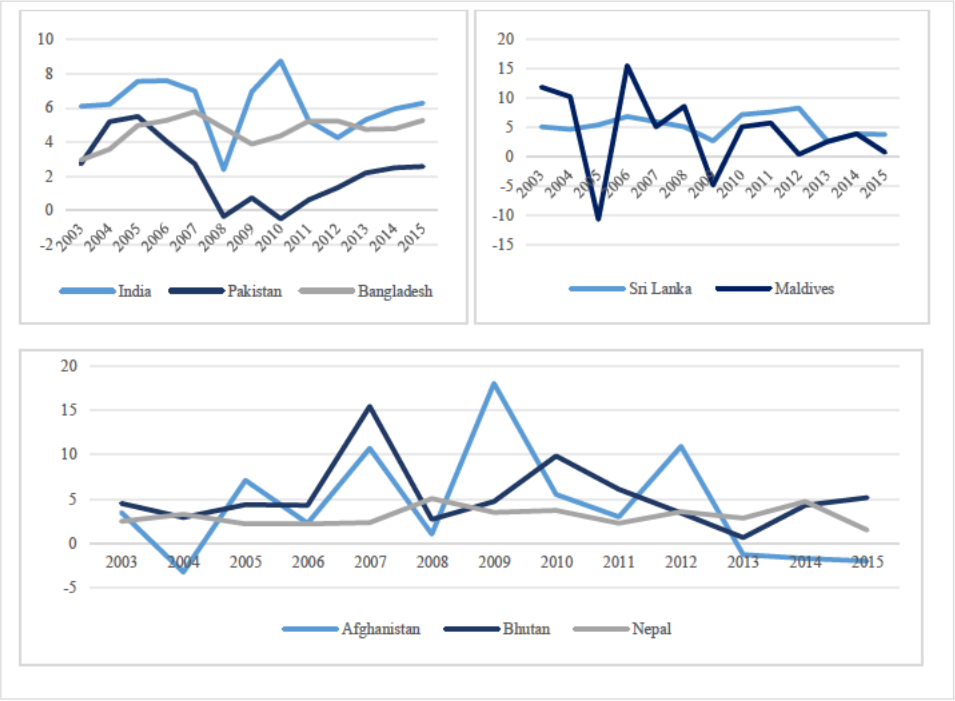


Figure 2.5: GDP per capita growth rate in South Asia

Source: World Development Indicators online database (World Bank, 2016b)

2.3.2.2.2. Income distribution

According to the World Bank, global poverty has reduced over the past few decades. There is an impressive reduction in poverty due to strong growth and resilience in South Asian countries. However, the region is still home to a very large number of the poor (World Bank, 2015b). According to the poverty headcount index (Table 2.3), nearly fourth quarter of the Indian population lives on less than $1.10 per day, whereas half of the population is below $3.10 per day. This indicates that most of the South Asian poor are living in India, despite its significant economic growth. This situation is common to most of the South Asian countries, except Sri Lanka and the Maldives. Most of the benefits of economic development flow towards a relatively small group of wealthy households, maintaining the regional disparities. The Gini index also shows that South Asia indicates an increase in disparities in income distribution. As Table 2.3 shows, this is a most serious phenomenon in South Asian countries, with income distribution worst in India and Pakistan.

Table 2.3: Income distribution in South Asia

Country	Headcount Index at $1.9	Headcount Index at $3.10	Gini Index (2010)
Sri Lanka	1.92	14.59	36.39
Bhutan	2.17	13.33	38.37
Pakistan	6.07	36.88	39.8
Maldives	7.2	23.26	-
Nepal	14.99	48.44	33.84
Bangladesh	18.52	56.8	32.13
India	21.23	57.96	38.37

Source: World Development Indicators online database (World Bank, 2016b)[2]

Despite progress in economic growth in South Asia, the region continues to face the challenges of poverty and serious income disparities. As poverty indicators show, most of the poor live in India. This emphasises that India still faces serious poverty complications. Further, landlocked economies in South Asia are diverting from other economies which has formed a large

[2] The year of this index differ among countries; India – 2011, Bangladesh – 2010, Pakistan – 2013, Bhutan – 2012, Maldives – 2009 and Nepal - 2010

economic lag in the region. However, external trade significantly contributes to economic growth in the region. The following section discusses recent trends in external trade in South Asia.

2.3.3. Trends in external trade

As Figure 2.6 shows, external trade in South Asia has increased over the last decade. The pattern of this trend reflects how the growth of exports and imports has contributed to South Asia's GDP.

India has contributed most significantly to this trade growth, showing that it is the dominant country responsible for regional economic growth. India contributes 85% of the total value of regional exports as illustrated in Figure 2.7.

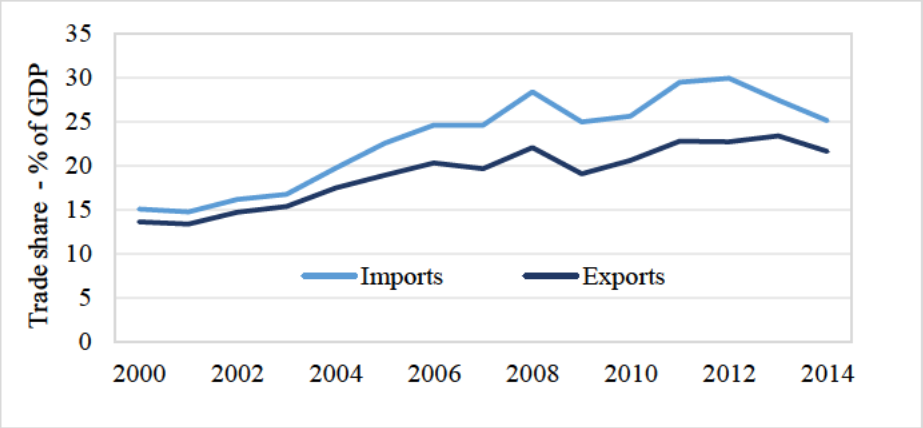


Figure 2.6: GDP share of goods and services trade in South Asia
Source: World integrated trade solution online database (World Bank, 2016c)

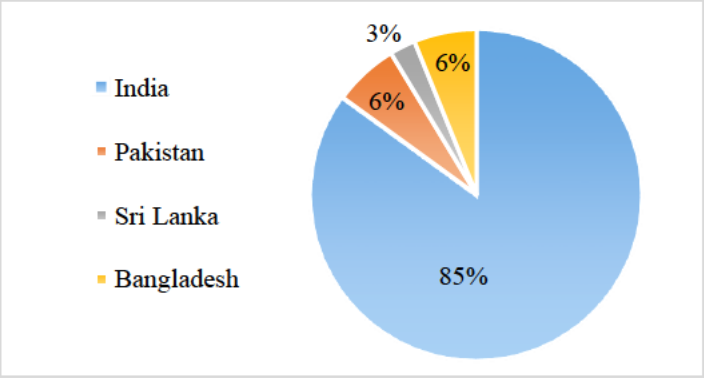


Figure 2.7: Export shares in South Asian countries
Source: World integrated trade solution online database (World Bank, 2016c)

India enjoys the largest share of the South Asian trade due to its size, comparative advantages and technological advancement, compared to rest of the region. The other seven countries have smaller economies than India and their contribution is relatively insignificant. The total export share of Bangladesh, Pakistan and Sri Lanka is around 15%.

2.3.3.1. Export diversification-commodities

South Asia exports mainly consumer and intermediate goods. The majority of imports are raw materials and intermediate goods (Figure 2.8). Export of capital goods contributes only 11% of total regional exports and India is the major exporter in this category (World Bank, 2016c). The manufacturing sector in South Asia is restricted by the limited capacity to generate exportable surpluses (World Bank, 2010). Thus, South Asia's exports generally concentrate on labour-intensive products such as textile and garments, leather products and agricultural products, all highly dependent on imported raw materials and other intermediate goods.

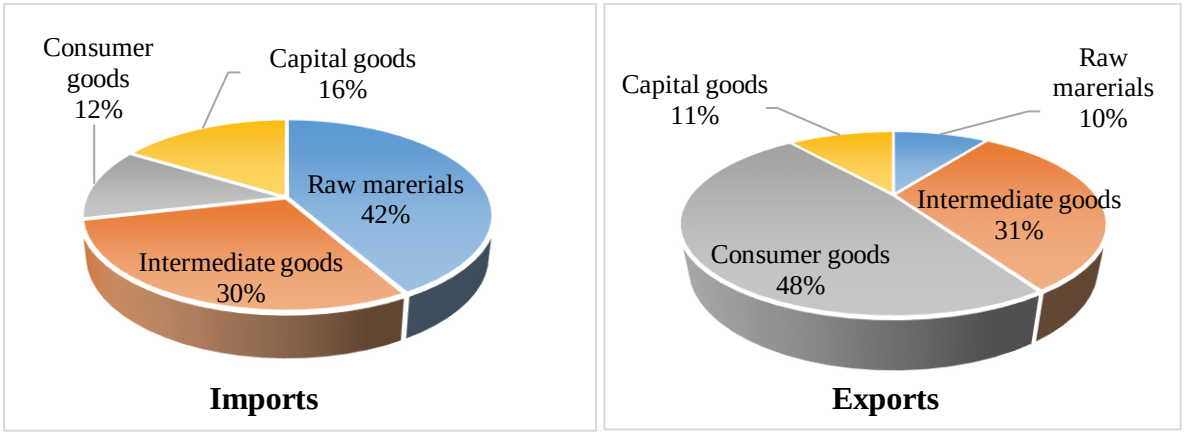


Figure 2.8: Trade composition in South Asia
Source: World integrated trade solution online database (World Bank, 2016c)

Exports of South Asia comprise mainly consumer and intermediate goods, fuels, textile and clothing. This includes 1532 consumer products, 2049 intermediate goods, 584 raw materials and 90 capital goods (World Bank, 2016c). Table 2.4 shows that compared to other countries, India's exports are diversified and their export basket consists of intermediate and consumer goods, as well as a considerable portion of capital goods. The other South Asian countries concentrate on the exporting of consumer goods such as labour-intensive textile and agricultural products. Bangladesh and Sri Lanka, in particular, mainly export textiles and clothing. The Maldives exports raw materials which represents nearly 83% total exports.

Consumer goods comprise 11.5% and include mainly fish and related products. Bhutan is least diversified and exports consist of 84% intermediate products.

Table 2.4: South Asia's exports by different product categories

	Total number of products		**Import and export product share in each product category**							
			Consumer goods		Capital goods		Intermediate goods		Raw materials	
	Imported	Exported	Imported	Exported	Imported	Exported	Imported	Exported	Imported	Exported
India	4331	4434	10.04	47.84	15.95	13.03	28.80	29.53	42.50	9.08
Pakistan	4083	2877	33.23	55.12	17.15	3.06	29.06	31.49	20.26	10.19
Sri Lanka	4165	3001	12.01	76.46	4.50	4.71	4.91	10.69	5.52	7.07
Bangladesh	4148	1768	14	89.78	7.18	0.68	10.62	4.02	11.51	5.5
Nepal	4004	1175	33.93	44.31	14.13	1.31	42.05	41.86	8.04	7.59
Bhutan	3266	332	37.10	4.24	18.95	0.01	31.53	84.35	11.16	11.39
Maldives	2580	29	59.73	11.52	17.51	NA	11.74	5.09	10.15	83.29
Afghanistan	15	5	4.54	27.14	NA	NA	13.3	NA	19.34	2.13

Source: World integrated trade solution online database (World Bank, 2016c)[3]

2.3.3.2. Export diversification-markets

South Asia exports to 226 destinations and imports from 231 sources (World Bank, 2016c). The largest export trading partners of the region (excluding landlocked countries) are the USA, EU, China and UAE (Figure 2.9). The share of these countries is around 50% of total exports and this shows that South Asia's export earnings depend heavily on a few developed countries. Landlocked country exports are limited to their neighbours. India accounts for 70 and 94% of Nepal's and Bhutan's exports, respectively, whereas Pakistan and India are Afghanistan's export markets.

The largest import sources of the region (excluding landlocked countries) are East Asia and the Middle East. China, Singapore, Indonesia, Thailand, UAE and Saudi Arabia are the leading import sources of India, Pakistan, Bangladesh and Sri Lanka. Similar to exports, the landlocked countries import only from their neighbours, especially India (World Bank, 2016c).

[3] Data included to the year 2014 expect Bhutan 2012, Nepal 2013, and Bangladesh 2011

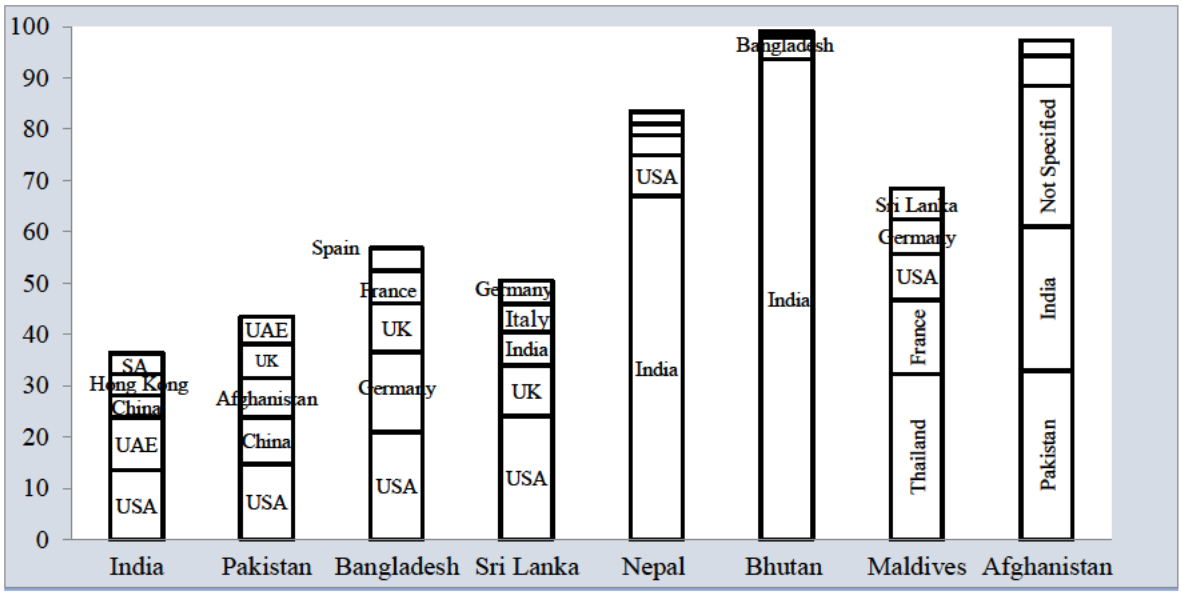


Figure 2.9: South Asia's export destinations

Source: World integrated trade solution online database (World Bank, 2016c)

South Asia's export and import markets are significantly concentrated. The five largest economies of the region account for nearly 50% of total trade, excluding landlocked countries. The trade of Nepal and Bhutan concentrates on India (more than 75%), whereas Afghanistan's trade primarily takes place with Pakistan and India (more than 50%). According to the Figure 2.10, the highest Herfindahl-Hirschman index[4] value is recorded in landlocked countries. These countries share common borders and therefore experience difficulties in accessing markets, both within and outside the region, due to security checking and other formalities imposed by bordering governments, and poor trade transport which limits market access.

Perhaps, the most negative regional economic reality is that national incomes largely depend on the economic prosperity of developed countries and are vulnerable to global economic shocks. Regional labour-intensive exports, such as textile and garments, are directed to high-income markets, for example, the USA and EU. The USA is the leading export market for the four largest economies of South Asia: India, Pakistan, Bangladesh and Sri Lanka. As Wilson and Ostuki (2007) have explained, the financial crisis of the late 1990s severely affected developing countries, including those of South Asia. Further negative impact on the South Asian economy was caused by the global financial crisis in 2008. According to the World Bank

[4] Which is commonly accepted measure for market concentration. The value ranges between 0 and 1 and if country's trade value concentrated to few markets will have an index closed to 1 (less diversifies).

(2010), the commodity price shocks led to major trade losses in South Asia which was nearly 9% of GDP until May 2008.

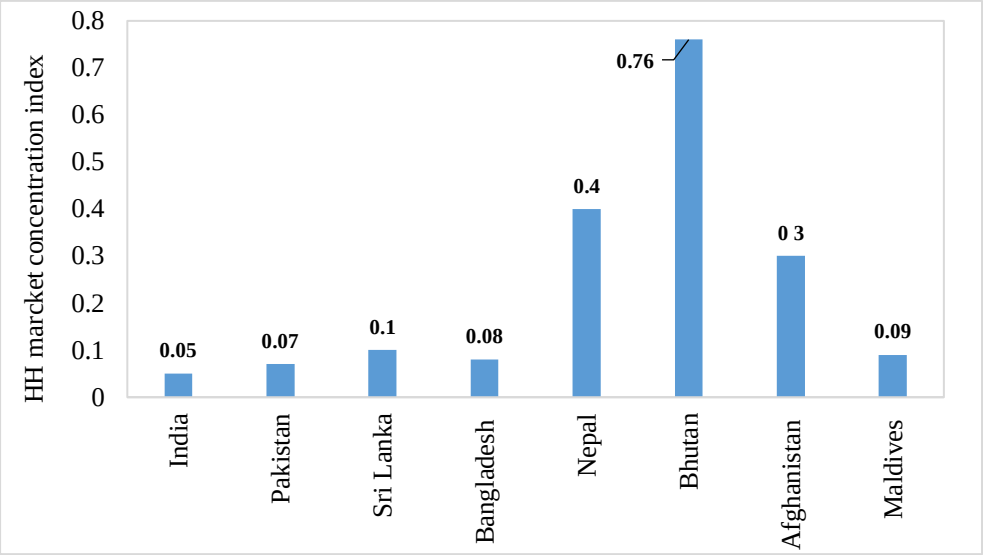


Figure 2.10: Market concentration in South Asia
Source: World integrated trade solution online database (World Bank, 2016c)

In the light of this dependency, trade economists have stressed the importance of strengthening intra-regional trade to increase stability against external shocks. Further, the long distances of these major markets impose significantly higher costs for South Asian exporters (Wilson & Otsuki, 2007).

2.3.3.3. Intra-regional trade in South Asia

South Asia remains one of the least integrated regions in the world. Intra-regional trade in South Asia has comprised merely approximately 5% of world trade over the last two decades. If India is excluded from the group, the contribution would be less than 2%. On the contrary, the contribution of the intra-regional trade of Southeast Asia accounts for around 25% of the world trade over the same period. The trade-oriented development strategies of Southeast Asian countries have rapidly transformed the economies of that region. Additionally, the Asia-Pacific regional trade share remains around 70%, signifying strong regional integration (Figure 2.11). Conversely, South Asia is the fastest growing region in terms of external trade. This regional trend indicates willingness to trade externally, limiting trade with neighbouring countries and confirming less regional integration.

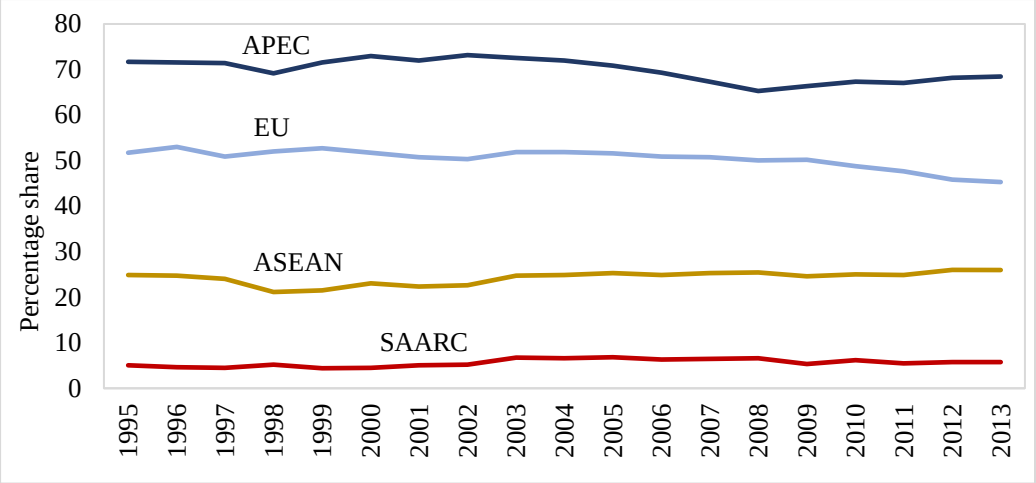


Figure 2.11: Intra-regional trade in goods and services
Source: UNCTAD statistical handbook (UNCTAD, 2015)

The poor regional integration impedes investment opportunities, diverts markets due to poor technology and information flow and restricts economies of scale. Clearly, closer integration is vital to the development of the economies in South Asia. Furthermore, strong regional integration is essential to the reduction of poverty and inequality among the countries of South Asia, which comprises both economically lagging and leading countries. Intra-regional trade is the foremost tool with which to strengthen regional integration leading to a reduction in economic inequality. Similarly, improved trade leads to economic growth and thus significantly contributes to reduce the persistent poverty in the region.

Progressively tariff and non-tariff barriers to trade in South Asia have declined due to favourable trade negotiations. However, the region still faces enormous trade impediments. Banik and Gilbert (2008); Ghani and Din (2006) have argued that tariff reforms alone, though important, are insufficient to optimising the potential contribution of trade on the development agenda. Regional welfare concern is uncertain and traders may be confronted by hidden non-tariff barriers which increase TTCs. Thus, TF is fast becoming a fundamental issue in the new global trade-driven economy and constitutes a major concern of the second-generation trade policy agenda.

There is consensus among trade economists that poorly facilitated trading systems form a major impediment to economic connectivity among South Asian countries. The World Bank (2007) emphasised that South Asia's true growth potential has not been realised due to the lack of market integration within and between countries, as a result of excessive transportation costs

and lack of connectivity between countries. Roy and Bagai (2005) highlighted the importance of increasing connectivity between South Asian countries. Poor connectivity that prevents economic exchange is a fundamental impediment to the regional development. Wilson and Ostuki (2007) advocated the importance of measures to increase trade and reduce logistics costs in South Asia, since these are the most important steps to promoting intra-regional trade and economic integration. De (2011) argued that improved TF not only promotes regional trade but also strengthens the trade capacity of the landlocked countries. This indicates that TF is the primary key to enhance connectivity among countries and reduce the gap between leading and lagging economies in South Asia. The subsequent sections discuss the major TF issues of South Asia and its impact on poverty.

2.3.4. Trade facilitation and economic growth in South Asia

It is essential that South Asia can stimulate further growth in trade, in order to strengthen regional integration and enhance economic growth among economies in the region. TF is one of the keys to improve regional trade and enhance these economies.

2.3.4.1. Trade transaction costs and trade facilitation in South Asia

Poor TF leads to increased time and costs associated with trade transactions, as discussed in the theoretical section in this chapter. Generally, South Asian countries incur high TTCs when goods move across borders. According to the Doing Business report, trading in landlocked countries is more costly. Trade in Afghanistan is most costly, followed by Nepal and Bhutan (Figure 2.12). South Asia experiences insufficient TF which generates high TTCs, in terms of both direct (charges) and indirect costs (delays).

Furthermore, trade costs are positively correlated with the time associated with goods and services moving through borders in South Asia. Generally, South Asia undergoes unnecessary time delays at borders, as well as behind the borders. In comparison with other regions, time to trade is higher in South Asia (Figure 2.13A). TTCs associated with export and import procedures in South Asia are more than 50% higher than in the developing countries in East Asia and the Pacific.

The disaggregated data related to time to trade in South Asia explains that Sri Lanka is the leading country which shows the shortest time involving exports and imports, followed by

India and Pakistan. Time to trade in these countries is more or less comparable with time taken to trade in developed countries such as EU and OECD. However, Afghanistan recorded the longest period taken for trade transactions, showing a substantial deviation from other countries in the region, and causing regional average time to trade to rise (Figure 2.13B).

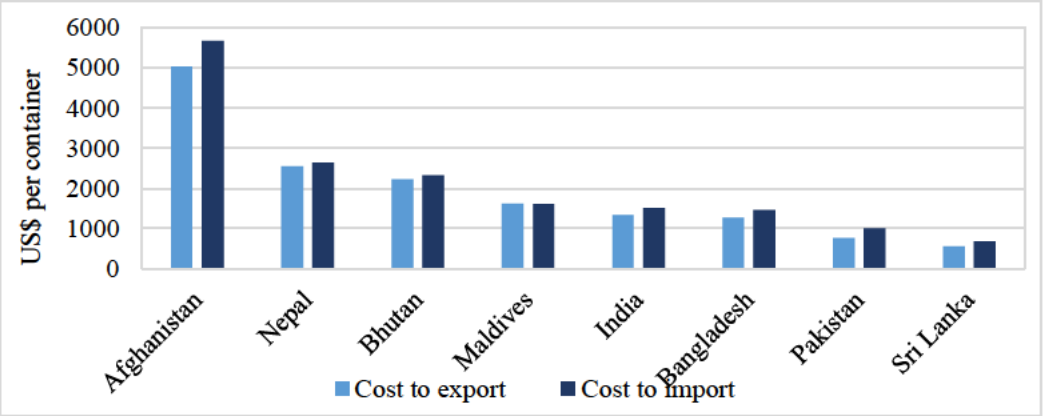


Figure 2.12: Costs of trading in South Asian countries

Source: Doing Business report (World Bank, 2016a)

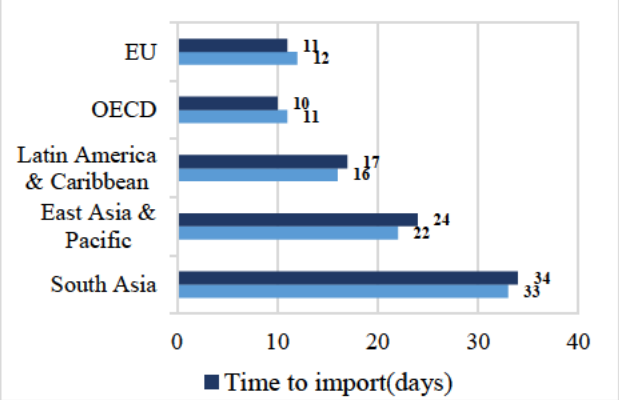


Figure 2.13-A: Comparison of time to trade in South Asia with other regions

Source: Doing Business Report [40][5]

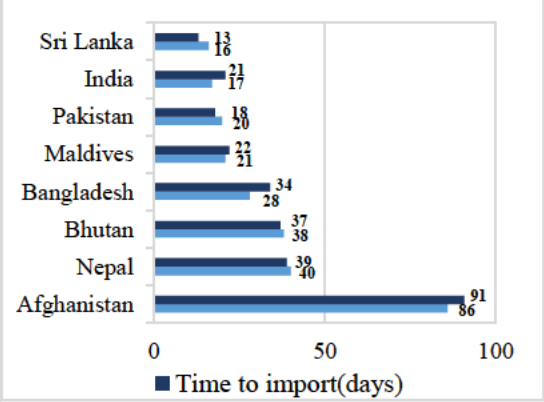


Figure 2.13-B: Time to trade in South Asian countries

Source: Doing Business Report [40]

[5] Latin America and the Caribbean and East Asia pacific included only developing countries and data pertaining to 2014

Trade delays in South Asia lead to increased TTCs. For exporters, transaction time plays a major role in competing in international markets. According to Arnold (2007), the textile industry in South Asia is a good example of the potential risk of not making timeous deliveries. For this reason, Bangladesh and India are willing to use expensive airfreight to prevent textile shipment delays and avoid the risk of losing clients. This confirms that time delays are more costly affairs in South Asia.

Several factors may increase TTCs at borders in the South Asian region. Requirements of several signatures for the same transaction, and the number of documents needed to be submitted increase TTCs. Time and costs involved with documentations and border clearances thus cause cost increases (Figure 2.14). Complicated documentation requirements and other outdated customs procedures frequently exceed tariff costs (Engman, 2009). The greater the documentation, the longer it takes for clearance, generating higher TTCs. Figure 2.14 clearly reveals the positive correlation between time and costs during the process of documentary and border compliance.

Engman (2009) has cited a survey conducted by World Bank (2000) which indicated that South Asia is worse affected by customs and foreign trade regulations compared with other regions. The report highlighted that two-thirds of companies in South Asia faced major or moderate trade obstacles in their businesses. Time required for documentation is excess in Afghanistan and Pakistan followed by Bangladesh, indicating complicated customs procedures (Figure 2.14). Hertel and Mirza (2009) state that while Thailand and Singapore authorities take a few hours to clear a vessel, a similar task in Bangladesh ports takes 2 or 3 days. Engman (2009) cited a study by the ADB (2014a) that Bangladesh's garment exports could earn 30% more if port inefficiencies such as poor management, corruptions and restricted port capacity were removed. As Wilson and Ostuki (2007) discussed, these delays of documentation preparation are due to a lack of standard documentation system. They cited a study by RIS (2004) to demonstrate that India-Bangladesh border compliance needs at least 22 documents, more than 55 signatures and a minimum of 116 copies for final approval. This contributes to the South Asian trend to trade with developed countries, due to the low documentary requirements and transaction times, compared with neighbouring countries.

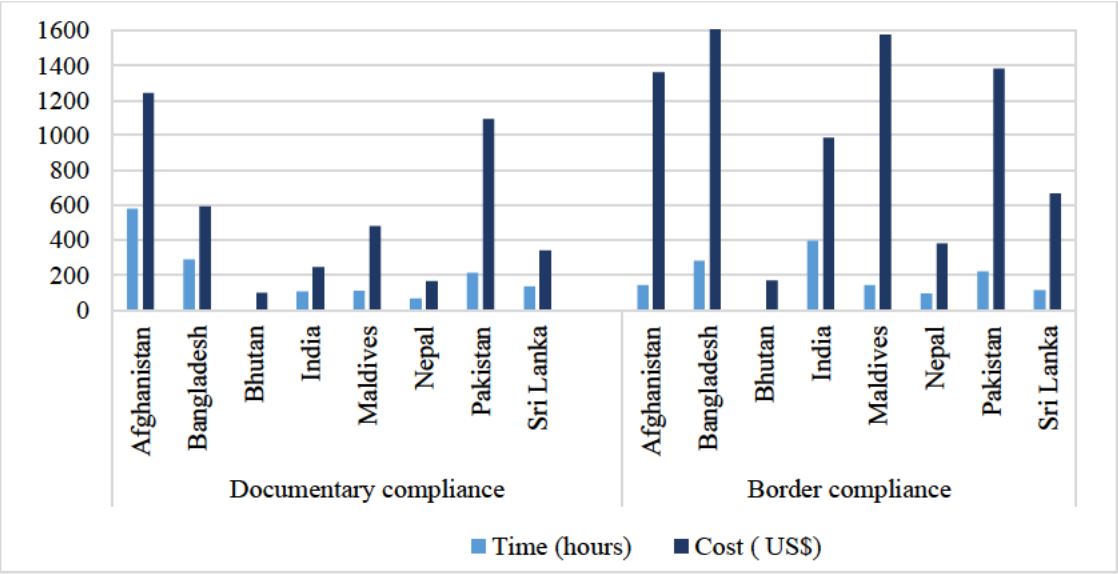


Figure 2.14: Time and costs involve in documentary compliance and border compliance for cross-border trading (exports + imports)

Source: Doing Business report (World Bank, 2016a)

Regional integration depends on connectivity, efficiency and speed with which goods and services move from production centres to consumer markets (Subramanian & Arnold, 2001). Thus, transportation time and costs play a vital role. In addition to the inefficient and drawn out customs practices and poor facilitation at borders, inadequate road and transport infrastructure increase TTCs in South Asia. According to Figure 2.15, domestic transport involved in exports and imports in India is very expensive compared to other countries in the region. Further, landlocked countries show more expensive domestic trade transport. This may be a result of an overabundance rules and regulations imposed by neighbouring countries during the transhipment. Wilson and Ostuki (2007) discussed the fact that the lack of current integrated transport networks poses a critical problem for landlocked countries, as improvements will increase cargo shipping costs.

South Asia demonstrates a low level of port infrastructure efficiency. Wilson and Ostuki (2007) have stated that the region can expect significant gains from improving ports infrastructure and reducing TTCs.

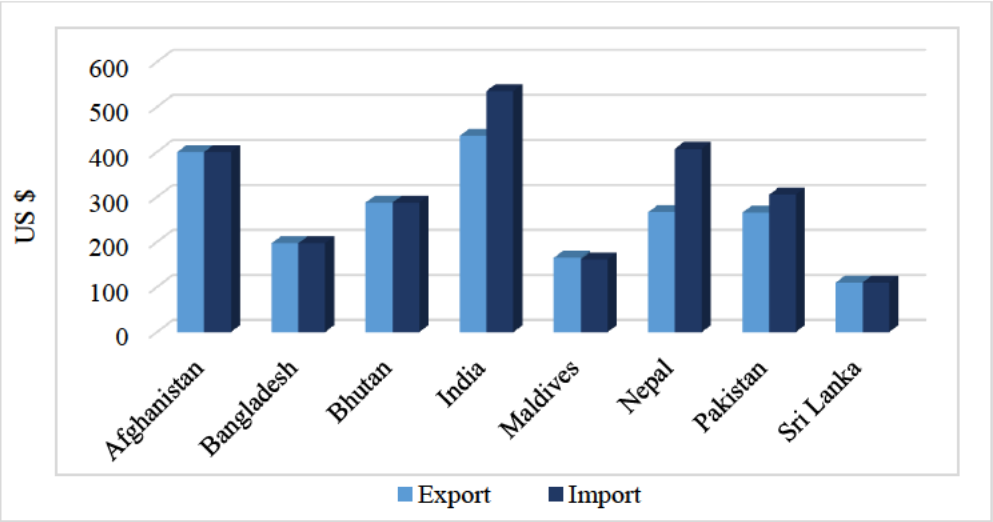


Figure 2.15: Domestic transport costs for exports and imports in South Asia

Source: Doing Business Report (World Bank, 2016a)

Further, a lack of human resources, government standing practices and poor applications of information technology generate inefficiencies that lead to unnecessary transaction delays. These may also become more costly than tariff barriers. Figure 2.16 explains the LPI which compares South Asia with other developing countries, in terms of customs efficiency, infrastructure, ease of arranging shipments, quality of logistic service, tracking and tracing capabilities and timeliness. Better logistics performance is strongly correlated with trade of goods and services. Countries with a stronger logistics performance tend to be more accessible to trade and experience faster economic growth (Shepherd & Wilson, 2009). According to this index, South Asia recorded the lowest values after Sub-Saharan Africa. The poor logistic performance in South Asia is due to poor infrastructure, high customs surcharges, congestions and excessive security checking due to political unrest (especially in India, Pakistan and Afghanistan border crossing).

2.3.4.1.1. The relationship between trade facilitation and economic growth in South Asia

There is a strong relationship between TF and trade in South Asia. Trade is directly linked with economic growth. Economic growth is one of the key factors which can reduce poverty in the long run. A number of studies have found that TF has now become a crucial factor impeding trade, as most other trade barriers (tariff and non-tariff) have been substantially removed.

There is an interrelationship between TF and trade volume and economic growth. Improved TF leads to increased trade volume and a larger trade volume motivates countries to introduce more efficient TF measures.

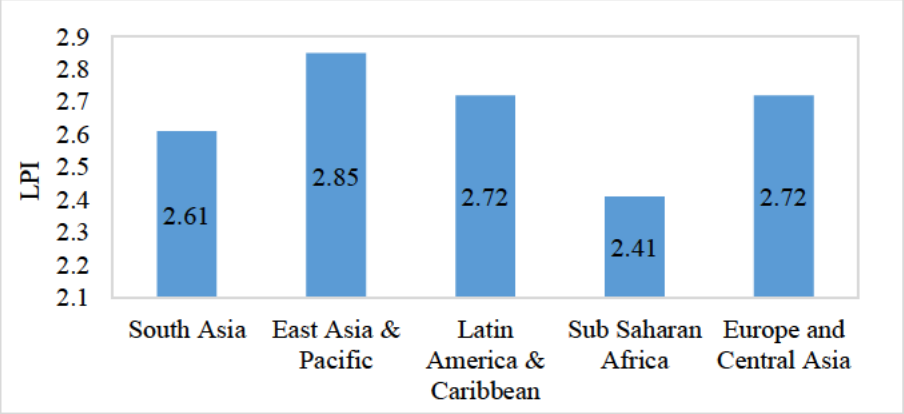


Figure 2.16: Logistic Performance Index in selected regions

Source: Doing Business Report (World Bank, 2016a)

The cost of TF implementation measures is very high and their real benefits are dependent on the volume of trade. Developed countries have more facilitated trade to cope with high volume of trade compared to developing countries. Table 2.5 shows that upper middle-income countries perform more facilitated trade compared with low- income countries, such as those of South Asia. This shows that higher-income countries generally exhibit better TF, whereas low-income countries experience poor facilitation.

Table 2.5: Trade facilitation by income levels and South Asia

	No of documents Exports	No of documents Imports	Time to Exports (days)	Time to Imports (days)	Logistics Performance Index
Low income	8.23	9.91	40.24	46.78	2.32
Lower middle income	7.42	8.18	27.47	31.42	2.5
Upper middle income	6.51	7.41	20.81	23.61	2.76
South Asia	8.34	9.47	33.05	34.73	2.46

Source: Based on UNESCAP trade costs database (UNESCAP, 2015)

Empirical estimates revealed that the impact on economic development of improved TF in developing countries exceeds those of developed countries, as TF is positively correlated with per capita income. Further, higher income countries perform better than lower income countries, since they have better infrastructure, logistics and timeliness than developing countries (Djankov, Freund, & Pham, 2010; OECD, 2003; Wilson & Ostuki, 2007; Zaki, 2014). UNESCAP (2013) also found that improved TF is positively correlated with exports and per capita GDP.

Complicated trade procedures and strong regulatory requirements increase documentation processes required for trade transactions. However, in South Asia, insufficient customs and port-handling procedures, poor use of information technology and transit barriers feature as major aspects of TF, causing additional TTCs. Border transaction costs in South Asia can be as much as 50% higher than the developing countries of East Asia and the Pacific. This worsens in landlocked countries, which recorded the greatest time taken for trade transactions due to border transit restrictions. Landlocked countries thus exhibit less regional and global trade connectivity, due to limited physical connectivity. This encourages informal trade which takes place via routes of greater distance such as Dubai and Singapore. This incurs higher TTCs both directly and indirectly.

Export-oriented industries in South Asia thus must overcome inherent limitations, in order to compete in international markets. Resources are not always used efficiently in trade transactions. Due to a lack of transparency and reliability in regional trading systems, export products in South Asia are limited to a few commodities. More time-sensitive product exports are not directed to long-distance markets and/or not traded at all on international markets. Further, intra-regional trade in South Asia itself is very limited and as a result the region tends to do more trading with developed countries. This has two negative consequences. Firstly, trade outside the region increases transportation costs, and secondly, the region has greater vulnerability to global economic recessions.

Consequently, poor TF impacts negatively on trade volumes of both exports and imports. Reducing international trade would increase unemployment, by restricting the development of a complete supply chain. Further, poor TF systems reduce government revenue received from trade taxes. Consumers face higher prices and producers suffer from a reduced comparative advantage. Overall, the economy would experience a slower or negative growth, maintaining and even increasing the persistence of poverty. Improved TF would lessen these problems and

produce higher returns through faster deliveries and lower costs. It is clearly evident that there exists a positive relationship between TF and economic growth in South Asia. Thus, TF must emerge as the dominant force for enhancing economic growth.

It is further evident that trade restrictiveness is mainly due to poor TF and this has become a major concern of the second-generation trade policy agenda. Recent trade research has shown the importance of eliminating TTCs through better TF, in that TF contributes effectively to overall economic development.

2.4. An overview of Trade Facilitation programmes in South Asia

Greater attention has been paid to TF policies in developing countries, which have mostly been unable to meet their trade expansion targets, despite trade liberalisation. Various TF initiatives have been implemented in South Asia under the umbrella of several institutions. Recently, WTO became the only multilateral institution to have implemented the Trade Facilitation Agreement (TFA). South Asian Association for Regional Cooperation (SAARC) is South Asia's major body for regional cooperation and focuses on the promotion of TF measures within the region. Apart from these two major global and regional initiatives, there are several sub-regional bodies which have implemented several TF programmes to promote regional trade.

2.4.1. WTO Trade Facilitation Agreement

The World Bank is the leading multilateral organisation actively involved in promoting TF in developing countries. WTO TFA has been implemented in member countries with effect from February 2017. There are three main objectives to the agreement: Provisions for expediting the movement, release and clearance of goods, measures for effective cooperation between customs and other authorities and provisions for technical assistance and capacity building.

TFA has three sections. Section I contains the provisions to clarify and improve the three articles of the General Agreement on Tariffs and Trade (GATT), that is, Articles V, VIII and X. Article V provides for the freedom of transit of members through fellow member territories. WTO members are permitted to use the most convenient routes through the territory of other members for transit. This shall not be subjected to traffic in transit and commitments, including no customs and transit duties or other charges imposed at the transit to ensure the elimination

of unnecessary delays or restrictions. This provision also ensures that all essential charges are reasonable and Most Favoured Nation (MFN) treatment should be the governing principle for all charges imposed on traffic in transit. The provisions of Article VIII contain the fees and formalities applicable to importation and exportation. The implication here is to restrict members to levy fees and charges that represent solely the approximate costs of the service delivered. Fees and charges for importation and exportation should not incorporate indirect protections or fiscal benefits such as import taxation. Article VIII further ensures the imposing of reasonable penalties for breaching customs regulations or procedural requirements and a commitment to minimise import/export documentation. The major provisions of Article X relate to the publication and communication of trade regulations and demand the prompt publication of laws, regulations, judicial decisions and administrative rulings affecting imports and exports. This provision thus enables partner governments and traders to immediately access such rules and regulations. Members shall further commit to publish details of new or more burdensome requirements and restrictions or prohibitions on the transfer of payments, prior to enforcement of such changes. Laws and regulations should be impartial and reasonable.

Section II contains Special and Differential Treatment (SDT) provisions, allowing developing and Least Developed Countries (LDCs) to determine when they will begin implementation of specific provisions of the agreement and to identify which provisions will only be implemented after technical assistance and support for capacity building. Section II also highlights that in order to qualify for the benefits of SDT, a member must categorise each provision into one of three categories:

Category A: provisions that the member will implement by the time the agreement takes effect, or in the case of a developing country member, within 1 year of the effective date.

Category B: provisions that the member will implement after a transitional period.

Category C: provisions that the member will implement on a date after technical assistance and support for capacity building.

Section III includes provisions for an institutional framework to establish a permanent committee on TF at the WTO and requires members to establish a national committee to facilitate domestic coordination and implementation of the provisions of the TFA (WTO, 2014).

It is estimated that the TFA will reduce global trade costs by an average of 14.3%; African countries and LDCs are projected to enjoy the biggest average reduction in trade costs. The full implementation has the potential to reduce the average time needed to import by 47%. Cuts in export time are predicted to achieve a 91% reduction from the current average (WTO, 2015). Further, the WTO has reported that the TFA will increase exports of existing traders and encourage new firms to export for the first time. The TFA is expected to contribute to world annual export growth and GDP growth by 2.7 and 0.5%, respectively. Developing and least developed countries are expected to enjoy two-thirds of all benefits after full implementation of the TFA (WTO, 2015).

2.4.1.1. TFA commitments in South Asia

TF programmes undertaken by South Asian countries, with respect to WTO TFA, can be assessed on the basis of publicly distributed evidence. Due to the lack of available information on South Asian TF programmes, this section is based on the few reports published online. The following section discusses the TFA commitments of South Asian countries.

2.4.1.1.1. Commitments for the provisions of freedom of transit (Article V)

Article V is more crucial for the landlocked countries as they face higher TTCs in transit. According to Weerakoon, Thennakoon, and Weeraratne (2005), India and Nepal have included several provisions regarding exceptions to non-discrimination of sensitive goods which require transhipment, regional transit agreements and the use of international standards. The two parties have agreed to provide new measures for simplifying the procedures of clearance of containerised traffic in transit. Chaturvedi (2007) reported that customs authorities in India have started to implement programmes on the further simplification of transit procedures. According to this report, there is no tax, duty or cash deposits for transit of goods in India. India also signed a formal treaty with Bhutan in 1995, in order to accommodate transit facilities and a similar treaty is expected to be signed with Afghanistan.

The relevance of provisions of transit measures established in Article V is very limited for Bangladesh which is geographically not proximate to any landlocked countries. However, Chaturvedi (2007) highlighted that Nepal and Bhutan (landlocked countries in South Asia) are willing to use Chittagong and Mongla sea ports in Bangladesh. As reported by Chaturvedi

(2007); Weerakoon et al. (2005), there are no specific measures related to Article V that have been implemented by the Bangladesh government.

In accordance with Article V, Sri Lanka has made considerable efforts towards express clearance of goods in transit and the government has established a policy of non-discrimination for transit goods to simplify clearance. Sri Lanka is further considering the acceptance of guarantees on the clearance of goods in transit (Chaturvedi, 2007). Pakistan has also committed to the rapid clearance of transit goods.

2.4.1.1.2. Provisions for fees and formalities connected with importation and exportation (Article VIII)

According to Chaturvedi (2007), importation and exportation fees and charges are clearly defined and published on the Internet in Bangladesh. Additionally, an Electronic Data Interchange (EDI) system has been introduced under the customs modernisation plan. There are several programmes which have been introduced by the Bangladeshi government in committing to Article VIII. These programmes include; the introduction of a self-assessment and rapid clearance procedure, simplification of tariff structures, customs modernisation with the objective of increasing the efficiency of customs clearance, and simplification of documentation procedures (Weerakoon et al., 2005).

The system EDI was established in Sri Lanka in 2004 under a project titled Sri Lanka Automated Cargo Clearance System (SLACCS), fulfilling the major provisions for technological improvement in trade procedures (ADB, 2009). According to the ADB (2009), EDI facilities must provide for the electronic submission of import/ export documents. Chaturvedi (2007) reported that there is a growing demand for transparency and non-discrimination in fees and charges in Sri Lanka with the provisions of online payments procedures. This report also indicated that Sri Lanka has simplified documentation and declarations with single window clearance procedures.

Nepal has also made considerable efforts to comply with Article VIII, which does away with charges to traders for the provision of information and makes most trade-related information freely available (Chaturvedi, 2007). They have introduced a new custom declaration form and a single administrative document to facilitate trade. Further, Nepal has introduced a system to

reduce documentation requirements and is progressing in the use of information technology for cargo handling (Weerakoon et al., 2005).

Pakistan has introduced an Electronic Assessment System (EASY) in 2000 to reduce the customs clearance time and provides online billing system for exports and imports. It is no longer required to present billing forms at Customs and an E-form number is sufficient. Chaturvedi (2007) reports that Pakistan has introduced a single administrative document (good declaration form) for both exports and imports, as well as a customs computerised system under the customs administrative reforms. Chaturvedi (2007) also indicates that India has substantially reduced the number of documents and number of copies needed for exports and imports; efforts have been made to avoid duplication information collections by Customs. In order to enhance coordination between border agencies, a broad institutional network has been introduced. The report further indicates that India operates a system for publishing release and clearance data quarterly. India has prioritised systematisation of customs codes at the eight-digit level for facilitating trade.

2.4.1.1.3. Publication and communications of trade regulations (Article X)

Sri Lanka has made a considerable progress in publication of trade regulations. Most trade regulations are available online and information related to penalties, customs appeals and judgements are accessible via the government gazette (Chaturvedi, 2007).

In Nepal, laws, regulations, administrative rulings, documentary requirements, standing practices and tariff classifications are available on the customs website. Weerakoon et al. (2005) indicated that Nepal plans to appoint an institutional body responsible for ensuring transparency and has developed inland customs depots at three border points (Birgung, Biratnagar and Bhairahawa) to reduce the time and cost of customs procedures. Nepal has established a client help desk, call centres and trade counters to give assistance. In addition, a rulings and appeals system has been introduced (Chaturvedi, 2007).

India offers advance rulings for classification, valuation and application for duty exemption related to exports and imports of production and manufactured goods. India uses electronic media extensively for disseminating information (Weerakoon et al., 2005) and a risk management system has been introduced at all customs points (Chaturvedi, 2007).

The Bangladeshi government supplies all the information related to trade but customs charge for providing information relating to rules and regulations at a flat rate. Details of such procedures and entry duties are available on the internet and the Bangladeshi port authority has initiated single-step service to reduce documentation and clearance time (Chaturvedi, 2007).

Pakistan has made laws, regulations and most administrative guidelines available on the internet. The country has implemented a tracking system using an electronic seal and application numbers to facilitate paperless trade transactions and single window clearance (Chaturvedi, 2007).

2.4.2. Regional initiatives

According to the (WTO, 2015), there is a rapid growth of number of Regional Trade Agreements (RTAs) with TF provisions. This trend reflects the expansion of RTAs in both developing-developing (South-South) countries and developed-developing countries (North-South). The RTAs TF provisions cover many areas which have not been covered by TFA (WTO, 2015). RTAs in South Asia are paying particular attention to regional TF issues. A regional integration agenda eliminating tariff and non-tariff barriers can never succeed without proper TF, because poor TF keeps entrepreneurs away from taking advantage of opportunities across borders in comparison with tariff barriers (Roy & Bagai, 2005). There are numerous RTAs in effect which cover the South Asian region, sub-regions and bilateral negotiations. The following section discusses few major RTAs and their provisions of TF.

2.4.2.1. South Asian Free Trade Area (SAFTA)

Recognising the importance of strengthening economic cooperation among South Asian countries, governments of the SAARC signed the South Asian Free Trade Area (SAFTA) in 2004, as a transition to the South Asian Preferential Trade Agreement (SAPTA). Adoption of a standardised TF by member countries is one of the objectives of SAFTA (SAARC, 1987).

Article 8 of this agreement establishes several additional recommendations for TF adoption which include;

a. Equalisation of standards, mutual recognition of testing and accreditation of testing laboratories of member countries and certification of products.
b. Simplification and harmonisation of customs clearance procedure.

c. Harmonisation of national customs classification based on HS coding system.
d. Customs cooperation in resolving entry point disputes.
e. Simplification and harmonisation of import licensing and registration procedures.
f. Simplification of banking procedures for financing imports.
g. Transit facilities for efficient intra-SAARC trade, especially for landlocked countries.
h. Removal of barriers to intra-SAARC investments.
i. Macroeconomic consultations.
j. Rules for fair competition and the promotion of venture capital.
k. Development of communication systems and transport infrastructure.
l. Making exceptions to foreign exchange restrictions, if any, relating to payments for products under the SAFTA scheme, as well as repatriation of such payments without prejudice to rights under Article XVIII of the General Agreement on Tariffs and Trade and the relevant provisions of Articles of Treaty of the International Monetary Fund (IMF).
m. Simplification of procedures for business visas.

2.4.2.2. The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)

This sub-regional organisation came into force in June 1997 in terms of a declaration made in Bangkok. This organisation includes seven member states: five from South Asia (Bangladesh, Bhutan, India, Nepal and Sri Lanka) and two from Southeast Asia (Myanmar and Thailand). BIMSTEC has also implemented several TF promotional programmes in order to promote free trade among members. They have identified areas such as transport and communication sector development as priority commitments. However, this agreement does not provide any special provision for TF (Chaturvedi, 2007; Roy & Bagai, 2005). International agencies such as the Asian Development Bank (ADB) provide technical assistance to BIMSTEC in developing policies and strategies to enhance physical connectivity and to develop a regional TF (Bayley, 2014).

2.4.2.3. The South Asia Sub-Regional Economic Cooperation (SASEC)

In addition to these two major intra-regional initiatives, there have been several sub-regional interactions between SAARC countries to strengthen intra-regional trade in South Asia. The South Asia Sub-regional Economic Cooperation (SASEC) focuses on the most significant TF

improvements. SASEC was established in 2001 as a project-based partnership to improve cross-border connectivity, boost trade among member countries and strengthen regional economic cooperation. The member countries are Bangladesh, Bhutan, India, the Maldives, Nepal and Sri Lanka. Since 2001, this organisation has contributed to the implementation of 44 regional projects ($9.05 billion) in energy, transport, TF, economic corridor development and the information and communications technology sectors (SASEC, 2016). ADB administers the SASEC programs. SASEC has established a TF Strategic Plan for 2014–2018, aiming to boost intra-regional trade through the reduction of time and costs. The TF strategic framework focuses on five priority areas (ADB, 2014b):

1. Customs modernisation and standardisation: This includes simplifying and expediting border formalities to facilitate the movement of goods, vehicles and people; increase the application of information and communication technology processing and developing a national single window system that would link all border agencies with the trading community.
2. Standards and conformity assessment strengthening: This aims to identify Sanitary and Phyto-Sanitary (SPS) sensitive commodities.
3. Cross-border facilities improvement: Establishing logistics facilities and services at major trade ports to facilitate trade.
4. Through transport facilitation: Develop a pilot bilateral transport facilitation arrangement.
5. Institution and capacity building: Enhance cooperation and coordination mechanisms among stakeholders to improve TF. SASEC has prioritised customs modernisation and harmonisation, as well as institution and capacity building during the first 2 years of the TF strategy.

In general, entire TF implementation programmes in South Asia proceed with similar objectives. However, the TFA implemented by WTO is focused only on simplification and harmonisation of trade procedures at borders to increase global trade, while other regional TF agendas target both border issues and behind the border issues including hard infrastructure developments, in order to stimulate intra-regional trade. However, it is very difficult to identify which TF measures are most efficient and have contributed to boost trade in the region. TF implementation programmes are no easy mission since the need for investment spending is immense. Bayley (2014) highlighted that the improvement of TF is a slow laborious process.

Efforts to achieve regional implementation targets have greater complexity and thus are more difficult to meet than national goals. Similarly, regional initiatives take longer to meet targets.

2.5. Concluding remarks

A facilitated trading system is a key to expanding trade. Trade is a foremost factor in achieving economic growth. Thus, efficient TF measures have the potential to enhance economy. South Asian trade is impeded by serious TF issues. As discussed in this chapter, South Asian TTCs, both direct and indirect, are relatively high. Obviously, traders are distressed by border delays which add further costs above direct charges for acquiring information, documentation costs, charges for logistic services and customs brokers and the customs clearance fees which increase with outsourcing to service providers. Such charges increase when border facilitations are insufficient and complicated.

Complex regional trade procedures and administrative barriers have led to laborious documentation to process trade transactions. Insufficient customs procedures and port handling, ineffective use of information technology and transit barriers are few of the major TF issues facing South Asia. Such barriers to trade affect landlocked countries more adversely, as trade by these countries faces additional red tape imposed by transit governments. The landlocked countries exhibit fragile economic growth leaving their poor among the poorest in the region. This has led to substantial regional disparities. Conversely, despite its position as regional leader in economic development, India is the home of the majority of the poor in the region. This chapter has ascertained that if the region could deliver trade goods and services across its borders on time and with minimum costs, it would increase export competitiveness and promote imports. Therefore, it is essential that South Asia can stimulate further growth in trade, in order to increase economic development and reduce poverty lags among the economies of the region. TF is one of the keys to improving regional trade and strengthening economies. There are several TF initiatives which have been implemented to bolster regional trade. WTO TFA is one of the mammoth implementation programmes currently being undertaken. In addition, there are several regional TF programmes active. However, further research is essential to identify which TF measures are more efficient for boosting trade across the region.

References

ADB. (2009). *National Strategies for Regional Integration: South and East Asian Case Studies*. Asian Development Bank: http://hdl.handle.net/11540/285.

ADB. (2014a). Bangladesh: Chittagong Port Trade Facilitation Project. Asian Development Bank: https://www.adb.org/sites/default/files/project-document/81275/36105-013-pcr.pdf.

ADB. (2014b). South Asia Subregional Economic Cooperation: Trade Facilitation Strategic Framework 2014-2018. Asian Development Bank: www.adb.org/sites/default/files/publication/111017/sasec-tf-strategic-framework-2014-2018.pdf.

Ahmed, S., & Ghani, E. (2008) Making regional cooperation work for South Asia's poor. *Policy Research Working Paper No. WPS4736*. Washington, DC: World Bank.

Ahmed, S., Kelegama, S., & Ghani, E. (2010). *Promoting Economic Cooperation in South Asia: Beyond SAFTA*. New Delhi, India: SAGE Publications

Anderson, J. E., & Wincoop, E. V. (2004). Trade Costs. *Journal of Economic Literature, 42*(3), 691-751. doi:10.1257/0022051042177649

Arnold, J. (2007). The role of trade facilitation in export growth. In S. Ahmed & E. Ghani (Eds.), *South Asia growth and regional integration* (pp. 191-235). Washington, DC: World Bank.

Banik, N., & Gilbert, J. (2008) Regional integration and trade costs in South Asia. *ADBI Working Paper 127*. Tokyo: Asian Development Bank Institute : http://www.adbi.org/working-paper/2008/12/19/2781.regional.integration.trade.costs.south.asia/.

Bayley, A. (2014) Policies to enhance trade facilitation in South Asia and Southeast Asia. *ADBI Working Paper 489*. Tokyo: Asian Development Bank Institute: http://www.adbi.org/working-paper/2014/07/09/6354.trade.facilitation.south.southeast.asia/.

Bernard, A. B., Redding, S. J., & Schott, P. K. (2007). Comparative advantage and heterogeneous firms. *The Review of Economic Studies, 74*(1), 31-66. doi:https://doi.org/10.1111/j.1467-937X.2007.00413.x.

Canut, O. (2013). *South Asia and the geography of poverty* Retrieved from World Bank: http://blogs.worldbank.org/growth/south-asia-and-geography-poverty.

Chaturvedi, S. (2007) Trade facilitation measures in South Asian FTAs: An overview of initiatives and policy approaches. *Working Paper Series No. 28*. Asia-Pacific Research and Training Network on Trade: http://www.unescap.org/tid/artnet/pub/tipub2466.pdf.

De, P. (2011). Why is trade at border a costly affair in South Asia? An Emprirical investigation. *Contemporary South Asia, 19*(4), 441-464. doi:https://doi.org/10.1080/09584935.2011.602666.

Decreux, Y., & Fontagne, L. (2011) Economic impact of potential outcome of the DDA. *CEPII Research Reports, No. 2009-01*. http://www.cepii.fr/CEPII/en/publications/reports/abstract.asp?NoDoc=1846.

Dennis, A., & Shepherd, B. (2011). Trade facilitation and export diversification. *The World Economy, 34*(1), 101-122. doi:https://doi.org/10.1111/j.1467-9701.2010.01303.x.

Djankov, S., Freund, C., & Pham, C. S. (2010). Trading on time. *The Review of Economics and Statistics, 92*(1), 166-173. doi:https://doi.org/10.1162/rest.2009.11498.

Engman, M. (2009). The economic impact of trade facilitation *Overcoming border bottlenecks: The costs and benefits of trade facilitation*. OECD Publishing: doi:https://doi.org/10.1787/9789264056954-4-en.

Francois, J., Meijl, H., & Tongeren, F. (2005). Trade liberalization in the Doha development round. *Economic Policy, 20*(42), 350-391. doi:10.1111/j.1468-0327.2005.00141.x.

Ghani, E., & Din, M., UD. (2006) Regional trade integration in South Asia: rationale, impediments and the way forward. *ART-NeT Policy Brief, No 7*. Bangkok: Asia Pacific Research and Training Network on Trade (ESCAP).

Hertel, T., & Mirza, T. (2009). The role of trade facilitation in South Asian economic integration. In K. Senga (Ed.), *Study on intraregional trade and investment in South Asia*. Manila: Asian Development Bank (ADB).

Hummels, D., Minor, P., Reisman, M., & Endean, E. (2007). Calculating tariff equivalents for time in trade. Washington DC: United States Agency for International Development (USAID): https://krannert.purdue.edu/faculty/hummelsd/research/tariff_equivalents.pdf.

Hummels, D., & Schaur, G. (2013). Time as a trade barrier. *The American Economic Review, 103*(7), 2935-2959. doi:10.1257/aer.103.7.2935

ICC. (2007). *Recommendations for a WTO Agreement on Trade Facilitation*. Retrieved from International Chamber of Commerce: https://iccwbo.org/publication/icc-recommendations-for-a-wto-agreement-on-trade-facilitation/.

Krugman, P. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics, 9*(4), 469-479. doi:https://doi.org/10.1016/0022-1996(79)90017-5

Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. *The American Economic Review, 70*(5), 950-959. doi:https://www.jstor.org/stable/1805774.

Melitz, M. J. (2003). The impact of trade on intra- industry reallocations and aggregate industry productivity. *Econometrica, 71*(6), 1695-1725. doi:https://www.jstor.org/stable/1555536.

Nordas, H., K., Enrico, P., & Geloso, G., M. (2006) Logistic and time as a trade barries. *OECD Trade Policy Working Paper, No. 35*. OECD Publishing: https://www.oecd-ilibrary.org/trade/logistics-and-time-as-a-trade-barrier_664220308873.

OECD. (2002) Business benefits of trade facilitation. *OECD Trade Policy Working Paper, No. WP(2001)21*. OECD publishing: http://www.oecd.org/trade.

OECD. (2003) Doha development agenda: welfare gains from further multilateral trade liberalisation with respect to tariffs. *OECD Trade Policy Working Paper, No. WP(2003)10*. OECD publishing: http://www.oecd.org/trade.

Otsuki, T. (2011) Quantifying the benefits of trade facilitation in ASEAN. *OSIPP discussion paper, No.DP-2011-E-006.* Osaka School of International Public Policy: https://core.ac.uk/download/pdf/6362014.pdf.

Panagariya, A. (2007). Trading choices of South Asia. In S. Ahmed & E. Ghani (Eds.), *South Asia's growth and regional integration*. Washington, DC: World Bank.

Persson, M. (2013). Trade facilitation and the extensive margin. *The Journal of International Trade & Economic Development, 22*(5), 658-693. doi:https://doi.org/10.1080/09638199.2011.587019.

Portugal-Perez, A., & Wilson, J., S, . (2012). Export performance and trade facilitation reform: Hard and soft infrastructure. *World Development, 40*(7), 1295-1307. doi:http://dx.doi.org/10.1016/j.worlddev.2011.12.002.

RIS. (2004). *South Asia development and cooperation report*. Retrieved from Reasearch and Information System for Developing Countries: http://ris.org.in/south-asia-development-and-cooperation-report-2004.

Roy, J., & Bagai, S. (2005) Key issues in trade facilitation: summary of World Bank/EU Workshops in Dhaka and Shanghai in 2004. *World Bank policy research working paper, No. WPS 3703*. Washington, DC: World Bank.

SAARC. (1987). SAARC charter. South Asian Association for Regional Cooperation: http://saarc-sec.org/saarc-charter.

Samuelson, P. A. (1954). The transfer problem and transport costs, II: analysis of effects of trade impediments. *The Economic Journal*, 264-289. doi:https://www.jstor.org/stable/2226834.

SASEC. (2016). SASEC vision and strategy. South Asia Subregional Economic Cooperation: www.sasec.asia/index.php?page=contact-us.

Shepherd, B. (2009). Enhancing export diversification through trade facilitation *ARTNeT policy brief, No.19.* Asia Pacific Research and Training Network on Trade: www.artnetontrade.org.

Shepherd, B., & Wilson, J. S. (2009). Trade facilitation in ASEAN member countries: measuring progress and assessing priorities. *Journal of Asian Economics, 20*(4), 367-383. doi:http://dx.doi.org/10.1016/j.asieco.2009.03.001.

Subramanian, U., & Arnold, J. (2001). *Forging subregional links in transportation and logistics in South Asia*. Washington, DC: World Bank: http://documents.worldbank.org/curated/en/529151468769277296/Forging-subregional-links-in-transportation-and-logistics-in-South-Asia.

UNCTAD. (2015). Statisttic of Handbook - 2015. United Nations Conference on Trade and Development: http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx.

UNESCAP. (2013). Impacts of trade facilitation measures on poverty and inclusive growth: case studies from Asia. United Nations Economic and Social Commission for Asia and the Pacific: http://www.unescap.org/sites/default/files/impacts%20of%20trade%20facilitation.pdf.

UNESCAP. (2015). UNESCAP trade costs database. United Nations Economic and Social Commission for Asia and the Pacifichttp: https://www.unescap.org/resources/escap-world-bank-trade-cost-database.

Weerakoon, D., Thennakoon, J., & Weeraratne, B. (2005). Multilateral agreement on trade facilitation-important but complex agenda for South Asia *South Asian Positions in the WTO Doha Round-in Search of a True Development Agenda* (pp. 249-296). Consumer Unity and Trust Society: http://www.cuts-international.org/.

Wilson, J., & Ostuki, T. (2007). Cutting trade costs and improved business facilitation in South Asia. In S. Ahmed & E. Ghani (Eds.), *South Asia's growth and regional integration*. Washington DC: World Bank.

Wilson, J., & Otsuki, T. (2007) Regional integration in South Asia: what role for trade facilitation? *Policy research working paper, No.WPS 4423*. Washington, DC: World Bank.

World Bank. (2000). World business environment survey World Bank: http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20699364~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html.

World Bank. (2007). *South Asia growth and regional integration*. Washington, DC: World Bank.

World Bank. (2010). South Asia economic update 2010: moving up, looking East: World Bank: http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1269620455636/6907265-1275784425763/SAREconomicUpdate7June2010.pdf.

World Bank. (2015a) Doing Business 2015: going beyond efficiency. Washington, DC: World Bank: doi: 10.1596/978-1-4648-0351-2.

World Bank. (2015b). South Asia extreme poverty falls but challenges remain: World Bank: http://www.worldbank.org/en/news/press-release/2015/10/15/south-asia-extreme-poverty-falls-but-challenges-remain.

World Bank. (2015c). The World Developement Indicators: World Bank: http://data.worldbank.org/indicator.

World Bank. (2016a). Doing Business Report: World Bank: http://www.doingbusiness.org/reports/global-reports/doing-business-2016.

World Bank. (2016b). The World Developement Indicators World Bank: http://data.worldbank.org/indicator.

World Bank. (2016c). World Integrated Trade Solusion World Bank: https://wits.worldbank.org/.

WTO. (2014). Protocol amending the marrakesh Agreement establishing the World Trade Organization: World Trade Organisation: https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm.

WTO. (2015) Speeding up trade: benefits and challenges of implementing the WTO Trade Facilitation Agreement. *World Trade Report - 2015*: World Trade Organisation: https://www.wto.org/english/res_e/booksp_e/world_trade_report15_e.pdf.

Zaki, C. (2014). An empirical assessment of the trade facilitation initiative: econometric evidence and global economic effects. *World Trade Review, 13: 1, 103–130*. doi:https://doi.org/10.1017/S1474745613000256

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

We, the PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

	Author's Name	% of contribution
Candidate	Manel Ahangamage	90%
Other Authors	Mahinda Siriwardana	5%
	Stuart Mounter	5%

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

The Chapter 2 published as a book chapter. The citation as follows;

Perera, S., Siriwardana, M., & Mounter, S. (2017). Trade facilitation, economic development and poverty alleviation: South Asia at a glance. In G. I. Staicu (Ed.), Poverty, Inequality and Policy. Rijwka, Croatia: InTech, doi:10.5772/intechopen.69948.

We, the PhD candidate and the candidate's Principal Supervisor, certify that the following text, figures and diagrams are the candidate's original work.

Type of work	**Page number/s**
Book chapter	13-53

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Chapter 7

Trade Facilitation, Economic Development and Poverty Alleviation: South Asia at a Glance

Subashini Perera, Mahinda Siriwardana and
Stuart Mounter

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/intechopen.69948

Abstract

South Asia faces enormous economic challenges unmitigated by generally poor economic growth. Increasing economic imbalance between countries hinders regional development. Recently, it has been confirmed that trade liberalisation aimed at expanding trade, has been insufficient in optimising the potential contribution of trade to economic development and reduce poverty. Thus, economists pay attention on Trade Facilitation (TF) which has the potential to contribute to economic development. This has motivated us to examine how TF can achieve this development in South Asia, where trade has yet to make its full contribution to economic growth. The aim of this chapter is to examine the economic impacts of TF on trade and economic growth in South Asia. Our analysis revealed that poor TF restricts trade between countries as it increases Trade Transaction Costs (TTCs). Trade delays are relatively high and affect the region's landlocked countries even more adversely. An efficiently facilitated trading system will enable these countries to participate more actively in global trade. There has been greater focus on TF policies in South Asia, however due to the complexity of TF measures and their investment needs, it is difficult to identify which TF measures have the most significance for the region.

Keywords: trade facilitation, trade transaction costs, economic growth, poverty, South Asia

1. Introduction

South Asia, as the world's second fastest growing region, demonstrates impressive economic growth and trade is escalating rapidly. The trade and economic growth of the emerging

Chapter 3. Trade Facilitation – Measurement difficulties in the Computable General Equilibrium model: A review[6]

Abstract

This paper reviews research on quantitative assessments of the economic impacts of Trade Facilitation (TF), based on Computable General Equilibrium (CGE) models, in the context of techniques adopted to estimate Trade Transaction Costs (TTCs). Insufficient TF poses a barrier to trade and is a major concern of the second generation trade policy agenda. Thus, recent CGE applications such as Global Trade Analysis Project (GTAP) model are generally associated with estimations of the benefits of eliminating TTCs by TF improvements, in that impacts of these trade barriers surpass those of tariff barriers, particularly in developing countries. However, accessing data relating to TTCs are limited, as no standard database has yet been developed. Thus, outcomes of existing CGE models vary in terms of the approach selected for TTC estimations. This paper outlines the methodological approaches adopted in recent research for estimating TTCs to incorporate into TF-related CGE models. Our literature survey revealed that two methods have been employed incorporating TTCs into CGE models and both approaches produced variances in estimating shortfalls. This review identifies the importance of developing a standard up to date trade costs database, including investment spending of TF implementations, which can be incorporated into GTAP aggregation to model TF variables, since cost benefit assessment is integral to determining the net global benefits of TF. Future TF related research should prioritise this process, since this is crucial for assessing the accurate economic impacts of eliminating TTC especially in developing countries.

Keywords

Trade Facilitation, Trade Transaction Costs, Computable General Equilibrium, Ad Valorem Equivalents.

[6] Perera, S., Siriwardana, M., & Mounter, S. (2017). Trade Facilitation-Measurement difficulties in the Computable General Equilibrium model: A review. *Theoretical Economics Letters, 7*(02), 154. doi:10.4236/tel.2017.72013

3.1 Introduction

Quantitative estimations of the benefits of Trade Facilitation (TF) initiatives are complex. The term TF has been applied to the economic effects of transporting or translocating goods and services across borders (narrow focus) and/or along the entire supply chain (wider focus). Hence, a definition of TF is dependent on the extent of measures incorporated (Otsuki, Honda, & Wilson, 2013) while the process of quantifying resultant economic benefits varies in complexity, relative to the inherent set of measures.

Insufficient TF poses a barrier to trade, increasing Trade Transaction Costs (TTCs). Improving TF minimizes TTCs in terms of the trans-border movements of imports and exports. Certain TTCs are transparent and data are available for estimating their economic impact. However, TF complications arising predominantly through trade delays and related indirect (time) costs are less demonstrable and more difficult to measure in monetary terms.

Despite the difficulties associated with measuring the economic impacts of TF, there have been numerous empirical studies which have attempted to estimate the impact of TF on global economic development. There are two dominant methods applied by trade economists to measure the impacts of TF: Partial Equilibrium methods (Gravity models) and Computable General Equilibrium (CGE) method.

Studies related to the gravity model are generally abundant in the literature since the model is not data intensive. This model only requires trade flows as dependent variables and the factors related to TTCs that could be lowered through efficient TF measures as independent variables. Thus, it requires only trade data and some proxies for TTCs. The results show a number of correlations. However, Hummels, Minor, Reisman, and Endean (2007) have argued that assessment of TF based on the gravity model has two inherent weaknesses. Firstly, the equation assumes a causal relationship between TTC variables and trade, which omits differentiation of particular trade costs. Secondly, gravity equations link trade volumes with other variables such as border waiting time, but do not estimate these delays in monetary terms. Hence, gravity model outcomes only partially outline the relationship between trade flows and TTC related factors. Reliability of model outcomes is dependent on model selection, data and interpretation of parameters (Hummels, 2000). Further, the outcomes of the gravity model are limited in the ability to account for real resource restrictions such as land, labour and capital. Nor does the

model define sectoral linkages, since no specific economic accounting scheme is imposed (Minor & Tsigas, 2008).

However, TF can affect trade flows (exports and imports) and hence production, factors of production and remuneration, government revenue and welfare impacts across the entire economy. The benefits of TF permeate the entire economy and, thus, assessing these impacts in a general equilibrium closure is imperative. The CGE modelling framework is better suited to assess the full extent of TF impacts, since it can explain the economy wide interactions (Dennis, 2006; Fox, Francois, & Londono-Kent, 2003). However, there is no TF related data available in CGE modelling databases for assessing TF economic impacts. Therefore, researchers estimate the costs of TF as tariff equivalents, based on econometric methods or sets of assumptions, in order to include these costs into the model database. After developing the baseline including the TF variables, CGE modellers can simulate different TF scenarios to determine the economic impacts of TF on both developed and developing countries, within the boundaries of estimation shortfalls. However, with no standard mechanisms to assess TF economic impacts within the CGE model, the TF related studies vary widely, depending on the method with which TTCs have been estimated and incorporated into the model.

This paper seeks to identify the importance of developing an updated TTC database which can be used as a supplementary input to the main databases in order to implement TF within the CGE framework. There is a paucity of research summarising the recent literature related to the estimating TTC. This paper reviews and critiques TF related CGE studies, focussing on the techniques employed to estimate TTCs and the methodological approaches used to assess the economic impacts within the CGE framework, as well as highlighting future research needs. The elements of TTC are discussed briefly in section 2 of this paper. The estimations of TTC and their implementation in CGE models is reviewed in section 3 in order to highlight the limitations of existing TF related CGE studies. The conclusions of this paper, together with comments and suggestions regarding future research, are provided in section 4.

3.2. Elements of Trade Transaction Costs

There are numerous reasons why TTC can arise at border crossings. According to OECD (2003), TTC related to border procedures varies depending on the efficiency and integrity of interacting businesses and administrations, type of goods and the size and type of business. For example agro-based commodities that are perishable by nature need quicker delivery times.

However, such goods are highly subject to documentary and physical inspections and other procedures at the border. This significantly increases the border process fees and clearance times. Shepherd (2010) details the circumstances whereby TTCs arise, including those that may be referred to as "natural" in the sense that they reflect inherent factors such as geographical distance or linguistic and cultural differences. In this sense, the total TTC is composed of both direct and indirect costs.

Direct TTC are the charges that are directly applied to trade transactions. This type of direct border transit cost includes customs clearance fees, charges of logistic services, and costs of providing necessary documentation. The direct costs are obvious and measurable in dollar terms. Improved TF lowers this type of cost by harmonizing and simplifying customs procedures.

Indirect TTC arises due to procedural delays at the borders. However, it is very difficult to express these in monetary terms since such costs are difficult to observe or tabulate. For example, Hummels (2000) explains that delays in transactions may necessitate additional inventory holding costs for traders in order for them to maintain buffer stocks to avoid inconsistent border clearance times. Hummels (2000) further states that inventory costs include both capital costs of the goods while they are in transit and costs of holding larger inventories to accommodate variation in arrival time. The latter has become increasingly important due to the use of "just in time" production techniques. The delays in border transactions may even cause traders to lose business opportunities because quick delivery is such an important element of the modern global business environment. This is most serious for those businesses trading fresh products, items with immediate information content such as newspapers, and goods for which demand cannot be forecasted well in advance, such as highly season-sensitive fashion apparel or seasonal holiday toys (OECD, 2003). The most obvious fresh products are agricultural and horticultural products that physically deteriorate with the passage of time. However, timely trade is also crucial for many technological products as consumers place a high value on purchasing the latest innovations (Hummels & Schaur, 2013). Therefore, time is becoming the most important factor in determining business competitiveness.

The empirical literature strongly points to the time consumed when goods and services are crossing borders for export or import as being a key element when addressing TTC. Hummels (2000) highlights that time savings can have immense benefits for international trade. Persson (2008) also argues that border delays are a good proxy for the TTC that TF aims to lower.

Djankov, Freund, and Pham (2010) further show that the impact of long time delays on trade is comparable to that of a tax on exports or imports due to depreciation of goods, resources being allocated to storage and transport instead of other uses, and/or increased uncertainty about delivery times.

3.3. Estimation of trade transaction costs and implementation in Computable General Equilibrium (CGE) Models

There are two types of global CGE model which have been used to assess the benefits of TF, the Global Trade Analysis Project (GTAP) model and Modelling International Relationships in Applied General Equilibrium (MIRAGE) model. The two differ in their approaches to modelling TF within the CGE framework. The iceberg method has been most commonly applied to TF within the GTAP model, whereby TTCs are introduced as a technical shift in the Armington import demand function. Thus, TTCs are treated as changes in the unobserved technical coefficient of "ams" in the import demand function. However, Walmsley and Minor (2015) have recently argued that the iceberg approach tends to overestimate the impacts of TF, and instead propose the "willingness to pay" method, which has not yet been empirically tested by other CGE modellers. Conversely in the MIRAGE model, TF is incorporated in the price and transport equations (Decreux & Fontagne, 2011; Zaki, 2014).

The majority of TF related CGE studies are based on the GTAP database and associated models, which may be classified as either static or dynamic. The standard GTAP model is a static model which does not account for long term growth effects. This limitation has led to the popularity of the GTAP dynamic model as it facilitates the inclusion of variables such as capital accumulation, population growth, labour supply and technological development. Whether static or dynamic, TF related GTAP models can be categorized as bi-lateral, regional or multilateral-global models.

TTC related data is not available in the standard GTAP database and hence, the introduction of TTCs into a GTAP model presents challenges. Studies of TF which have used the GTAP database as the main input display a variety of approaches to the estimation of TTC impacts on the import demand function. Most common has been the introduction of trade delays (time costs) as a proxy variable of TTCs, in that trade delays due to poor TF impact adversely on trade volumes. Time taken in moving goods to the market affects trade flows in two ways.

Firstly, it determines whether or not firms will enter a particular foreign market. Secondly, once a market entry is made, time affects the volume of trade (Nordas, Enrico, & Geloso, 2006). Faster transactions are critical for enhancing bi-lateral trade flows. However, analysis and estimation of the value of time is difficult due to the complexity and interdependencies of its impacts.

For this reason, some CGE modellers have included supplementary data as a proxy for the costs of trade delays, based on assessment of the validity of a case-specific set of assumptions. For example: OECD (2003) used the GTAP framework to assess the impacts of TF on developed and developing countries, assuming that the costs of trade delays are higher for agro-food products compared to manufactured products, and that small and medium enterprises incur higher time costs than larger enterprises. However, according to Hummels et al. (2007), this assumption is inconsistent through the sector, as trade delay costs of specific products such as dried grains and other bulk products are less than those of fresh products. Similarly, specific manufactured products costs such as clothing and electronic items also incurred relatively higher time costs than the mean for the sector. Hummels et al. (2007) substantiated such sectoral inconsistencies showing that some manufactured products suffer rapid depreciation in market value as a result of extended time delays. They further showed that costs of lengthy delays of intermediate goods accumulate throughout the value chain, with the final product reflecting the greatest sensitivity to delays. Thus, broad assumptions in estimating impacts and costs of trade delays across a supply chain may reduce the accuracy of results.

Some studies have attempted to estimate the impacts and costs of trade delays as Ad Valorem Equivalents (AVEs) of imports and exports (Hummels, 2000; Hummels et al., 2007; Hummels & Schaur, 2013). AVEs of time to trade indirectly measure the effects of improved TF as factors reflected in price changes. The price effect of TF is the difference between the market price and the hypothetical price resulting from improved TF measures. The AVEs form a percentage of the total value of the traded good. This method has practical value in capturing the aggregated effects of all TF measures where individual influencing factors cannot be extricated (Otsuki et al., 2013). Important principles relating to the estimation of AVEs of time in trade are covered in the above studies. Firstly, such data types assist researchers in the execution and development of quantitative TF impact analyses, similar to analyses of conventional tariff effects. Secondly, these AVE results enable policy makers to identify

efficient measures to improve TF in countries or trade sectors with higher trade costs and time sensitive products, whereby exports may be threatened.

Hummels et al. (2007); Hummels and Schaur (2013) calculated AVEs of trade time for 1000 traded commodities across 175 countries, as a modification to his paper (Hummels, 2000). The results confirmed that goods subject to rapid depreciation are time sensitive (fresh Agricultural commodities and some Manufactured products) while bulk products such as crude oil exhibit no such time sensitivity. Further, it was confirmed that AVEs for delays exceeded normal tariffs in every region. This approach for estimating AVEs for delays during the transaction refines the process of capturing indirect TTCs, enhancing the accuracy of evaluating TF impacts. Many later studies have tested the impact of trade delays based on AVE data.

Hertel, Walmsley, and Itakura (2001) used estimations of AVEs of time to trade in Hummels (2000) to model TF components, using the iceberg approach in the GTAP model to assess the Japan-Singapore Free Trade Agreement (FTA). Their assessment estimated the average value of a firm's willingness to pay for one day saved in trade as 0.5 percent ad valorem. In considering the value for time savings in specific product categories, bulk commodities were assigned lower values and intermediate goods highest value. The results of this dynamic GTAP model highlighted the importance of TF components in enhancing trade under the FTA. However, the implementation costs of TF improvements are enormous and possibly prohibitive for developing countries. Thus, assessing the cost-benefit analysis of TF implementation programs to enhance faster delivery of goods and services is vital, while capturing these costs in a macroeconomic model such as GTAP is important for greater accuracy of results and guarding against overestimations. However, Hertel et al. (2001) rated the implementation costs of TF improvements as small in relation to the potential benefits of this particular FTA.

The macroeconomic impacts of poor TF may, in specific cases, comprise both trade delays and unnecessary service charges arising from inefficiencies along the supply chain. Examples of inefficiencies include payments by traders for non-essential or uncompetitive border crossing services and the time involved in the multiple steps of specific border crossing operations (Fox et al., 2003). In such case studies, time costs can be modelled by the iceberg approach with AVEs and direct charges incorporated into the GTAP model, following the approach applied in modelling normal import tariffs (Dennis, 2006; Fox et al., 2003; Hoekman & Konan, 1999; OECD, 2003). These studies concluded that a reduction in indirect TTCs results in greater welfare gains, in comparison with a reduction in direct TTCs. However, if the treatment of

eliminating unnecessary service charges is considered as a complete deadweight loss, there would be a party who is worse off due to eliminating the revenue gain from these charges (Fox et al., 2003). Thus, a complete analysis of transaction flows related to TTCs is paramount.

In recognizing the importance of AVEs of trade delays in modelling the impacts of TF for the baseline in the GTAP model, Minor and Hummels (2013) constructed a new AVEs of time to trade database. This is a supplementary database to the existing GTAP database based on the estimations of (Hummels et al., 2007). The supplementary database aggregates time to trade for each product and country, based on the existing GTAP database (version 8.1) which includes 134 countries and 57 sectors. The aggregated time values were estimated using US trade and transport data. Hence, the application of the database to TF modelling within the GTAP model may have limitations in the case of developing countries.

In general, the AVEs of trade delays database is a useful adjunct to the GTAP model, as the data enhances simulations of reductions in time cost as a measure of TF improvements. This enables modellers to capture the overall effects of trade delays as a component of changes in prices of traded goods. However, a limitation of this approach is the lack of identification of individual TF elements that lead to increased time delays. Consequently detailed information is not provided on specific TF areas of improvement that countries should consider.

The impact on TF of specific influential variables differs according to the size and nature of the economy and the rules and regulations imposed by particular trading partners. Thus, an analysis of the TF components that explicitly affect the impact of TF on trade provides the basis for implementing TF improvement policies in developing countries. This may include measuring customs inefficiencies in terms of number of days and documents necessary to fulfil the export and import processes, availability of online document submission facilities, transportation infrastructure and the geophysical aspects of the country and its borders, such as being landlocked or an island. These factors can be used to identify how countries facilitate trade and the impact on international trade. Poor infrastructure may retard the development of both exports and imports and limit international trade growth (Brun, Carrere, Guillaumont, & De Melo, 2005; Francois & Manchin, 2013; Limao & Venables, 2001; Nordas & Piermartini, 2004; Portugal-Perez & Wilson, 2012). In gravity model-based studies, infrastructure is a quantitative element in determining TF. Poor institutional quality and underdeveloped infrastructure limit trade in developing countries, as well as market access for exports from developed countries. Behar, Nelson, and Manners (2009) found that improving trade logistics,

significantly reduced TTCs, while Fink, Mattoo, and Neagu (2002) highlighted the relative importance of communication costs, in comparison with other trade cost components.

AVEs of TTC data processed in gravity models can be used to model TF in the CGE framework. Initially, TTC parameters are estimated based on correlations between trade flows and TF variables derived by the gravity model. These estimated parameters are then used to develop a TTC database for different sectors and regions within the CGE multi-regional framework. This database provides CGE modellers with a supplementary input tool for their simulations. Zaki (2014) used the process to measure the costs of red tape (administrative and bureaucratic barriers) and the resultant impact on world trade. He assessed the impact of TF in developing and developed countries based on AVEs of administrative barriers to trade at a global level, using a modified version of the MIRAGE model. Two-step estimation was performed to obtain red tape AVE values. Firstly, time to export and import were regressed, using as determinants of numbers of documents demanded to export or import and procedures required to start a business, levels of internet coverage and corruption and ease of geographical access, in order to capture the institutional environment. These variables were used as proxies for administrative barriers. Secondly, the predicted values of time to export and import obtained from the first step were integrated into the gravity model and the outcome was used to compute AVE values. According to Zaki (2014), estimating AVEs of various TF variables, in addition to the time variable, enables researchers to capture the complexities of TF processes. The end results of the completed process facilitate a detailed understanding of the phenomenon of TF and its wide-ranging economic implications. Zaki (2014), however, emphasized that his estimations were measures of gross gains, since he was unable to capture precisely the implementation costs of TF, as data reflecting such costs at the global level, were unobtainable.

3.4. Conclusion and research needs

The outcomes of existing GTAP applications vary widely in terms of reference year of the study, TF components considered, sample-size of countries, in addition to choice of estimation approach in TTC and TF modelling. The empirical results of these studies have not been discussed, in that the primary purpose of this review was to assess limitations in the estimation of, and modelling approaches to, TF variables within the CGE model. This review has not focused on the evolution of TF related CGE studies, but rather on highlighting selected papers that have contributed significantly to the development of the related literature. We identified significant gaps related to the estimations of TTC and implementation of TF in the CGE

modelling framework. The two basic approaches employed to estimate TTCs were reviewed, considering that no specific TF data exist in the standard GTAP model. One approach to estimating AVEs of trade delays assumes that the effect of trade delays exceeds other direct charges. This approach is based on the demand function, derived from commodity specific estimates of the willingness of consumers and producers to pay to avoid time delays. However, developing this type of database is complex, costly and time consuming. Further, the existing database is based on US trade and transportation data and the validity and accuracy of applying generalised AVEs to other economies and regions is questionable. AVEs of time to trade data provide a limited method for the analysis of TF components, and thus some compromise in the accuracy of outcomes. The alternative approach estimates parameters of specific TF components to fit the gravity model, thereafter incorporating these into the CGE model. This approach has greater value for analysing the impact of TF in terms of special policy implementation programs, particularly in developing countries, since it enables modellers to argue which TF components need prioritization in a specific economy. Our research noted the minimal interest in developing a standard trade costs database, as a supplementary input to the main GTAP updated data base. A TF database is yet to be considered. Another important finding of our review is that incorporating the aggregated costs to the economy of TF implementation into the CGE model has not yet been investigated. CGE modellers point out the lack of information relating to TF implementation programs at the global level, with no mechanism to model these costs within the CGE framework. The majority of TF related GTAP models assume that TF can be achieved at no cost. There is a lack of investigations of governmental budget constraints in implementing TF measures in the GTAP applications. However, this may require large investment needs and government spending, particularly in developing countries. This must be a priority in future research as cost-benefit assessment is integral to determining the net global benefits of TF.

References

Behar, A., Nelson, B. D., & Manners, P. (2009) Exports and logistics. *Economics Series Working Papers, No. 439*. University of Oxford, Department of Economics.

Brun, J.-F., Carrere, C., Guillaumont, P., & De Melo, J. (2005). Has distance died? Evidence from a panel gravity model. *The World Bank Economic Review, 19*(1), 99-120. doi:10.1093/wber/lhi004.

Decreux, Y., & Fontagne, L. (2011) Economic impact of potential outcome of the DDA. *Working Papers, No. 2011-23*. CEPII research center: http://www.cepii.fr/CEPII/en/publications/reports/abstract.asp?NoDoc=1846.

Dennis, A. (2006) The impact of regional trade agreements and trade facilitation in the Middle East and North Africa region. *Policy Research Working Paper, No. WPS3837*. Washington, DC: World Bank.

Djankov, S., Freund, C., & Pham, C. S. (2010). Trading on time. *The Review of Economics and Statistics, 92*(1), 166-173. doi:https://doi.org/10.1162/rest.2009.11498

Fink, C., Mattoo, A., & Neagu, I. C. (2002). Trade in international maritime services: how much does policy matter? *The World Bank Economic Review, 16*(1), 81-108. doi:http://documents.worldbank.org/curated/en/598111468159608716/Trade-in-international-maritime-services-how-much-does-policy-matter

Fox, A. K., Francois, J. F., & Londono-Kent, P. (2003). Measuring border crossing costs and their impact on trade flows: The United States-Mexican trucking case *Global Trade Analysis Resource-1282*. Purdue University: www.gtap.agecon.purdue.edu.

Francois, J., & Manchin, M. (2013). Institutions, Infrastructure, and Trade. *World Development, 46*(0), 165-175. doi:http://dx.doi.org/10.1016/j.worlddev.2013.02.009

Hertel, T., Walmsley, T., & Itakura, K. (2001). Dynamic effects of the" new age" free trade agreement between Japan and Singapore. *Journal of Economic Integration*, 446-484. doi:https://www.jstor.org/stable/23000768

Hoekman, B., & Konan, D. E. (1999). Deep integration, nondiscrimination, and Euro-Mediterranean free trade *Policy research working paper, No. 2130*. Washinton, DC: World Bank.

Hummels, D. (2000). Time as a trade barrier *Purdue CIBER working papers, No. 7*. Purdue University: http://docs.lib.purdue.edu/ciberwp/7

Hummels, D., Minor, P., Reisman, M., & Endean, E. (2007). Calculating tariff equivalents for time in trade. United States Agency for International Development (USAID): https://krannert.purdue.edu/faculty/hummelsd/research/tariff_equivalents.pdf.

Hummels, D., & Schaur, G. (2013). Time as a trade barrier. *The American Economic Review, 103*(7), 2935-2959. doi:10.1257/aer.103.7.2935

Limao, N., & Venables, A. J. (2001). Infrastructure, geographical disadvantage, transport costs, and trade. *The World Bank Economic Review, 15*(3), 451-479. doi:https://www.jstor.org/stable/3990110

Minor, P., & Hummels, D. (2013). Time as a barrier to trade: A GTAP database of ad valorem trade time costs. ImpactEcon: http://mygtap.

Minor, P., & Tsigas, M. (2008). Impacts of Better Trade Facilitation in Developing Countries *GTAP resource, No. 2762*. Purdue University: https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2762.

Nordas, H., K., Enrico, P., & Geloso, G., M. (2006) Logistic and time as a trade barries. *Trade policy working paper, No. 35*. OECD: https://www.oecd-ilibrary.org/trade/logistics-and-time-as-a-trade-barrier_664220308873.

Nordas, H. K., & Piermartini, R. (2004) Infrastructure and trade. *Staff working paper, No. ERSD-2004-04*. Geneva, Switzerland: World Trade Organization.

OECD. (2003) Quantitative assessment of the benefits of trade facilitation. *Working paper, No. WP(2003)31*. OECD: http://www.oecd.org/trade.

Otsuki, T., Honda, K., & Wilson, J. (2013). Trade facilitation in South Asia. *South Asian Journal of Global Business Research, Vol. 2,* (No. 2), pp. 172-190. doi:https://doi.org/10.1108/SAJGBR-12-2011-0052

Persson, M. (2008). Trade Facilitation and the eU-aCP economic partnership agreements. *Journal of Economic Integration, 23*(3), 518-546. doi:https://www.jstor.org/stable/23001231

Portugal-Perez, A., & Wilson, J., S, . (2012). Export performance and trade facilitation reform: Hard and soft infrastructure. *World Development, 40*(7), 1295-1307. doi:http://dx.doi.org/10.1016/j.worlddev.2011.12.002

Shepherd, B. (2010). Facilitating services trade in the Asia-Pacific *ARTNeT Policy Brief*. Asia Pacific research and training network on trade: www.artnetontrade.org.

Walmsley, T., & Minor, P. (2015). Willingness to Pay in CGE Models *Working paper, No. 04*. ImpactECON: https://impactecon.com/?attachment_id=1014.

Zaki, C. (2014). An empirical assessment of the trade facilitation initiative: econometric evidence and global economic effects. *World Trade Review, 13: 1, 103–130*. doi:https://doi.org/10.1017/S1474745613000256

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

We, the PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

	Author's Name	% of contribution
Candidate	Manel Ahangamage	90%
Other Authors	Mahinda Siriwardana	5%
	Stuart Mounter	5%

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

The Chapter 3 published as a journal article. The citation as follows;

Perera, S., Siriwardana, M., & Mounter, S. (2017). Trade Facilitation-Measurement difficulties in the Computable General Equilibrium model: A review. Theoretical Economics Letters, 7(02), 154. doi:10.4236/tel.2017.72013

We, the PhD candidate and the candidate's Principal Supervisor, certify that the following text, figures and diagrams are the candidate's original work.

Type of work	**Page number/s**
Journal Article	62-71

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Scientific Research Publishing

Theoretical Economics Letters, 2017, 7, 154-163
http://www.scirp.org/journal/tel
ISSN Online: 2162-2086
ISSN Print: 2162-2078

Trade Facilitation—Measurement Difficulties in the Computable General Equilibrium Model: A Review

Subashini Perera*, Mahinda Siriwardana, Stuart Mounter

UNE Business School, University of New England, Armidale, Australia
Email: *aperera4@myune.edu.au

How to cite this paper: Perera, S., Siriwardana, M. and Mounter, S. (2017) Trade Facilitation—Measurement Difficulties in the Computable General Equilibrium Model: A Review. *Theoretical Economics Letters*, **7**, 154-163.
https://doi.org/10.4236/tel.2017.72013

Received: November 10, 2016
Accepted: February 1, 2017
Published: February 4, 2017

Abstract

This paper reviews research on quantitative assessments of the economic impacts of Trade Facilitation (TF), based on Computable General Equilibrium (CGE) models, in the context of techniques adopted to estimate Trade Transaction Costs (TTCs). Insufficient TF poses a barrier to trade and is a major concern of the second generation trade policy agenda. Thus, recent CGE applications such as GTAP are generally associated with estimations of the benefits of eliminating TTCs by TF improvements, in that impacts of these trade barriers surpass those of tariff barriers, particularly in developing countries. However, accessing data relating to TTCs are limited, as no standard database has yet been developed. Thus, outcomes of existing CGE models vary in terms of the approach selected for TTC estimations. This paper outlines the methodological approaches adopted in recent research for estimating TTCs to incorporate into TF-related CGE models. Our literature survey revealed that two methods have been employed incorporating TTCs into CGE models and both approaches produced variances in estimating shortfalls. This review identifies the importance of developing a standard up to date trade costs database, including investment spending of TF implementations, which can be incorporated into GTAP aggregation to model TF variables, since cost benefit assessment is integral to determining the net global benefits of TF. Future TF related research should prioritise this process, since this is crucial for assessing the accurate economic impacts of eliminating TTC especially in developing countries.

Keywords

Trade Facilitation, Trade Transaction Costs, Computable General Equilibrium, Ad Valorem Equivalents

DOI: 10.4236/tel.2017.72013 February 4, 2017

Chapter 4 Trade delays constitute a conclusive barrier to economic development: Should South Asia be motivated accordingly?[7]

Abstract

Time is a critical determinant of international trade competitiveness, global value chain integration and, consequently, regional economic development. South Asia, as a partially integrated developing region, manifests a greater accumulation of trade delays than other developing regions. The regional economy wide impacts of these delays remain unquantified, necessitating a comprehensive cross-country, cross-sector assessment. This study applies the Global Trade Analysis Project (GTAP) model to assess the economic benefits of regional commitment to trade delay reductions, with particular emphasis on customs processing, port and terminal handling procedures, and inland transport delays. The effects of trade delay reduction are compared with tariff removal. The study is the first to incorporate the sector and country specific Ad Valorem Equivalents (AVEs) of time in trade database to supplement the current GTAP database in quantifying the economy wide impacts of trade delays in South Asia. The simulation results reveal a substantial improvement in both South Asian extra-and intra-regional trade volumes, in that reductions of delays associated with inland transport would increase trade in landlocked regions, while reductions in delays in ports and terminal handling and customs procedures would produce substantial trade gains in neighbouring regional nations. Overall, 90% of the estimated welfare improvements are due to trade delay reductions and delays are shown to impede trade more severely than import tariffs in South Asia. The findings of this study highlight the need for further research into extending the GTAP modelling framework to incorporate the economic costs of reducing trade delays and provide a platform for exploring more effective trade facilitation policy options.

Key words: Trade Delays, Trade Facilitation, GTAP model, developing countries, South Asia

[7] Perera, S., Siriwardana, M., & Mounter, S. (2018). Trade delays constitute a conclusive barrier to economic development: Should South Asia be motivated accordingly? The World Economy, under review.

4.1. Introduction

South Asia confirmed its rating as one of the world's fastest-growing economic regions, returning a regional 7% real Gross Domestic Product (GDP) in 2016 (World Bank, 2017b). However, constituent nations display a growing economic diversity, reflected in the widening gap between the leading and lagging regional economies since 2007 (World Economic Forum, 2016). Overall, India dominates the regional economy, maintaining the largest land area (62%), population (75%) and real GDP (83%), while the GDP share of the next largest regional economies of Pakistan and Bangladesh constitutes 7.6% and 5.6% respectively (World Bank, 2016). The South Asian regional population is approaching 250 million, who live on average income of $1.90 per day (World Bank, 2013). South Asia is the least integrated global region in terms of trade and investment which is a critical issue for sustained economic development and poverty reduction. World Bank (2017b) statistics indicate that the total exports of Europe and Central Asia account for more than 30% of GDP in those regions, demonstrating that trade is the key to economic growth, whereas South Asian exports only contribute about 10% of regional GDP. South Asian intra-regional trade comprises only 5% of total trade, while in Europe and East Asia it accounts for 60% and 35%, respectively. The potential, however, exists for increased trade among South Asian neighbours. For example, Bangladeshi exports to India can increase by a potential 300% (World Bank, 2017c). On the other hand, the major South Asian export destinations remain developed regions, with exports limited to a few labour intensive commodities such as Textile and Wearing Apparel (T&W), while imports include capital intensive intermediate products. The USA and EU are the leading export markets for the four largest economies of South Asia; India, Pakistan, Bangladesh, and Sri Lanka, and regional income largely depends on the economic prosperity of these developed countries. The World Bank (2017b) indicates that a 1% GDP growth in the US and EU, is followed by a South Asian response of about 0.5% in the following quarter. Perhaps, the most depressing reality of regional trade is that developed countries invest in the labour intensive industries of South Asia to gain a comparative advantage from the use of abundant labour, making the South Asian labour force vulnerable to global economic shocks.

Despite the gradual elimination of import tariffs and other non-tariff barriers, trade liberalisation remains ineffective due to unnecessarily high trade costs, one of the major determinants of global trade participation. The World Bank (2017c) shows that Indian-Brazilian bilateral trade is 20% less costly than Indian-Pakistani trade. Arvis, Duval, Shepherd,

Utoktham, and Raj (2016), pointed out that it was less expensive to ship goods via Singapore than trade directly between two points in South Asia. While elsewhere intra-regional trade costs less than extra-regional, in South Asia these costs are approximately equal. Arvis et al. (2016) revealed that Ad Valorem Equivalent (AVE) of trade costs in the South Asian manufacturing sector amount to 116%, and 195% in the agricultural sector. Ahmed and Ghani (2008) demonstrated that trans-border trading costs of India and Bangladesh are nearly double and Afghanistan, Bhutan, and Nepal are treble compared to China.

Trade costs contain direct and indirect components. Direct trade costs arise from direct charges of trade transactions while indirect trade costs occur from delays and are often unforeseen. Trade delay is a critical factor in global supply chains. Unreliable or delayed deliveries lessen competitiveness and deteriorate product values by adding unnecessary costs. This becomes more critical in trading perishables and other time sensitive goods, such as seasonal fashions, and periodical or intermediate items, such as parts and components. Arnold (2007) asserted that trade competitiveness is dependent, not only on actual product costs and quality, but on time between ordering and receiving, as well as reliability in fulfilling agreed upon delivery times. Bangladeshi and Indian T&W manufacturers frequently use expensive airfreight for delayed shipments, to demonstrate reliability rather than lose customers. Thus, exporters understand that the time factor is crucial for maintaining business competitiveness. Hummels and Schaur (2013) argued that delay costs incur the cost of market depreciation. These include the costs of spoilage of fresh produce and superseding of electronic goods, in that consumers are generally willing to pay more for the latest innovation. Further costs of delays are incurred through buffer stocks that traders maintain to offset unreliable deliveries. These additional inventory items comprise cycle stock offsetting infrequent shipments, pipeline inventory offsetting extended lead time from source to destination, and safety stock offsetting unreliability of shipments. These may be classed as equivalents of export taxes, as they involve the costs of depreciation and additional storage and transportation (Freund & Rocha, 2011; Hausman, Lee, & Subramanian, 2013). Trade delays impact not only on trade volume but also on domestic production which is dependent on specific imported parts and components for manufacturing. Supply chain interdependency has developed globally and, hence, delivery delays of imported parts and components equally impede the production cycle. The development of segmented production chains renders the temporal element more crucial than in the past; all supply chain disruptions have a negative economic impact (Martincus, Carballo, & Graziano, 2013; Zaki, 2013).

Delay costs may accrue in any transaction of time sensitive commodities and exporters tend to compensate by reducing shipment volumes, limiting distant export markets, or opting for quicker, but more costly, airfreight. This potentially reduces export volume and competitive value when added costs are borne by end consumers. Hoekman and Nicita (2011) highlighted that South Asian nations face more market entry difficulties than other developing countries, due to their export composition. South Asian imports comprise 42% raw materials, 30% intermediate goods (parts and components) and 16% capital goods (World Bank, 2015). Output depends on the timely delivery of these items. World Bank Doing Business (DB) indicators rank the South Asian region trans-border delivery of goods to the markets as the slowest of all global regions, other than sub-Saharan Africa. Border compliance averages 59.4 hours for exports and 113.8 hours for imports, while documentary compliance takes 77 hours and 104.7 hours for exports and imports, respectively (World Bank, 2017a).

It is clear that time is a critical driver in determining the competitiveness of international trade and, thus, the integration of the global value chain. A number of studies have attempted to estimate the impact of trade delays using the partial equilibrium gravity model and general equilibrium Global Trade Analysis Project (GTAP) Model. The former provides sufficient evidence of the contemporary relationship between time and trade flows. The latter model has not been adequately applied to estimations of the economic impact of trade delays in South Asia; a developing, less integrated global region with greater accumulation of delays compared to other developing regions. The broad regional economy wide impacts of these delays remain unquantified. South Asia has committed to the World Trade Organization (WTO) Trade Facilitation Agreement (TFA), implemented in February 2017. In theory, the reduction of trade delays increases trade volume and, consequently, national income and economic growth. Such reforms can also affect the trade volume of a country's trading partners, and due to supply chain linkages, inter-sectoral growth as well. Therefore, cross-country, cross-sector assessment is essential to determining the overall economic effects of trade delays. An estimation of potential economic benefits of accelerating border transactions in South Asia is vital. The key objective of this study was to assess the impact of regional commitment to trade delay reductions on economic development based on the GTAP model. Second objective was to compare the economic effects of tariff removals and trade delay reductions, on the basis of a broad trade economists' assessment that existing tariff liberalisation policies are partially ineffective due to problematic sensitive lists in ongoing Free Trade Agreements (FTAs). Hence, we aimed to assess the simultaneous impact of import tariffs, and trade delay costs on

trade volumes to compare the effects of possible trade liberalisation policies with Trade Facilitation (TF) policies.

This study's original contribution to trade and economic development literature is threefold. Firstly, the use of the GTAP model and AVEs of time in trade database to quantify the economy wide impacts of trade delays in South Asia is unprecedented. Some studies have focused on estimating the economic effects of timeliness using the GTAP model, however the findings are subject to various types of databases or indicators, particularly variations of the time period and modelling approach. Secondly, a single database is used to quantify the overall economic impacts of trade delays and assess the timeliness impacts on border transactions in South Asia focusing on inland transport, customs operations, and port and terminal handling. The stage at which the border transaction processes takes longer and, consequently, affects trade more adversely is identified. This type of analysis is valid for the prioritisation of TF policy creation to accelerate and simplify border transactions, which has not occurred previously in South Asia. Thirdly, the two major time costs databases evident in the literature are compared to gain a greater understanding of the benefits and limitations of each time costs estimation procedure. Finally, we intend that the results of our study draw attention to the urgency for TF improvements in South Asia, based on our findings that a reduction of trade delays can increase trade volumes and deliver significant welfare improvements.

The remainder of the paper is structured as follows: Section two reviews the current literature on previous estimations of the impacts of trade delays on trade flows based on gravity models and the GTAP model. Section three provides a discussion of the AVEs of time in trade and compares the two major databases in South Asia. The methodology is presented in Section four and the simulation results and associated discussions are provided in Section five. Section six summarises the key findings and suggests potential further research towards the South Asian acceleration of border transactions.

4.2. Measuring the cost of trade delays and its economic impacts

Border crossing delays increase trade costs, thus, reducing export sales. Additionally, delays destabilise domestic production reliant on imported parts and components, causing higher consumer prices. Where consumers are willing to pay more for faster deliveries to receive quality products, traders can remain competitive with just-in-time deliveries. These facts

motivate researchers to investigate the relationship of time in trade and economic development. Quantifying trade delay costs is complex due to unforeseen costs in transaction time and the need to convert day delays into dollars. No definitive method of estimating costs of time to trade can be found in related literature, despite substantial progress in methods used in recent research which show variations in defining the costs of delays, and the scope of estimations, data and time frames. Generally, time cost estimates are based on gravity models, which adequately illustrate the relationship between time variables and trade flows and examine the effects on aggregate trade, or sectoral bilateral trade, of border transaction delays. They supply sufficient evidence for investigating time costs and their economic impact, where costs of time are implied but unmeasured. Certain studies have employed time costs associated-common proxy variables. In terms of measuring the explicit effects of trade in time, a few studies have used AVEs of time in trade, which has made a significant contribution to the methodology of measuring time costs and assessing the impact of trade delays on economic development.

In the gravity model, the effects of trade delays are mostly computed based on the number of days to import/export. The gravity model estimates of Freund and Rocha (2011) showed that a one day delay at inland transit, within Sub-Saharan Africa, reduces export values by about 7%, especially for time sensitive commodities. Korinek and Sourdin (2010) found that an additional day transit of a shipment reduces bilateral trade by 4.5%. Djankov, Freund, and Pham (2010) showed that a delay of one additional day reduces trade by more than 1%. This estimation considers time as the major explanatory variable, based on the number of days taken to move cargos from factory to ship in 126 countries. Martincus, Carballo, and Graziano (2015), investigated the impact of customs delays on export performance using customs clearance times of Uruguayan export transactions between 2002 and 2011. Nordas, Enrico, and Geloso (2006) estimated the impact of time on trade, using a control of corruption index as a proxy variable for lead time and time variability. They concluded that time is an important determinant of trade volumes for time sensitive tradable goods (electronics sector) and a decisive factor when considering entry to time sensitive export markets. However, no direct measures of time factors were incorporated. Hillberry and Zhang (2015) addressed trade delays treating time as a dependent variable to estimate the impacts of WTO TFA related customs policies on trade transaction time and revealed that the value of the reduction of time due to these policies is equivalent to a mean tariff reductions of 0.9% on imports and 1.2% on exports. Liu and Yue (2013) showed that time delays affect product quality and price, relative to their degree of perishability.

The literature covering impacts of trade costs on trade flows includes more comprehensive approaches, assessing all costs directly and indirectly affected by border delays. Anderson and Wincoop (2004) estimated trade costs, inclusive of time costs, policy barriers, and other related costs at borders, together with an analytical account of the gravity model and its assumptions for producing robust estimates. Other literature has focused on integral structural factors, such as infrastructure, logistic performance, institutional quality, communications, and transportation in the relationship of trade delays and costs (Behar, Nelson, & Manners, 2009; Bougheas, Demetriades, & Morgenroth, 1999; Devlin & Yee, 2005; Fink, Mattoo, & Neagu, 2005; Francois & Manchin, 2013; Freund & Weinhold, 2004; Hausman et al., 2013; Hoekman & Nicita, 2011; Iwanow & Kirkpatrick, 2009; Korinek & Sourdin, 2011; Limao & Venables, 2001; Njinkeu, Wilson, & Fosso, 2008; Yadav, 2014). The primary approach to reducing trade delays and trade costs is improving TF. The Organisation for Economic Cooperation and Development (OECD) developed TF indicators, which are applied widely in many regions to assess the economic impacts of trade costs. These sets of indicators offer detailed analyses of policies that enhance faster trading, and identifying specific areas requiring TF improvement, to reduce trade costs (Moise, Orliac, & Minor, 2011; Moise & Sorescu, 2013). Further, greater efficiency of customs procedures in Dennis and Shepherd (2011) and port operations in Feenstra and Ma (2014) have proven to be significant for economic development. More predictable and simplified transactions reduce trade costs by improving trade transparency and, thus, expanding trade flows (Helble, Shepherd, & Wilson, 2009). These studies provide evidence that protracted procedures tend to generate inefficiency, besides increasing the duration of border processing.

The gravity model also provides elasticity estimations of time related variables to demonstrate the percentage changes in bilateral trade due to changes in delivery time. This type of estimation generally provides AVE of time in trade values. AVEs of time in trade can be described as percentage shares of the trade value or AVEs of trade delays relative to the AVEs of tariff or relative prices that describe the costs of the delays. Hausman et al. (2013) found that a 1% reduction in export processing time and costs resulted in 0.37% and 0.5% increase in bilateral trade, respectively. Persson (2008) showed that, on average, cutting trade delays by one day increased exports by about 1% in the exporting country, while the same reduction in the importing country increased imports by 0.5%. Similarly, Clark, Dollar, and Micco (2004) found that improving port efficiency from 25% to 75% reduced shipping costs by 12%, while an equivalent reduction of transportation inefficiency increased bilateral trade by 25%. Persson

(2013) estimated that if the number of days needed to export an item declined by 1%, the number of differentiated and homogeneous product exports rose by 0.6% and 0.3%, respectively. Indicators associated with port efficiency, customs environment, regulatory environment, and e-business usage have been used to assess TF impacts on trade flows. It was found that if Asian Pacific members improve these indicators half away to the average of the region, trade would increase by 21 percent (Wilson, Mann, & Otsuki, 2003). Further, improving these indicators to 50% of the global average would increase global trade by $377 billion (Wilson, Mann, & Otsuki, 2005). This study emphasized that South Asia has greater potential to increase trade by TF improvement than other regions. Prabir (2008) estimated that a 10% reduction in transport costs would increase trade by between 1 and 6% while improving infrastructure quality boosts trade by between 0.6 and 1%. In a later article, the same author estimated that reducing border transaction costs by 10% would increase South Asian exports by about 2% (Prabir, 2011). Based on the frequency and size of shipments, Hornok and Koren (2015) estimated that a 50% reduction of AVEs of administrative costs per shipment is equivalent to a 9% reduction in tariffs. The gravity estimations of Portugal-Perez and Wilson (2009) included AVEs of trade for the African region and confirmed that reducing trade costs produced substantial positive gains in regional trade.

A global database which captures the impact of trade delays is a fundamental resource in trade policy analysis, since there is a lack of data to compute monetary values of trade delays at national and sectoral levels. Some prominent studies have estimated AVEs of time in trade, elucidating the bilateral trade percentage benefits derived exclusively from reducing trade related border transaction delays. This facilitates the compilation of AVEs of time in trade values for different commodities and in some cases countries, and determining delay costs in both export and import flows. Two examples are particularly significant. The first relates to the time in trade AVE estimates based on willingness to pay to avoid trade delays. Hummels (2000) developed estimates of AVEs of time in trade based on firm choices of the trade-off between air freighting and Standard Ocean freighting using US trade and transport data for the period 1974-1998. The AVEs of per day time saving estimate revealed that each day saved in the shipping time of manufacturing goods equals 0.8% AVEs and an additional day reduces the potential of trade by 1% for all commodities and 1.5% for manufacturing commodities. Hummels, Minor, Reisman, and Endean (2007), extended Hummels' original research into a global database compiled from US 1991-2000 transport data, containing worldwide total AVE values of time in trade for each product. Their results showed that AVEs of import delays

exceeded tariff in every region, while bulk products were less time sensitive than manufacturing and fresh products. Extending the model further, Hummels and Schaur (2013) estimated per day time costs of AVEs using US 1991-2005 trade data which included air freight premiums paid and ocean transit time lags. They showed that per day AVEs of transit delays equalled between 0.6 and 2.1% of traded value, with parts and components exhibiting the greatest time sensitivity. AVE estimates in these three studies have since been used in many impact of time on trade studies (Dennis, 2006; Fernandes, Hillberry, & Alcantara, 2015; Fox, Francois, & Londono-Kent, 2003; Hertel, Walmsley, & Itakura, 2001; Minor & Hummels, 2013; Minor & Tsigas, 2008; Walmsley & Minor, 2015). Minor and Hummels (2013) developed a new database using the primary AVEs global database of Hummels et al. (2007) to supplement the GTAP database for estimating the economy wide impacts of trade delays. This database includes product, sector and country per day AVEs of time in trade values compatible with GTAP aggregation.

The second approach is the estimation of AVE time values for manufacturing products in 138 countries based on administrative barriers using the gravity model (Zaki, 2015). The study was executed in two steps. The first determined time to export and import based on the number of required documents, internet usage, geographic variables, corruption, and number of procedures to start a business. The second predicted time to import and export variables, which were incorporated into the gravity model to determine the effects of time in trade on bilateral trade and, consequently, estimate the AVEs of time in trade. This study found that perishable, seasonal and value added goods produced high AVE values. Whereas Zaki (2015) analysed administrative barriers to trade, Hummels et al. (2007) analysed transport costs and price effects. Their estimation methods and data differed and, consequently, outcomes differed. However, both datasets are constructive in terms of assessing the impacts of trade delays on bilateral trade (these AVE estimates are compared in Section 3). Personal preferences in data selection inevitably hold the potential for individual bias. However, these studies provide a resource for further studies of the time costs estimations and the use of these time costs estimates hold validity for assessing the economy wide welfare impacts of trade delays based on Computable General Equilibrium (CGE) models.

4. 2.1. Implications of trade delays in Computable General Equilibrium (CGE) models

CGE models have been widely used to analyse economy wide impacts of tariff and non-tariff barriers (NTBs) as they provide a more constructive outcome for policy makers. Many of these barriers have been slowly reduced or eliminated and policy makers are now paying more attention to reducing border transaction times in developing countries. The complex nature and diversity, together with a lack of data availability in the literature present challenges in the analysis and quantification of the economy wide impacts of trade delays within a CGE framework. Value of time costs are conventionally transposed into AVEs, as discussed in the previous section, and then incorporated into the CGE model for simulations. This is especially applicable to the use of GTAP model, since a reduction of export processing times in one country impacts significantly on imports in its partner countries. The GTAP model facilitates the replication of the global effects of time cost reductions. Hence, a substantial category of literature has focused more on GTAP modelling of AVE time costs changes.

In general, the effects of NTBs can be implemented in the standard GTAP model as import or export side effects, or efficiency effects, using AVEs (Burfisher, 2017; Fugazza & Maur, 2008; Walmsley & Minor, 2015). These can be explained as tax effects via the changes of prices captured as economic rents to the exporter/importer, or import augmented technical changes due to trade inefficiencies. AVEs representing inefficiencies are termed “Sand in the Wheels” of trade (Burfisher, 2017; Fugazza & Maur, 2008). Such inefficiencies increase trade costs and are represented in the GTAP model as iceberg costs, since a part of the traded commodity melts away due to border transaction losses. Thus, iceberg cost reduction lowers trade costs, enhances import efficiency, decreases import prices and increases import volumes. In GTAP, the “ams” variable represents import-augmenting technical change. A positive shock of AVEs to “ams” indicates an import price reduction; hence, increased import quantity.

The iceberg approach is the most commonly used method for implementing trade delays in the GTAP model. The concept of technical efficiency losses due to the iceberg effect was first introduced by Samuelson (1954), to model transport costs in trade. Since Hertel et al. (2001) first used it in the GTAP model, it has been commonly applied to assess trade inefficiency impacts. Hertel et al. (2001) used AVEs of time in trade values in Hummels (2000) and applied a positive shock to the “ams” variable to model customs delays in assessing the Japan-Singapore Economic Partnership Agreement. The study revealed that the benefits of

accelerating customs procedures exceeded those of tariff removals. Adopting a similar approach, later studies have used the technical efficiency variable to apply trade cost related shocks to the GTAP model (Dennis, 2006; Fox et al., 2003; OECD, 2003).

Several GTAP studies have examined the simultaneous effects of trade liberalisation and TF, showing that, generally, TF benefits exceed those of trade liberalisation. Using the GTAP model, Francois, Meijl, and Tongeren (2005) assessed tariff removal, service trade liberalisation and TF in the WTO Doha negotiations and assumed TF related trade costs amount to 1.5 % and were implemented following the iceberg approach. Zaki (2014) used the iceberg method to model administrative barriers on trade, using the Modelling International Relationships in Applied General Equilibrium (MIRAGE) model. These estimations were based on global AVEs of administrative barriers and included greater simulation details to show a variety of TF gains. The confirmation that trade gains, and thus welfare gains, hold greater significance for developing, rather than developed, countries; that long-run welfare gains from administrative barrier reductions are higher than short-run; and that these gains will promote both intra- and extra-regional trade, as well as increase export diversification in time-sensitive sectors, holds a powerful message for South Asia.

Walmsley and Minor (2015) introduced a new methodological approach in their CGE based supply chain modelling of trade delay impacts, treating demand-side effects and comparing iceberg effects described as the 'Willingness to Pay Method'. It is based on the analysis of consumer preferences for faster delivery, in terms of customs delay reductions due to the WTO TFA. The changes in willingness to pay facilitated by the reductions in customs delays are assumed to increase utility and, consequently, welfare. The willingness to pay model produced a smaller change in real GDP than iceberg effects, but resulted in greater terms of trade and welfare improvement, particularly for private households. The authors contended that welfare rises due to utility enhancement resulting from the consumption of more preferred imported and domestically produced commodities, while under the iceberg method, the welfare gain is only attributable to productivity gains from imports.

Implementation of any TF measure to reduce trade delays requires substantial investment costs. Therefore, countries face costs to gain from reducing trade delays. In general, NTM reductions incur adjustment costs at the firm level, as production methods must be altered to meet the new requirements. Conversely, administrative and regulatory reforms incur adjustment costs at country level (Rau & Verma, 2015). In general, programs related to trade delay reductions lead

to country level adjustment costs. Therefore, assessments of both benefits and costs of TF policies are imperative and adjustment costs must be implemented in the GTAP model together with the delay costs, since the effects of TF implementation costs can be substantial. However, there is limited research for the inclusion of TF implementation costs into GTAP modelling. The studies reviewed covered the iceberg impacts of TF but excluded implementation costs. There are studies that argue that TF benefits outweigh implementation costs. Moise (2013) estimated the costs of implementing the WTO TFA and confirmed that these are smaller than the value of benefits gained. The study noted specific measures that would be expensive to implement but carry low operational costs, thus, requiring political commitment rather than funding. Rau and Verma (2015) highlighted cases carrying unavoidable substantial NTBs adjustment costs. Their study modelled NTMs as standard iceberg costs, by modifying the GTAP model to include adjustment costs, in assessing the FTA between Ukraine and the EU. The authors showed that modelling only NTM removals was insufficient to derive the true benefits, since adjustment costs were significant in determining the model results. This is applicable to implementing trade delays in the GTAP model, since the initial TF investment costs of trade delay reductions are likely to be enormous.

CGE model assessment of South Asian regional TF effects is limited. A few studies have compared the effects of TF improvements from import tariff elimination with trade cost reductions. Francois and Wignaraja (2008) used a CGE model to examine the impacts of the East and South Asian economic integration based on tariff removal and trade cost reduction. TF related AVEs were derived from a gravity model, revealing potential gains of 2 to 4% in GDP through export growth from this integration. Wignaraja, Morgan, Plummer, and Zhai (2015) also estimated the economic benefits of the same integration, based on the elimination of tariff and non-tariff barriers and the reduction of trade costs. Trade cost reductions were attributed to hard and soft infrastructure improvements, arising from additional connectivity between the two regions, and implemented in the GTAP model as standard iceberg. Overall results produced aggregate income increases amounting to 8.9% of GDP for South Asia and 6.4% for Southeast Asia. Hertel and Mirza (2009) is one of the few studies to exclusively examine TF impacts on South Asian regional trade. A gravity model initially estimated the coefficients to measure TF using two different datasets, one compiled from survey based data on Logistic Performance Index (LPI), and the other being the World Bank Doing Business time to trade data. It was established that the two databases produced quite similar impacts on trade flows. The LPI simulation showed TF enhanced trade by 16.2% and the time based simulation

by 16.1%. These values were used to calibrate the GTAP model, which estimated an increase of $37 billion in South Asia's trade volume, and that the value of TF benefits exceeded the gains from tariff removal. The same approach has validity for estimating trade delay effects using appropriate databases.

A review of the literature indicates that CGE modelling has been used to assess trade delay impacts, frequently using iceberg approaches, while shock values have been estimated with gravity models. No research has tested the AVEs of time in trade database which explains willingness to pay for fast transport to model trade delay reductions in South Asia. This is a significant research gap, given that the Minor and Hummels (2013) time in trade database enables modelling of trade delays in the GTAP framework, free of gravity model robustness issues. Further, no current regional GTAP based time in trade estimates exist for South Asia. As South Asian countries have ratified the WTO TFA, this current study assesses trade delay impacts in South Asia following the approach of Hertel et al. (2001), which proposed that time in trade can be implemented as iceberg effects. This study is differ from a similar study of Hertel and Mirza (2009), using an alternative database, base year and simulation design.

4.3. Ad Valorem Equivalents (AVEs) of time in trade estimates for South Asia

AVEs of time values represent percentages of total import or export values. These can be calculated in several ways, the most common being gravity model estimation. Gravity model based AVEs account for elasticities of time in trade flows, converting quantity effects into price effects. Alternatively, per day time in trade AVEs are based on "willingness to pay for fast transport" and explain the overall impacts of time to trade on trade flows. Two major global databases of AVEs are dominant in recent literature. The first, AVE estimates explaining willingness to pay for fast transport, is based on Walmsley and Minor (2015). The second is based on gravity model AVE estimates explaining administrative barriers and their effects on time to trade (Zaki, 2015). In this section, the two AVEs time in trade estimates are compared in relation to South Asia.

Minor and Hummels (2013) database comprises per day AVEs, based on the original database developed by Hummels et al. (2007). This database enable commodity and regional aggregations for use with GTAP model. The aggregation has generated missing values which are equal to 17% of GTAP original database. The background on the missing data is that the

original AVEs database was based on monthly values of quantity traded and transport mode, for each product imported to the US for the period 1991–2005. The missing values are the products not listed in US trade data for that period. Therefore, the replacement mechanisms are an important consideration for users of this database, in that there exists a choice of three different datasets, based on alternative replacement methods. The first replaces missing values with zero values; the second replaces missing values with positive values of time cost estimations from the original study which were not statistically significant, to reduce the bias of zero values; and the third replaces missing values with trade weighted averages of non-missing significant values showing the highest estimates. There are a few limitations in the use of this AVEs database in modelling trade delays in South Asia. First, the original data is derived from US data, potentially limiting the accuracy for representing time in trade AVEs in developing countries. Second, an informed choice needs to be made regarding the use of missing value estimates. Third, the database used to estimate the original values requires updating. Thus, the robustness of this database must be critically analysed and compared. Figure 4.1 illustrates per day trade weighted AVEs of time to trade in three different sets, which replicate the range of regional AVE values between low and high estimates. Gaps between the three represent the magnitude of the difference of replaced missing values and do not vary significantly across the region.

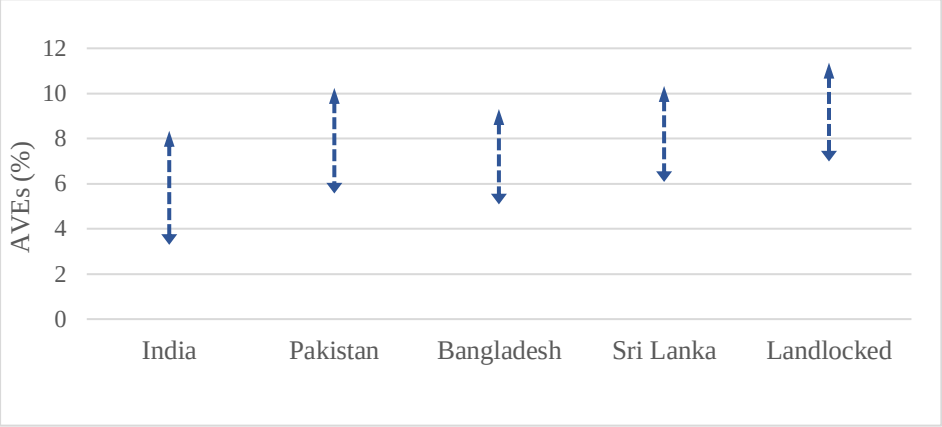


Figure 4.1: Low and high value estimates of AVEs of time in trade in South Asia
Source: Based on Minor and Hummels (2013)

Per day AVEs of high estimates and import and export shares of each sectors across South Asia are presented in Table 4.1. Time values are significantly higher in vegetables and fruits and manufacturing commodities because of their time sensitivity due to perishability. However, the

fresh agricultural product trade share is relatively small. Parts and components (paper, chemical & mineral, petroleum products, metal products, and motor vehicles and parts) display high time values, due to greater demand for rapid delivery linked to heavy supply chain interdependency. Border delays in the parts and components trade are significant in South Asia, as its trade share is comparably large.

Generally, time values are significantly higher in the T&W sector, consistent with previous studies. This database displays moderately lower values for this sector compared to other manufacturing tradable goods. However, the sector's trade share is greater than other manufacturing tradable goods and must be expected to produce significantly larger welfare impacts by accelerating trade. Gravity model based time to trade AVEs per product are shown in Table 4.2. These estimates explain the time effects of administrative barriers to trade (Zaki, 2015). Regional values are significantly lower for all commodity groups compared to those in Table 4.1. The different estimates reflect an inherent bias arising from the basic assumptions and specified characteristics of time costs employed in each method. Estimates in Table 4.1 explain how consumers and producers value product according to timely delivery. Thus it explicitly explains the delay costs. Estimates in Table 4.2 explain the time costs due to the administrative barriers. Therefore, it may subject to the partial judgment of the overall costs of trade delays. Though the assigned time values in the two databases vary significantly, both methods produced higher values for the time sensitive products, except the T&W sector in the region which shows higher estimates compared to other sectors in Table 4.2.

Per day AVEs of time in trade values computed from Minor and Hummels (2013) and Zaki (2015) can be used to estimate annual total value of time in trade based on the World Bank Doing Business Trading across Borders (TAB) database. The TAB database has been widely used to assess the economic impacts of time in trade (Dennis & Shepherd, 2011; Hertel & Mirza, 2009; Hillberry & Zhang, 2015; Hoekman & Nicita, 2011; Iwanow & Kirkpatrick, 2009; Liu & Yue, 2013; Persson, 2008, 2013; Walmsley & Minor, 2015; Zaki, 2014) . The TAB database includes indicators measuring the number of days required for document preparation, customs procedures, port and terminal handling, and inland transport, nationally per annum. When converting per day AVEs to total number of days AVEs, Minor and Hummels (2013) omitted time taken for document preparations, assuming this activity occurs simultaneously with other transit processes.

Table 4.1: AVEs of time in trade estimates and import and export shares across sectors in South Asia

Sectors	India			Pakistan			Bangladesh			Sri Lanka			Landlocked		
		Share of total trade (%)			Share of total trade (%)			Share of total trade (%)			Share of total trade (%)			Share of total trade (%)	
	AVE	Imports	Export	AVE	Imports	Exports	AVE	Imports	Exports	AVE	Imports	Exports	AVE	Imports	Exports
Agricultural products	5.89	0.28	3.89	3.04	5.22	6.32	3.54	8.30	1.65	5.37	3.86	10.54	7.37	2.91	8.21
Vegetable and fruits	23.27	0.92	0.98	23.29	1.79	2.98	23.10	2.27	0.36	23.12	2.00	1.84	26.42	3.25	10.67
Textile and wearing apparel	6.13	1.39	11.93	6.97	6.45	54.45	6.60	19.53	89.21	5.25	11.90	41.90	6.18	8.06	16.18
Extractions and mining	5.20	39.61	5.38	6.49	11.45	1.56	5.45	4.21	0.70	5.82	10.22	2.85	5.26	1.47	12.91
Food product	12.38	2.55	7.28	9.80	7.60	12.69	8.91	13.11	2.33	9.47	6.80	12.81	10.63	11.42	8.55
Beverage and tobacco	4.60	0.07	0.18	4.61	0.09	1.38	4.61	0.03	0.04	4.60	0.35	0.12	5.07	2.12	1.60
Leather product	3.99	0.31	1.64	3.58	0.66	2.34	4.34	0.45	2.36	4.51	0.24	0.24	4.28	1.20	1.81
Wood product	3.53	0.38	0.34	4.23	0.48	0.09	3.33	0.17	0.05	3.43	0.54	0.74	4.02	1.29	0.50
Paper, chemical and mineral	12.15	13.22	15.25	11.41	19.93	6.80	12.66	17.27	1.14	11.88	15.73	15.20	12.42	17.61	8.11
Petroleum product	15.96	2.85	19.06	15.96	19.48	1.50	15.96	9.11	0.34	15.96	16.28	0.93	17.95	10.12	9.79
Metal product	13.97	17.12	7.68	12.47	6.72	3.55	11.77	6.75	0.61	12.89	7.16	0.97	12.98	7.06	16.74
Moto vehicle and parts	9.00	1.55	3.14	13.44	3.54	0.17	12.42	2.03	0.01	14.75	8.83	0.24	14.19	13.02	0.31
Electronic equipment	4.72	4.99	2.03	5.23	2.91	0.26	5.53	2.27	0.07	6.08	2.26	0.35	7.30	3.31	0.61
Machinery and equipment	4.87	12.69	7.99	5.81	12.69	2.44	6.26	13.78	0.79	6.27	12.64	5.52	7.31	16.28	2.85
Other manufacturing	8.28	2.07	13.23	9.01	0.99	3.46	12.92	0.71	0.34	10.30	1.19	5.77	10.73	0.88	1.17
All sectors		100	100		100	100		100	100		100	100		100	100

Source: Minor and Hummels (2013) and GATP version 9 database (Aguiar, Narayanan, & McDougall, 2016)

Table 4.2. Per day AVE of time in trade estimates explaining administrative barriers to trade in South Asia

Sectors	Bangladesh	India	Sri Lanka	Nepal
Food Products	0.18	0.04	0.45	0.67
Beverages	0.21	0.04	0.72	1.07
Tobacco	0.00	0.00	0.00	0.00
Textiles	0.83	0.09	1.45	1.39
Apparel	0.44	0.08	1.52	2.23
Leather products	0.12	0.07	0.48	0.69
Wood products except furniture	0.04	0.01	0.14	0.20
Furniture except metal	1.22	0.13	1.80	1.96
Paper and products	0.31	0.06	0.61	0.60
Printing and publishing	0.67	0.26	1.23	1.12
Industrial Chemicals	0.39	0.20	0.35	0.39
Other chemicals	0.44	0.33	0.96	0.94
Petroleum refineries	0.53	0.20	0.17	0.40
Misc. petrol. /coal prod.	0.98	0.17	1.38	0.75
Rubber products	1.47	0.56	2.31	2.23
Plastic products	0.64	0.14	1.00	1.04
Iron and steel	0.18	0.08	0.40	0.50
Non-ferrous metals	0.92	0.32	1.46	1.84
Fabricated metal products	0.33	0.07	0.70	0.61
Machinery except electrical	0.00	0.00	0.00	0.00
Machinery electric	0.25	0.08	0.72	0.83
Transport equipment	0.25	0.08	0.72	0.83
Prof. and sci. equipment	0.25	0.16	0.36	0.38
Other manufactured products	0.90	0.24	1.01	1.35

Source: Based on Zaki (2015)

This potentially avoids overestimating final delivery times. Alternatively, Zaki (2015) considered time of documentation preparation as the most significant aspect in determining final delivery time. These different assumptions and per day AVEs of time in trade estimation methods produced different database values.

The welfare estimation used in the current study is based on Minor and Hummels (2013) database, which is more suitable for the GTAP model. To the best of our knowledge, this database has not been previously used to estimate economic welfare in South Asia, based on the GTAP model. The database limitations have been acknowledged and improvements through data extension have been discussed. We have chosen AVEs of high estimates, since we considered it reasonable to choose the high rather than low estimates which constitute zero values replacing missing values.

4.4. Methodology

4.4.1. Aggregation mapping

The simulations of this study are based on the GTAP database version 9 for the base year 2011 (Aguiar et al., 2016). This version includes 140 regions which are mapped into 9 regions and disaggregated South Asia as Bangladesh, India, Pakistan, Sri Lanka and Landlocked regions (Nepal, Bhutan and Afghanistan). The USA, EU, and China are considered as South Asia's main export destinations to highlight the impacts of trade delay reductions on major trading partners. The USA and EU are the major export destinations for India, Pakistan, Bangladesh, and Sri Lanka, while China ranks as a major import source (Figure 4.2).

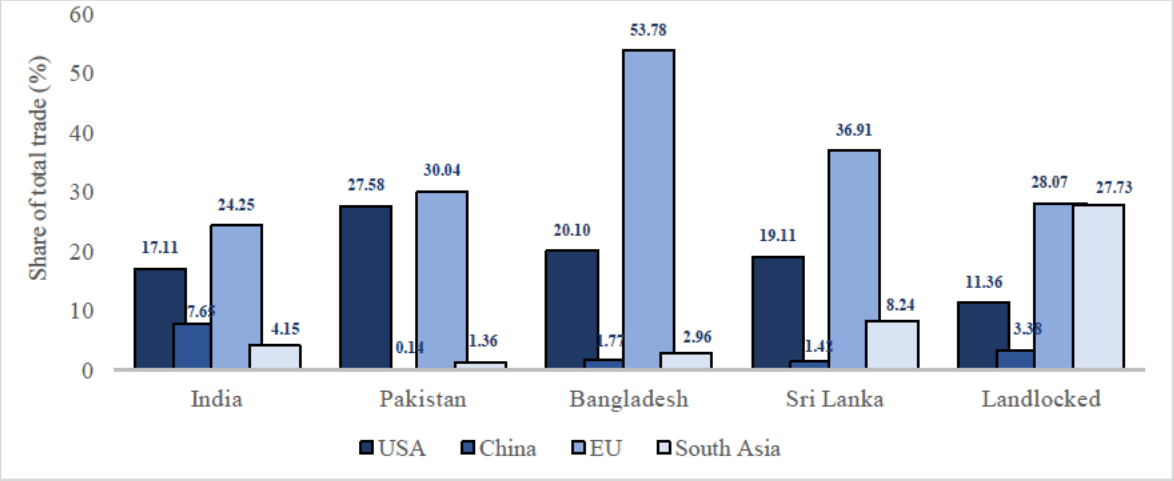


Figure 4.2: South Asia's major export destinations and trade share among members
Source: GTAP version 9 (Aguiar et al., 2016)

The sector aggregation is based on the region's major tradable goods and their time responsiveness to the total value of trade. Thus, GTAP commodities are mapped into 16 sectors (Figure 4.3). Vegetables and fruits are the major perishables, with largest AVEs of time to trade. Time in trade of parts and components impacts on supply chain management efficiency and final product values. Consumer tradable goods, such as T&W, require rapid delivery. This sector dominates South Asian labour intensive exports and is particularly sensitive to trading times. Intermediate and raw material imports constitute approximately 30 and 40% of total imports, respectively. Consumer and intermediate goods constitute approximately 48 and 31% of total exports (World Bank, 2015).

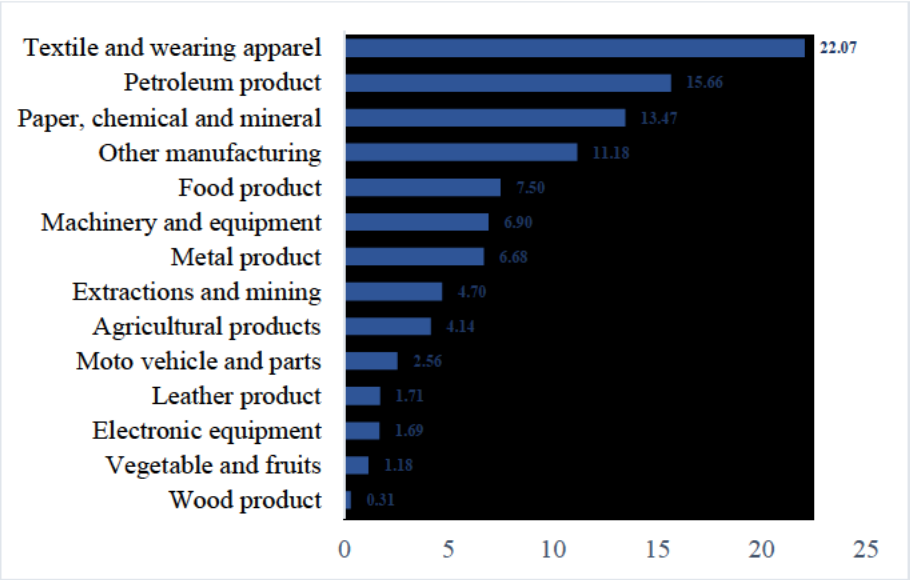


Figure 4.3: South Asia's merchandise exports (percentage shares)
Source: GTAP version 9 (Aguiar et al., 2016)

4.4.2. The benchmark

Estimating the level of reduction of time to trade in South Asia is critical to assess its economic impacts. Using a comparative evaluation, the level of reduction of time to trade was assumed at the level of Southeast Asia. Southeast Asia and South Asia constitute open economies, comprising a mix of dynamic emerging and least developed economies. Both regions are fast growing, exhibiting different patterns of trade impacting on economic development, levels of regional integration, and regional trade as a share of GDP. South Asian trade contributes around 38% of regional GDP, while trade shares of GDP in the Southeast Asian developing countries of Malaysia, Thailand, and the Philippines, represent 114, 104 and 50%, respectively. South Asia, however, has the potential to match Southeast Asian development levels, by following similar trade improvements as the above mentioned countries. Southeast Asian trans-border trading is far quicker than South Asian trans-border trading except Cambodia, Indonesia and Laos. These three countries' trans-border trading time is comparable to South Asia. However, average time to import in this region is approximately 7.7 days (Table 4.3).

Time involves during inland transport is less compared to other two major import processing points of customs clearance and port and terminal handling. On the other hand, the South Asian average number of days to import is approximately 12.3 with only Sri Lanka and Pakistan under 10 days (Table 4.4).

Table 4.3: Number of days to import of different border transit processes in Southeast Asia

	Customs clearance	Port & terminal handling	Inland transport	Total
Cambodia	3.00	5.00	3.00	11.00
Indonesia	4.00	6.00	2.00	12.00
Laos	8.00	2.00	4.00	14.00
Malaysia	1.00	2.00	2.00	5.00
Philippines	2.00	3.00	1.00	6.00
Singapore	1.00	1.00	1.00	3.00
Thailand	2.00	2.00	1.00	5.00
Viet Nam	4.00	4.00	1.00	9.00
Rest of the South East Asia	1.00	2.00	1.00	4.00
Regional average	**2.89**	**3.00**	**1.78**	**7.67**

Source: Minor and Hummels (2013)

South Asian landlocked countries take more time making regional average high. The regional average time at port and terminal handling and inland transport are comparably higher than custom clearance time in South Asia.

Table 4.4: Number of days to import of different border transit processes in South Asia

	Customs clearance	Port & terminal handling	Inland transport	Total
India	4.00	5.00	3.00	12.00
Pakistan	2.00	3.00	2.00	7.00
Bangladesh	3.00	7.00	2.00	12.00
Sri Lanka	2.00	3.00	2.00	7.00
Landlocked	5.83	5.09	12.55	23.47
Regional average	**3.37**	**4.62**	**4.31**	**12.29**

Source: Minor and Hummels (2013)

This study employed the average number of days to import in Southeast Asia, as a benchmark for the potential time in trade reductions in South Asia. Accordingly the number of days to import of each South Asian member at each transit process were computed to reach the benchmark (Table 4.5).

In order to simulate the reduced number of days to import based on the GTAP model, days are to be converted into AVE values. Therefore, Minor and Hummels (2013)'s per day AVEs of time in trade database were used to compute the total value of AVEs. This database consists AVEs for each commodity sent from exporting region to importing region (three diomentional) in the GTAP aggregation. The total value of AVEs for each commodity sent from exporting

region to importing region were estimated by multiplying the potential reduced number of days reported in Table 4.5. Therefore, the shock value are in the form of three diamnetioal[8].

Table 4.5: Simulated number of days to import of different border transit processes in South Asia

	Customs clearance	Port & terminal handling	Inland transport	Total
India	2.54	3.17	1.90	7.61
Pakistan	1.27	1.90	1.27	4.44
Bangladesh	1.90	4.44	1.27	7.61
Sri Lanka	1.27	1.90	1.27	4.44
Landlocked	3.70	3.23	7.96	14.59
Regional average	**2.14**	**2.93**	**2.73**	**7.74**

Source: Authors' calculation based on Minor and Hummels (2013)

4.4.3. Implementation of the potential reduction of time to trade (AVEs) in the GTAP model

Incorporating the potential reduction of time to trade (AVEs) into the GTAP model is challenging. There are no representative equations of trade time cost (delay costs) variables in the GTAP. However, in the empirical literature, it has been generally assumed that reduced trade delays take the form of technical progress in trading activities and can be introduced as a technical shift in the Armington import demand function in the GTAP model. Minor and Hummels (2013) explained this shift was due to a reduction in trade delays using a partial equilibrium framework. As Figure 4.4 illustrates, S_1 is the world supply of the commodity and D_1 is the initial import demand, P* is the initial equilibrium price and Q* is the initial equilibrium quantity. A reduction in trade delays, ceteris paribus, shifts the import demand curve from D_1 to D_2. Now consumers are willing to pay P_1 for the imported commodity because of faster delivery time to the market. The difference between P*and P_1 is the AVEs of time in trade.

[8] This three dimensional shock file cannot be presented in the paper and is available upon requests.

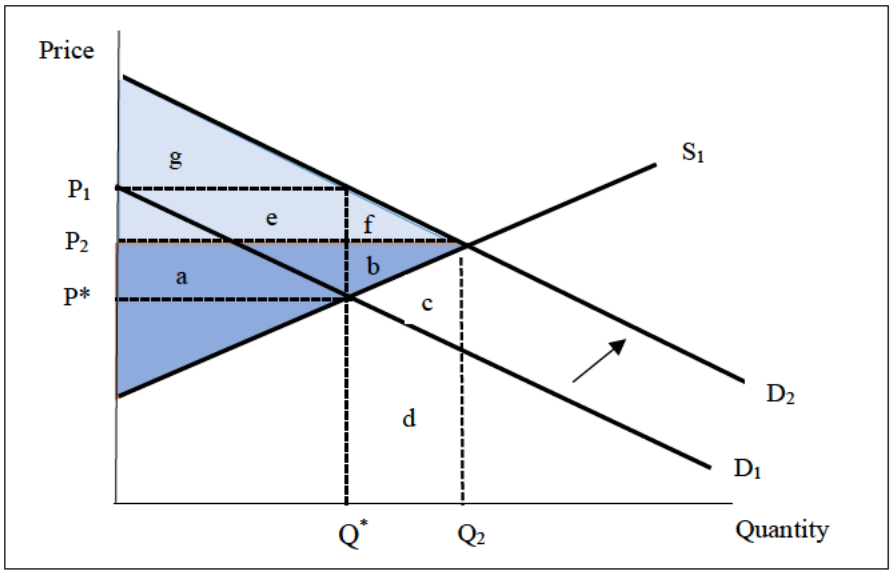


Figure 4.4: Welfare impacts of reduction in trade delays
Source: Minor and Hummels (2013)

However, in order to meet the excess demand at price P^*, export supply of the good increases (without any costs) up to the market clearing price P_2 and quantity traded Q_2. The welfare impacts due to the reduction in trade delays are depicted in the marked areas in Figure 4.4. Producer surplus and consumer surplus increase due to the reduction in trade delays, as shown by areas (a + b) and (e +f + g), respectively. Area (c +d) is the new resources that needed to be allocated to increase the export supply.

The welfare impacts can also be estimated for each product and region within the GTAP framework based on the iceberg approach. This is the most commonly used method to conduct trade facilitation related simulations such as trade delays in the GTAP model. This is based on the "iceberg" effect in the Armington equation, which has been introduced by Samuelson (1954). Samuelson used the analogy of an iceberg, where only a fraction of ice exported reaches its destination as un-melted ice, to explain the effect. He used this concept to explicitly model transportation costs in order to analyse the possible effects of transport impediments to trade. Later studies have used the iceberg method to analyse the impacts of trade costs that arise especially due to trade delays based on CGE models. Hertel et al. (2001) first used this method to implement the elimination of customs delays while assessing the Japan-Singapore Free Trade Agreement (FTA). Many of the later studies, after Hertel et al. (2001), used this approach to model trade delays with the GTAP framework (Abe & Wilson, 2008; Dennis, 2006; Francois

et al., 2005; OECD, 2003 2018; Valensisi, Lisinge, & Karingi, 2016; Walmsley & Minor, 2015).

The parameter of import augmenting technical change in the demand equation can be used to represent the AVEs of time in trade. This technical coefficient "ams" variable is exogenous and equal to one in initial equilibrium. This facilitates simulation of any trade policy changes associated with technical improvements. A positive shock to the "ams" variable causes an upward shift in the import demand function, and the effects can be captured as improvements in technical efficiency in transit. The import demand equation in the GTAP model is given by:

$$\boldsymbol{qxs_{irs} = -ams_{irs} + qim_{is} - \sigma_m^i (pms_{irs} - ams_{irs} - pim_{is})} \quad (1)$$

The composite import price equation in the GTAP model is:

$$\boldsymbol{pim_{is} = \sum_r \theta_{irs} pms_{irs} - ams_{irs}} \quad (2)$$

Where:

$\sigma_m^i = Elasticity\ of\ substitution\ among\ imports\ of\ i$

$qxs_{irs} = Percentage\ change\ in\ bilateral\ exports\ of\ i\ from\ r\ to\ s$

$qim_{is} = Percentage\ change\ in\ total\ imports\ of\ i\ into\ s$

$pms_{irs} = Percentage\ change\ in\ price\ of\ imports\ of\ i\ from\ r\ to\ s$

$pim_{is} = Percentage\ change\ in\ average\ import\ price\ of\ i\ in\ s$

$ams_{irs} = Demand\ shift\ equal\ to\ the\ AVEs\ of\ trade\ delays\ of\ i\ from\ r\ to\ s$

$\theta_{irs} = The\ share\ of\ commodity\ i\ shipped\ from\ region\ r\ to\ region\ s$

Source: Hertel et al. (2001)

As Hertel et al. (2001) indicated three distinct effects can be observed when shocks are introduced to the ams_{irs} variable in the above two equations. The first effect is a positive shock to the ams_{irs} variable in equation (1) that will lower the effective import price of good i from exporting country r to importing country s.[9] (It is important to note that the GTAP uses "effective price" approach to introduce "ams" augmented domestic price of commodity i

[9] Exporter's price is not directly changed due to the "ams" shocks but it changes due to CGE effects such as recourse costs. Therefore, the importers adjusted price is referred as the effective price (Walmsley & Minor, 2015)

imported from country r to country s. This is related to the observed price *PMS** = *PMS/AMS*. However, in order to maintain the balanced dataset, "ams" augmented import quantity also is defined as "effective quantity". Thus the observed quantity *QXS** = *QXS.AMS*. This generates the balance between the product of observed price and quantity and product of effective price and quantity). This gives rise to increased substitution of i from this exporter, who is subjected to reduced trade delays. However, the magnitude of the substitution effect is determined by the elasticity of substitution (σ_m^i). Second, in the same equation, the positive shock to the ams_{irs} variable results in the effective quantity of import of i increasing, as less is now required to meet the need of importers, since faster deliveries avoid iceberg effects during border transactions. The third effect is that the average import price of good i will decrease when a positive shock is applied to the ams_{irs} variable in equation (2). This implies that import demand for good i increases at the expense of domestic purchases. However, the overall impacts on imports of good i depend on the values of the trade elasticities that are used in GTAP.

4.4.4. Factor market closure

In the standard GATP closure, factor endowments, such as labour (skilled and unskilled), capital, land, and natural resources are fixed, and factor prices are adjusted to full employment in equilibrium. However, in order to examine the implications of factor market clearing conditions in developing countries, we experimented with alternative factor market closures, since full employment in both skilled and unskilled labour is not a representative assumption for the South Asian factor markets. We, thus, assumed unemployed labour market circumstances, in which both skilled and unskilled labour supplies adjust to the policy shock with a fixed wage rate in equilibrium, enabling us to examine employment effects resulting from trade delay reductions. For the landlocked countries (Afghanistan, Bhutan, and Nepal), we assumed only unemployed unskilled labour and an inadequate skilled labour supply, producing a fully employed labour market condition with fewer adjustment effects and fixed wages.

4.4.5. Scenario analysis

Considering the high trade delay costs and ample circumstances for accelerating South Asian border transactions, we developed two potential scenarios. In the first scenario, total time to import in South Asia is reduced to the average level for Southeast Asia, with sub scenarios on the separate impacts of customs processing time, port and terminal handling time, and inland

transport time. In the second scenario, the simultaneous effects of reducing total time to import and maintaining zero tariffs among members is considered. There has been confirmation that while the South Asian liberalisation process is alive and well, negative practices continue in many aspects of FTA and trade is impeded not only by border delays but also unacceptable tariffs. Where tariffs are high, the negative effects of trade delays are also high. Trade liberalisation measures are no substitute for TF, although the policies are complementary. Thus, our study also provides a comparative evaluation of the effects of both liberalisation and TF policy. These scenarios are as follows:

1. Reduction of South Asia's total time to import to the average level of Southeast Asia
    1.1 Reduction of time to import customs processes
    1.2 Reduction of time to import port and terminal handling processes
    1.3 Reduction of time to import inland transport processes
2. Reduction of total time to import with zero tariffs for South Asian countries

4.5. Results and discussions

4.5.1. Effects on trade flows

Estimations of the first scenario projected an expansion of trade flows in South Asia with growth in imports (7%) exceeding growth in exports (3%), resulting in a forecast trade volume increase of $57 billion (exports: $12 billion, imports: $45 billion), but a deterioration in the regional trade balance by $36 billion. This deterioration would largely be due to a heavy dependency on imports in the relatively small landlocked region valued at $21 billion. Less competitiveness in the global market causes a decline in exports of these countries. However, with a reduction in trade delays, the landlocked region could expect a greater variety of imports on the domestic market. The South Asian trade balance deterioration would be absorbed by its major trading partners, the USA, EU and China whose trade balances would improve by $11 billion, $8 billion, and $4 billion, respectively, as these countries would gain from increased exports due to the partner countries' border reforms. This assumes that faster border transactions in the South (developing) would encourage the North (developed) – South trade, spurring economic growth in the South.

Portugal-Perez and Wilson (2012) and Zaki (2014) both showed that the negative impacts of trade delays affect imports more significantly than exports. Our results are consistent with those studies in that imports growth outweighs exports growth with trade delay reductions. However, our modelling only focused on reducing import delays and assumes improved export facilitation, resulting from greater exportable domestic production, in which imported parts and components function as intermediate inputs. The trend of trade in the global South is to export to the North and import from the South (Hertel & Mirza, 2009). On that premise, reduced border delays on South Asian imports would encourage exports from the North, as the global North exports parts and components to export oriented industries of the South. Our results show that aggregate exports of South Asia would improve by 3%, mainly due to the positive impacts of accelerated import transactions on domestic export oriented industries. This suggests that any importing country policy which reduces trade delays enhances bilateral trade volumes in terms of exports and imports. These findings are in agreeance with previous studies focusing on time in trade in developing countries. Export gains would be larger by including delay reductions in exporting countries, on the basis of the trade theory that export oriented policy is a major driver of economic growth and job creation. However, South Asia's export basket lacks diversity and the supply response lacks elasticity.

Cross-country and cross-sector percentage changes in import and export volumes are listed in Table 4.6. Imports in almost all sectors in India and Sri Lanka are forecast to increase, as expected, with more significant facilitation improvements in trading of time-sensitive goods. Thus, vegetables and fruits, food products, and parts and components (metal product, motor vehicles and parts, electronic equipment and machinery and equipment) sectors show positive import changes. Interestingly, parts and components exports would increase more than imports if India and Sri Lanka can reduce import delays to the simulated benchmark. Bearing out the findings of Hummels et al. (2007), our results show that timeliness in arrivals of parts and components at production plants is essential for efficiency of highly segmented production chains. Therefore, accelerating the delivery of imported parts and components is fundamental for supply chain interdependency (Arnold, 2007; Zaki, 2015). Further, as Arvis et al. (2016) asserted, trade cost is a major determinant of a country's ability to participate in the global value chain. Walkenhorst and Dihel (2006) also showed that trade costs exert considerable economic impact, due to vertical specialisation and interdependency in economic activities. India's domestic output of motor vehicles and parts, machinery and equipment, and other manufacturing goods is forecast to expand by 2%, 4%, and 2%, respectively. The Sri Lankan

manufacturing sector's output expansion is notably outstanding, increasing by 12%, comprising machinery and equipment 14%, electronic equipment 10%, and other manufacturing goods 20%. This indicates that import promoting policies encouraging faster border transactions boost domestic production. TF policies to this effect will stimulate domestic production more effectively than trade liberalisation. Our results further reveal that the reduction of import delays in the parts and components sector would deliver potential economic growth to India and Sri Lanka. Export competitiveness would improve, not necessarily due to the comparative advantage in trade, due to the shortened border transaction time. This contributes to reduce skilled and unskilled unemployment in Sri Lanka by 17% and 10% and in India by 4% and 2%, respectively, and increase real consumption and income in India by 4% and in Sri Lanka by 9% and 12%, respectively. Real GDP would increase in India by 1.3 % and Sri Lanka by 3%.

Traders face a challenge in the optimal delivery time of fresh produce due to its perishability. According to iceberg theory, delays increase spoilage costs and increase the effective import price. Our results indicate that South Asian import volumes of these time sensitive tradable goods (agricultural products, vegetables and fruits, and food products) show significant improvement. This finding is consistent with previous estimations as agricultural commodities in developing countries remain constrained by various trade restrictive policies. Demand for imported fresh produce is predicted to increase significantly in the food products, vegetables and fruits, and other agricultural products sectors, with import volumes rising by 30%, 26%, and 17%, respectively (Table 4.6). Pakistani and Bangladeshi fresh produce is adversely affected by neighbouring countries' import delays. Accelerated border transaction, due to trade policy changes of neighbours, would stimulate exports within the region. Our results predict that Pakistani exports of vegetables and fruits to neighbours will increase by 74% and food product exports by 100%. The expansion of agricultural imports in India and Sri Lanka may be the consequences of encouraging domestic production in the manufacturing sector, particularly in the parts and components export industries. Income and consumption increased in these countries as more employment generate in manufacturing sector result more demand for fresh produce but less domestic production cause to increase imports. This implies that with resource mobility, specialisation is moving away from agriculture to the manufactured sector. Agricultural sector's decline, however, is questionable for Sri Lanka and Bangladesh, since the vast rural populations are agriculture dependent. However, the impact of trade delays on

regional income distribution and inequalities within countries are beyond the scope of this paper.

T&W is the major South Asian export to the USA and EU, who invest in the South Asian T&W sector to benefit from the abundant unskilled labour, while the major portion of quality raw materials imported by South Asia is turned into quality exportable goods. Due to seasonal changes, T&W products are time sensitive and subject to increased costs due to time delays. This sector significantly determines South Asian export volumes. In Bangladesh, the sector represents 85%, Pakistan 50%, Sri Lanka 35%, and India 9% of total exports. Consistent with Hertel and Mirza (2009), our results predict a significant rise in demand for South Asian T&W from developed countries, with the exception of Sri Lanka. Aggregate South Asian imports of T&W raw materials are projected to increase in India by 16%, Bangladesh by 11% and Pakistan by 16%, generating additional exports. The Sri Lankan T&W apparel sector shows a decline despite constituting the largest portion of exports.

Two explanations account for this contrary result. First, in our results, final domestic consumption of imported T&W increases as import prices decline due to the iceberg cost reduction. However, total imports decline mainly due to a decline in sector demand for imported intermediate inputs as domestic output declines[10]. Domestic output is discouraged due to the crowding-out effect of resource allocations between sectors showing greater growth. The manufacturing sector, excluding T&W, was shown to improve remarkably at the expense of T&W in Sri Lanka[11]. Secondly, other South Asian countries are likely to enlarge their T&W sector markets, compared to Sri Lanka, by reducing import delays which may lead to reductions in the Sri Lankan T&W sector market share.

Aggregate imports of South Asian landlocked countries show large percentage changes, mainly due to the fact that these contribute the smallest shares of regional GDP and constitute the region's least developed members, with the lowest levels of border efficiency. They also exhibit higher AVEs of time in trade values due to the additional transit time needed to cross their common borders.

[10] The share of imported intermediate inputs of total imports in T&W sector in Sri Lanka represents 80%.
[11] Sri Lanka's employment of skilled and unskilled labour declined in T&W sector and increased in other manufacturing sectors.

Table 4.6: Impacts on trade volume in South Asia (percentage change)

Sector	India		Pakistan		Bangladesh		Sri Lanka		Landlocked		South Asia	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Agricultural products	4.57	-2.15	6.08	-2.10	3.62	-0.20	7.73	-9.61	212.25	-161.46	17.24	-4.84
Vegetable and fruits	17.70	4.22	13.85	31.83	14.89	7.35	25.43	-5.37	145.16	-121.88	26.12	0.68
Textile and wearing apparel	16.24	2.73	16.28	0.98	10.65	2.33	-8.39	-20.66	77.08	-137.41	15.38	0.23
Extractions and mining	0.59	3.31	-14.65	13.66	-2.42	-29.73	-1.92	-54.54	75.25	-200.78	0.17	-1.98
Food product	21.80	-0.92	23.14	17.76	20.12	-6.79	19.73	-19.58	143.37	-146.23	31.21	-0.78
Beverage and tobacco	-2.00	12.52	4.22	8.20	9.97	10.82	17.51	-5.64	79.39	-77.58	33.77	7.17
Leather product	8.20	0.81	18.98	-6.76	8.62	1.08	-4.13	-40.49	140.08	-156.15	21.34	-1.31
Wood product	6.32	2.81	13.14	5.36	19.28	0.38	6.34	-15.25	156.47	-147.37	19.33	-0.19
Paper, chemical and mineral	8.57	10.49	12.64	2.75	9.38	-4.44	7.71	-14.75	31.51	-132.36	9.80	8.57
Petroleum product	12.52	5.40	-2.05	3.09	-2.16	13.05	6.36	-0.98	37.41	-112.36	6.99	4.76
Metal product	5.95	21.41	9.60	7.06	12.95	16.36	2.90	27.63	81.51	-251.19	7.11	15.66
Moto vehicle and parts	8.54	9.85	15.92	-2.77	-1.85	1.63	4.75	40.38	41.64	-23.01	13.64	9.84
Electronic equipment	5.37	18.30	18.28	-5.04	2.19	-7.22	15.38	20.68	55.58	53.11	7.16	18.02
Machinery and equipment	3.65	24.73	13.23	-2.39	5.53	-7.49	11.14	32.41	48.43	26.09	6.37	23.83
Other manufacturing	13.19	5.92	17.95	0.72	40.84	-8.39	12.31	25.71	148.02	-140.90	15.64	5.97
Services	3.64	-1.20	0.97	-0.72	11.48	-6.99	25.81	-16.81	201.07	-126.20	9.44	-5.16
All sectors	**4.73**	**5.83**	**6.55**	**3.21**	**8.78**	**1.08**	**7.59**	**-13.15**	**87.66**	**-139.80**	**7.40**	**3.02**

Source: Authors' calculations based on simulated GTAP results

Due to our study's uniform regional benchmark for decreasing trade delays, these landlocked countries display greater number of days to import reductions than other regional members. Almost all import sectors, except electronic and machinery and equipment, would increase by higher percentage values in the landlocked countries, while exports would decline due to lower import prices at the expense of domestically produced goods. A different result would be obtained if the landlocked countries had been assigned an alternative benchmark for implementing TF policies to improve border transit efficiency.

Overall, faster, more efficient South Asian border import procedures lead to increased aggregate export of the rest of the world by 0.15%. USA aggregate export volume would increase by 0.3%, EU by 0.08%, and China by 0.3%.

4.5.2. Intra- and extra-regional trade effects

South Asian regional trade integration is small compared to other global regions and members are more oriented to trading outside the region than within. As other studies have observed, trans-border transaction inefficiencies and delays may increase trade costs to the degree that it is less costly to transact with distance markets than with neighbours. Our results emphasize that reducing border trade delays would strengthen regional trade integration significantly. As shown in Table 4.7; potential South Asian intra-regional trade expansion is14%.

India, Pakistan, and Bangladesh show greater gains in almost all sectors from improved regional export competitiveness due to TF reforms than other regional members. Sri Lanka and landlocked countries would consume less costly imports from their neighbours (India, Pakistan and Bangladesh) based on shorter market distances and reduced costs from greater border efficiency. Overall, the region would gain from the production of manufacturing products and fresh produce for trade among members, reducing the dependency on imports from other regions and strengthening export-driven economic development.

South Asian import delays not only affect intra-regional trade but restrict bilateral trade with the rest of the world, since import prices increase due to distance transport costs, as well as iceberg costs. Thus, any reforms that reduce border delays would also stimulate trade with the rest the world. Our simulation predicted extra-regional trade rises of 7% in imports and 3% in exports (Table 4.8).

Table 4.7: Intra-regional trade effects (percentage change)

	India		Pakistan		Bangladesh		Sri Lanka		Landlocked		Intra trade
Sector	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Total
Agricultural products	-43.97	30.20	-13.01	7.47	5.48	5.18	16.81	17.84	192.42	-175.87	14.00
Vegetable and fruits	-54.69	38.64	-7.72	73.82	-8.92	18.39	17.15	26.00	128.40	-124.87	20.00
Textile and wearing apparel	-52.47	18.91	14.97	-8.81	-0.24	7.79	-9.32	-23.95	82.32	-159.04	1.10
Extractions and mining	-87.47	54.84	-190.50	48.46	0.32	-18.08	5.84	-47.94	87.33	-326.47	-38.28
Food product	-45.35	16.92	-4.15	102.61	-10.81	29.43	2.69	4.62	113.92	-184.98	39.24
Beverage and tobacco	-64.77	69.41	4.55	67.00	12.07	18.06	14.50	48.87	78.20	-76.42	42.55
Leather product	-96.99	34.75	-48.26	12.33	-5.38	4.97	-13.21	-27.72	113.28	-164.45	-26.66
Wood product	-33.98	136.72	-1.28	86.93	22.22	13.07	0.00	-10.60	156.92	-148.91	10.59
Paper, chemical and mineral	-54.12	18.26	6.21	3.38	7.87	-2.30	12.30	-23.43	22.45	-138.24	6.17
Petroleum product	-62.24	16.51	-16.05	3.36	-0.88	17.64	8.26	-6.09	39.80	-117.42	8.96
Metal product	-163.85	73.00	-101.54	28.20	28.07	36.96	21.60	19.28	90.06	-257.55	-19.92
Moto vehicle and parts	32.18	21.58	33.90	-7.43	4.76	15.57	10.93	43.67	86.14	24.00	21.57
Electronic equipment	1.17	58.52	83.58	-13.11	31.70	8.70	43.03	22.26	88.50	123.53	51.15
Machinery and equipment	18.39	67.89	42.83	7.46	46.98	4.52	49.52	22.72	107.66	86.20	58.98
Other manufacturing	3.43	115.51	41.35	54.18	42.08	22.88	30.01	42.90	161.44	-173.14	98.37
Services	-37.82	28.77	-3.87	15.37	-0.97	6.15	17.49	-6.12	187.49	-126.05	4.71
All sectors	**-67.72**	**30.05**	**-11.82**	**31.16**	**5.40**	**6.31**	**12.56**	**-3.86**	**79.32**	**-183.51**	**13.52**

Source: Authors' calculations based on GTAP simulations results

Table 4.8: Extra-regional trade effects (percentage change)

	India		Pakistan		Bangladesh		Sri Lanka		Landlocked		Extra - trade	
Sector	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Agricultural products	16.73	-7.11	12.15	-5.83	2.50	-5.25	3.36	-11.95	230.57	-146.26	18.66	-8.46
Vegetable and fruits	22.23	-4.40	22.27	-3.18	25.39	-4.37	30.01	-10.67	175.37	-113.14	27.36	-7.18
Textile and wearing apparel	21.31	1.86	16.34	1.47	13.74	2.29	-8.08	-20.59	74.98	-124.97	17.95	0.20
Extractions and mining	0.73	2.29	-13.20	12.37	-2.79	-47.85	-1.99	-57.92	63.77	-140.24	0.29	-0.49
Food product	22.54	-2.22	25.24	-5.05	25.13	-8.31	27.20	-21.53	173.64	-135.51	30.29	-4.58
Beverage and tobacco	5.41	0.06	4.17	-1.87	9.81	-4.41	18.43	-17.26	80.17	-85.33	31.02	-1.53
Leather product	10.84	0.63	19.37	-7.62	10.63	1.05	-0.19	-41.51	142.13	-148.81	23.31	-0.96
Wood product	7.49	0.67	13.36	-9.12	19.22	-1.59	6.46	-20.61	156.43	-144.50	19.60	-0.96
Paper, chemical and mineral	9.03	9.99	13.17	2.29	9.53	-5.01	6.29	-13.41	40.68	-114.40	9.97	8.78
Petroleum product	14.11	4.72	-1.99	3.07	-2.27	2.88	3.90	3.94	34.71	-103.83	6.77	4.47
Metal product	6.93	19.40	15.37	-2.65	12.21	9.31	-0.31	40.84	70.44	-153.91	7.58	18.41
Moto vehicle and parts	8.51	8.47	15.91	-1.85	-3.07	-7.61	1.18	38.24	38.69	-30.33	13.09	8.44
Electronic equipment	5.37	17.67	18.25	-4.31	1.45	-9.33	13.12	20.25	53.14	47.83	6.99	17.41
Machinery and equipment	3.60	22.00	13.07	-3.84	1.27	-8.53	0.34	36.43	38.30	17.78	5.23	21.27
Other manufacturing	13.20	5.62	17.47	0.11	40.71	-9.70	10.85	25.43	134.36	-138.72	14.62	5.67
Services	3.74	-1.30	1.11	-0.94	11.68	-7.18	25.95	-20.43	201.37	-126.20	9.47	-5.30
All sectors	**5.15**	**4.84**	**7.39**	**-0.26**	**9.34**	**0.93**	**5.97**	**-14.60**	**91.31**	**-124.04**	**7.20**	**2.48**

Source: Authors' calculations based on GTAP simulations results

India, generally, imports from the North but exports to both North and South; thus, India's extra-regional exports and imports would increase, as well as intra-regional exports. In other South Asian countries extra-regional imports would increase while extra-regional exports would decline, the latter being due to the expansion of its intra-regional exports, particularly in Pakistan, where extra-regional exports of agricultural products would decline, while manufacturing tradable goods would increase.

Overall, it appears that both intra-regional and extra-regional trade will expand when all regional members implement policy reforms reducing border transaction delays aimed at expanding regional trade integration. South Asia's major Northern trading partners also stand to gain from expansion of their exports.

4.5.3. Effects on trade due to faster cross-border processes

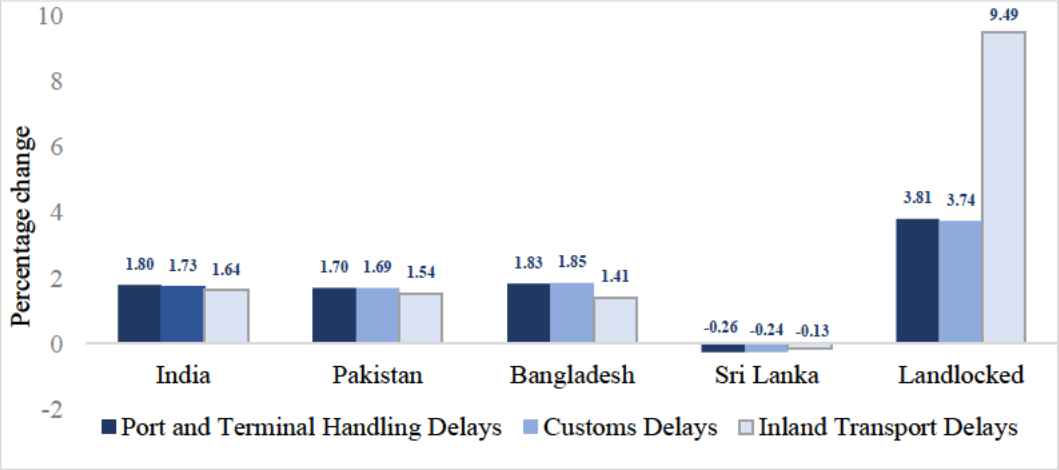
The effects of delays at customs, port and terminal handling and inland transport on total trade are illustrated in Figure 4.5. The impacts on trade flows are similar for all members except for the landlocked countries. This indicates that South Asian trade delays are an accumulation of complicated customs, and ports procedures, as well as poor road infrastructures and transport systems. Notably, landlocked regions trade mostly using inland roads and share common border services with neighbouring countries. Thus, landlocked countries have the most to gain by reducing trade delays in inland transport.

Zaki (2014) highlighted that the geographical trade barriers of landlocked countries may only be overcome through improved roads and transport infrastructure. Ahmed and Ghani (2008) described South Asia's transport infrastructure quality as poor; truck operating speeds are slow and delays are worsened when provincial official checkpoints are frequent. Our results confirm that transport oriented infrastructure policy reform would give a 1.7% trade gain to India, 1.5 % to Pakistan and 1.4% to Bangladesh, with a 9% boost to landlocked countries (Figure 4.5).

Wilson et al. (2005) asserted that improving port efficiency promotes exportation. Our results reveal that trade gains from port and terminal handling exceeded those from inland transport reforms, excluding the landlocked countries, accounting for 37% of total trade gains. Similarly, reduction in customs processing reforms contributes 35% of total gains. The sector wise analysis revealed that trade volumes of fresh produce would expand substantially from inland transport delay reductions (Table 4.9). Customs and port handling processing time also

significantly influenced trade volumes of the vegetables and fruits sector, which requires additional quarantine time at customs and ports.

Figure 4.5: Effects of trade delays in different cross border activities on total trade



Source: Authors' calculations based on GTAP simulations results

Our scenarios indicate that South Asia needs to improve efficiency in every trans-border process. Hertel and Mirza (2009) and Portugal-Perez and Wilson (2012) contended that costs of customs and port handling procedures reforms are far less than those of improving transportation infrastructure quality. Customs procedures improvements involve reducing documentation and accelerating preparation time, simplifying and synchronizing clearing procedures, improving transparency, and reducing corruption and red tape. However, investigating the investment costs of improving efficiency at border transaction in each border procedures is important to prioritise TF policies. The costs and benefits need separate analysis, whereas our results have projected gross gains.

4.5.4. Labour market effects

Robust growth in a country's international trade generates greater income. Iceberg effects lower import prices meaning that consumers pay less for quality imported products that reach the market on time. Simultaneously, export sales increase with less costs to fulfil importer demand. The importing country's export sector also grows as a result of expansion of domestic production, due to less costly and faster delivery of imported inputs. Our results indicate that growth of South Asian exports, due to import border transit delay reductions, generates employment opportunities for skilled and unskilled labour.

Table 4.9: Effects of trade across sectors due to faster cross-border processes (percentage change)

Sectors	Customs Delays	Inland Transport Delays	Port Handling Delays
Agricultural products	0.04	0.47	0.07
Vegetable and fruits	4.44	5.35	5.06
Textile and wearing apparel	1.31	0.76	1.00
Extractions and mining	3.25	4.03	3.49
Food product	3.17	5.22	3.33
Beverage and tobacco	1.38	1.16	1.08
Leather product	2.85	3.74	2.97
Wood product	3.15	2.99	3.25
Paper, chemical and mineral	1.74	1.87	1.90
Petroleum product	3.02	3.25	3.27
Metal product	3.39	3.78	3.62
Moto vehicle and parts	3.08	2.71	2.96
Electronic equipment	3.21	3.21	3.40
Machinery and equipment	2.78	2.57	2.72
Other manufacturing	0.13	0.12	0.11

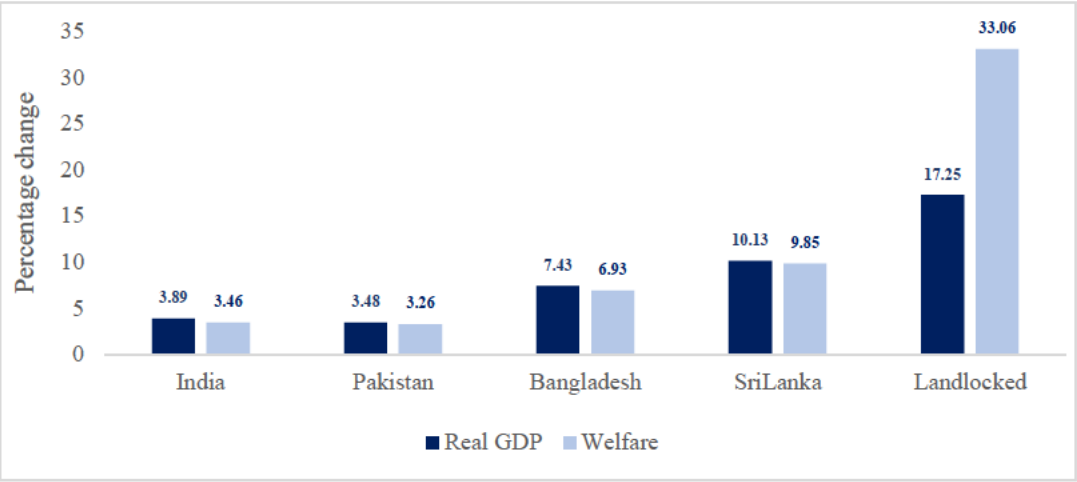
Source: Authors' calculations based on GTAP simulations results

The notable growth of the manufacturing export sector would produce higher wages, with new job creation. Freund and Rocha (2011) stated that strong export growth encourages a more efficient production structure through compositional shifts, since more productive exporting firms develop rapidly due to small changes in the production process. As unskilled labour is the most available resource in South Asia, increased demand for labour would increase income. This is apparent in the T&W sectors of India and Bangladesh and the manufacturing sector in Sri Lanka. The Bangladeshi garment industry employs over 1.5 million poor, low skilled female workers (Hausman et al., 2013). These changes, thus, enable countries to overcome the balance of payment issues and reduce poverty to some extent.

4.5.5. Macroeconomic effects

South Asia can expect growth in real GDP and improvements in welfare due to the expansion of region's trade volume following a reduction of iceberg costs. This explains the relationship between a country's real GDP and trade flows. Reducing iceberg costs will boost exports and employment, resulting in greater national income and savings, leading to growth of real GDP across South Asia. Figure 4.6 shows the percentage changes in real GDP and relative welfare improvement, with relatively larger GDP and welfare gains in landlocked countries.

Figure 4.6: Real GDP and welfare effects



Source: Authors' calculations based on GTAP simulations results

The improvement of border transaction processes offer greater economic growth to less developed landlocked countries than other countries in this developing region. However, the reality is that the landlocked countries currently exhibit a lower level of border process efficiency according to our modelling, thus, showing larger gains. However, the investment affordability to reach the benefit would be an enormous challenge.

4.5.6. Welfare effects due to the reduction of trade delays and zero tariffs

Table 4.10 summarises the results of our second scenario, comparing the welfare effects of zero tariffs and border import time reductions, to the average level of the Southeast Asian region. Welfare would increase significantly for all members if they reduce trade delays and maintain zero tariffs for member countries. As Table 4.10 shows, 90% of positive changes in total welfare is due to the reduction of trade delays. The welfare improvement of maintaining zero tariffs is around 10% in all the South Asian members except in the landlocked region where the zero tariff would contribute to increase welfare by 22%. Our results are consistent with findings of previous studies in revealing that the impacts of trade delays impede trade more severely than do import tariffs in South Asia. Trade and economic growth would improve significantly if South Asia were able to implement TF policies to reduce trade delays. Thus, regional FTAs should not only negotiate to further eliminate import tariffs but should also focus on reducing border transaction times to accelerate trade. In that implementing TFA

commitment among South Asian members would be more effective. However, further research on modelling WTO TFA impacts based on GTAP for South Asia is suggested as an extension of this research.

Table 4.10: Welfare effects due to the reduction of trade delays and zero tariffs (US $ million)

	Allocative Effect		Endowment Effect		Technical Change		Terms of Trade		Total	
	Scenario		Scenario		Scenario		Scenario		Scenario	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
India	11,230	12,421	29,890	31,342	31,881	31,990	-3,105	-1,626	67,589	72,230
Pakistan	663	779	1,562	1,760	5,219	5,244	-36	271	7,214	8,103
Bangladesh	1,439	1,458	3,466	4,269	3,402	3,418	-28	-267	8,332	8,932
Sri Lanka	911	960	2,939	3,491	2,154	2,173	364	335	6,417	6,916
Landlocked	2,823	3,243	2,958	4,030	1,677	1,607	1,665	1,991	15,787	20,189

Source: GTAP simulations results

4.6. Conclusion

This study used the GTAP model to assess the potential impacts of trade delay reductions on economic development. A review of previous studies on assessing the impacts of time in trade and an evaluation of previous approaches used in the development of a global database of trade time costs, together with a comparison of the two major databases referred in the literature, provided a greater and synthesised understanding of the specific methodological approaches. Both approaches to trade time costs compare favourably with alternative methods used in the estimation of the economic costs of trade delays. All estimation methods, however, show an inherent bias arising from the basic assumptions and specified characteristics of time costs employed. AVEs of time costs values may show significant variations and their effective incorporation in modelling is subject to the individual user analysis of border transaction times employed to produce these time values. Our evaluation concluded that current trade time costs estimates require further improvement and updating.

This has been the first study to incorporate the AVEs of time in trade database, based on the willingness to pay for fast transport, to supplement the current GTAP database in quantifying the economy wide impacts of trade delays in South Asia. Our findings indicate that were the region to reduce border transaction times to match those of Southeast Asia, South Asian nations

would potentially increase their trade volumes by 10%. Were all regional members to implement policy reforms reducing border transaction delays, with a common purpose of expanding regional trade integration, the South Asian intra-regional trade volume would increase by 14%. The regions' major northern trading partners would also stand to gain from expansion of their exports as extra-regional trade would expand by 9.7%. The disaggregated results showed the potential for parts and components exports to exceed imports if India and Sri Lanka can reduce import delays to the simulated benchmark levels. This confirms the fact that timeliness, in the arrivals of parts and components at production plants, is essential for the efficiency of highly segmented production chains. Our results also predict a significant rise in demand from developed countries for South Asian T&W, excluding products from Sri Lanka. Aggregate regional imports of T&W raw materials would increase; in India by 16%, Bangladesh by 11%, and Pakistan by 16%, generating additional exports. Overall, faster border transactions will generate additional employment in South Asia and increase regional real GDP by 4%.

We considered the three major elements of border crossing: customs clearance, port and terminal handling, and inland transport, in modelling the impacts of delays and confirm that inland transport associated delays impede trade more heavily in landlocked regions, while ports and terminal handling and customs procedures delays significantly affect trade volumes in fellow South Asian nations. Thus, our analysis validates the prioritisation of TF policies that accelerate and simplify border transactions, which has not previously been assessed for South Asia. We further compared the economic effects of tariff removals and trade delay reductions, in terms of the broad trade economist's viewpoint that existing tariff liberalisation policies of current FTAs are partially ineffective, due to selective demands for controls on products considered sensitive. However, our modelling results show consistency with those of previous studies, in revealing that the impacts of delays impede trade more severely than the impacts of import tariffs in South Asia.

It should be noted that we have not incorporated the costs of reducing trade delays and that South Asian nations could face challenges in bearing the investment costs of upgrading infrastructures related to border transactions. As Portugal-Perez and Wilson (2012) have mentioned, even though the investment costs of hard infrastructure produce substantial spill-overs, these are difficult to measure and may require country specific case studies. Alternatively, the economic gains of soft infrastructure related border efficiency improvements

in developing countries may be achieved with comparatively smaller investments. Nordas et al. (2006) also highlighted that reforms reducing trade delays can be implemented at relatively low costs in developing countries, by prioritising specific logistic services, for which adjustment costs are low but gains are substantial. Our results are subject to the assumption that a certain level of trade delay reduction can be achieved at zero costs. This limits the practical value of our study as a basis for formulating policy to accelerate South Asian border transactions. It should, thus, be seen to highlight the need for further research into extending the GTAP modelling framework to incorporate the economic costs of reducing trade delays. Further, our results provide a platform from which to explore more effective TF policy options in future research. It is our intention to proceed by incorporating the costs of TF initiatives into comparative modelling of the iceberg and willingness to pay approaches, within the GTAP framework. Similarly, more detailed research into the South Asian economic impacts of WTO TFA will constitute a valuable addition to the body of literature.

References

Abe, K., & Wilson, J. S. (2008) Governance, corruption, and trade in the Asia Pacific region. *Policy Research Working Paper, No. WPS4731*.Washington, DC: World Bank.

Aguiar, A., Narayanan, B., & McDougall, R. (2016). An overview of the GTAP 9 data base. Journal of Global Economic Analysis, 1(1), 181-208. doi:http://dx.doi.org/10.21642/JGEA.010103AF

Ahmed, S., & Ghani, E. (2008) Making regional cooperation work for South Asia's poor. *Policy Research Working Paper, No. WPS4736*. Washington, DC: World Bank.

Anderson, J. E., & Wincoop, E. V. (2004). Trade Costs. *Journal of Economic Literature, 42*(3), 691-751. doi:10.1257/0022051042177649

Arnold, J. (2007). The role of trade facilitation in export growth. In S. Ahmed & E. Ghani (Eds.), South Asia growth and regional integration (pp. 191-235). Washington, DC: World Bank.

Arvis, J.-F., Duval, Y., Shepherd, B., Utoktham, C., & Raj, A. (2016). Trade costs in the developing world: 1996–2010. World Trade Review, 15(3), 451-474. doi:https://doi.org/10.1017/S147474561500052X

Behar, A., Nelson, B. D., & Manners, P. (2009) Exports and logistics. Economics Series Working Papers, No. 439. University of Oxford, Department of Economics.

Bougheas, S., Demetriades, P. O., & Morgenroth, E. L. (1999). Infrastructure, transport costs and trade. Journal of International Economics, 47(1), 169-189. doi:https://doi.org/10.1016/S0022-1996(98)00008-7

Burfisher, M. E. (2017). *Introduction to computable general equilibrium models*. New York: Cambridge University.

Clark, X., Dollar, D., & Micco, A. (2004). Port efficiency, maritime transport costs, and bilateral trade. Journal of Development Economics, 75(2), 417-450. doi:https://doi.org/10.1016/j.jdeveco.2004.06.005

De, P. (2008). Empirical estimates of trade costs for Asia. New Delhi: Research and Information System for Developing Countries (RIS)

De, P. (2011). Why is trade at border a costly affair in South Asia? An Emprirical investigation. *Contemporary South Asia, 19*(4), 441-464. doi:https://doi.org/10.1080/09584935.2011.602666

Dennis, A. (2006) The impact of regional trade agreements and trade facilitation in the Middle East and North Africa region. *Policy Research Working Paper, No. WPS3837*. Washington DC: World Bank.

Dennis, A., & Shepherd, B. (2011). Trade facilitation and export diversification. The World Economy, 34(1), 101-122. doi:https://doi.org/10.1111/j.1467-9701.2010.01303.x

Devlin, J., & Yee, P. (2005). Trade logistics in developing countries: The case of the Middle East and North Africa. The World Economy, 28(3), 435-456. doi:https://doi.org/10.1111/j.1467-9701.2005.00620.x

Djankov, S., Freund, C., & Pham, C. S. (2010). Trading on time. The Review of Economics and Statistics, 92(1), 166-173. doi:https://doi.org/10.1162/rest.2009.11498

Feenstra, R. C., & Ma, H. (2014). Trade facilitation and the extensive margin of exports. The Japanese Economic Review, 65(2), 158-177. doi:https://doi.org/10.1111/jere.12031

Fernandes, A., Hillberry, R., & Alcantara, A. M. (2015) Trade Effects of Customs Reform; Evidence from Albania. *Policy Research Working Paper,No. WPS7210*. Washington, DC: World Bank.

Fink, C., Mattoo, A., & Neagu, I. C. (2005). Assessing the impact of communication costs on international trade. *Journal of International Economics, 67*(2), 428-445. doi:https://doi.org/10.1016/j.jinteco.2004.09.006

Fox, A. K., Francois, J. F., & Londono-Kent, P. (2003). Measuring border crossing costs and their impact on trade flows: The United States-Mexican trucking case Global Trade Analysis Resource-1282. Purdue University: www.gtap.agecon.purdue.edu.

Francois, J., & Manchin, M. (2013). Institutions, Infrastructure, and Trade. *World Development, 46*(0), 165-175. doi:http://dx.doi.org/10.1016/j.worlddev.2013.02.009

Francois, J., Meijl, H., & Tongeren, F. (2005). Trade liberalization in the Doha development round. Economic Policy, 20(42), 350-391. doi:10.1111/j.1468-0327.2005.00141.x

Francois, J., & Wignaraja, G. (2008). Economic implications of Asian integration. Global Economy Journal, 8(3). doi:https://ssrn.com/abstract=1275688

Freund, C., & Rocha, N. (2011). What constrains Africa's exports? The World Bank Economic Review, 25(3), 361-386. doi:http://documents.worldbank.org/curated/en/791201468193750831/What-constrains-Africas-exports

Freund, C., & Weinhold, D. (2004). The effect of the Internet on international trade. Journal of International Economics, 62(1), 171-189. doi:https://doi.org/10.1016/S0022-1996(03)00059-X

Fugazza, M., & Maur, J.-C. (2008). Non-tariff barriers in CGE models: How useful for policy? Journal of Policy Modeling, 30(3), 475-490. doi:https://doi.org/10.1016/j.jpolmod.2007.10.001

Hausman, W. H., Lee, H. L., & Subramanian, U. (2013). The impact of logistics performance on trade. *Production and Operations Management*, *22*(2), 236-252. doi:https://doi.org/10.1111/j.1937-5956.2011.01312.x

Helble, M., Shepherd, B., & Wilson, J. S. (2009). Transparency and regional integration in the Asia Pacific. *The World Economy*, *32*(3), 479-508. doi:https://doi.org/10.1111/j.1467-9701.2009.01170.x

Hertel, T., & Mirza, T. (2009). The role of trade facilitation in South Asian economic integration. In K. Senga (Ed.), *Study on intraregional trade and investment in South Asia*. Manila: Asian Development Bank (ADB).

Hertel, T., Walmsley, T., & Itakura, K. (2001). Dynamic effects of the" new age" free trade agreement between Japan and Singapore. *Journal of Economic Integration*, 446-484. doi:https://www.jstor.org/stable/23000768

Hillberry, R., & Zhang, X. (2015) Policy and Performance in Customs- Evaluating the Trade Facilitation Agreement. *Policy Research Working Paper,No. WPS7211*. Washington, DC: World Bank.

Hoekman, B., & Nicita, A. (2011). Trade Policy, Trade Costs, and Developing Country Trade. *World Development, 39*(12), 2069-2079. doi:http://dx.doi.org/10.1016/j.worlddev.2011.05.013

Hornok, C., & Koren, M. (2015). Administrative barriers to trade. *Journal of International Economics, INEC -02832*(0). doi:http://dx.doi.org/10.1016/j.jinteco.2015.01.002

Hummels, D. (2000). Time as a trade barrier *Purdue CIBER working papers, No. 7*. Purdue University: http://docs.lib.purdue.edu/ciberwp/7

Hummels, D., Minor, P., Reisman, M., & Endean, E. (2007). Calculating tariff equivalents for time in trade. United States Agency for International Development (USAID): https://krannert.purdue.edu/faculty/hummelsd/research/tariff_equivalents.pdf.

Hummels, D., & Schaur, G. (2013). Time as a trade barrier. *The American Economic Review, 103*(7), 2935-2959. doi:10.1257/aer.103.7.2935

Iwanow, T., & Kirkpatrick, C. (2009). Trade Facilitation and Manufactured Exports: Is Africa Different? *World Development, 37*(6), 1039-1050. doi:http://dx.doi.org/10.1016/j.worlddev.2008.09.014

Korinek, J., & Sourdin, P. (2010). Clarifying Trade Costs: Maritime Transport and Its Effect on Agricultural Trade. *Applied Economic Perspectives and Policy, 32*(3), 417-435. doi:10.1093/aepp/ppq007

Korinek, J., & Sourdin, P. (2011) To What extent are high-quality logistics services trade facilitating? *OECD trade policy papers, No. 108*. OECD Publishing: http://dx.doi.org/10.1787/5kggdthrj1zn-en

Limao, N., & Venables, A. J. (2001). Infrastructure, geographical disadvantage, transport costs, and trade. *The World Bank Economic Review, 15*(3), 451-479. doi:https://www.jstor.org/stable/3990110

Liu, L., & Yue, C. (2013). Investigating the impacts of time delays on trade. *Food Policy, 39*(0), 108-114. doi:http://dx.doi.org/10.1016/j.foodpol.2013.01.001

Martincus, C. V., Carballo, J., & Graziano, A. (2013). Customs as Doorkeepers: What Are Their Effects on International Trade? Inter-American Development Bank: https://www.etsg.org/ETSG2013/Papers/034.pdf.

Martincus, C. V., Carballo, J., & Graziano, A. (2015). Customs. *Journal of International Economics, 96*(2015), 119–137. doi:https://doi.org/10.1016/j.jinteco.2015.01.011

Minor, P., & Hummels, D. (2013). Time as a barrier to trade: A GTAP database of ad valorem trade time costs. ImpactEcon: http://mygtap.

Minor, P., & Tsigas, M. (2008). Impacts of Better Trade Facilitation in Developing Countries *GTAP resource, No. 2762*. Purdue University: https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2762.

Moise, E. (2013) The costs and challenges of implementing trade facilitation measures. *Trade Policy Papers, No. 157*. OECD publishing: http://dx.doi.org/10.1787/5k46hzqxt8jh-en.

Moise, E., Orliac, T., & Minor, P. (2011) Trade facilitation indicators: The impact on trade costs. *Trade Policy Papers, No. 118*. OECD Publishing: http://dx.doi.org/10.1787/5kg6nk654hmr-en

Moise, E., & Sorescu, S. (2013) Trade Facilitation Indicators: The potential impact of trade facilitation on developing countries' trade. *Trade Policy Papers, No. 144*. OECD Publishing: http://dx.doi.org/10.1787/5k4bw6kg6ws2-en.

Njinkeu, D., Wilson, J. S., & Fosso, B. P. (2008) Expanding trade within Africa: the impact of trade facilitation. *Policy Research Working Paper Series, No. 4790*. Washington, DC: World Bank.

Nordas, H., K., Enrico, P., & Geloso, G., M. (2006) Logistic and time as a trade barries. *OECD Trade Policy Working Paper, No. 35*. OECD Publishing: https://www.oecd-ilibrary.org/trade/logistics-and-time-as-a-trade-barrier_664220308873.

OECD. (2003) Quantitative assessment of the benefits of trade facilitation. *Working paper, No. WP(2003)31*. OECD: http://www.oecd.org/trade.

OECD. (2018). *Trade Facilitation and the Global Economy*. OECD Publishing, Paris: http://dx.doi.org/10.1787/9789264277571-en.

Persson, M. (2008). Trade Facilitation and the eU-aCP economic partnership agreements. *Journal of Economic Integration, 23*(3), 518-546. doi:ttps://www.jstor.org/stable/23001231

Persson, M. (2013). Trade facilitation and the extensive margin. *The Journal of International Trade & Economic Development, 22*(5), 658-693. doi:https://doi.org/10.1080/09638199.2011.587019

Portugal-Perez, A., & Wilson, J., S, . (2012). Export performance and trade facilitation reform: Hard and soft infrastructure. *World Development, 40*(7), 1295-1307. doi:http://dx.doi.org/10.1016/j.worlddev.2011.12.002

Portugal-Perez, A., & Wilson, J. S. (2009). Why trade facilitation matters to Africa. *World Trade Review, 8*(03), 379-416. doi:https://doi.org/10.1017/S147474560900439X

Rau, M. L., & Verma, M. (2015). *NTMs in CGE models – Is reducing iceberg trade costs enough? An experiment of modelling EU DCFTAs in GTAP*. The 2nd Macroeconomics of Agriculture and Development (MAD) workshop (November 19-20, 2015).

Samuelson, P. A. (1954). The transfer problem and transport costs, II: analysis of effects of trade impediments. *The Economic Journal*, 264-289. doi:https://www.jstor.org/stable/2226834

Valensisi, G., Lisinge, R., & Karingi, S. (2016). The trade facilitation agreement and Africa's regional integration. *Canadian Journal of Development Studies, 37*(2), 239-259. doi:https://doi.org/10.1080/02255189.2016.1131672

Walkenhorst, P., & Dihel, N. (2006). Trade impacts of increased border security concerns. *The International Trade Journal, 20*(1), 1-31. doi:https://doi.org/10.1080/08853900500467958

Walmsley, T., & Minor, P. (2015). Willingness to Pay in CGE Models *Working paper, No. 04*. ImpactECON: https://impactecon.com/?attachment_id=1014.

Wignaraja, G., Morgan, P., Plummer, M. G., & Zhai, F. (2015). Economic Implications of Deeper South Asian–Southeast Asian Integration: A CGE Approach. *Asian Economic Papers, 14*(3), 63-81. doi:10.1162/ASEP_a_00376

Wilson, J., Mann, C. L., & Otsuki, T. (2003). Trade facilitation and economic development: A new approach to quantifying the impact. *The World Bank Economic Review, 17*(3), 367-389. doi:http://documents.worldbank.org/curated/en/819921468247820688/Trade-facilitation-and-economic-development-new-approach-to-quantifying-the-impact

Wilson, J. S., Mann, C. L., & Otsuki, T. (2005). Assessing the Benefits of Trade Facilitation: A Global Perspective. *The World Economy, 28*(6), 841-871. doi:10.1111/j.1467-9701.2005.00709.x

World Bank. (2013). World Development Indicators World Bank: http://data.worldbank.org/indicator.

World Bank. (2015). World Integrated Trade Solusion World Bank: https://wits.worldbank.org/.

World Bank. (2016). The World development indicators World Bank: http://data.worldbank.org/indicator.

World Bank. (2017a). Doing business report World Bank: http://www.doingbusiness.org/~/media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB17-Report.pdf.

World Bank. (2017b). Globalization backlash: *South Asia economic focus spring 2017*. Washington DC: World Bank.

World Bank. (2017). The potential of Intra-regional trade for South Asia. World Bank: http://www.worldbank.org/en/news/infographic/2016/05/24/the-potential-of-intra-regional-trade-for-south-asia.

World Economic Forum. (2016). The global competitiveness report 2016–2017. World Economic Forum: http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

Yadav, N. (2014). Impact of trade facilitation on parts and components trade. *The International Trade Journal, 28*(4), 287-310. doi:https://doi.org/10.1080/08853908.2014.922040

Zaki, C. (2013). Trade facilitation and corruption: a CGE model of Egypt. *The Journal of North African Studies, 18*(1), 70-111. doi:https://doi.org/10.1080/13629387.2012.731165

Zaki, C. (2014). An empirical assessment of the trade facilitation initiative: econometric evidence and global economic effects. *World Trade Review, 13: 1, 103–130*. doi:https://doi.org/10.1017/S1474745613000256

Zaki, C. (2015). How does trade facilitation affect international trade? *European Journal of Development Research*, *27*(1), 156-185. doi: https://doi.org/10.1057/ejdr.2014.36

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

We, the PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

	Author's Name	% of contribution
Candidate	Manel Ahangamage	90%
Other Authors	Mahinda Siriwardana	5%
	Stuart Mounter	5%

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

The Chapter 4 is submitted to publish as a journal article and currently under reviewed (The World Economy).

Perera, S., Siriwardana, M., & Mounter, S. (2018). Trade delays constitute a conclusive barrier to economic development: Should South Asia be motivated accordingly? The World Economy, under review.

We, the PhD candidate and the candidate's Principal Supervisor, certify that the following text, figures and diagrams are the candidate's original work.

Type of work	**Page number/s**
Journal Article	77-115

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Chapter 5 Economic impacts of the WTO Trade Facilitation Agreement on trade transaction efficiency at the South Asian borders[12]

Abstract

This study sets out to estimate the economic impacts of the Trade Facilitation Agreement (TFA) on South Asian economies based on the Global Trade Analysis Project (GTAP) model. The methodology involved two major steps. The first used an econometric model to estimate the relationship between TFA policy variables and the TFA implementation outcomes. The results revealed that the TFA policy variables relating to Advance rulings and Formalities-procedures strongly influence the TFA outcomes. In the context of South Asia this implies that strict adherence to the TFA provisions reduces import time substantially arising from the country's own TFA measures; whereas the OECD and other developed countries can further reduce export time based on the quality of their trading partners' implementation. In the second step, the estimated reduced number of days to import and export were converted into Ad Valorem Equivalents (AVEs) and incorporated into the GTAP model in accordance with the iceberg approach. The results revealed that South Asian regional trade would increase by 2.7% if members continue to implement the measures at the current rate, whereas the full implementation of the Agreement would potentially increase regional trade by 5.75%. Increases resulting from the final consumption of agricultural sector imports and intermediate inputs in the manufacturing sector contributed significantly to this rise in real Gross Domestic Product (GDP). These gains, however, are dependent on the time frame of the implementation and extent to which these developing countries receive technical support and capacity building.

Keywords: Trade Facilitation Agreement, WTO, South Asia, GTAP

[12] Perera, S., Siriwardana, M., & Mounter, S. (2018). Economic impacts of the WTO Trade Facilitation Agreement on trade transaction efficiency at the South Asian borders. The Journal of International Trade & Economic Development, Under review.

5.1. Introduction

The Trade Facilitation Agreement (TFA) entered into force on 22 February 2017, after ratification by two-thirds of the World Trade Organization (WTO) member nations. The Agreement contains provisions for expediting the movement, release, and clearance of goods, including goods in transit. With the ratification of the provisions of the Agreement, the WTO anticipates the simplification of documentation, greater efficiency of customs procedures through harmonization and modernization of customs activities, and a reduction in costs and time of import and export transactions. The TFA aims to provide assistance for developing and Least-Developed Countries (LDCs) to fully benefit from its provisions. According to the WTO (2015), full implementation of the TFA is expected to reduce global trade costs by an average of 14.3% and reduce average time for imports by 47% and exports by 91%, with the largest gain from the reduction in trade costs and time accruing to the LDCs. The WTO forecasts that the reduction of trade time and costs through the Agreement would result in a 2.7% global export growth and 0.5% global real Gross Domestic Product (GDP) growth annually. The forecast is that developing countries and LDCs will gain two-thirds of all benefits arising from the Agreement, in that developing country annual exports and GDP will increase by 3.5% and 0.9% respectively.

Border trade transaction inefficiency is the major issue restricting trade expansion in South Asia. The negative impacts of trade delays on economies in the region are higher than in other developing regions. Traders face the burden of severe added costs due to excessive documentation, unnecessary numbers of security checks and quarantine inspections, overcomplicated customs formalities, and the addition of certain unnecessary fees and charges. Small traders generally lack the capacity and resources to cope with complicated and cumbersome border procedures. Unnecessary import and export processes and the associated delays increase the uncertainty of delivery times and seriously hamper the trade of time-sensitive commodities in these countries. Domestic production is affected by such delays due to uncertainty regarding deliveries of imported raw materials and intermediate inputs. South Asia comprises three landlocked nations which are the region's least developed economies, being worst affected by the sum of delays from procedures at additional transit points. Thus, the TFA initiative is critical for South Asia as a developing region, in order to reduce costs of border transaction delays.

Thus far, there has been limited empirical evidence as a basis for estimating the economic impacts of the TFA. As the Agreement has only recently been implemented insufficient time lags exist to measure its actual economic impacts, as well as a limitation on the availability of information and data for comprehensive assessments. However, there is a small body of literature written during the period that the Agreement was under negotiation, constituting economy-wide assessments of the potential impacts of TFA. Two studies published under the auspices of the Organisation for Economic Co-operation and Development (OECD) provide evidence of the reduction of potential trade costs arising from the global implementation of TFA policies. Initially, the OECD developed 12 Trade Facilitation (TF) indicators which correspond to the TFA provisions[13]. These indicators measured the extent to which TFA policies had been already introduced and implemented in absolute terms. Moise and Sorescu (2013) set out to estimate the potential impacts of TFA policies on trade costs based on these indicators, at the time the Agreement was still under negotiation. These estimates were based on the standard gravity model and illustrated that TFA provisions have a potentially positive outcome in expanding trade flows. The collective improvements of all TFA indicators were estimated to reduce trade costs by 14.5% in low income countries, 15.5% in lower middle income countries, and 13.2% in upper middle income countries. Recently, using updated 2017 TF indicators, the OECD produced a policy brief (OECD, 2018a) which includes estimates of the potential impacts of the TFA on trade costs in the global context. The second study reproduced the same illustration used in the previous study, with TF indicators corresponding to current time, after the five-year time lag since the first. The variation in TFA impacts on trade costs, according to which low income countries benefit more in comparison with high income countries remained consistent and, the potential reduction of trade costs due to the full implementation of the TFA increased to 16.5% in low income countries, 17.4% in lower middle income countries, 14.6% in upper middle income countries, and 11.8% in OECD countries. This implies that the inclusion of updated border policy indicators, reflecting current national border policy performances and thus, more accurate results, indicated that TFA impacts were greater than originally estimated.

Sufficient evidence does exist for quantitative estimations of the economy-wide impacts of TF. However, with the exception of the two OECD-related estimations of the impact of TFA on trade costs reductions, very few empirical studies have estimated the impacts on trade flows

[13]These indicators will be discussed in detail later in the paper.

and the overall economy. One such study (Beverelli, Neumueller, and Teh 2015) focused on the export diversification effects of the TFA, while another (Hillberry and Zhang, 2015) assessed the overall economic outcome of the TFA based on an econometric model and related simulations. Walmsley and Minor (2015) introduced a new Computable General Equilibrium (CGE) approach and assessed the economic impacts of the TFA. It should be noted that these studies were carried out after the WTO concluded TFA negotiations at the Bali Ministerial Conference in 2013. Most recently, OECD (2018b) estimated the global economy-wide impacts of the TFA based on updated OECD TF indicators after the Agreement had finally been implemented. Each of these studies is briefly reviewed in turn, as a means to position the empirical contribution of this current study.

Beverelli et al. (2015) estimated the effects of the TFA on export diversification, measured as the number of products exported to new destinations and the number of export destinations served by new products. OECD TF indicators were used to measure the TFA policies, together with trade margin data and estimated cross-sectional regressions for the year 2009. Using estimated TFA policy related coefficients, the impacts of the implementation of the Agreement on developing countries' extensive margins of trade were simulated under two scenarios. The first scenario was designed to measure the impacts of the TFA on the extensive margins, assuming countries improve TFA policies to the level of the regional median, while the second was designed to measure the impacts based on the national improvements of TFA policies on a global scale. The overall simulation results showed that developing countries would experience a significant increase in the number of products exported, as well as destination markets. Sub-Saharan African countries, particularly, would increase the number of products exported per destination by up to 15.7%, and the number of export destinations per product by up to 34.9%, while Latin American and Caribbean countries would increase the number of products exported per destination by up to 12.2% and the number of export destinations per product by up to 26.9%. Despite these positive gains in the extensive margins of exports due to the TFA, the authors suggested further research in analysing the impacts of the TFA, based on the actual implementation schedules as notified by WTO members, rather than based on hypothetical scenarios. The current study fills this gap by developing more realistic scenarios by including actual rates of implementation of member nations.

Hillberry and Zhang (2015) also estimated the global economic impacts of the TFA, based on a multiple imputation discrete-time transition model, adopting OECD TF indicators for the

quantitative explanations of TFA border policies. They measured TFA outcomes as time and costs required to clear customs (customs efficiency), while TFA policies, based on OECD TF indicators were incorporated as explanatory variables. Trading across Border (TAB) data[14] was used to measure customs efficiency, with time reported in units of days. The authors argued that this leads to overlooking of noteworthy variations in national border performances since customs processing times vary for most cases by a matter of hours. In order to capture such variations, Hillberry and Zhang (2015) used a discrete-time transition model and similarly, the multiple imputation method was selected as there were significant missing observations of specific OECD TF indicators in particular countries. The methodology and procedures adopted here were comprehensive in that they have been tested along with many other independent variables as control variables for the TF policy indicators, such as countries' level of development, geographical indicators, memberships of relevant international economic bodies etc. Furthermore, the dependent variable (time) which measures the border outcome (customs efficiency) was tested together with other variables such as trade infrastructure variables, which include physical infrastructure, information and communication technology, and business environment. However, it was ascertained that time taken for customs procedures strongly explains the variations of TFA policies and interprets the results accordingly. From the twelve TF policy indicators, only the governance and impartiality and procedures-automation indicators were statistically significant and it was thus deduced that these two indicators were most clearly related to customs clearance time. The model used in Hillberry and Zhang (2015) did not provide a straightforward interpretation of the coefficients and thus conducted a counterfactual scenario analysis to assess the quantitative impacts of the TFA, in that they calibrated their model according to a scenario which explains the WTO members' trend towards the best performances of all twelve TFA policies and then quantified the impacts. The results showed that when all WTO members achieve best practices in all policies, the average expected time in customs for exports would reduce by 2 days and time for imports by 1.6 days. These projected reductions in time to import and export resulting from the TFA implementation were applied to estimate Tariff Equivalents (TE), based on the per day TE estimates developed by Hummels and Schaur (2013) and revealed that the full implementation of the TFA would be approximately equivalent to a cross-country mean tariff cut reduction of 0.9% in imports and 1.2 % in exports. Finally, the predicted welfare results showed that the global welfare gain due to the TFA would be USD 16.01 and 17.30 in imports and exports respectively, per WTO

[14] Annual publication of the World Bank

resident per year. Overall, the findings revealed that the Agreement reduces border crossing time and increases customs efficiency, thereby substantially improving welfare in member nations. Hillberry and Zhang (2015) provided empirical evidence that contributes to the literature, in terms of both methodological approach and findings, as well as pointing to many avenues for future research. The methodology and results of Hillberry and Zhang (2015) are referred to when necessary in the current paper since similar variables have been chosen, although updated and modified data has been used with a different model.

Walmsley and Minor (2015) introduced a new CGE approach to estimate the economic impact of reducing customs delays, while estimating the possible impacts of the TFA on customs efficiency. The standard existing methodology of incorporating customs delays into the CGE model, known as the "Iceberg Approach", was first introduced by Samuelson (1954) to model transport costs. Subsequently, Hertel, Walmsley, and Itakura (2001) introduced the approach in the CGE Global Trade Analysis Project (GTAP) model to incorporate trade delays due to poor customs performances. The iceberg approach is introduced into the GTAP model as a technical efficiency term, in which import quantity consumed increases relative to the actual quantity sent by the exporter since technical efficiency reduces spoilage and wastage; therefore, importers need less quantity to satisfy the same amount of imports. Conversely, Walmsley and Minor (2015) for the first time introduced the willingness to pay method to model reductions in customs delays, based on the consumer willingness to pay for faster delivery. Effectively, border efficiency improvements increase the import demand to satisfy the increased utility due to faster delivery, which was a novel concept and an important contribution to the literature. Walmsley and Minor (2015) employed a linear model as opposed to the discrete time transitional model employed by Hillberry and Zhang (2015). The new model incorporates the OECD TF indicators as independent variables to explain the customs processing time, along with other general control variables such as the country's GDP and geographical variables such as land area and OECD membership. The method involves converting estimated reduced time in customs due to the TFA into Ad Valorem Equivalents (AVEs) of the TFA, and applying these to the recently-introduced global supply chain model as demand-side shocks based on the assumption of full implementation of the Agreement. The authors additionally employed the iceberg approach to compare results, which revealed that the iceberg approach tends to produce a greater increase in GDP compared to the willingness to pay method. However, the impact produced by the TFA on prices, trade volumes, and ultimately welfare is greater under the willingness to pay method. This demonstrates that iceberg tends to overestimate the GDP

impact, while willingness to pay method produces a higher welfare component due to the TFA. Therefore, Walmsley and Minor (2015) suggested to use a combination of iceberg and willingness to pay to attain more realistic results.

OECD (2018b) estimated the global economic impacts of the TFA based on the OECD global CGE trade model named "METRO" (Modelling Trade at the OECD). The study used the updated OECD TF indicators (2017) and TAB data to estimate the reduced time in customs procedures due to the TFA, while following the same methodological procedure used by Walmsley and Minor (2015). However, the authors retained AVEs in their model to represent iceberg and willingness to pay effects simultaneously. Assuming an equal distribution of these two effects, the estimated AVEs were hypothetically split into 50% iceberg effects and 50% willingness to pay effects. The simulation results showed that the full implementation of the TFA could potentially increase GDP between 0.04% and 0.41% depending on the level of development. In line with the earlier literature, the authors confirmed that low income countries will benefit more than those with a higher income. In practice, it is extremely complicated to estimate AVEs of the TFA as both iceberg and willingness to pay effects due to the lack of sufficient data, as researchers need to distinguish between the percentage of costs accounted for as losses or wastage of goods in transit and the percentage of the costs due to loss of consumer utility arising from delayed delivery. This is a significant limitation, as identified in the literature. Use of this type of assessment is strongly based on the researcher's choice of method and the assumptions imposed.

The main purpose of the current study is to estimate the economic impact of the TFA on South Asian economies based on the GTAP model. A lack of empirical research on the actual economic impacts of the TFA in South Asia has been clearly indicated, whereas the TFA is critical for the region with its composition of developing and least developing economies, together with border trade transaction performances among the weakest globally. The successful implementation of the TFA therefore potentially brings positive economic gains to a nation and as the literature emphasizes, as much as two-thirds of the global TFA benefits can be acquired by developing countries and LDCs.

According to the above review, there are two main approaches to estimating the economy-wide impacts of the TFA using the CGE framework, namely the iceberg and willingness to pay approaches. The iceberg approach is more applicable to the GTAP model while the willingness to pay approach is mostly used with the global supply chain model. Even though iceberg is a

well-established method for incorporating trade costs in the CGE framework, it has been criticized on the grounds that it provides larger GDP effects for the importing country. However, the willingness to pay method has to be implemented in conjunction with a supply chain model or modified GTAP model, but requires further theoretical and practical research due to its tendency to produce a welfare bias in its results. To achieve a superior modelling outcome, as has been suggested in the literature, the use of the two approaches should be combined which provides a significant challenge in the collection of sufficient data, which should be primary survey-based with the addition of more specific case studies. While acknowledging the specific limitation of the approach, this current study will employ the iceberg in conjunction with the GTAP model and its database, governed by the assumption that the TFA has reduced losses on traded commodities in transit due to increased border efficiency, while consumers have acquired a broader variety of imported goods due to faster deliveries at the constant-utility.

There are three main research objectives to assessing the economy-wide impacts of the TFA in South Asian countries. The first is to identify the relationships between TFA policy measures and border transaction times and estimate the coefficients which explain the magnitude of the reductions in import and export time due to changes in border policies. The second is to estimate the reduced number of days to import and export assuming full TFA implementation (best practices of border policies) based on estimated parameters. The third is to estimate the economy-wide impacts of the TFA, based on the GTAP model in which the reduced number of days attributable to the Agreement are converted into AVEs and implemented according to the iceberg approach. The empirical contribution of this paper to the literature is threefold. Firstly, the parameters of the study are original in that there is no literary precedent in the use of updated OECD TF indicators and TAB data to measure actual current impacts of the TFA on South Asian economies, almost one and half years after the actual implementation date. Secondly, previous TFA-related studies have considered the performances of countries as income-based country groups, while this study has disaggregated South Asia into individual South Asian member nations, while the rest of the world has been aggregated according to income levels. This facilitates the observation of the TFA impacts specifically in South Asia while making a comparison with the rest of the world. Thirdly, the study will provide the first realistic simulation using the actual current implementation rates to date, as reported by South Asian economies and the rest of the world. The simulation results will supply the evidence of gains already made in South Asian economies since enforcement of the TFA provisions. While

the landlocked countries, Sri Lanka and Bangladesh will require a substantial transitional period to implement all the TFA measures, in the long-run, these countries stand to be the largest beneficiaries of a full TFA implementation, subject to necessary financial and technical support from donor countries.

This paper has the following structure. The second section provides a brief overview of the content of the Agreement, its provisions, and the progress made by the South Asian member countries. The third section falls into two subsections. Firstly, the econometric method of estimation of the AVEs of the TFA and the results are discussed, based on a comparison of the results of previous estimations available in the literature. Secondly, the implementation of the AVEs of the TFA into the GTAP model and the estimation of the values of shocks and the scenarios are discussed. The fourth section provides an analysis of the GTAP model results and the fifth section provides a conclusion to the study.

5.2. Trade Facilitation Agreement (TFA): An overview

The WTO implemented the TFA on 22 February 2017 after the agreement was ratified by two-thirds of its members. The provisions of the agreement aim to simplify, rationalise, and harmonise export and import processes. The agreement contains three main sections (Table 5.1). Section 1 includes the provisions for expediting the movement, release, and clearance of goods including goods in transit. Section 2 includes the Special and Differential Treatment (SDT) provisions for developing countries and LDCs to determine the flexible implementation time period and necessary support. Section 3 contains the provisions for establishing the committee to facilitate the implementation of the agreement. Under the SDT provisions, developing and LDC countries can determine their own implementation schedules and are entitled to technical and financial assistance in this respect.

5.2.1. Brief summary of the TFA provisions and disciplines

The TFA Section 1 provisions (i.e. the provisions for expediting the movement, release, and clearance of goods including goods in transit) are briefly outlined in this paper in order to understand the WTO member nations' commitment to improve TF and reduce trade costs and border crossing time. The section includes 12 Articles and each includes border area obligation. The following information is based on the information provided in WTO (2014, 2015).

Article 1: publication and availability of information

The article instructs members to publicise information relating to the import, export and transit procedures, making these readily accessible to governments, traders and other parties. This includes the applicable rates of duties and taxes, fees and charges, product classification rules, regulations, transit restrictions, penalty breaching formalities, appeal procedures, related trade agreements and tariff quota administration. Similar information is required to be available on the internet and points of enquiry to answer queries are to be established. The WTO shall be notified as to where the information has been published, including that on the internet, and provide the contact information of the enquiry points.

Table 5.1: Provisions of the Trade Facilitation Agreement (TFA)

Section I
Provisions for expediting the movement, release and clearance of goods, including goods in transit. It clarifies and improves the relevant articles (V, VIII and X) of the General Agreement on Tariffs and Trade (GATT) 1994. It also sets out provisions for customs cooperation.
Section II
Special and Differential Treatment (SDT) provisions for developing and least-developed countries to determine when they will implement individual provisions of the agreement and to identify provisions that they will only be able to implement upon the receipt of technical assistance and support for capacity building. Therefore, this section is divided into three categories. **Category A**: provisions that the member will implement by the time the Agreement enters into force (or in the case of a least-developed country within one year after entry into force). **Category B**: provisions that the member will implement after a transitional period following the entry into force of the Agreement. **Category C**: provisions that the member will implement on a date after a transitional period following the entry into force of the Agreement and requiring the acquisition of assistance and support for capacity building.
Section III
Provisions that establish a permanent committee on trade facilitation at the WTO, require members to have a national committee to facilitate domestic coordination and implementation of the provisions of the Agreement. It also sets out a few final provisions.

Source: WTO (2014)

Article 2: opportunity to comment, information before entry into force, and consultations

The article instructs members to establish the means to facilitate comments from traders and other interested parties on new or amended laws and regulations relating to the movement, release, and clearance of goods. Additionally, members shall publish this information as soon as possible before regulations come into force to allow traders and other interested parties time to familiarise with the new laws and regulations.

Article 3: advance rulings

The article instructs members to issue a timeous advance ruling in response to any written request that contains all necessary information. An applicant shall be notified in writing if the application is declined, specifying the reasons and inform the applicant if the advance ruling is revoked, modified or invalidated. This further includes providing a review of the advance ruling, ensuring the validity of the advance ruling for a reasonable period of time after issuance, publishing information on the requirements for an advance ruling application, the time period in which an advanced ruling will be issued, and the length of time for which the advance ruling is valid, as well as making publicly available any information on advance rulings which it considers of significant interest to other interested parties, while protecting commercially confidential information.

Article 4: procedures for appeal or review

The article guarantees the right to an administrative appeal or review by the appropriate administrative authority, and/or to a judicial appeal or review to the recipient of an administrative decision. Under this provision, parties are ensured non-discriminatory decisions, afforded the right to a further appeal or review if there is undue delay in providing the original decision and are entitled to be provided with the reasons for the administrative decision to allow them recourse to an appeal or review.

Article 5: other measures to enhance impartiality, non-discrimination, and transparency

The article instructs members to issue notifications or guidance on enhanced border controls regarding specific foods, beverages, or feedstuffs, as well as be provided with information relating to the risk, details regarding the lifting or suspension of the notification, as well as to be promptly informed regarding the detention of goods for inspection, provided with the opportunity for a second test, if requested, where the first test has had an adverse outcome, as well as provide details of the laboratory where the test can be carried out in a case where the right to a second test has been granted.

Article 6: disciplines on fees and charges imposed on or in connection with importation and exportation and penalties

The article explains the requirements regarding the advance publication of information on the application of fees and charges in, allowing an adequate time period after information on amendments has been published, periodically review the fees and charges, and limit the fees and charges for customs processing to the cost of services rendered. Penalties shall only be imposed only on those responsible for a breach of regulations, commensurate with the degree and severity of the breach, ensure measures are in place to avoid any conflicts of interest and incentives in the assessment and collection of penalties and duties, provide a written explanation for the imposition of a penalty to the persons concerned, and to consider a voluntary disclosure of a breach as a potential mitigating factor when establishing a penalty for that person.

Article 7: release and clearance of goods

The article requires members to establish or maintain the procedures to allow for the advance submission of documentation and additional requirements prior to the arrival of goods to facilitate pre-arrival processing intended to enable the immediate release of the goods on arrival. Members shall, where possible, make provision for the electronic submission of documentation and payments and provide for the release and clearance of goods for imports, exports or transit prior to final determination of customs duties, taxes, fees, and charges. Under such circumstances, the member has a right to request a guarantee in the form of a surety. Further members shall maintain a risk management system, post-clearance audit, establishment, and publication of average release times, maintain TF measures for authorised operators and special provisions applicable to expedited shipments and perishable goods.

Article 8: border agency cooperation

The article requires members to ensure internal cooperation and coordination among the authorities and agencies responsible for border controls and procedures dealing with the importation, exportation, and transit of goods; ensuring that there is external cooperation and coordination with the border control authorities and agencies of other member nations with whom it shares a common border. Such coordination may include alignment of working days and hours and procedures and formalities, development and sharing of common facilities, joint controls and the establishment of a one-stop border post control.

Article 9: movement of goods intended for import under customs control

The article requires that members shall allow goods intended for import to be moved under customs control from one customs office to another within its territory.

Article 10: formalities connected with importation, exportation and transit

The article makes provision for minimising the incidence and complexity of import, export, and transit formalities; the decreasing and simplification of the associated documentation requirements, the acceptance of copies, use of international standards, the maintaining of a single window (a sole entry point at which traders submit all documentation to the required authorities), pre-shipment inspection, the use of customs brokers, common border procedures and uniform documentation requirements, the reassignment or return of rejected goods where possible, and provision for full or partial remission of duties and taxes for temporary admission and the inward and outward processing of goods.

Article 11: freedom of transit

The article prohibits the imposition of restricting regulations and formalities on traffic in transit, as well as the collection of any fees or charges specific to transit other than the normal costs of transportation and administration or the levying of voluntary restraints on traffic in transit. Members are required to facilitate the same treatment of goods in transit as in their place of origin, making available where possible a separate infrastructure (e.g. demarcated traffic lanes at borders) for traffic in transit; minimise of the burden of transit formalities, documentation and customs controls, technical regulations and conformity assessment procedures, and transit procedures; make provision for advance filing and processing of transit documents, expedite the termination of transit operations, make transaction guarantees publicly available, and cooperate with other members to enhance freedom of transit.

Article 12: customs cooperation

The article requires members to ensure that traders are aware of all compliance requirements and to facilitate the encouragement of voluntary compliance; to allow traders and other involved parties to share information to improve coordination of customs controls while respecting the confidentiality of the information shared; including measures promoting compliance and cooperation, the exchange of information, verification prior to a request, the format of a request, protection and confidentiality, the provision of information and the

postponement or refusal of a request; acknowledge the inability to offer reciprocity to a similar request, take into account the administrative burden of responding to requests for information, accept the limitation on information provided and the unauthorised use or disclosure of information and the freedom to enter into bilateral and regional agreements.

Section II of the agreement defines the SDT provisions availed to developing country members and LDCs members to implement the provisions of Article 1 -12. Article 14, defines the three categories of provisions (Table 5.1). On implementation, developed countries must commit to apply the TFA provisions from the date of entry into force. Alternatively, developing countries and LDCs are required only to apply those provisions they have indicated are within their capabilities to apply from the date of the TFA entry into force. LDCs have been granted an additional year to evaluate their capabilities to implement the provisions. Category C, Section II (Table 5.1) of the agreement outlines the provision of technical assistance for developing nations and LDCs in TF. Technical assistance and capacity building are provided by the WTO, its members, and other organizations such as the World Bank, the World Customs Organization, and the United Nations Conference on Trade and Development (UNCTAD). To provide the necessary technical assistance, the WTO launched the Trade Facilitation Agreement Facility (TFAF) for assisting developing countries and LDCs in implementing the TFA.

The primary function of the TFAF is to assist developing and LDC members in achieving the full benefits of the TFA. To this end, the TFAF provides vital support in assessing specific areas in need of TF improvements, as well as identifying additional organisations or development partners that may provide technical and financial assistance. Such assistance includes the preparation of the notification of special and differential treatment categories, capacity building for the understanding of the Agreement, the steps required to achieve implementation, the requirements to benefit from the SDT provisions, as well as guidance toward the accessing of further implementation assistance via regional and multilateral agencies, bilateral donors and other stakeholders. The TFAF also provides grants to developing and LDC member nations for project preparation and implementation. Australia, New Zealand, China, many EU nations, Norway and the United Kingdom have contributed toward TFAF activities supporting the implementation of the Agreement by developing and LDC member nations (TFAF, 2018).

5.2.2. Expected economic benefits of the Agreement

Economic literature confirms that the TFA will have a significant impact on reducing trade time and costs, thus enhancing global trade. The evidence shows clearly that member nations will derive benefits from both the implementation of their own TF policies, as well as from the collective TF efforts of their trading partners. According to the WTO (2018), the economic benefits of the TFA will exceed benefits derived from the global elimination of existing tariffs and developing countries and LDCs will derive the greatest benefits. According to the literature, the WTO (2015) identified several rationales for implementing the TFA.

The TFA reduces the terms of trade driven prisoners' dilemma: inefficient customs procedures increase trade costs and lead to increased import prices. This will lower the terms of trade and, at the same time, cause a deterioration in the exporting country's terms of trade. According to Figure 5.1, the domestic price of the importing country increases from P_w to P_w+c and reduces the import demand. If the importing country has the market power, the world market price will reduce from P_w to P^1_w. This will generate losses equal to the area *a*, representing the losses due to inefficient customs procedures. The total welfare loss to the importing country due to inefficiency is equal to the areas *a* and *b*. However, TF generates welfare gains due to the minimising of inefficiencies at customs in the importing country, as well as the exporting country. If the importing country implements TF measures, the country will gain and, at the same time, its partner country will also gain, described as positive externalities for the exporting country. However, when implementation costs of TF are high, a larger importing country may invest less to improve efficiency but can reduce the import demand and push to reduce the export price. This creates the so-called prisoners' dilemma effect, whereby a large importing country requires less investment in TF to improve the efficiency of customs procedures but causes increased losses for both countries. However, the commitment of all member countries to improve customs efficiency according to the provisions of the TFA reduces the prisoners' dilemma effect.

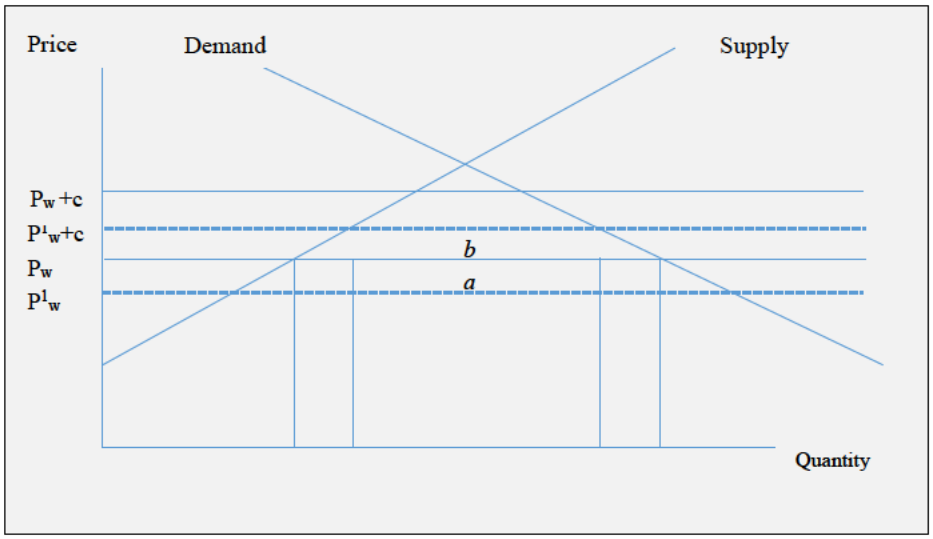


Figure 5.1: Impacts of insufficient customs procedures on welfare
Source: WTO (2015)

The TFA has established common customs procedures that reduce trade costs and coordination problems. Without the formal Agreement, it is probable that countries would have applied different approaches and adopted a variety of standards and procedures to improve customs efficiency. This would have forced traders to acquire some knowledge of the multiple procedures established by their different trading partners and lead to an increase in costs and time expended on information gathering. The adoption of common procedures has thus reduced these costs and time, as well as the coordination problems associated with the asymmetries in implementation costs and capacity, since the TFA provisions require developed countries to provide assistance and support for capacity building in developing countries. Alternatively, the creation of individual national TF policies results in coordination problems with other countries, while the negotiated attainment of the Agreement eliminates such problems. For example, if country 1 decides to implement x type of TF measures but country 2 prefers y type, both countries benefit individually, but coordination issues arise with the need to understand and adhere to the individual measures of each country with which they engage in trade. The TFA, as a global compromise, offers the surest common approach with the best possible standards to eliminate coordination issues and gain a proportionate share of the overall benefits.

In practice, TFA makes border crossing transactions quicker, easier, and cheaper by simplifying, modernising and harmonising export and import processes. Improved customs efficiency facilitates the clearance of goods at ports in the minimum possible time, reducing the operational costs of exporting and enabling the goods to be placed more competitively on

the international market. With WTO members committed, under the TFA, to provide the documentation forms online, exporters can process their import documentation while goods are in transit and get clearance before payment of duties and other charges imposed. According to WTO (2015), the full implementation of the TFA is expected to reduce trade costs by an average of 14.3%, which is produced by a projected 18% decline in trade costs on manufactured goods and 10.4% on agricultural goods. Based on these estimated cost reductions, LDCs implementing TFA will reap proportionately the greatest benefit, with African countries realising an average 16.5% reduction in trade costs. The full implementation of the TFA is projected to reduce time to import by one and half a days and time to export by two days with world trade increasing by 2.7 % per year.

The WTO (2015) estimation of the impact of the full implementation of the TFA on trade flows predicts increases of 36% in LDCs exports, 26% in developed countries and 31% in other developing countries. TFA also facilitates greater export diversification. A full implementation is projected to increase the number of products per destination by 35.6% in LDCs, by 20% in other developing countries, and by 9.8% in developed countries. Projecting this export diversification as the number of destinations per product indicates that a full implementation would result in an expansion of 59.3% for LDCs, 33.2% for other developing countries and 19% for, developed countries. Referring to the simulations based on a CGE model, the report provided evidence that annual GDP in some countries would increase by almost 1% from the implementation of the TFA in a more rapid and comprehensive manner. The combined outcome of the simulation of the full implementation of the TFA and complete elimination of tariffs by the year 2030 shows an 11% increase in export and 0.8% increase in GDP with the effects of TF exceeding those of tariff on trade. As the report revealed, this is because TF reduces efficiency losses more than the tariff reductions. Tariff elimination provides a smaller efficiency gain in that it redistributes a portion of efficiency from the government to the consumers. The sectoral impacts of the Agreement show that electronics, and textile and clothing would benefit most, as exports of these sectors would grow by 4 percent per annum from the immediate full implementation of all the provisions of the TFA. Under the differential and special treatment provisions of the Agreement, exports are expected to increase in Sub-Saharan Africa and some Asian countries. In certain countries, Small and Medium Enterprises (SMEs) would tend to gain more as small firms are more responsive to TF and lacked adequate resources, knowledge or market power to cope with complex customs procedures. Furthermore, TFA would attract more foreign direct investments. TFA is more crucial for

developing countries as customs revenue contributes to a larger share of government revenues and therefore, rent-seeking activities are high. However, governments can increase the revenue collection from efficiency improvements in customs procedures through reductions of informal trade, the control of corruption and increasing customs duties.

OECD (2018b) also reported the empirical estimates of the benefits of the TFA measures. According to this report, simplification of trade documents, streamlining of border procedures, and automation of the border process would provide the greatest impact on trade costs. TFA will potentially generate cost savings of 2.8% to 4.2% depending on the level of national development. Provisions relating to information and advance rulings could also generate lower trade costs. The TFA reduced trade costs in low income countries by 4.2% in the areas of harmonising and simplifying trade documents, 3.6% from automating trade and customs processes, 2.8% from ensuring the availability of trade related information and 2.8% from streamlining border procedures. In the lower middle income countries, trade costs are reduced by 3.9% from streamlining border procedures, 3.5% from harmonising and simplifying trade documents and 2.9% from automating trade and customs procedures. The streamlining border procedures factor had the greatest impact for upper middle income countries at 3.6%, while automating trade and customs processes reduced trade costs by 2.8%, ensuring the availability of trade-related information by 2.4% and providing advance rulings on customs matters by 2.4%.

5.2.3. WTO TFA commitments made by South Asian countries

All the South Asian WTO members, with the exception of the Maldives, committed to the provisions of the TFA. According to the TFAF (2018), South Asian members' notifications included the categorisation of each provision of the Agreement with specific timelines and their capacity to implement these measures (Figure 5.2). South Asia comprises both LDCs and developing countries and therefore, most of their implementation commitments fall under the SDT provisions of the TFA, which allow those countries to determine when they will implement specific measures and which need assistance. According to Figure 5.2, in Nepal, 86% of the measures will be implemented upon the receipt of capacity building support, while in the case of Afghanistan and Sri Lanka, 58% and 59% of the measures require technical assistance and capacity building, respectively. Conversely, India did not require any assistance and support under category C, with 72% of all TFA measures already implemented (Figure 5.2).

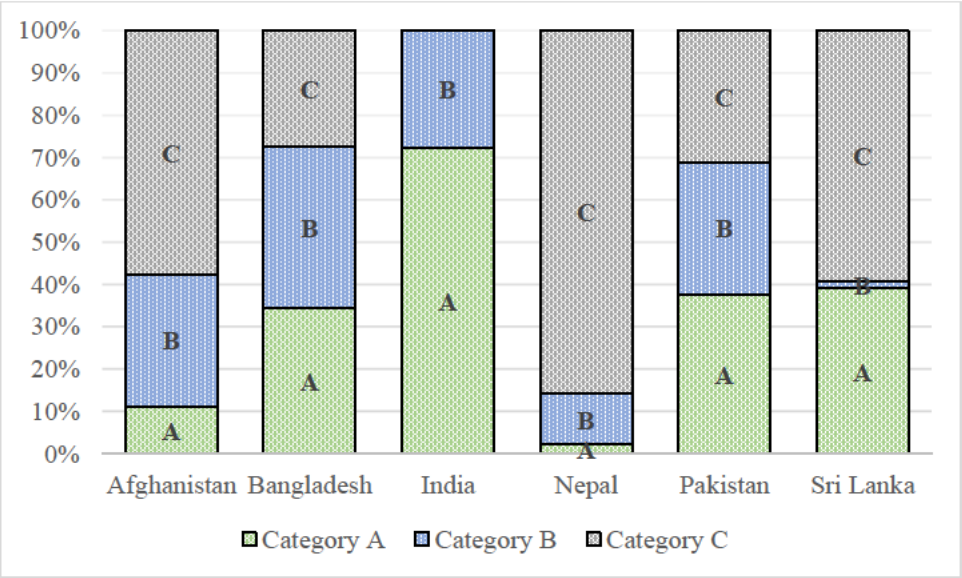


Figure 5.2: South Asian rate of implementation commitments of the TFA

Source: Trade Facilitation Agreement Facility Database (2018)

Note: Category A - rate of implementation commitments to date, Category B – rate of implementation commitments without capacity building support, Category C - rate of implementation commitments upon receipt of capacity building support

To date, Nepal had only implemented two measures (pre-shipment inspections and use of customs brokers) of the TFA[15], while eight measures including publications, acceptance of copies, and general disciplines on fees and charges had been notified to be implemented by the end of 2020, with no capacity support. Nepal requested support from regional and multinational donors to fully implement the remaining 26 measures, while Afghanistan had already implemented 5, and Sri Lanka 11 TFA measures, with Afghanistan capable of implementing 14 without capacity-building support. In general, most South Asian countries expressed concern about envisaged difficulties and requested assistance and donor support in the areas of consultations, acceptance of copies, information available through the internet, enquiry points, comments and information before entry into force, advance rulings, notifications for enhanced controls or inspections, test procedures, pre-arrival processing, average release times, authorised operators, expedited shipments, border agency cooperation, use of international standards, and the single window (Appendix 5.1-A).

Under category C, all South Asian members, excluding India, requested technical assistance, although the types of technical assistance relating to the TFA measures had yet to be

[15] TFA includes 36 individual TF measures which are categorised within 12 Articles

determined by Afghanistan, Nepal and Bangladesh, while Pakistan and Sri Lanka had already determined the required types of technical assistance and processed the notifications. Areas identified for technical assistance for Pakistan are indicated in Figure 5.3, and for Sri Lanka in Figure 5.4.

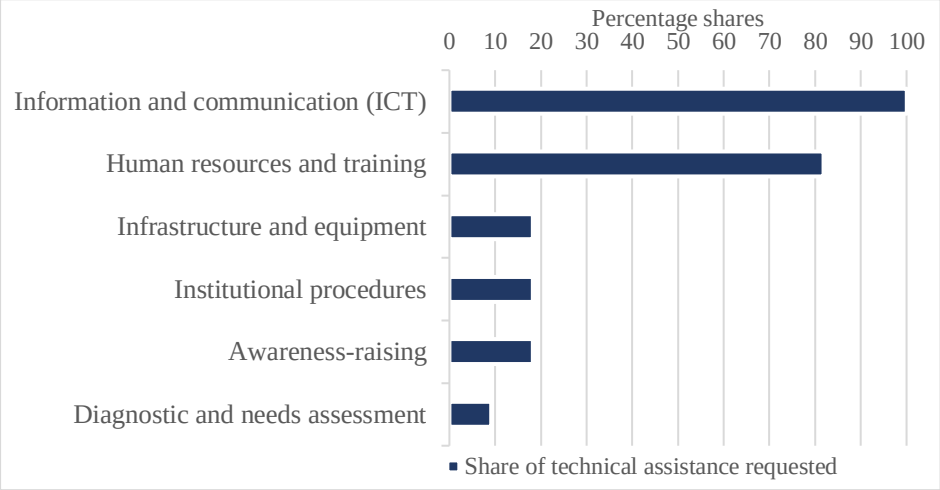


Figure 5.3: Type of assistance requested by Pakistan
Source: Trade Facilitation Agreement Facility database 2018

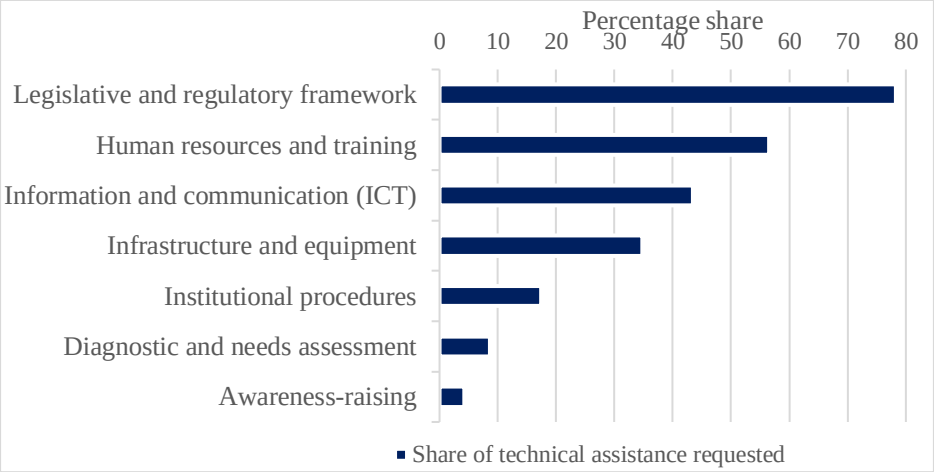


Figure 5.4: Type of assistance requested by Sri Lanka
Source: Trade Facilitation Agreement Facility database 2018

As represented in the two figures, these two countries both identified Information and Communication Technology (ICT), human resources and training, infrastructure and equipment, institutional procedures, awareness-raising, diagnostic and needs assessment, and the legislative and regulatory frameworks as key areas. In order to improve trade-related ICT

and human resources and training, Pakistan is mostly seeking external technical assistance, while Sri Lanka is seeking more technical support in order to improve ICT, human resources and training, together with infrastructure development and equipment essential to implement some certain measures.

5.3. Methodology

One of the core TFA objectives is to reduce import and export delays to boost customs efficiency. This paper focuses on analysing the economic benefits of the reduction of trade delays in South Asia arising from the TFA, which will be performed in three stages: the first investigates the relationship between border crossing time and border policies, together with the estimated elasticities based on an econometric model; in the second, the estimated elasticities are used to calibrate the time required for exports and imports when countries adopt best performance (full TFA compliance) and estimates the saving, in number of days, after full implementation; in the third, the saved days expended on exports and imports are converted into AVEs and to be processed into the GTAP model based on the iceberg approach, to analyse the economy-wide impacts of the TFA on South Asian countries and the rest of the world.

5.3.1. Econometric estimation of the impacts of border policies on border crossing time

5.3.1.1. Data

Three types of data were collected to estimate the TFA impact on time to import and time to export. The TFA outcomes variables (dependent variables) are total time to import and export that includes border compliance time and documentary compliance time. These dependent variables are expected to have an inverse relationship with border policies; if the values assigned for border policies are high, the time to import and export will be low. There are two types of explanatory variables: one set is related to the OECD Trade Facilitation Indicators (TFIs) which represent the TFA policy variables; the other is the control variables that explain the variance of export and import times due to factors other than TFA policy variables.

The following section defines the outcome and explanatory variables (OECD TF indicators) more extensively, together with the data types and sources.

5.3.1.1.1. Measures of the outcome of the Trade Facilitation Agreement (dependent variables)

Reductions in export and import times resulting from improved border transaction (customs) efficiency have become accepted as the outcome of the TFA and its associated policies. The World Bank Doing Business-Trading across Border (TAB) indicators are used as the quantitative measures of outcome variables of the TFA. The TAB database has been widely referred to in assessing the impacts of TF on trade flows (Dennis & Shepherd, 2011; Hertel & Mirza, 2009; Hoekman & Nicita, 2011; Iwanow & Kirkpatrick, 2009; Liu & Yue, 2013; Persson, 2008; Zaki, 2014). Among the sources reviewed in the study, Hillberry and Zhang (2015) and Walmsley and Minor (2015) used TAB data to assess the TFA economic impacts. Based on these sources and their confirmation of the reliability of TAB data for assessing TFA implications, the present study includes two major TAB indicators (time to exports and imports) as dependent variables.

The TAB database includes time and costs involved in the process of exporting or importing a shipment of goods, which is defined as the complete process of moving the shipment from the warehouse in the country of origin, to a warehouse in an overseas trading partner through a port. The data were assembled through a questionnaire to local freight forwarders, customs brokers, port authorities, and traders. The database covers 190 economies and assumes: (1) the shipment is located in a warehouse in the largest business city of the nation; (2) a shipment is a single unit of trade; and (3) the mode of transport is via the most widely used seaport, or border crossing point in the case of overland transportation. Time is measured in hours. The TAB database comprises two major components: border compliance time and costs of exports/imports and documentary compliance time and costs of exports/imports. Documentary compliance captures the time and costs of compliance with the documentary requirements of the economy of origin, the destination economy and any transit economies. It includes the time and costs of obtaining, preparing, processing, presenting, and submitting documents[16]. Border compliance indicates the time and costs incurred for compliance with customs regulations and other mandatory inspections at the border crossing, and the time and costs of handling at ports

[16] **Obtaining** - time spent to get the document issued and stamped, **preparing** - time spent gathering information to complete the customs declaration or certificate of origin, **processing** - time spent waiting for the relevant authority to issue a phytosanitary certificate, **presenting** -time spent showing a port terminal receipt to port authorities, and **submitting** - time spent submitting a customs declaration to the customs agency in person or electronically.

or borders (World Bank, 2018). The TAB database contains time series data and this study has used recent TAB data reported for 2017.

Hillberry and Zhang (2015) used TAB data reported in 2012, while Walmsley and Minor (2015) used the average of three years of TAB data reported for 2010-2012. Both of these studies omitted the time taken for documentary compliance. Walmsley and Minor (2015) excluded the time to prepare documents from their TAB, assuming that documents can be prepared in parallel with the activities of shipping and production. However, Hillberry and Zhang (2015) argued that TFA reforms may affect the costs and time of documentary compliance but still excluded these factors from their TAB sample, due to difficulties in estimating the impact of these within their model. However, time consumed for documentary compliance is a major issue in border crossing activities, especially in developing countries. Additionally, the reduction of the documentary preparation time and costs are one of the key objectives of the Agreement. Considering these facts, this paper included both border compliance and documentary compliance time for exports and imports. Therefore, the dependent variables are total time taken for exports and total time taken for imports reported in 2017 TAB database.

Table 5.2 shows the regional averages of four indicators of TAB data reported in 2017. These figures reveal that South Asia's export and import time and costs are only exceeded by Sub-Saharan Africa. Time and costs involving imports compared to exports in South Asia are more apparent. However, documentary compliance time and costs are higher for the border processing activities of exports. On average, time and costs expended on imports are higher than exports. Generally, import procedures take more time compared to export procedures because imports are often a revenue source, and developing countries usually import a wider range of goods than they export (WTO, 2015). Overall, TAB data reveals that developed regions take less time, and thus incur less costs compared to developing and LDC regions. Therefore, it is expected that the full implementation of the Agreement will reduce border crossing time very significantly in South Asia.

Figure 5.5 illustrates disaggregated TAB data for the South Asian region. Time and costs of documentary compliance and border compliance within the region vary widely. India, Bangladesh and Afghanistan border crossing activities are more costly and time consuming than other member nations in the region. However, India's rate of implementation of the TFA policy measures up to the date is recorded as 72% and full implementation will take place by

2020, without capacity building support (TFAF, 2018). This means, the TFA would expect that India has already substantially reduced excess time and costs of imports and exports to date. However, Bangladesh and Afghanistan require a transitional period and technical support for full implementation to reduce import and export time and costs. Therefore, the full benefits of the Agreement will be dependent on their rate of implementation and the magnitude of external financial and technical support.

Table 5.2: Import/export time and costs (regional averages in 2017)

	Time to Exports(hours)		Cost to Exports (USD)		Time to Imports (hours)		Cost to Imports (USD)	
	Border compliance	Documentary compliance	Border compliance	Documentary compliance	Border compliance	Documentary compliance	Border compliance	Documentary compliance
East Asia & Pacific	55.9	68.2	387.5	112.1	70.5	65.6	431.0	111.4
Europe & Central Asia	28.0	27.9	191.4	113.8	25.9	27.3	185.1	94.7
Latin America & Caribbean	62.5	53.3	526.5	110.4	64.4	79.9	684	119.5
Middle East & North Africa	62.6	74.3	464.4	243.6	112.3	94.5	540.7	266.2
OECD high income	12.7	2.4	149.9	35.4	8.7	3.5	111.6	25.6
South Asia	***59.4***	***77.0***	***369.8***	***179.5***	***113.8***	***104.7***	***638***	***341.6***
Sub-Saharan Africa	100.1	87.8	592.1	215.1	136.4	103.0	686.8	300.1

Source: Doing Business Trading across Border (TAB) online database (2018)

In general, the TAB database reports higher times and costs for landlocked countries since freight movements into such countries involve extra time and costs due to interactions with customs officials of more than one country (Hillberry & Zhang, 2015). However, in the case of South Asian landlocked countries, the TAB database reports comparatively less time and costs (Figure 5.5). An important reason is that South Asian landlocked countries have smaller economies and up to 80% of their trade movements occur by road transport to and from neighbouring India. Their openness to global trade is minimal.

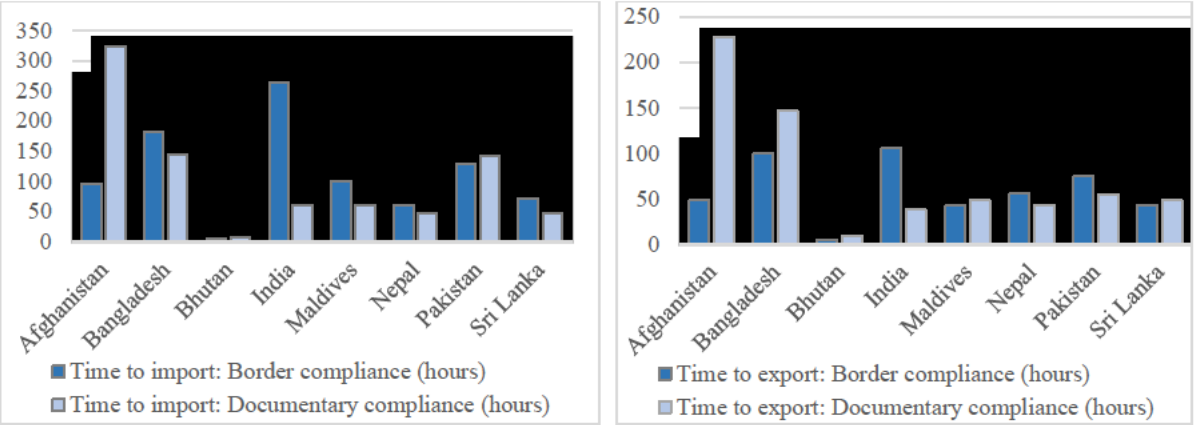


Figure 5.5: Time to import and export within South Asia

Source: Doing Business Trading across border online database (2018)

5.3.1.1.2. Measures of Trade Facilitation Agreement provisions (Independent variables)

The OECD border policy indicators were developed with the aim of measuring improvements in the efficiency of border transaction procedures and thus, they provide an effective means of assessing factors that impact on border transaction times. These indicators may also be used to monitor the changes and overall progress of the implementation of the TFA policies (OECD, 2018a). 16 indicators were developed for each country, based on 97 variables. Data were gathered through a questionnaire and publicly available sources. Appendix 5.2-B illustrates these indicators in greater detail. A list of the 97 policy variables from which the indicators were constructed is available in Moise and Sorescu (2013). The OECD border policy indicators are strongly related to the TFA provisions and well-suited to analyse the impacts of the Agreement, since the policy bundles correspond with the provisions of the TFA, enabling the indicators to be easily mapped into the provisions of the TFA. As Table 5.3 shows, OECD border policy indicators are related to one or more of the Articles of the Agreement.

The OECD border policy indicators (hereafter referred to as TFA policy variables) form the explanatory variables of the TFA outcome variables (border crossing time) in the model of this study. The values for each TFA policy variables are assigned based on the scoring system range of 2 to 0. The best performance related to TFA policy variables is assigned 2 and the worst, 0. The recent database includes TFA policy variables for 160 countries (in that 96 countries are WTO members and 11 countries are WTO observers) for the year 2017.

Table 5.3: OECD Trade Facilitation indicator map for TFA provisions

	OECD Trade Facilitation Indicators	TFA provisions
a	Information availability	Article 1+2
b	Involvement of the trade community	Article 2
c	Advance rulings	Article 3
d	Appeal procedures	Article 4
e	Fees and charges	Article 6
f	Formalities – documents	Article 7+10
g	Formalities – automation	Article 7+10
h	Formalities – procedures	Article 5+7+10
i	Cooperation – internal	Article 9.1 and 12
j	Cooperation – external	Article 9.3+12
k	Governance and impartiality	-

Source: Moise and Sorescu (2013)

A large number of TFA policy variables for many countries are missing from the database. Therefore, the sample used in this paper includes 104 observations (countries) after eliminating the observations with incomplete policy variables[17]. Table 5.4 provides a statistical summary of the TFA policy and outcome variables in the sample. Several advanced economies scored the maximum value, 2, representing the best performance which reflects TFA policy variables related to the involvement of trading community, advance rulings, appeal procedures, fees and charges, formalities-documents, and formalities-automation. Minimum scores ranged from 0.08-0.67. The lowest scores were reported in LDCs and developing economies reflecting a weaker performance based on border policies. In that formalities-automation, external border agency cooperation and formalities-documents record lower values. The TFA outcome variable (TAB data) mentioned in the last two rows in Table 5.4 shows that import processes take more time compared to exports and vary more largely across observations.

5.3.1.1.3. Control variables

National policies and their enforcement and administration emerge from historical and cultural traditions, socio-economic development and the political status quo. Import and export times are not only dependent on border policies but also on a combination of other variables ranging

[17] There are missing policy variables across all 12 provisions

from size of the land area, population, and transportation infrastructure to levels of education, remuneration, and even corruption, in the border control and transportation services.

Table 5.4: Statistical summary of the independent variables and the dependent variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Information availability	104	1.21	0.39	0.25	1.95
Involvement of the trade community	104	1.27	0.40	0.13	2.00
Advance rulings	104	1.17	0.52	0.25	2.00
Appeal procedures	104	1.22	0.39	0.20	2.00
Fees and charges	104	1.44	0.32	0.67	2.00
Formalities - documents	104	1.11	0.53	0.13	2.00
Formalities - automation	104	1.08	0.53	0.08	2.00
Formalities - procedures	104	1.16	0.35	0.42	1.86
Internal border agency co-operation	104	0.82	0.40	0.18	1.91
External border agency co-operation	104	0.81	0.42	0.09	1.91
Governance and Impartiality	104	1.29	0.54	0.11	2.00
Time to Exports hours(TAB)	104	104.44	91.84	3.00	481.00
Time to Imports hours (TAB)	104	147.47	139.65	2.00	642.00

Source: Authors' calculations based on the OECD policy indicator database and TAB database.

Thus, independent variables impacting on the overall border crossing and transit time are included in the model to represent the national development, geographical factors and, most importantly, relevant multilateral organisation memberships and participation. These factors cover the potential basic control variables that could affect time to imports and exports which have been already tested in the literature. Hillberry and Zhang (2015) mentioned that the education level of officials, capability of the engagement of firms with the international trading community and the development level of soft and hard border infrastructure are potential determinants of the border agency efficiency. The overall size of the economy explains such facts. Thus, the present study uses log GDP[18] as an independent control variable to measure the level of country development. The two geographical measures are also included on the right-hand side of the regression. Log square kilometres[19] was included to measure size of the country as it is related to the TAB data which measures the time involved in moving goods from the warehouse to the port. Generally, crossing larger countries takes longer. The second geographical variable indicates whether the country is landlocked. The transport from a landlocked country to reach the nearest port takes a longer time and use of the common border

[18] Data source: World Development Indicators 2017
[19] Data source: World Development Indicators 2017

facilities of a neighbouring territory involves added costs. To account for such burden, a dummy variable was introduced to represent the landlocked countries. Two additional dummy variables were introduced to denote the membership of multinational trade organisations. The OECD dummy variable avoids any potential bias through sequencing of the collected data, as indicators related to TFA policy variables were initially developed by the OECD for their members (Hillberry & Zhang, 2015). The WTO dummy variable indicates the potential effects of trade regulations on customs efficiency.

5.3.1.2. Model estimation

In order to estimate the potential reduction of time to trade, an econometric model was developed to identify the relationships between TFA policy variables and their impact on time to trade. Returning to the variables: the outcomes variables of the model are time to import and time to export; the 12 indicators related to border policies function as explanatory variables together with the 5 control variables, discussed in the previous section. TFA policy variable data are not reported over time and thus, a cross-sectional regression for 2017 was estimated. After eliminating the missing data related to TFA policy variables, 104 observations remained. A linear Ordinary Least Square (OLS) model was employed to estimate these relationships. Hillberry and Zhang (2015) selected a nonlinear "discrete time transition" model for the same purpose, based on two reasons: (1) The unit of measurement of time to import and export was 'days' rather than hours, which means in practice that if time to import in country X is reported as 0.5 days and for country Y, 1.4 days, both will be reported as 1 day unit (i.e. discrete units). (2) Significant numbers of missing observations exist in independent variables which are not randomly distributed. The approach used in the current paper has a number of similarities to Walmsley and Minor (2015), who also provided two reasons for employing a linear model to estimate the parameters related to border policies and border crossing time. The first was that the use of a non-linear model is challenging when directly interpreting the coefficients. The use of a linear model avoids this limitation and provides a different outcome that allowed them to compare their result with previous nonlinear model outcomes. The second reason is that they foresaw that the linear approach could be used in the future, in conjunction with newly updated TAB data where time is measured in hours. This study follows the Walmsley and Minor (2015) model as TAB data is reported in hours in 2017, avoiding the discrete nature of the dependent variable. Additionally, this study has used updated TFA policy variables with less missing observations such that introducing the linear model will not exert a bias on the parameter

estimates as was assumed by Hillberry and Zhang (2015). The model used in the present study is transformed into the log-log form and hence the estimated coefficients are interpreted as elasticities. Accordingly, two models have been used to regress the TFA policy variables and other control independent variables, along with the two dependent variables of time to import and time to export.

All 12 TFA policy variables and the control variables were tested individually. When all were tested simultaneously, most of the border policy variables proved statistically insignificant, while some carried the wrong sign. These outcomes lead to model specification insignificant, indicating that most of the policy variables are a poor fit. The insignificant variables and those carrying the wrong sign were removed and the model was re-run. The best fit import and export model specifications are as follows;

$$ln\,Time\ to\ import = \beta_0 + \beta_1(ln\,TFI\ Adv) + \beta_2(ln\,TFI\ Form) + \beta_3(lnGDP) + \beta_4(OECD) \quad (1)$$

$$ln\,Time\ to\ emport = \beta_0 + \beta_1(ln\,TFI\ Adv) + \beta_2(ln\,TFI\ Form) + \beta_3(lnGDP) + \beta_4(\ln L - area) \quad (2)$$

Where;

ln TFI Adv =TFI indicator related to Advance ruling

ln TFI Form=TFI indicator related to Formalities procedures

ln GDP=Gross Domestic Product

ln OECD=OECD membership

ln L-area=Land area squire kilometres

Tables 5.5 and 5.6 report the parameter estimates and standard errors for specifications of the import and export models[20]. The negative coefficients indicate that countries reporting lower values of the variables tend to require more time to import/export, while a positive coefficients indicate that higher values of a variable are related with more time to import/export. The import model explains 44% of the variation of time to import, and the export model explains 46% of the variation of time to export. Only two TFA policy variables (Advance-rulings and Formalities-procedures) and two control variables which are statistically significant at 1% and 5% levels (Table 5.5 and 5.6).

[20] The robust test and model specification test has been carried out and multicollinearity has been checked.

Table 5.5: Parameter estimates in the import model

	Robust		
Variable	Parameter estimate	Standard error	Significance
Log Advance rulings	-0.45998	0.19293	0.019
Log Formalities - procedures	-0.90841	0.34952	0.011
Log Per capita GDP	-0.23166	0.09483	0.016
OECD dummy	-0.88380	0.42375	0.04
Intercept	6.519601	0.78106	0.000

Source: STATA results of the linear regression model, equation (1)

Table 5.6: Parameter estimates in the export model

	Robust		
Variable	Parameter estimate	Standard error	Significance
Log Advance rulings	-0.28374	0.14874	0.059
Log Formalities - procedures	-1.23128	0.25537	0.000
Log Land area	0.11676	0.05088	0.024
Log Per capita GDP	-0.23287	0.087601	0.009
Intercept	4.866455	1.1254	0.000

Source: STATA results of the linear regression model, equation (2)

These results correspond closely with the estimates of Walmsley and Minor (2015). The linear import and export models developed in their paper are also fitted with two TFA policy variables and the adjusted R^2 is around 0.5 in the import model and 0.48 in the export model. The two statistically significant variables are formalities-documents and formalities-procedures. Formalities-procedures is also significant at the 1% level in the current model as well, indicating that formalities-procedures strongly affect border transaction times. The formalities-documents variable was found to be significant in Walmsley and Minor (2015) but has been omitted in the current model, as it is not statistically significant. One reason is that the dependent variable in this study includes time to prepare documents and the independent policy variable of formalities-documents denotes the same procedure. The appearance on both sides of the equation may cause this policy variable to become insignificant according to Hillberry and Zhang (2015). The non-linear model employed in the latter study confirms that only two TFA policy variables correctly explained time to import and export, namely, governance and impartiality and procedures-automation.

Formalities-procedures is significant in the current model covering procedures relating to: streamlining of border controls, single submission points for all required documentation (single windows), pre-arrival processing, release of goods separate from final determination and payment of customs duties, treatment of perishable goods, post-clearance audits, and authorised operators. The next statistically significant policy bundle is Advanced Ruling, which includes policies related to prior statements by the administration querying traders in regard to the classification, origin, valuation method, etc., applied to specific goods at the time of importation and the rules and procedures applied to such statements (Appendix 5.2-B). These two TFA policy variables cover a wide area of the Agreement and thus, would be substantial predictors of the TFA outcome.

5.3.2. Estimation of the potential reduction of import/export time upon the full implementation of the TFA

The second methodological step estimates the reduction of import and export times due to full TFA implementation. It is assumed that WTO members will have adopted best operational practices upon full TFA implementation. Accordingly, all policy variables in the model have been assigned the value "2" to represent the full implementation, while keeping other variables fixed as observed values in the initial estimation[21]. The projected times to import and export for each country are recalculated at this point, based on the elasticity estimates in Tables 5.5 and 5.6. The estimated times under full compliance are then subtracted from the actual time reports in the TAB database, to calculate the potential reduction of time due to comply with the Agreement. The trade-weighted estimates of the potential reductions of time to import and export are reported in Table 5.7. These time estimates are reported in days, in order to compare the results in similar earlier studies. The potential reduction of times to import and export in high income OECD countries due to the TFA is significantly lower than in other national groups. This can be attributed to the fact that the majority of OECD countries had introduced best practises before the Agreement entered into force and thus, impact (change) was negligible. Similarly, very minor reductions of time to import and export can be observed in other developed country group since their TFA policy variable scores are close to "2". These estimates are more or less close to the estimates of Walmsley and Minor (2015) with respect to the OECD country groups. Their estimates showed reduced times on imports and exports in

[21] In the initial database, most of the OECD countries and other developed countries have a reported border policy score value "2" indicating the best performances. This implies that these countries have already accomplished the requirements of the Agreement and thus impacts would be lower.

the OECD country group of 0.6 and 0.8 days respectively. However, in the case of middle and low income countries, the estimates of the current study are significantly larger than those of Walmsley and Minor (2015). As Table 5.7 shows, the potential reduction times on imports and exports in middle income countries are double those of the high income countries, while the reduced delays in low income countries are double those of middle income countries. Differences in estimates from Walmsley and Minor (2015) may be due to the differences in data used in the econometric model and other calculations, as well as the mix of countries included in each income category[22].

Table 5.7: Potential reduction of number of days in imports and exports due to the TFA (trade-weighted average)

Border point	High income OECD countries	High income non-OECD countries	Middle income countries	Low income countries
Imports - own	0.19	2.20	4.77	10.30
Exports - partners	0.23	1.36	1.82	6.49

Source: Authors' calculations based on econometric model estimations

However, both studies found higher values for reduced import time compared to export time and developing countries and LDCs showed greater potential reductions compared to developed countries. These substantial variations in average time reductions for countries representing different income levels imply that the TFA brings significantly larger policy changes in developing and LDCs countries and limited changes in developed countries.

5.3.3. Implementation of the estimated TFA-related reduced number of days to import and export in the GTAP model

The potential reductions of time to import and time to export, due to the Agreement, can be implemented in the GTAP model using the "Iceberg" approach. This is the most commonly used technique to estimate economy-wide impacts of border crossing delays based on the GTAP model (Abe & Wilson, 2008; Fox, Francois, & Londono-Kent, 2003; Hertel et al., 2001; Minor & Hummels, 2013; OECD, 2003). The GTAP model replicates the global effects of the reduction of time costs as a technical efficiency improvement in import demand. The exogenous variable "ams" in the Armington import demand equation can be used to assign the

[22] Walmsley and Minor (2015) used data reported in 2012 to categorise countries according to the GTAP aggregation and included a separate group for the rest of the world. This study uses the latest TAB and policy data reported in 2017 to categorise countries in accordance with the OECD with more countries included in the middle and low income groups.

value of reduced time to import and export, representing the changes in technical efficiency due to the TFA related border policies[23]. A positive shock on the "ams" variable causes a downward shift in the import demand equation, and the effects can be captured as technical efficiency gains due to implementation of the provisions of the Agreement.

5.3.3.1. Estimating shock values

The reduced number of days in imports and exports require conversion them into values in order to assign positive shocks on the "ams" variable in the GTAP model. The numbers of days are thus, transformed into AVEs that each represents a percentage share of the value of time of the total value of exports and imports. Estimation of the value of time saving is challenging since time costs involve indirect hidden costs which are often difficult to identify. Hummels (2000); Hummels, Minor, Reisman, and Endean (2007); Hummels and Schaur (2013) are the best available trade literature commentaries on value of time estimates and have been widely used to assess the impacts of border crossing delays based on the GTAP framework (Dennis, 2006; Hertel et al., 2001; Minor & Hummels, 2013). Apart from those reputable literature sources, Hillberry and Zhang (2015); Walmsley and Minor (2015) and OECD (2018b) are the only available studies on estimating TFA impacts, in which the amount of time saved has been used as the basic assessment of TFA outcomes. Hillberry and Zhang (2015) used Hummels and Schaur (2013) per day AVE estimates to simulate the welfare impacts of the TFA within the partial equilibrium framework. These estimates provide values for an additional day in transit which is in the approximate range of 0.6 to 2.1 percent. Walmsley and Minor (2015) and OECD (2018b) used per day AVE estimates of Hummels et al. (2007) to implement the reduced import and export time due to TFA in the GTAP model, a global database constituting AVEs for each commodity from all countries. The current study follows the latter example, using the AVE estimates provided by Hummels et al. (2007)[24], as the base from which to convert the estimated reduction of days in imports and exports due to the TFA into Ad valorem term. This database contains per day AVEs of time in trade derived from estimates of consumer willingness to pay to eliminate the risk of delays, which is the logical implication of the decision to pay airfreight over ocean freight, reported as a percentage of total value of the traded commodity.

[23] Detailed discussion of the use of iceberg approach and "ams" variable in the GTAP model can be found in the previous Paper; Perera, Siriwardana, and Mounter (2018)

[24] Minor and Hummels (2013) published these databases where AVEs are aggregated by country by commodity use in the GTAP database. We used the data provided in this version.

Table 5.8 illustrates the trade-weighted AVEs in relation to South Asian countries and the rest of the world, according to the GTAP aggregation of this study. The current GTAP model (version 9) and associated database which includes 57 commodities (sectors) and 140 regions have been used. The commodities were aggregated into 14 to consider the impacts on the relationship of time sensitivity and increased costs at border crossings. The South Asian region was disaggregated as India, Pakistan, Bangladesh, Sri Lanka and the landlocked nations (Afghanistan, Nepal and Bhutan[25]), while the rest of the regions were aggregated according to income level categories: high income, middle income, low income countries and the rest of the world. The country level of economic development has a direct influence on border crossing efficiency and TFA implementation mechanisms, varying widely according to the income level. The aggregation details are provided in Appendix 5.3-C. Zero shocks were assumed in the service sector, agricultural bulk commodity imports (paddy, sugar, wheat, cereal etc.), and coal, oil, and gas imports, based on the assumptions that trade transactions of these commodities do not involve costs of time. Table 5.8 shows per day AVEs of time across commodities.

Table 5.8: Trade-weighted percentage of per day AVEs in South Asia and the rest of the world

Sectors	India	Pakistan	Bangladesh	Sri Lanka	Landlocked	High income	Middle income	Low income	Rest of the world
Agriculture bulk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vege &fruits	2.92	2.91	2.90	2.91	2.96	2.93	2.89	2.90	2.89
Other agriculture	1.38	1.49	1.47	1.43	1.38	1.35	1.36	1.47	1.39
Textile &apparel	0.82	0.91	0.83	0.67	0.69	0.74	0.84	0.75	0.75
Coal, oil, gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mineral &metals	1.35	1.64	1.67	1.45	1.61	1.46	1.46	1.60	1.60
Food products	1.71	1.54	2.22	1.41	1.46	1.33	1.45	1.50	1.33
Other manufacturing	1.34	1.47	1.57	1.59	1.36	1.17	1.47	1.41	1.38
Wood products	0.43	0.53	0.42	0.54	0.41	0.38	0.42	0.41	0.43
Paper products	1.97	2.18	2.30	2.28	1.50	1.97	2.04	1.87	1.95
Petroleum products	2.00	2.00	2.00	2.00	2.00	2.00	1.99	2.00	1.99
Automobile &parts	1.01	1.80	1.80	1.90	1.89	1.78	1.57	1.87	1.87
Equipment	0.61	0.69	0.75	0.90	0.79	0.70	0.56	0.75	0.77
Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Authors' calculation based on Minor and Hummels (2013) database

[25] Bhutan is not a WTO member

The vegetable and fruits sector, other agricultural products and manufacturing imports which are related to parts and components (intermediate inputs) which are higher in every region, being more susceptible to lengthy waits at borders; hence, involving high costs of time. For example; the perishability of agricultural commodities increases the wastage costs while delays in manufactured parts and components imports lead to increase delays over the entire supply chain, thus reducing domestic production. Similarly, seasonality-driven demand may increase the costs of getting goods such as textile and wearing apparel to the market on time.

Table 5.9 shows the estimated potential reduction of time following the full implementation of the TFA and the reduced time at the current rate of implementation in South Asian countries and the rest of the world. When compared to the weighted average number of day reduction (Column A) in the rest of the country groups, the potential reduction of time in the South Asian region is substantial. This is understandable because, as the TAB data reports, the South Asian region expends more time to import and export than virtually all other regions in the world. Similarly, according to the OECD policy data, the scores given to the performance of border policies in the region are low (some indicators report near-zero values). When the score values begin nearing "2" as discussed in the previous section, the potential reductions of import and export times following full compliance will increase substantially across South Asia, implying that to achieve full promise of the TFA, it is obligatory for the whole region to comply with all outstanding measures. These countries may require radical policy changes. Column B in the Table 5.9 illustrates the estimated reduced import times at the current rate of implementation (percentages)[26], as provided in TFAF (2018). The current rate of implementation in India is around 70% and therefore, Indian reduced time to import is high at the current implementation rate, on which the shock values in scenario 1 were estimated, as described in the next section.[27] In contrast, the current import time reductions of other South Asian members are low as their current implementation rates are low. However, reduction times after full implementation of the TFA in these countries would be larger and the impact would be significant. Column C in the Table 5.9 illustrates the estimated reduced export times with fully implemented TFA measures by the export partners of each country. These estimates are lower compared to estimates of the country implementation measures described in column A, due to the fact that time to import exceeds time to export in most countries based on TAB database. Assuming all

[26] Estimated reduced import time at the current implementation rate = Estimated full compliance time x current implementation rate (Percentage)

[27] The potential reduction of import time with full compliance would be lower in India compared to other South Asian countries, since India has already implemented around 70% of the TFA measures.

export partners currently implement TFA at the 50% rate, current reduced time to export for each South Asian member is estimated and reported in Column D in Table 5.9. The group average implementation rates estimate the current reduced time to export for other country groups.

Table 5.9: Reduced import/export time (days) with the implementation of the TFA in South Asia and the rest of the world

	Imports own		Exports partners		
	Potential reduced time with full compliance (A)	Reduced time at current compliance rate (B)	Potential reduced time with full compliance (C)	Reduced time at 50% compliance rate (D)	Current compliance rate (%) (E)
Bangladesh	11.54	3.98	8.78	4.39	34.50
India	8.38	6.06	3.96	1.98	72.30
Pakistan	9.46	3.58	3.77	1.89	37.80
Sri Lanka	3.78	1.48	3.89	1.94	39.10
Landlocked	7.26	0.87	4.29	2.14	12.00
High income	0.49	0.49	0.43	0.43	100.00
Middle income	4.77	2.69	1.82	1.02	56.30
Low income	10.30	2.99	6.49	1.89	29.10
Rest of the world	2.63	1.59	1.12	0.68	60.50

Source: Authors' calculation based on the econometric model and TFAF database

Note: *Landlocked, high income, middle income and low income countries and the rest of the world reduced time are trade-weighted.*

The next step in estimating the shock values is to combine the per day AVEs reported in Table 5.8, and the estimated reduction in number of days to import and export at the current TFA implementation rate reported in Table 5.9[28]. In this step, per day trade-weighted AVEs are multiplied by the reduced import and export times, in order to obtain the total value of reduced delays in Ad valorem terms.

Table 5.10 illustrates the estimated shock values for commodities by importer and by exporter, respectively. The importer value represents the measure of reduction in border crossing and transit trading time attributable to the country's effectiveness of TFA policy implementation within its territory and services. The exporter value represents the measure of reduction in border crossing and transit trading time due to country partners' effectiveness of TFA policy

[28] Assumed per day AVEs for imports are equivalent to exports

implementation. The largest shock values are assigned for the country's own border policy performance, as opposed to the partner's policy changes.

Table 5.10: Shocks applied to the "ams" variable in the GTAP model

Commodity by importer									
Sectors	India	Pakistan	Bangladesh	Sri Lanka	Landlocked	High income	Middle income	Low income	Rest of the world
Agriculture bulk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vege &fruits	17.69	10.42	11.57	4.30	2.58	1.43	1.07	8.68	4.61
Other agriculture	8.37	5.32	5.87	2.11	1.20	0.66	0.51	4.41	2.22
Textile &apparel	4.95	3.24	3.31	0.99	0.60	0.36	0.31	2.23	1.19
Coal, oil, gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mineral &metals	8.19	5.87	6.66	2.14	1.40	0.72	0.54	4.80	2.55
Food products	10.36	5.50	8.86	2.09	1.27	0.65	0.54	4.50	2.12
Other manufacturing	8.15	5.26	6.27	2.35	1.19	0.57	0.55	4.23	2.19
Wood products	2.63	1.88	1.68	0.80	0.35	0.18	0.16	1.23	0.68
Paper products	11.92	7.78	9.18	3.36	1.31	0.96	0.76	5.58	3.11
Petroleum products	12.09	7.13	7.95	2.95	1.74	0.98	0.74	5.97	3.18
Automobile &parts	6.10	6.44	7.18	2.80	1.65	0.87	0.58	5.59	2.97
Equipment	3.68	2.48	2.98	1.33	0.69	0.34	0.21	2.25	1.23
Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Commodity by exporter									
Sectors	India	Pakistan	Bangladesh	Sri Lanka	Landlocked	High income	Middle income	Low income	Rest of the world
Agriculture bulk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vege &fruits	5.78	5.50	12.75	5.66	6.34	1.26	2.95	5.47	1.97
Other agriculture	2.74	2.81	6.47	2.77	2.95	0.58	1.39	2.78	0.95
Textile &apparel	1.62	1.71	3.64	1.30	1.47	0.32	0.85	1.41	0.51
Coal, oil, gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mineral &metals	2.67	3.10	7.34	2.82	3.46	0.63	1.49	3.03	1.09
Food products	3.38	2.90	9.76	2.75	3.12	0.57	1.48	2.84	0.91
Other manufacturing	2.66	2.78	6.91	3.10	2.92	0.50	1.50	2.66	0.94
Wood products	0.86	0.99	1.86	1.06	0.87	0.16	0.43	0.77	0.29
Paper products	3.89	4.11	10.12	4.42	3.22	0.85	2.08	3.52	1.33
Petroleum products	3.95	3.77	8.76	3.88	4.27	0.86	2.03	3.76	1.35
Automobile &parts	1.99	3.40	7.91	3.69	4.05	0.76	1.60	3.52	1.27
Equipment	1.20	1.31	3.28	1.75	1.70	0.30	0.58	1.42	0.53
Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Authors' calculations based on Table 5.8 and Table 5.9

5.3.3.2. Simulation design

The first scenario of this analysis examines the impact of the increase in border transaction efficiency, by applying positive shocks to the "ams" variable, imposing the value of the shocks in reduced times to import and export at the current rates of implementation. The second scenario assume the best practices based on the estimated expected reduced time to import and export with full compliance to the TFA measures as reported in Table 5.9. This scenario promotes the understanding of the potential economic impacts of the full implementation after receipt of all technical and financial support. These scenarios are summarised as follows:

Scenario 1:

I. Reduced time due to country's own TFA measures (imports) at the current implementation rate.
II. Reduced time due to country's trading partners (exports) TFA measures at the current implementation rate.

Scenario 2:

I. The potential reduced time due to country's own TFA measures (imports) after full compliance of TFA policy.
II. The potential reduced time due to country's trading partners' TFA measures (exports) after full compliance of the TFA.

5.4. Results and discussion

The GTAP model results are discussed in this section. Following the initial examination of the macroeconomic results, the disaggregated sectoral changes in trade flows, the overall changes in real import and export volumes and welfare impacts in South Asian countries, relative to world trade, are reported and discussed. The economic impacts of the TFA are compared with scenarios 1 and scenario 2, which indicate the immediate impacts and the potential impacts of the full TFA implementation after a transitional period. Finally, previous estimations of TFA impacts described in the literature are compared with the current study to validate the results, as well as to suggest specific areas for further improvement of this type of exercise.

5.4.1. Macroeconomic impacts

Figure 5.6 illustrates the impact of the TFA on change in real GDP in South Asia and the rest of the world under scenario 1. The AVEs were calculated at the current rate of implementation and shocks were applied as technological changes in the import demand equation according to the icebag approach, which asserts that technological change boosts GDP in every region of the TFA implementation. The implication is that an increase in consumption as a result of a rise in imports lead to increased real GDP. Imports rise due to reduced spoilage resulting from faster deliveries influenced by TFA policies. According to the recued iceberg effect importers receive more imported products, while exporters send the same quantity. Thus, the rise in real GDP is not due to increased consumption due to increased domestic production, but rather an increase in productivity of imports. However, more than 70% of imports are purchased by domestic firms (Figure 5.7), due to greater efficiency in intermediate input imports (reducing the iceberg effects) used in domestic production. The reduced price of imported inputs will serve to reduce the costs of production and improve resource allocation efficiency, stimulating a rise in domestic production. South Asian manufacturing is heavily reliant on imported inputs from outside the region, due to the unavailability of locally produced intermediate inputs at competitive prices. Therefore, the TFA serves as a potential source to boost productivity in imported inputs which are crucial to the economy. Private household import purchases are shown to rise by 27%, and more imported varieties enter the market on time due to the productivity increase in imports.[29]

Alternatively, Figure 5.6 shows that the increase in real GDP with respect to the importing country's TFA implementation measures (imports-own) significantly exceeds the contribution of the exporting partner attributed GDP impact, in every region except high and middle income country groups. This is mainly due to the fact that South Asian members and other low income country groups export to developed countries where border transaction efficiency levels are already high, thus restricting the potential size of TFA gains from export partner commitments. Of course, the most-developed high income countries do still benefit from the TFA, by way of the border efficiency improvements of their importing partners. This emphasizes the importance of the commitments of the developed nations to provide the financial and technical

[29] These results are consistent with the CGE Supply Chain model employed results that were provided in Walmsley and Minor (2015).

support to developing countries and LDCs to implement the TFA provisions as an equitable means of increasing exports from developed to less developed nations.

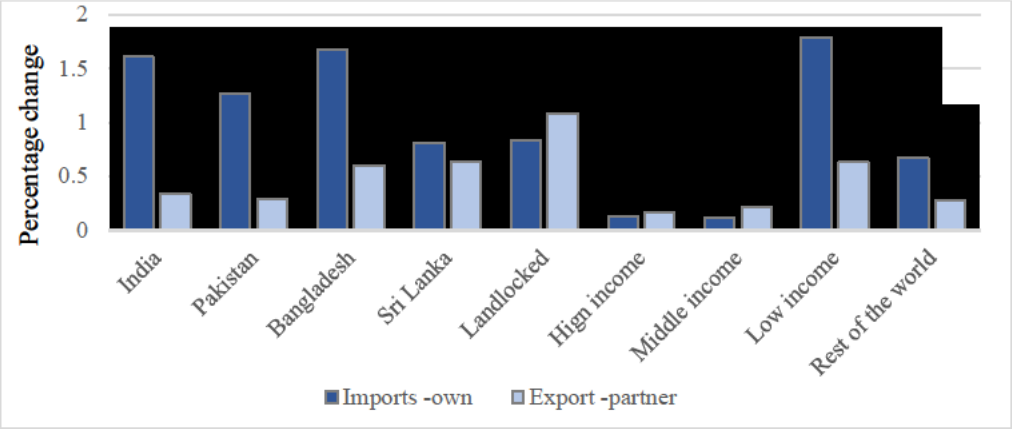


Figure 5.6: The impact of TFA on real GDP in Scenario 1
Source: GTAP model results

Among the South Asian members, real GDP increased approximately by 1.5% in Bangladesh and India, and approximately by 1 % in Pakistan; however, in Sri Lanka and the landlocked regions, the real GDP increase was less than 1%. In scenario 1, larger TFA shocks were applied to India, given its current high rate of implementation. A large real GDP change is therefore, attributed to shock values. Table 5.11 shows the potential TFA impact on real GDP under the full implementation context (Scenario 2) in India is lower compared to other South Asian members, due to the significant progress already made by India.

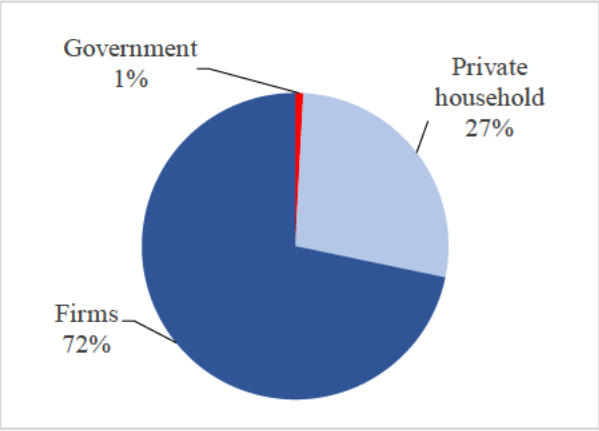


Figure 5.7: Increase in import demand by agents in scenario 1
Source: Authors' calculation based on GTAP results

Conversely, Sri Lanka and landlocked countries, to date, have made less progress in TFA implementation, and are still seeking assistance to introduce the TFA policy measures. Therefore, the hypothetical scenario of full implementation of the TFA (Scenario 2) predicts larger gains for these countries. As all the landlocked countries in the region are classified as LDCs in South Asia, they are projected to be the top beneficiaries once they have fully implemented the agreement, subject to a substantial transitional period of implementation and technical support from other WTO members. A similar outcome can be observed in the low income group, for whom a full implementation scenario has been predicted to produce larger gains (Table 5.11).

Table 5.11: The impact of TFA on real GDP in Scenario 2 (percentage changes)

Scenarios	India	Pakistan	Bangladesh	Sri Lanka	Landlocked	High income	Middle income	Low income	Rest of the world
Scenario 1									
TFA at the current implantation rate	1.94	1.56	2.27	1.44	1.91	0.29	0.32	2.42	0.95
Scenario 2									
TFA with full implantation	2.85	3.83	5.79	3.18	9.17	0.36	1.75	7.27	1.56

Source: GTAP model results

Table 5.12 shows increases in aggregate imports and exports in every region, except in Sri Lanka, and the landlocked and low income country groups in Scenario 1. A decline in exports in these latter regions would be the end result of the increased private household use of imported products discouraging domestic production.

When private household demand for retailed imports exceeds that of manufacturing firms for intermediate input imports[30], the consequential reduction of domestic production is followed by a reduction in the production of goods for export. A marginal improvement in imports and exports in high and middle income country groups is due to the smaller aggregate shocks

[30] Imports share of private household and firms' report as 63.7%, 56.3% respectively in Sri Lanka and 32% and 41% respectively in landlocked regions.

imposed under this scenario. Increases in exports begin to exceed increases in imports as trading partners demand more exports after implementing TFA measures.

Table 5.12 shows, aggregate imports at world market price (qiw) and iceberg inclusive imports derived from the changes in aggregate imports at market price (qim). Following Walmsley and Minor (2015), qim is aggregated based on commodity shares and interpreted as iceberg inclusive import changes. Table 5.12 illustrates the significant differences in imports at world market price (qiw) and iceberg effect inclusive imports (qim) and shows, what appears to be an imbalance with importers in receipt of quantities of imports in excess of the amount actually sent by exporters (qiw). That is the additional quantity of imports which are previously lost during the border crossing. In understanding this it is important to realise that aggregate imports at the market price (qim) includes tariffs and other fees and charges as well.

Table 5.12 also reports the TFA impacts on export and import prices and terms of trade. Import and export prices decreased in every region except in Sri Lanka, and the landlocked and low income country groups. Export prices fell as domestic costs of production dropped due to productivity changes in imported inputs imports, while import prices reduced as efficiency improved in border transactions.

Table 5.12: Impacts of the TFA on trade flows in Scenario 1 (percentage changes)

	Exports	Imports (qiw)	Iceberg costs inclusive imports (qim)	Terms of Trade	Export prices	Import prices
India	3.38	2.85	7.73	-0.30	-0.59	-0.29
Pakistan	1.90	2.48	6.81	-0.10	-0.36	-0.27
Bangladesh	0.32	2.32	6.82	0.15	-0.12	-0.26
Sri Lanka	-3.36	0.55	2.33	1.04	0.65	-0.38
Landlocked	-10.87	4.40	5.46	3.58	3.22	-0.35
High income	0.43	0.43	0.84	0.01	-0.24	-0.25
Middle income	0.61	0.44	0.79	0.01	-0.27	-0.27
Low income	-1.09	0.99	4.46	0.51	0.22	-0.30
Rest of the world	0.83	1.08	2.63	-0.14	-0.39	-0.25

Source: Based on GTAP model results

However, the export prices of Sri Lanka, the landlocked and low income country groups rose as they imported more final goods relative to intermediate inputs and therefore, the high costs of production reduced the export surplus. Increased productivity and reduced costs of

production in South Asian countries supported the observation of an increase in real factor prices which is illustrated in the Table 5.13.

Table 5.13: Percentage change in real factor prices due to iceberg costs effects in Scenario 1

	Wages Skilled labour	Wages Unskilled labour	Real rental on capital
India	1.98	1.24	1.43
Pakistan	1.36	0.89	1.25
Bangladesh	2.21	2.04	1.89
Sri Lanka	1.89	1.33	1.22
Landlocked	3.28	2.42	2.70
High income	0.20	0.17	0.18
Middle income	0.15	0.14	0.12
Low income	2.44	2.04	1.99
Rest of the world	0.99	0.87	0.80

Source: GTAP model results

South Asian total trade is found to increase by 2.70 % and 5.75% in scenario 1 and scenario 2, respectively. The impact of the full TFA implementation (scenario 2) predicts that regional trade volumes more than double, indicating that the potential trade gain is significant if the region receives essential technical support during the transitional period to negotiate these TFA policies. The rise in global trade by 0.54% in scenario 1 will expand to 1.9% after all WTO members implement all the provisions according to scenario 2.

Walmsley and Minor (2015) provided similar results based on the global supply chain model. Recalling, the comparison of the willingness to pay and iceberg methods in the literature review section of this paper, Walmsley and Minor (2015) found that real GDP increased more in the iceberg approach relative to the willingness to pay approach (increase in consumer utility). However, global trade increased by 1.93% in the willingness to pay approach and 0.98% in the iceberg approach. Export and import prices increase as real trade volume increase in the willingness to pay approach but prices decrease in the iceberg approach due to productivity increases in imports resulting in a fall in costs of domestic production.

5.4.2. Sector specific impacts

Table 5.14 provides the percentage changes in sector-specific imports at world market prices across South Asia and the rest of the world under scenario 1. The changes in imports for each

sector are reported in two separate rows to differentiate import changes due to the TFA measures implemented in the importing country that reduced import border transaction time (imports own) and import changes due to export partner TFA measures that reduced export border transaction time (exports partner). In general, time-sensitive imported commodities in the agricultural and manufacturing sectors rose within South Asia due to the larger TFA shocks applied. Coal, oil, and gas imports fell in all regions due to zero shocks and the compensation of increased import demand in other sectors. Conversely, agricultural bulk commodities such as rice, wheat, sugar imports and service sector imports increased despite zero shocks being imposed. This was due to the fact that manufacturing sector tends to import more services and agricultural bulk products. These imports increased more in the majority of sectors as a result of importing country TFA implementation. Implementing the provisions of the TFA policies will support the expansion of a wider variety of imported fresh vegetable and fruits in South Asian domestic markets and the low income country group. For Bangladesh, Sri Lanka and the landlocked countries, fresh vegetable and fruits trade partners are predominantly their close South Asian neighbours and results indicate that reduced export delays due to export partner measures increase imports in this sector.

While the agriculture sector imports increased due to country TFA implementation measures and export partner border policies, manufacturing sector imports increased heavily due to the importing country's home policy measures. The imports concerned are those demanded by domestic firms as intermediate inputs, essential to produce the final consumable products, where greater quantities may be demanded for wholesale or retail businesses. This may increase domestic demand for imported manufacturing goods by households, as well as firms, to use in domestic industries. India is importing more goods since its implementation of 72% of TFA provisions and thus, scenario 1 reduced time to import were comparably high. Imports increased more in landlocked and low income country groups even when small shocks were imposed. This confirms that these countries' import flows will increase extensively when they have fully implemented TFA provisions.

Table 5.15 reports the sector-specific percentage change in aggregate exports by country in scenario 1. The sectoral changes in exports are also split into 'import own' and 'export partner'. Import own figures explain the indirect impact of changes in exports, where the importing country's TFA policies lead to increases of intermediate imported inputs and thus, produce an increase in domestic production and finally exports.

Table 5.14: Impact of TFA on imports at world c.i.f. prices in Scenario 1 (percentage change)

Sectors	Source of TFA measures	India	Pakistan	Bangladesh	Sri Lanka	Landlocked	High income	Middle income	Low income	Rest of the world
Agriculture bulk	Imports own	1.28	-0.34	0.97	1.43	12.73	-0.02	0.03	3.41	0.49
	Export partner	2.97	2.12	7.08	2.70	15.28	-0.37	0.66	3.75	0.19
Vege &fruits	Imports own	12.87	5.55	6.64	4.73	9.04	0.14	0.8	11.08	2.83
	Export partner	4.18	3.06	6.63	5.48	11.28	-0.11	2.12	6.24	1.33
Textile &apparel	Imports own	13.11	6.07	4.57	-2.46	4.37	0.53	0.75	1.83	1.74
	Export partner	5.38	3.96	7.55	-3.11	5.31	0.13	1.90	1.48	0.79
Other agriculture	Imports own	12.53	5.64	9.05	6.02	12.19	0.71	0.88	10.28	3.07
	Export partner	4.75	3.01	9.28	7.60	15.85	0.56	2.38	6.36	1.34
Coal, oil, gas	Imports own	-1.41	-8.63	-9.41	-1.71	-2.97	-0.12	-0.26	-8.24	-1.01
	Export partner	2.12	-0.51	-0.62	-1.58	-2.93	-0.52	-0.01	-2.01	-0.25
Mineral &metals	Imports own	2.6	5.37	5.06	-0.59	3.54	0.69	0.77	1.94	1.64
	Export partner	1.82	2.94	6.28	0.73	4.67	0.55	1.86	2.11	0.98
Food products	Imports own	7.71	4.93	6.41	2.17	3.78	0.36	0.36	4.94	1.16
	Export partner	2.89	2.85	5.27	3.14	4.55	0.25	1.10	3.36	0.55
Other manufac.	Imports own	7.04	7.03	2.75	0.92	1.87	0.69	0.95	1.27	1.46
	Export partner	3.56	3.84	4.94	2.52	2.13	0.49	2.10	1.58	0.87
Wood products	Imports own	4.75	5.42	5.46	0.54	9.54	0.25	0.21	3.82	0.86
	Export partner	3.68	4.26	11.84	1.05	12.3	-0.05	1.13	3.69	0.42
Paper products	Imports own	12.45	11.12	5.10	0.09	9.34	1.55	0.98	3.37	3.54
	Export partner	4.00	4.51	5.68	1.63	11.7	1.47	2.39	2.61	1.70
Petroleum products	Imports own	10.68	-1.20	-2.93	-0.13	1.29	0.67	0.46	-3.49	1.51
	Export partner	2.24	0.14	0.24	0.05	1.18	0.61	1.01	-0.88	0.74
Automobile &parts	Imports own	7.37	7.07	-3.57	-0.04	1.88	0.81	0.56	-0.81	1.25
	Export partner	3.99	3.63	1.05	1.22	3.30	0.69	1.66	0.97	0.72
Equipment	Imports own	3.41	5.70	0.57	1.49	2.89	0.53	0.36	0.71	0.95
	Export partner	2.86	3.98	3.36	2.23	3.94	0.33	1.30	1.17	0.59
Services	Imports own	1.85	-0.26	2.75	4.16	9.23	0.00	-0.13	1.80	0.65
	Export partner	2.61	1.86	7.93	6.44	12.44	-0.18	0.67	2.76	0.40

Source: GTAP model results

Conversely, figures relating to changes in exports due to export partners measures, explain the direct impact of increase in exports, due to reduced import time at their partner destinations. As Table 5.15 shows, generally, exports increase more due to the direct impact of TFA policies, excluding India and other low income countries. While exports increased considerably in imported input- oriented industries in some sectors in South Asia and the low income country

group, exports increased more due to increases in imported inputs in most of the sectors in India.

Table 5.15: Impact of TFA on exports at world f.o.b. prices in Scenario 1(percentage change)

Sectors	Source of TFA measures	India	Pakistan	Bangladesh	Sri Lanka	Landlocked	High income	Middle income	Low income	Rest of the world
Agriculture bulk	Imports own	-1.49	1.57	-1.02	-3.37	-21.61	0.28	0.18	-5.39	-0.72
	Export partner	-5.08	-2.01	-9.43	-7.31	-26.7	1.35	-0.77	-7.29	0.00
Vege &fruits	Imports own	1.48	5.7	6.62	-0.96	-5.02	0.91	0.65	-1.17	3.01
	Export partner	6.22	8.87	20.89	2.94	-3.53	-0.89	1.65	3.93	0.64
Textile & apparel	Imports own	0.94	2.29	0.52	-4.86	-8.95	0.72	0.83	1.90	0.77
	Export partner	-0.32	2.14	1.87	-6.73	-11.36	0.42	0.88	0.05	0.17
Other agriculture	Imports own	2.46	3.57	4.76	-3.70	-15.44	1.16	1.88	-4.27	1.69
	Export partner	4.27	6.94	16.03	-1.83	-16.42	0.43	2.19	1.18	1.24
Coal, oil, gas	Imports own	-6.25	15.88	5.89	0.84	-2.72	-0.35	-0.30	-0.47	-0.25
	Export partner	-5.52	-0.73	-29.76	0.74	-4.44	0.01	-0.61	-0.82	-0.29
Mineral & metals	Imports own	7.43	2.05	2.28	-3.58	-9.35	0.69	0.72	0.35	1.83
	Export partner	5.45	7.01	18.16	-0.73	-3.30	0.13	2.52	5.11	1.49
Food products	Imports own	0.19	1.37	-0.70	-2.90	-7.27	0.48	0.54	-1.89	0.15
	Export partner	2.57	3.17	14.16	-2.06	-6.28	0.16	1.03	0.67	0.22
Other manufac.	Imports own	8.29	1.50	2.65	-2.04	-1.7	0.66	0.73	1.29	2.46
	Export partner	6.02	5.54	18.74	3.40	3.80	-0.10	3.35	4.95	1.84
Wood products	Imports own	-0.55	-1.29	1.40	-2.43	-17.00	0.23	0.48	-1.83	-0.09
	Export partner	-3.37	-1.41	-7.57	-3.94	-20.45	0.53	-0.19	-3.07	-0.11
Paper products	Imports own	6.77	2.40	7.74	6.82	-13.83	1.58	2.17	2.30	2.06
	Export partner	10.18	11.52	34.61	11.58	-10.72	0.93	5.33	6.58	2.30
Petroleum produ.	Imports own	1.03	3.41	7.82	4.79	0.31	0.71	0.69	-1.01	0.70
	Export partner	8.20	8.46	22.4	9.97	2.64	-0.40	2.92	6.37	0.82
Automobile & prt.	Imports own	3.94	0.24	0.32	7.96	3.48	0.79	0.70	4.05	2.20
	Export partner	0.12	6.09	16.55	12.59	15.11	0.54	2.71	8.09	1.71
Equipment	Imports own	12.68	0.13	-1.88	5.25	9.00	0.27	0.64	1.77	2.32
	Export partner	0.78	-0.67	-2.84	6.02	18.21	0.79	0.25	0.96	1.52
Services	Imports own	-1.84	0.83	-3.08	-5.08	-14.02	0.25	0.47	-1.93	-0.51
	Export partner	-3.96	-3.27	-12.51	-8.77	-18.29	0.60	-0.75	-4.29	-0.4

Source: GTAP model results

Developing countries and LDCs face challenges in rising along the global value chain with limited access to intermediate inputs from global markets. TFA policies assist these countries to import inputs they need as quickly as possible. The results show that the TFA impact on export sector development relates to increased imported inputs in industries such as textile and apparel, and equipment in almost every region, as well as in other manufacturing, and automobile and parts in some regions including India. Petroleum and paper-related product export obtained more-impressive increases benefitting from the time reductions attributable to export partner TFA policies. Exports rose more in the manufacturing sector but declined in the agricultural sector, with the exception of a few countries, quite obviously due to the fact that imported agricultural consumable goods increased at the expense of similar domestic products. Conversely, the manufacturing sector exports rose supported by reduced export times achieved by the TFA policies of the importing partner country, where productivity was stimulated by the increase in imported manufactured inputs. The textile and wearing apparel sector, which is prominent within South Asia, showed a negligible increase in exports attributable to TFA, while in Sri Lanka and the landlocked region the textile and wearing apparel sector even indicated a slight decline that coincided with TFA implementation. The disappointing negative trend in this sector may be directly related to the migration of a significant portion of the unskilled textile and wearing apparel labour force towards more competitive wages in alternative booming manufacturing sectors.

Figure 5.8 illustrates the TFA impact on real trade volume changes relative to the changes in total world trade volumes in scenario 1. In this scenario, trade volumes increased in every region indicating the positive global impacts of the TFA. However, middle income countries are the winners of the TFA, followed by the high income countries, in terms of expanding both real export and import volumes relative to the rest of the world. Imports demonstrated greater increases than exports in all regions excluding high income countries. It should be noted that these results were derived from the first scenario, in which South Asian and other low income countries reported a low TFA policy implementation rate and hence, smaller shock values. Realistically, the majority of high income countries had already implemented full TFA measures and expected no gains from further improvements.

It is clear that high income countries can still increase their export volumes as their trading partners reduce import delays. Nonetheless, low income countries, including those in South

Asia, will continue to enhance their levels of trade by fully implementing the Agreement provisions.

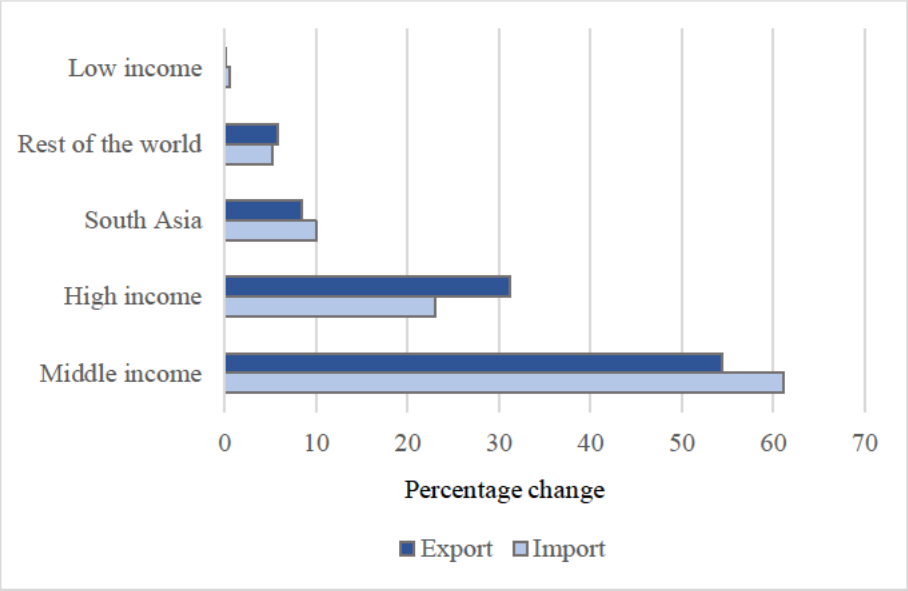


Figure 5.8: Real export and real import volume changes relative to the world trade
Source: Authors' calculations based on the GTAP model results

5.4.3. Welfare impacts

Table 5.16 illustrates the overall welfare effects and levels of change in each component of the welfare calculation in scenario 1. Under the iceberg approach, welfare improves predominantly due to technological effects, since the shocks are applied as technological changes. Welfare improves universally due to technological change, while the magnitude of change is dependent on the relative size of the economy. Technological change contributes to greater welfare through increasing imports by firms, private households, governments, and for investment. Terms of trade (prices of exports relative to imports) improve benefits in all regions, except India, Pakistan and rest of the world. The positive terms of trade result from the positive technological impact on imports which transform into greater production of domestic goods reliant on imported inputs, thus reducing export prices relative to imports. Import prices fall due to reduced delay costs. The allocative efficiency gain is due to larger increases in trade in every region.

The welfare impacts of scenarios 1 and 2 are compared in Figure 5.9. These are measured relative to each country's base period GDP levels and illustrate the more substantial impact of full TFA implementation on welfare in the landlocked and other low income countries.

Table 5.16: Impact of TFA on total welfare and its decomposition in Scenario 1 ($ millions)

	Allocative efficiency effect	Technological change	Terms of trade	Terms of trade (savings and capital goods)	Total welfare
India	5827	24397	-1106	-1048	28071
Pakistan	252	2462	-29	-123	2562
Bangladesh	220	1644	42	27	1934
Sri Lanka	66	415	139	49	669
Landlocked	130	208	184	339	861
High income	6289	56847	1645	349	65131
Middle income	2704	16786	276	234	20000
Low income	305	2616	256	-68	3110
Rest of the world	1321	14881	-1413	235	15024

Source: GTAP model results

South Asian regional and individual member welfare improves in all categories, but most under the full implementation scenario. As expected, welfare improves marginally in middle income countries and high income countries, paralleling the lesser impacts of TFA on GDP and trade in those countries, as discussed in the previous section.

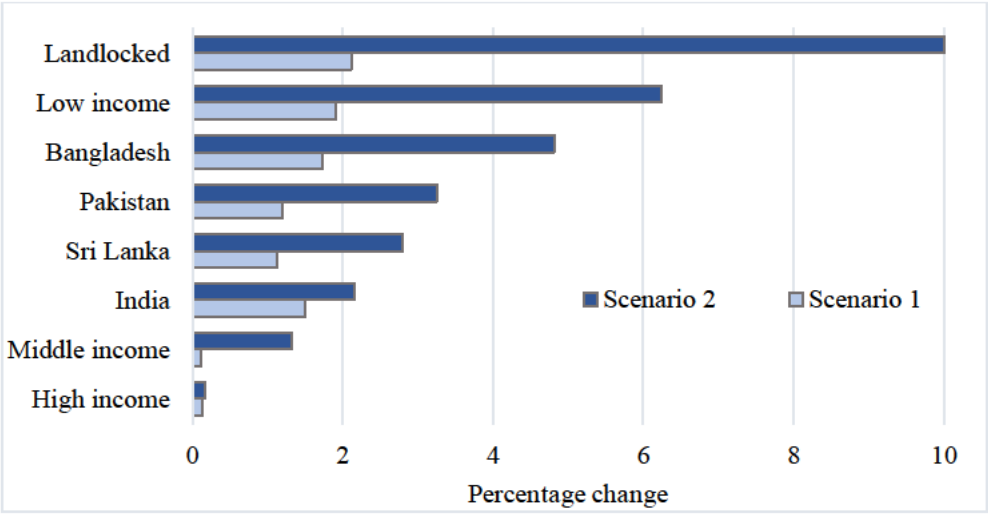


Figure 5.9: Impact of TFA on welfare relative to the base period GDP in scenarios 1 and scenario 2

Source: Authors' calculations based on the GTAP model results

The overall global results of this analysis confirm the underlying strength of the Agreement; that while all nations stand to gain, the benefits are weighted to accrue more strongly in favour of LDC and developing countries. These findings echo the view of comparative literature. The results provide overwhelming evidence for each South Asian member and for all nations comprising the LDC and developing country groups to identify the comprehensive outcome of the benefits and equally, specific areas requiring improvement. Similarly, the results provide hard evidence for the WTO and its members to identify the accomplishments of both donors and recipients as a guide to strengthening international TF support programs.

5.5. Conclusion

The primary objective of this study was to estimate the economy wide impacts on South Asian countries of implementing the WTO Trade Facilitation Agreement (TFA) and to compare these with the impacts on the rest of the world. It was clearly established in the structuring of the TFA, and highlighted by the examples of the literature review, that a full and successful implementation of the Agreement potentially offers greater economic benefits to developing countries, making it critical for the South Asian region where economies are hampered by the costs of poor TF. The Agreement was implemented in early 2017 and South Asian members committed to the provisions of the Agreement. Eighteen months have now passed since the TFA entered into force. This assessment of the actual economic benefits of the TFA for the South Asian region and its constituent nations, still in the phase of partial implementation, serves as a novel contribution to the body of TF literature.

The methodology required two major steps. The first used an econometric model consisting of twelve TFA policy variables, along with other general control variables, to measure the outcomes of the TFA implementation achieved through national border policy changes. These outcomes are measured by the changes in TFA policy variables after implementation of the provision and rated by the reduced number of days to import and export between countries. The results of the model revealed that the TFA policy variables relating to Advance rulings and Formalities-procedures most strongly explained the TFA outcome. These two provisions cover a wide area of TF and thus, the results of scenario analysis pointing to their high level of influence as expected. The estimates of the reduction of import days at the current rate of implementation were significantly positive in each country. A substantial reduction of time to import, due to implementation of the TFA provisions, is projected for South Asian countries. However, this can only be achieved through full compliance with the Agreement since the

current rate of implementation is not satisfactory. It is absolutely essential that the South Asian members, with the exception of India, receive technical and capacity building support from donor agencies to fully implement the TFA measures. In the case of OECD and other developed countries, the reduction in import times is marginal, due to the fact that their border policy measures were already up to the standard of the Agreement's provisions as of its enforcement. Consequently, these developed members mainly benefit indirectly from the Agreement since they can expect to further reduce export times through improved border transaction efficiency achieved by the TFA implementation of their developing country trading partners.

In the second part of this paper, the estimated reduced number of days to import and export were converted into AVEs and incorporated into the GTAP model using the iceberg approach, in order to estimate the economic impacts of the TFA on South Asian countries and compare these at the global level. Two scenarios were considered; the first assessed the impacts at the current level of TFA implementation and the second, after full implementation. The first scenario provides new insights and evidence, as no previous study has estimated the immediate real impacts of the TFA based on the actual implementation rate. The results of this study, thus, hold value for a current assessment of the real progress of the TFA implementation in individual countries in the South Asian region.

The macro level results of the first scenario showed that real GDP increased significantly in individual South Asian countries due to their own TFA implementation measures. The implication here is that the largest portion of gains is attributable to imports, derived from the increased border transaction efficiency achieved by the country's own implementation, with a lesser portion attributable to exports derived from greater border efficiency achieved by the trading partner. Conversely, as confirmed by the reviewed literature, the OECD and other developed countries showed minimal increases in real GDP. The basis of the increase for South Asian and other low income countries is mainly attributable to the increased demand for imports from private households in the Agricultural sector and imported intermediate inputs demanded by firms in the Manufacturing sector. The results highlight the importance of full TFA implementation to improve Agricultural sectors such as vegetable and fruits, and intermediate inputs required in Manufacturing industries such as textile and apparel, equipment, petroleum, and paper related products. On average, South Asian total regional trade would increase by 2.70% in scenario 1 and 5.75% in scenario 2. Thus, regional trade would more than double if South Asian countries implement the TFA fully, a process that is far from

complete. Overall, international trade increased by 0.54% and 1.90% in scenarios 1 and 2 respectively, implying that the full global benefits of the TFA have yet to be achieved. Based on the assumption of full global TFA implementation, scenario 2 predicted a substantial improvement in welfare, especially in LDCs and other developing countries including South Asia.

These GTAP model results were derived according to the iceberg approach, which is the most commonly used method that models border efficiency as iceberg losses. However, recent literature asserted that the iceberg approach produces overestimated GDP results as the impacts of improvements in border efficiency should explicitly be regarded as technical efficiency improvements. Thus, the willingness to pay method was recently introduced as an alternative approach to assessing TFA impacts based on the CGE framework. This latest approach explains the increase in consumer utility due to faster delivery of imported goods, reducing or eliminating waste and spoilage while goods are in transit. It has been suggested that combining the willingness to pay and iceberg methods would produce the best estimates. However, it is a significant challenge for the modellers owing to a lack of available data to explain the value of losses due to delays at transit, as well as the value of consumer utility changes. Primary survey-based data or data from more specific case studies needs to be assembled; otherwise, broad assumptions have to be included. Hence, it is acknowledged that the estimates of this paper are subject to the limitations of the iceberg approach.

The implementation of some specific provisions of the TFA involves substantial costs that provide a challenge for the LDCs and developing countries. Thus, the potential benefits of the Agreement are dependent on the process employed in the introduction of these measures to improve border efficiency. This study concludes through its assessment that the net benefits of the Agreement will depend on the amount of investment necessary to cover the capital and operational costs of full TFA implementation. In the case of LDCs and developing countries, full benefits may depend on the time frame of the implementation programs and the costs. So much is at stake for these countries that it goes without saying that further research is essential, monitoring TFA implementation progress and aid in the form of financial and technical support and national capacity building programs.

References

Abe, K., & Wilson, J. S. (2008) Governance, corruption, and trade in the Asia Pacific region. *Policy Research Working Paper, No. WPS4731,* . Washington, DC: World Bank.

Aguiar, A., Narayanan, B., & McDougall, R. (2016). An overview of the GTAP 9 data base. Journal of Global Economic Analysis, 1(1), 181-208. doi:http://dx.doi.org/10.21642/JGEA.010103AF

Beverelli, C., Neumueller, S., & Teh, R. (2015). Export diversification effects of the WTO trade facilitation agreement. *World Development, 76*, 293-310. doi:https://doi.org/10.1016/j.worlddev.2015.07.009

Dennis, A. (2006) The impact of regional trade agreements and trade facilitation in the Middle East and North Africa region. *Policy Research Working Paper, No.WPS3837*. Washington DC: World Bank.

Dennis, A., & Shepherd, B. (2011). Trade facilitation and export diversification. The World Economy, 34(1), 101-122. doi:https://doi.org/10.1111/j.1467-9701.2010.01303.x

Fox, A. K., Francois, J. F., & Londono-Kent, P. (2003). Measuring border crossing costs and their impact on trade flows: The United States-Mexican trucking case Global Trade Analysis Resource-1282. Purdue University: www.gtap.agecon.purdue.edu.

Hertel, T., & Mirza, T. (2009). The role of trade facilitation in South Asian economic integration. In K. Senga (Ed.), *Study on intraregional trade and investment in South Asia*. Manila: Asian Development Bank (ADB).

Hertel, T., Walmsley, T., & Itakura, K. (2001). Dynamic effects of the" new age" free trade agreement between Japan and Singapore. *Journal of Economic Integration*, 446-484. doi:https://www.jstor.org/stable/23000768

Hillberry, R., & Zhang, X. (2015) Policy and Performance in Customs- Evaluating the Trade Facilitation Agreement. *Policy Research Working Pape, No. WPS7211*. Washington, DC: World Bank.

Hoekman, B., & Nicita, A. (2011). Trade Policy, Trade Costs, and Developing Country Trade. *World Development, 39*(12), 2069-2079. doi:http://dx.doi.org/10.1016/j.worlddev.2011.05.013

Hummels, D. (2000). Time as a trade barrier *Purdue CIBER working papers, No. 7*. Purdue University: http://docs.lib.purdue.edu/ciberwp/7

Hummels, D., Minor, P., Reisman, M., & Endean, E. (2007). Calculating tariff equivalents for time in trade. United States Agency for International Development (USAID): https://krannert.purdue.edu/faculty/hummelsd/research/tariff_equivalents.pdf.

Hummels, D., & Schaur, G. (2013). Time as a trade barrier. *The American Economic Review, 103*(7), 2935-2959. doi:10.1257/aer.103.7.2935

Iwanow, T., & Kirkpatrick, C. (2009). Trade Facilitation and Manufactured Exports: Is Africa Different? *World Development, 37*(6), 1039-1050. doi:http://dx.doi.org/10.1016/j.worlddev.2008.09.014

Liu, L., & Yue, C. (2013). Investigating the impacts of time delays on trade. *Food Policy, 39*(0), 108-114. doi:http://dx.doi.org/10.1016/j.foodpol.2013.01.001

Minor, P., & Hummels, D. (2013). Time as a barrier to trade: A GTAP database of ad valorem trade time costs. ImpactEcon: http://mygtap.

Moise, E., & Sorescu, S. (2013) Trade Facilitation Indicators: The potential impact of trade facilitation on developing countries' trade. *OECD Trade Policy Papers, No. 144*. OECD Publishing: http://dx.doi.org/10.1787/5k4bw6kg6ws2-en.

OECD. (2003) Quantitative assessment of the benefits of trade facilitation. *Working paper, No. WP(2003)31*. OECD: http://www.oecd.org/trade.

OECD. (2018a). OECD Trade Facilitation Indicators: An overview of available tools *Trade Policy Note*. http://www.oecd.org/tad/policynotes/oecd-trade-facilitation-indicators-available-tools.pdf.

OECD. (2018b). *Trade Facilitation and the Global Economy*. OECD Publishing, Paris: http://dx.doi.org/10.1787/9789264277571-en.

Perera, S., Siriwardana, M., & Mounter, S. (2018). Trade delays constitute a conclusive barrier to economic development: Should South Asia be motivated accordingly? *The World Economy*, under review.

Persson, M. (2008). Trade Facilitation and the eU-aCP economic partnership agreements. *Journal of Economic Integration, 23*(3), 518-546. doi:ttps://www.jstor.org/stable/23001231

Samuelson, P. A. (1954). The transfer problem and transport costs, II: analysis of effects of trade impediments. *The Economic Journal*, 264-289. doi:https://www.jstor.org/stable/2226834

TFAF. (2018). Trade Facilitation Agreement Facility. World Trade Organisation: http://www.tfafacility.org/

Walmsley, T., & Minor, P. (2015). Willingness to Pay in CGE Models *ImpactECON Working Paper No. 04*. ImpactECON: https://impactecon.com/?attachment_id=1014.

World Bank. (2018). The World Bank Doing Business Report. World Bank: http://espanol.doingbusiness.org/~/media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB2018-Full-Report.pdf

WTO. (2014). Protocol Amending The Marrakesh Agreement Establishing The World Trade Organization: https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm.

WTO. (2015) Speeding up trade: benefits and challenges of implementing the WTO Trade Facilitation Agreement. *World Trade Report - 2015*. World Trade Organisation: https://www.wto.org/english/res_e/booksp_e/world_trade_report15_e.pdf.

WTO. (2018). Annual Report - 2018. World Trade Organisation: https://www.wto.org/english/res_e/publications_e/anrep18_e.htm.

Zaki, C. (2014). An empirical assessment of the trade facilitation initiative: econometric evidence and global economic effects. *World Trade Review, 13: 1, 103–130*. doi:https://doi.org/10.1017/S1474745613000256

Appendix

Appendix 5.1-A: Detailed notification breakdown

Article No.	Provisions	Afghanistan	Bangladesh	Nepal	Pakistan	Sri Lanka	India
1.1	Publication	B	Ap,Bp	B	Ap,Bp	C	Ap,Bp
1.2	Information available through internet	C	Ap,Bp	C	Ap,Cp	C	Ap,Bp
1.3	Enquiry points	C	C	C	Ap,Bp	C	B
1.4	Notification	B	B	B	A	C	B
2.1	Comments and information before entry into force	C	B	C	B	C	Ap,Bp
2.2	Consultations	C	B	B	B	C	A
3.0	Advance rulings	C	A	C	C	C	Ap,Bp
4.0	Procedures for appeal or review	B	Ap,Bp	C	B	A	Ap,Bp
5.1	Notifications for enhanced controls or inspections	C	B	C	B	C	Ap,Bp
5.2	Detention	A	A	B	A	A	A
5.3	Test procedures	C	B	C	A	C	A
6.1	General disciplines on fees and charges	B	B	B	B	C	A
6.2	Specific disciplines on fees and charges	B	B	C	A	C	A
6.3	Penalty Disciplines	B	B	C	Ap,Bp	A	Ap,Bp
7.1	Pre-arrival processing	C	C	C	A	B	Ap,Bp
7.2	Electronic payment	B	B	C	C	A	A
7.3	Separation of release	A	A	C	Ap,Bp	C	B
7.4	Risk management	B	C	C	C	C	B
7.5	Post-clearance audit	B	C	C	C	C	Ap,Bp
7.6	Average release times	C	A	C	C	C	A
7.7	Authorized operators	C	C	C	C	C	A
7.8	Expedited shipments	C	C	C	C	A	Ap,Bp
7.9	Perishable goods	B	C	B	B	C	Ap,Bp
8.0	Border Agency Cooperation	C	C	C	C	C	Ap,Bp
9.0	Movement of goods	B	A	C	B	A	A
10.1	Formalities	B	Ap,Cp	C	B	C	A
10.2	Acceptance of copies	C	Ap,Bp	B	Ap,Bp	C	Ap,Bp
10.3	Use of international standards	C	A	C	B	C	A
10.4	Single window	C	C	C	C	C	B
10.5	Pre-shipment inspection	A	Ap,Bp	A	A	B	Ap,Bp
10.6	Use of customs brokers	A	A	A	A	A	A
10.7	Common border procedures	B	A	C	Ap,Cp	A	A
10.8	Rejected Goods	B	A	B	B	A	Ap,Bp
10.9	Temporary admission of goods	A	B	C	B	A	Ap,Bp
11.0	Transit	Ap, Bp, Cp	Ap,Bp,Cp	C	Ap,Bp	A	Ap,Bp
12.0	Customs cooperation	Bp,Cp	B	C	B	C	A

Source: Trade Facilitation Agreement database

Note:

A - Fully notified for provisions implement by the time the Agreement enters into force (Category A)

Ap - Partially notified for provisions implement by the time the Agreement enters into force (Category A)

B - Fully notified for implement after a transitional period following the entry into force of the Agreement (Category B)

Bp - Partially notified for implement after a transitional period following the entry into force of the Agreement (Category B)

C - Fully notified for requiring the acquisition of assistance and support for capacity building (Category C)

Cp - Partially notified for requiring the acquisition of assistance and support for capacity building (Category C)

Appendix 5.2-B: OECD Trade Facilitation Indicators and relevant components

Information Availability	Enquiry points; publication of trade information, including on Internet
Involvement of the Trade Community	Structures for consultations; established guidelines for consultations; publications of drafts; existence of notice and-comment frameworks
Advance Rulings	Prior statements by the administration to requesting traders concerning the classification, origin, valuation method, etc., applied to specific goods at the time of importation; the rules and process applied to such statements
Appeal Procedures	The possibility and modalities to appeal administrative decisions by border agencies
Fees and Charges	Disciplines on the fees and charges imposed on imports and exports; disciplines on penalties
Formalities – Documents	Acceptance of copies, simplification of trade documents; harmonisation in accordance with international standards
Formalities – Automation	Electronic exchange of data; use of automated risk management; automated border procedures; electronic payments
Formalities – Procedures	Streamlining of border controls; single submission points for all required documentation (single windows); pre-arrival processing; release of goods separated from final determination and payment of Customs duties; treatment of perishable goods; post-clearance audits; authorised operators
Internal Co-operation	Control delegation to Customs authorities; institutionalised mechanism supporting co-operation between various border agencies of the country; coordination / harmonisation of data requirements and documentary controls; coordination of inspections; coordinated / shared infrastructure and equipment use
External Co-operation	Co-operation with neighbouring and third countries; alignment of procedures and formalities; coordination / harmonisation of data requirements and documentary controls; risk management co-operation; joint controls
Governance and Impartiality	Customs structures and functions; accountability; ethics policy

Source: (OECD, 2018a)

Appendix 5.3-C: Sectoral and regional aggregation

Aggregated sectors	Mapping to GTAP sectors
Agriculture bulk	Paddy rice, wheat, cereal grains nec., oil seeds, sugar cane, sugar beet plant-based fibers, raw milk, dairy products, processed rice, sugar
Vege &fruits	Vegetables, fruit, nuts
Other agriculture	Crops nec., bovine cattle, sheep and goats, horses, animal products nec., forestry, fishing, bovine cattle, sheep and goat meat products, meat products, vegetable oils and fats
Textile &apparel	Wool, silk-worm cocoons, textiles, wearing apparel
Coal, oil, gas	Coal, oil, gas
Mineral &metals	Minerals nec., mineral products nec., ferrous metals, metals nec., metal products
Food products	Food products nec, beverages and tobacco products
Other manufacturing	Leather products, chemical, rubber, plastic products, manufactures nec.
Wood products	Wood products
Paper products	Paper products, publishing
Petroleum products	Petroleum, coal products
Automobile &parts	Motor vehicles and parts
Equipment	Transport equipment nec., electronic equipment, machinery and equipment nec.
Services	Electricity, gas manufacture, distribution, water, construction, trade, transport nec., water transport, air transport, communication, financial services nec., insurance, business services nec., recreational and other services, public admin., and defence, education, health, ownership of dwellings.
Aggregated regions	**Mapping to GTAP regions**
India	India
Pakistan	Pakistan
Bangladesh	Bangladesh
Sri Lanka	Sri Lanka
Landlocked	Afghanistan, Bhutan, Nepal
High income	Australia; New Zealand; Hong Kong; Japan; Korea; Singapore; Canada; United States of America; Chile; Uruguay; Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovakia; Slovenia; Spain; Sweden; United Kingdom; Switzerland; Norway; Croatia; Russian Federation; Bahrain; Israel; Kuwait; Oman; Qatar; Saudi Arabia; United Arab Emirates.
Middle income	China; Mongolia; Indonesia; Lao People's Democratic Republic; Malaysia; Philippines; Thailand; Viet Nam; Mexico; Argentina; Bolivia; Brazil; Colombia; Ecuador; Paraguay; Peru; Costa Rica; Guatemala; Honduras; Nicaragua; Panama; El Salvador; Hungary; Albania; Bulgaria; Belarus; Romania; Ukraine; Kazakhstan; Kyrgyzstan; Armenia; Azerbaijan; Georgia; Iran Islamic Republic of; Turkey; Egypt; Morocco; Tunisia; Cameroon; Cote d'Ivoire; Ghana; Nigeria; Senegal; Mauritius; Zambia; Botswana; Namibia; South Africa.
Low income	Cambodia; Ethiopia; Kenya; Madagascar; Malawi; Mozambique; Rwanda; Tanzania; Uganda; Zimbabwe.
Rest of the World	Rest of Oceania; Taiwan; Rest of East Asia; Brunei Darussalam; Rest of Southeast Asia; Rest of North America; Venezuela; Rest of South America; Rest of Central America; Dominican Republic; Jamaica; Puerto Rico; Trinidad and Tobago; Caribbean; Rest of EFTA; Rest of Eastern Europe; Rest of Europe; Rest of Former Soviet Union; Jordan; Rest of Western Asia; Rest of North Africa; Benin; Burkina Faso; Guinea; Togo; Rest of Western Africa; Central Africa; South Central Africa; Rest of Eastern Africa; Rest of South African Customs ; Rest of the World.

Source: Authors' aggregations based on GTAP Database (Aguiar, Narayanan, & McDougall, 2016)

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

We, the PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

	Author's Name	% of contribution
Candidate	Manel Ahangamage	90%
Other Authors	Mahinda Siriwardana	5%
	Stuart Mounter	5%

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

The Chapter 5 is submitted to publish as a journal article and currently under reviewed (The Journal of International Trade $ Economic Development)

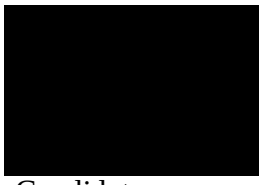
Perera, S., Siriwardana, M., & Mounter, S. (2018). Economic impacts of the WTO Trade Facilitation Agreement on trade transaction efficiency at the South Asian borders. The Journal of International Trade & Economic Development, Under review.

We, the PhD candidate and the candidate's Principal Supervisor, certify that the following text, figures and diagrams are the candidate's original work.

Type of work	**Page number/s**
Journal Article	124-175

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana



05.10.2018

Candidate Date

5-10-18

Principal Supervisor Date

Chapter 6. The costs and challenges of implementing WTO Trade Facilitation Agreement in South Asia

Abstract

The primary objective of this study was to investigate the costs and challenges of the implementing the World Trade Organisation (WTO) Trade Facilitation Agreement (TFA) in South Asia, using an analysis based on qualitative information gathered from a literature review and quantitative estimates of the costs and benefits of the Agreement. The economy-wide costs and benefits were estimated using the Global Trade Analysis Project (GTAP) model. The paper introduced a new approach to incorporate the implementation costs of the TFA into the GTAP model. The results of this analysis revealed that the expenses of introducing the Agreement measures did not affect the economy significantly in South Asian countries, excluding the landlocked countries and Sri Lanka, which require support priorities from donor nations. According to the analysis, the net benefits of the full implementation of the Agreement in these countries will be achieved at the expense of reduced household expenditure due to increased income tax and thus, reduced real Gross Domestic Product (GDP). Overall, the study confirms that the financial costs of the TFA implementation measures will not significantly impede the attainment of the benefits of the Agreement for other South Asian members. However, South Asia needs greater technical and capacity building support to identify areas requiring improvement and to develop strategic plans for introducing, maintaining and sustaining of these reforms.

Keywords: WTO, Trade Facilitation Agreement, Implementation costs, South Asia, GTAP

6.1. Introduction

The Trade Facilitation Agreement (TFA) was implemented by the World Trade Organization (WTO) in February 2017 and signatories, including South Asian members, thereby indicating their commitment to its provisions. The agreement sets out to eliminate trade delays through the simplification of border transaction procedures and thereby improve border transactions efficiency. Inherent in the commitment to the agreement is the recognition of its reciprocity in offering mutual benefits to trading partners that translate into greater global wealth and welfare.

These provisions include improving the availability of information; broadening the involvement of the international trading community; prioritising advance rulings and the channels for appeal; abolishing unnecessary fees and charges by minimising and automating formalities and procedures and facilitation of advance submission of documentation; consolidating and fostering cooperation among internal and external border agencies by means of impartial governance and the control of corruption. Research indicates that the TFA offers greater benefits to developing countries that stand to gain two-thirds of the potential global benefits from the efficient border transaction measures established by the Agreement if they and their trading partners fully implement all provisions in the TFA. However, these countries face greater challenges in implementing the TFA measures compared to developed countries. The initial and operational costs of Trade Facilitation (TF) measures are relatively more burdensome for developing countries, as the necessary standards to match with those of the best practices used by developed countries. Therefore, implementation for developing countries implies careful consideration in the allocation of their limited resources and knowledge.

To date, South Asia, with the exception of India has been made very little progress in implementing the provisions of the Agreement due to the significant economic impact of the costs and challenges. The economies of the regional nations are relatively small and border TF is exceptionally low, such that they require substantial investment in infrastructure and human resources to remedy and match the TFA minimum standards. This necessitates an assessment of the potential costs and challenges for the region.

There is a lack of related evidence on which to produce a quantitative assessment of the potential overall costs. This is no easy task given the complexity of differentiating the costs of each measure taking into account regional economic diversity and the required level of change

in the implementation program of each constituent country. OECD (2018c) confirms that no research can generate hard and fast figures to calculate the total expenses involved in improving TF in any country. Clearly, each country starts improving customs efficiency and other TF-related reforms at different starting points and the related expenditure is dependent on the size of the reforms. Further, the approach and the level of achievement is dependent on national ambition and a variety of internal decisions. Such differences make it difficult to calculate the costs of implementing the agreed-on TFA measures at individual country level. However, some estimation of the economic costs is vital for developing country governments to decide on their resource allocation for implementing these measures which may crowd out other development priorities. The level of economic development of most of the South Asian economies is more or less similar but each faces a different combination of challenges in implementing TFA. Hence solutions may be country-specific.

The primary objective of this paper is to investigate the cost implications of implementing the TFA measures in South Asia using qualitative information, in addition to the quantitative estimations of the TFA implementation costs based on the Global Trade Analysis Project (GTAP) model. Based on these findings, the paper will highlight useful information about the costs and challenges that South Asian members face when implementing these measures, emphasizing policy implications to improve TF in South Asia.

The methodology adopted in this study has two major components. The first investigates the cost implications of the TFA in the South Asian region based on the information obtained from the literature review. In the second, the study estimates the economy-wide costs of TFA implementation based on the GTAP model by comparing the economic benefits and implementation costs. The originality of this study is threefold. Firstly, an evaluation of the costs of TFA measures, together with an estimation of its economic benefits based on the GTAP model has not previously been conducted. Secondly, the study introduced a simple, straightforward method for identifying the economy-wide costs of implementing the TFA which has not previously been attempted. Thirdly, as no properly-compiled information on TFA implementation progress exists regarding benefits, costs, and challenges in the South Asian context, the findings of this study will be useful for policy-makers in structuring and prioritising the reforms to optimise the benefits of improving TF.

The remainder of the paper has the following structure. The second section reviews the existing literature on TFA implementation costs, the progress made by South Asian nations and the

external financial support these members have received. In section three, the economy-wide costs are estimated, based on the GTAP model and compared with the potential benefits. Section four provides the conclusion.

6.2. Literature review

There is very limited evidence available in the literature for assessing the implementation costs of the TFA. Alternatively, there is sufficient literature which addresses TF issues and has estimated the economic benefits of improvements on a regional and global scale. Most of these studies have identified the importance of estimating the potential costs of implementing TFA, but have not attempted to provide cost estimates due to the lack of reliable, relevant data (Beverelli, Neumueller, & Teh, 2015; OECD, 2018c; Walmsley & Minor, 2015; Zaki, 2014). A few OECD studies have focussed on addressing the costs of TFA implementation and provided qualitative information about the associated costs. This section briefly reviews these studies to understand the nature of TF costs.

OECD (2009) collected data based on a survey that explains the costs of implementing the TFA and provided information on the implementation expenses of 15 developing countries, namely Argentina, Barbados, Cambodia, Chile, Jamaica, Latvia, Mauritius, Morocco, Mozambique, the Philippines, Senegal, Tanzania, Thailand, Uganda and Zambia, representing Africa, Asia, Europe and the Americas and containing six Least Developed Countries (LDCs). Implementation costs data in the sample was gathered on an individual country basis. Moise (2013) provided data on the costs and challenges of implementing the TFA by updating the previously-mentioned study and including an additional nine developing countries, Burkina Faso, Colombia, Costa Rica, the Dominican Republic, Kenya, Lao PDR, Malaysia, Mongolia and Sierra Leone. In this case, data were based on the actual national planned expenses in domestic TF reforms and capacity building programs. The findings of these two studies indicated that the initial costs of introducing TFA measures and the annual operating costs are significantly smaller than the benefits. Based on these findings, the latter study provided a rough estimate of the capital expenditure involved in introducing the TFA measures in the range of USD 5–USD 25 million while confirming annual operating costs do not exceed USD 3.5 million (Moise, 2013). The study further highlighted that donor support for implementing TFA has increased significantly over the ten year period, reporting a sum of USD 381 million for 2011.

A recent study by OECD (2018b) demonstrated that measures that incur considerably large investment costs are not necessarily costly to operate after they are implemented and annual operating costs may be minimal. However, some measures that are relatively less expensive to implement do have challenges in maintaining long-term sustainability. This study highlighted the need of a substantial introductory time period to deal with such measures, in addition to external technical and financial assistance and political commitment.

Another study recently published by OECD (2018c) provided useful information on the complexity of TFA cost estimations, highlighting that the overall costs of TFA implementation are not necessarily financial but include the challenges of organisational and behavioural changes to adopt the new measures. These are difficult to identify. Another issue is that it is difficult to separate annual operating expenses of TF reforms from the regular budget as some of the measures are already absorbed by the government costs for day-to-day development activities.

These OECD studies provided comprehensive details on the costs incurred in implementing the TFA measures. The information has been widely used in other studies, by setting out to understand the TFA costs in addition to the benefits. TFA implementation costs and challenges in developing countries are discussed in the following section, based on the information reported in these four studies.

6.2.1. The elements of the implementation costs

TFA implementation costs can basically be categorised into capital and recurrent costs. Capital costs may include, but are not limited to, the introduction of automated systems for advance lodging and processing data, introducing the single window system, purchasing equipment, vehicles, and buildings, and initial training on newly introduced operations. These involve significant investment costs to developing countries. While the operational and maintenance costs might be minimal, the related capacity building of relevant manpower, the introduction of new mechanisms and identification and addressing of new issues could be significantly costly. The recurrent costs, therefore, would include salaries, the operation and maintenance of equipment and regular training to maintain skills need at the required standard.

The reviewed OECD studies identified a number of components of TFA implementation costs. Figure 6.1 illustrates the major cost components of the TFA reforms which include diagnostic

and re-engineering costs, regulatory costs, institutional costs, training costs, equipment and infrastructure costs, and awareness-raising and change management costs. Initially, countries may have to identify the priority areas and develop strategic plans. However, due to the complexity of the measures, developing countries may face challenges and significant costs for diagnosing and re-engineering the new system in committing to these global measures. The regulatory costs comprise the costs of legislative changes or amendments of existing laws in the areas of customs modernisation. Time and costs may incur for assessing the existing regulatory framework, ensuring the consistency and coherence of other domestic policies and identifying the potential unexpected consequences of the change in regulations. The costs of changes will vary relative to a country's own legislative structures, procedures, and frequency of changes in legislation. The literature indicated that such TFA-related legislation costs generally entail minimal additional costs since the Agreement provides extensive supporting materials which include information on regulatory and institutional aspects of the TFA measures. Some measures do not require legislative changes and can thus be implemented at the regular operational level. Institutional costs may incur in the establishment of new units such as a post-clearance team, risk management team, or central inquiry point for implementing some measures. These may involve additional costs for human and financial resources. In general, training costs are the most critical cost component in implementing the TFA measures due to the vast changes required in improving and extending administrative capacity. Relative to developed countries, specific customs skills and expertise are extremely limited in developing countries. The training costs, therefore, would include the costs of recruiting new staff and developing new posts which are a costly option. This implies offering more attractive salaries for better-qualified staff. Alternatively, additional administration costs may be limited to training existing staff and/or hiring trained staff from other institutions for specific TF measures.

In order to implement some of the TFA measures, purchasing new equipment and improving existing infrastructure are necessary. They are the most costly options. TFA measures demand the internet publication of information relating to border clearance requirements, the development of customs websites and establishment of online inquiry desks. Hence, there is a necessity to improve information and communications technology (ICT), which implies the purchasing and installation of the appropriate hardware such as computers, monitors, and scanners, as well as the software that facilitates interoperability. Technological innovation requires human resource changes either through training or new appointments at the

institutional level which requires a substantial financial outlay. However, the inescapable need for the appropriate technology to effectively promote efficiency at the borders implies long-term benefits that irrefutably outweigh the costs.

Successful TFA implementation requires the participation of all stakeholders, namely government departments and private firms with whom customs and other border agencies interact. This demands the promotion of general awareness among these partners and specific information for certain stakeholders that is vital to TFA sustainability. Thus, change management costs are an important component of some TFA measures that may involve the development of communication strategies between customs and other stakeholders and the establishment of client service standards.

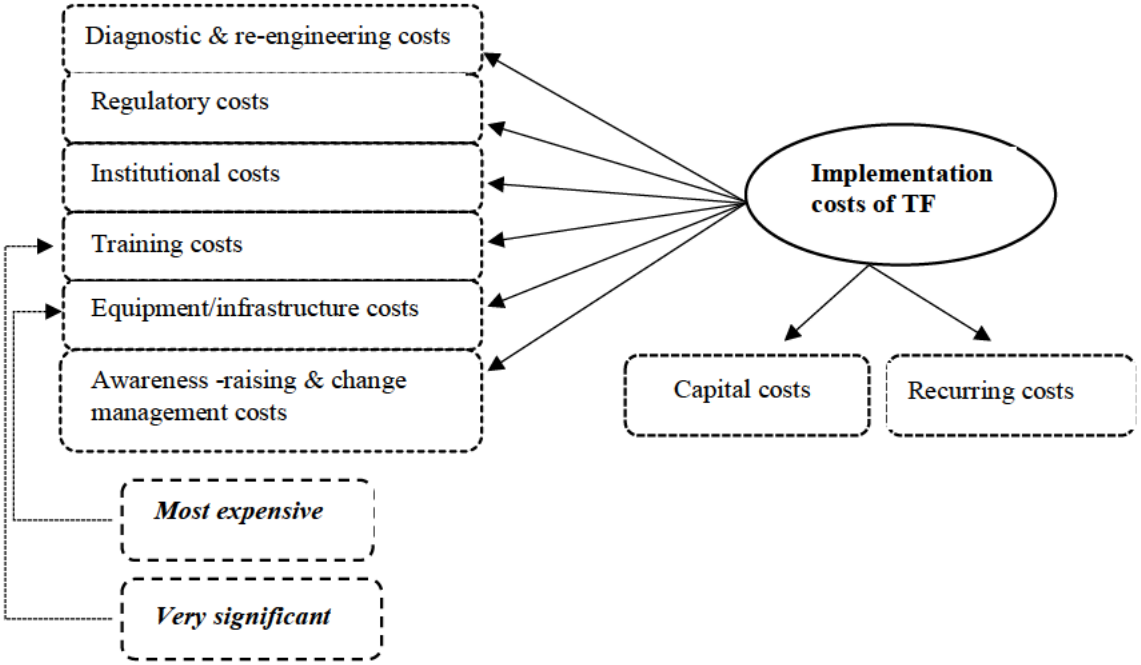


Figure 6.1: Types of cost in implementing the TFA

Source: Based on OECD (2018)

Quantifying the costs of each measure of the Agreement is complex and not feasible. However, OECD identified certain measures that are more costly to implement, necessitating financial support for developing countries. Conversely, some measures are inexpensive to introduce but require a significant political commitment to adopt and maintain. The most costly elements of the TFA measures have been identified as transparency and predictability, procedural simplification and streamlining, coordination and cooperation between border agencies, purchasing equipment and infrastructure for the introduction and use of ICT and the

establishment of single window mechanisms. Training has been identified as the most important and fundamental area of the implementation. However, the developing country financial burdens of the implementation of these measures are relatively short-term. The full implementation of the Agreement with the establishment of all the measures would eventually reduce the government expenditure in the long-term through staff reductions due to customs automation, enhanced transaction efficiency and transparency, the elimination of bureaucratic functions, and more efficient utilisation of resources. Governments can also increase revenue collection from reasonable service charges based on improved efficiency of services to traders and other stakeholders. Further, the costs of certain TFA measures are already absorbed by the regular national budget. It was also noted that the overall implementation costs of TFA measures are dependent on the current national levels of infrastructure development, ICT usage, existing customs staff skills and flexibility in changes to regulatory and legislative structures.

6.2.2. Overcoming implementation challenges

Due to the complexity of the TFA measures, different countries face different combinations of challenges, irrespective of the fact that they may exhibit similarity in their levels of economic development. As the OECD literature has identified, implementation capacity is not only dependent on level of economic development, but on a synthesis of individual factors such as geographical location which determines the proximity and accessibility of global markets, the mix of import and export composition, and the extent of national government priorities for customs modernisation and other TF related reforms. Moise (2006) identified that some LDCs had already achieved greater TF improvements than some other advanced developing countries. Thus, it is a complex task to establish a common set of solutions to overcome the implementation challenges that developing countries face.

Some measures are relatively elementary and straightforward while other measures are costly and technically challenging to implement. Considering the complexity of the implementation, OECD classified TFA measures into four broad categories (Figure 6.2): (1) Measures closely related to regular national practices of customs administration, which can immediately be implemented without additional costs. These measures are identified as promulgation and publication of laws and regulations, advance rulings, appeals and feedback mechanisms, and cooperation between border agencies. These measures do appear to be uncomplicated and can thus be implemented rapidly. (2) Measures which involve financial and resource implications

which are subjected to implementation with donor support. In such cases, countries have been instructed to notify and request. OECD noted that these financial and resource-supported measures are costly to implement but relatively straightforward to operate. (3) Measures requiring a substantial timeframe, but are not costly to operate. For this type of measure, countries may need to reallocate resources to adjust to the new measures. Introducing these measures requires time since they involve challenging organisational and behavioural changes, an example being the training of existing staff to adopt the new business procedures and build confidence among stakeholders regarding the innovations. (4) Measures which require resources, as well as a timeframe, such as the development of ICT and infrastructure related to border transactions, which require external support. Depending on their starting level of infrastructure and ICT development, countries are required to call for technical and financial assistance, to progress in the longer-term. Also, some measures involve greater expenditure but provide longer-term benefits.

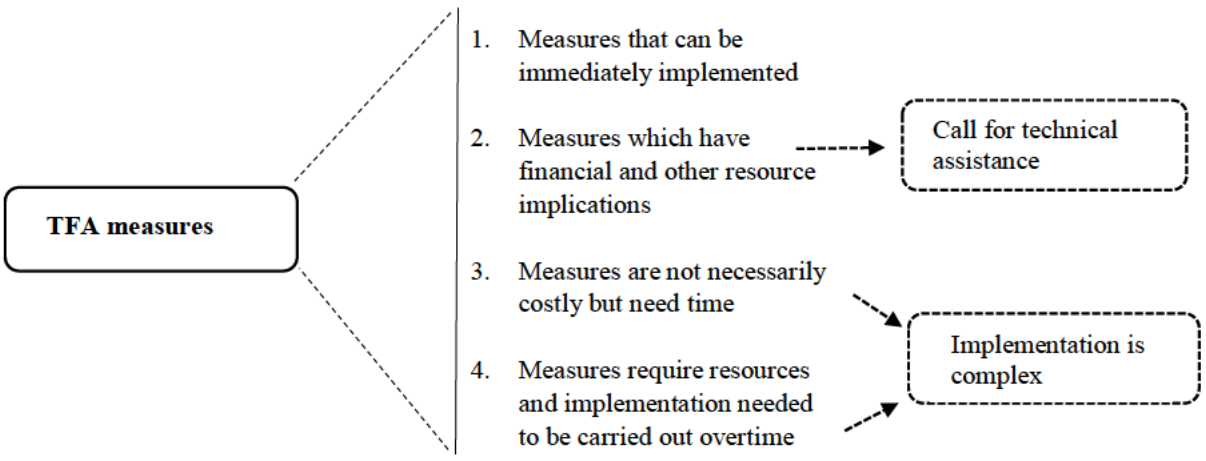


Figure 6.2: Classification of the TFA measures

Source: Based on Moise (2006)

The Agreement allows developing countries to design and implement the measures according to their own needs and assessed priorities within a flexible time period, thus allowing the country to establish a transitional period in which to assess its needs and request external support from donors under the provision termed Special and Differential Treatment (SDT). The extent of technical support needed and the time frame is dependent on the types of costs involved in the specific TFA measures of each country.

In terms of the SDT provision, individual countries are required to provide a comprehensive implementation plan for the most technically-demanding measures. Additionally, the provision also covers support for designing appropriate capacity building plans.

6.2.2.1. Status of the SDT provisions in South Asia

The current status of TFA implementation and the types and levels of implementation support requested by South Asian members are discussed briefly in this section. This highlights the TFA measures that have been found to be the most difficult to implement, those that demand greater external support, and overall priorities that are common across the region.

Figure 6.3 shows the percentage rate of TFA implementation measures in each South Asian member. The implementation rates, as notified by the South Asian members, are categorised into three groups: (1) Measures already implemented. (2) Measures which are still required to be implemented within the transitional period and, (3) Measures which cannot be implemented without capacity building support. India does not require capacity building support but requested a transitional period to implement 27.7% of the total measures under the SDT provisions. Nepal qualifies as the country performing most poorly and has found it is unable to implement almost 80% of the measures without capacity building support. Sri Lanka and Afghanistan also are expecting support in implementing about 60% of the total measures.

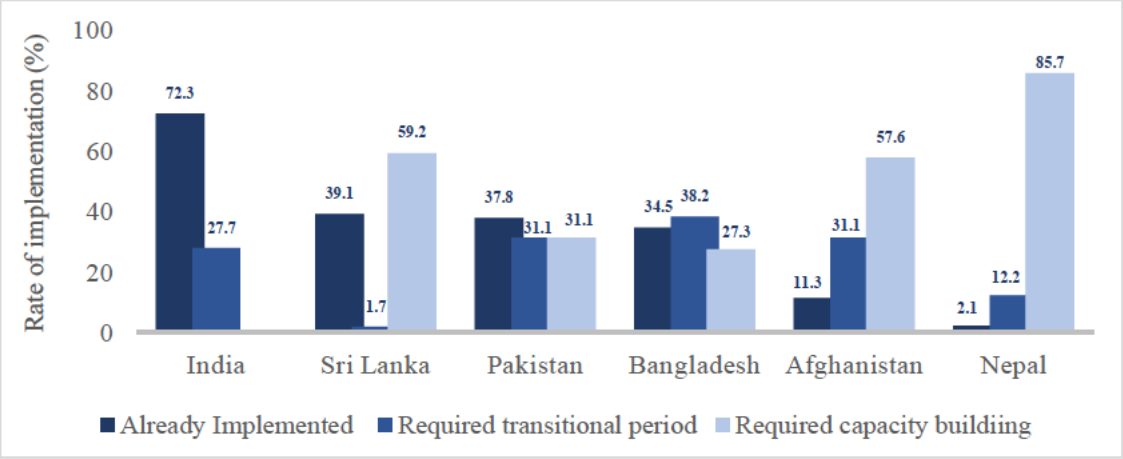


Figure 6.3: Current status of implementation of the TFA measures by South Asian members
Source: Based on Trade Facilitation Agreement Facility database 2018

Table 6.1 lists the type of measures for which South Asian members require capacity building support, as notified by 2018. All South Asian members, except India, made notifications under the SDT provision for the implementation of virtually all measures. According to the

notifications issued, it can be identified that Articles 7 and 8 are considered the most difficult measures to implement by South Asian members. Article 7 explains WTO member commitment to improving the release and clearance of goods at the borders. The article entails that members maintain a risk management system, post-clearance audit, record times in order to calculate and publish average release time, and ensures these measures are maintained by authorised operators together with the special provisions applicable to expedited shipments and perishable goods (WTO, 2014). Article 8 explains the activities necessary to ensure external and internal border agency cooperation and coordination. These include alignment of working hours and days, formalities and procedures, development of common shared facilities, joint controls and the establishment of a one-stop border control post (WTO, 2014). South Asian members have identified that these measures are the most costly and complex to implement and issued notifications of the need for financial support and technical assistance (Table 6.1). In contrast, Article 10 covers formalities and procedures connected with importation, exportation and transit, with the exception the single window system, acceptance of copies, and use of international standards; Article 11 stipulates freedom of transit; and Article 12 which covers the independence of customs corporations, require no external supports. These measures, therefore, can be identified as less costly to implement and some members only require a transitional period while some members have already implemented them (Table 6.1).

Overall, the countries requiring the greatest capacity building support are Nepal, followed by Afghanistan and Sri Lanka. Implementation support priorities must therefore be focussed on these three countries. The most difficult and expensive measures for South Asia are included in Articles 7 and 8. The less costly and more easily implemented measures are included in Article 1 (excepting the establishment of inquiry points), 4, 10, 11 and 12. India has most rapidly implemented the TFA measures and requires no additional support.

6.2.2.2. Trade Facilitation grants provided to South Asia

It is understandable that without external financial, technical and capacity building support, most South Asian members are unlikely to be able to implement the majority of measures. Further, members from the region may find the measures hard to interpret and determine the required level of external supports without guidance since the TFA measures are complex and difficult to break down measure by measure. For this reason, under the framework of the Agreement, donor members (developed countries) and other international and multilateral organisations, reported their willingness to support developing and LDC countries to

implement the TFA. This support will be executed under existing established relationships between countries and donors within the existing framework (OECD/WTO, 2015).

Table 6.1: Measures implemented upon receipt of capacity building support

Article No.	TFA measures	Country request support
1.1	Publication	Sri Lanka
1.2	Information available through internet	Afghanistan, Nepal, Sri Lanka
1.3	**Enquiry points**	Afghanistan, Bangladesh, Nepal, Sri Lanka
1.4	Notification	Sri Lanka
2.1	Comments and information before entry into force	Afghanistan, Nepal, Sri Lanka
2.2	Consultations	Afghanistan, Sri Lanka
3.0	**Advance rulings**	Afghanistan, Nepal, Pakistan, Sri Lanka
4.0	Procedures for appeal or review	Nepal
5.1	Notifications for enhanced controls or inspections	Afghanistan, Nepal, Sri Lanka
5.2	Detention	-
5.3	Test procedures	Afghanistan, Nepal, Sri Lanka
6.1	General disciplines on fees and charges	Sri Lanka
6.2	Specific disciplines on fees and charges	Nepal, Sri Lanka
6.3	Penalty Disciplines	Nepal,
7.1	Pre-arrival processing	Afghanistan, Bangladesh, Nepal
7.2	Electronic payment	Nepal, Pakistan
7.3	Separation of release	Nepal, Sri Lanka
7.4	**Risk management**	Bangladesh, Nepal, Pakistan, Sri Lanka
7.5	**Post-clearance audit**	Bangladesh, Nepal, Pakistan, Sri Lanka
7.6	**Average release times**	Afghanistan, Nepal, Pakistan, Sri Lanka
7.7	**Authorized operators**	Afghanistan, Bangladesh, Nepal, Pakistan, Sri Lanka
7.8	**Expedited shipments**	Afghanistan, Bangladesh, Nepal, Pakistan
7.9	Perishable goods	Bangladesh, Sri Lanka
8.0	**Border Agency Cooperation**	Afghanistan, Bangladesh, Nepal, Pakistan, Sri Lanka
9.0	Movement of goods	Nepal
10.1	Formalities	Nepal, Sri Lanka
10.2	Acceptance of copies	Afghanistan, Sri Lanka
10.3	Use of international standards	Afghanistan, Nepal, Sri Lanka
10.4	**Single window**	Afghanistan, Bangladesh, Nepal, Pakistan, Sri Lanka
10.5	Pre-shipment inspection	-
10.6	Use of customs brokers	-
10.7	Common border procedures	Nepal
10.8	Rejected Goods	-
10.9	Temporary admission of goods	Nepal
11.0	Transit	Nepal
12.0	Customs cooperation	Nepal, Sri Lanka

Source: Based on Trade Facilitation Agreement Facility database 2018

According to OECD/WTO (2015), TFA support has already been provided to developing countries, as demanded, and expressed in national and regional development plans. This section briefly examines the overview of already provided TFA support received by South Asian

members from their development partners. This existing support system provides insight into potential donors and South Asian beneficiaries.

Figure 6.4 illustrates the trend of TF Aid provided to the South Asian members during the period of 2008 to 2016. Total Aid increased from USD 0.96 million in 2008 to USD 21 million in 2016. Despite the increasing trend in TF disbursements, considerable fluctuation is evident. The flow of TF Aid to South Asia peaked in 2012 (USD 22.3 million), then dropped sharply in 2013 (USD 5.6 million). However, the TF Aid flows will potentially increase with the completion of the identification process and notification of funding required for the TFA implementation by South Asian members. Currently, only Pakistan and Sri Lanka have given notification of the type of technical assistance required.

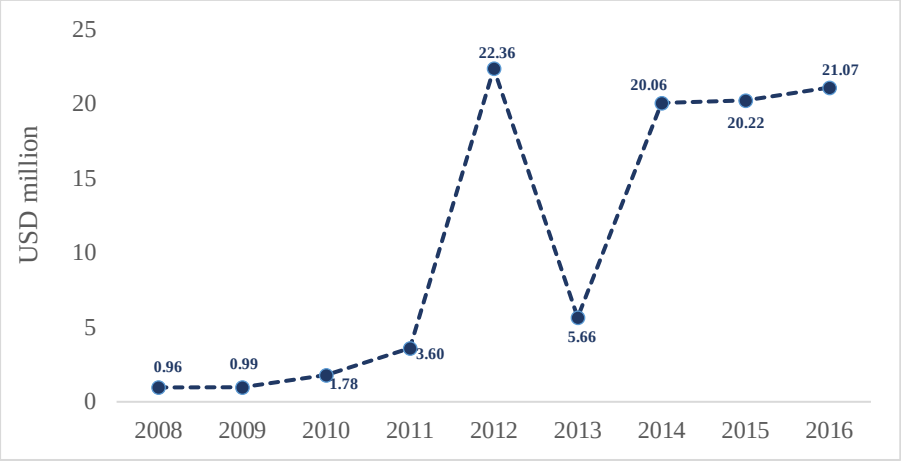


Figure 6.4: Trade Facilitation Aid provided to South Asia
Source: Based on OECD Aid activities database (CRS), 2018 (OECD, 2018a)

Figure 6.5 illustrates the total TF Aid received by the South Asian members during the period 2008 to 2016. Afghanistan received 65% of the total Aid given during that period. The greatest share of Aid was provided to Afghanistan in 2012, while the period 2014-2016 saw total Aid to South Asia peak. Over the years, Afghanistan has received 98% of its total Aid from the USA (USD 62.5 million). The remaining donors included Canada (USD 0.39 million), Japan (USD 0.09 million), Korea (USD 0.05 million), United Kingdom (USD 0.13 million) and (OECD, 2018a). The least foreign Aid received by a South Asian nation is in the case of Bhutan which is not a WTO member and thus will not benefit directly from the TFA. Bhutan is a landlocked country and has not been successfully opened to the global trade system. Its major

trading partner is India. Other members in South Asia received more or less relatively equal amounts of foreign Aid during 2008-2016 (around USD 7 million for each member).

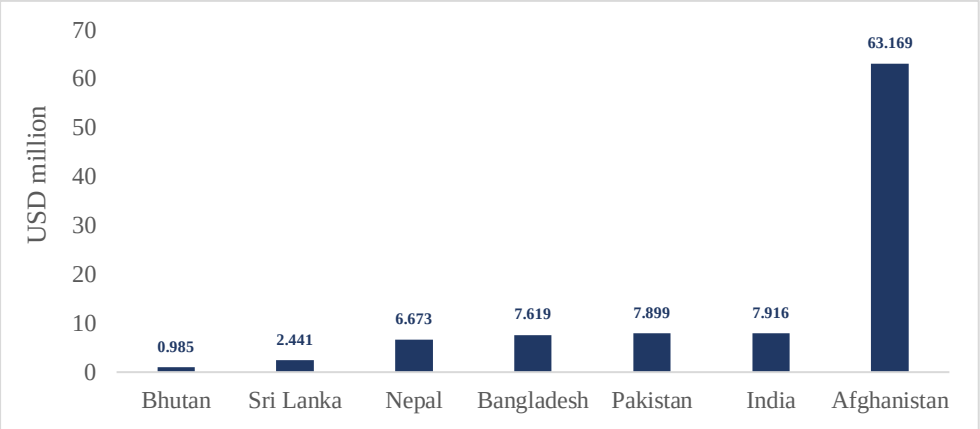


Figure 6.5: Total TF Aid received by South Asian members over the period 2008-2016
Source: Based on OECD Aid activities database (CRS), 2018

Figure 6.6 shows the major bilateral TF donors to South Asia during the period 2008-2016. The percentage shares of donor support in Figure 6.6 were calculated based on the average value of Aid provided to South Asia by each donor during that period. It appears that South Asia's external TF support is sourced from three developed donor countries, with the United States most prominent in providing Aid to South Asia. During the period 2008-2016, the United States has provided on average USD 9 million annually to improve TF in the region followed by Australia (USD 1.76 million) and Korea (USD 0.73 million). The remaining donors have included the United Kingdom, Canada, Norway, Japan, Germany, and Spain. The latter group provided USD 1.55 million annually over the period of 2008-2016. These foreign TF funding flows to South Asia were basically aimed at developing capacity building in the area of customs administration and other TF-related government agencies. South Asia also has received grants to establish Single Window systems, customs automation, and improve regional connectivity related infrastructure (OECD, 2018a).

According to the Agreement, WTO donor members must notify their willingness to provide assistance and capacity building support for developing countries. However, in terms of the Agreement offering donor assistance is not mandatory but by independent arrangement of an individual developed nation. Alternatively, developing nations and LDC countries are granted the flexibility to seek assistance from potential donor members, as well as other international organisations.

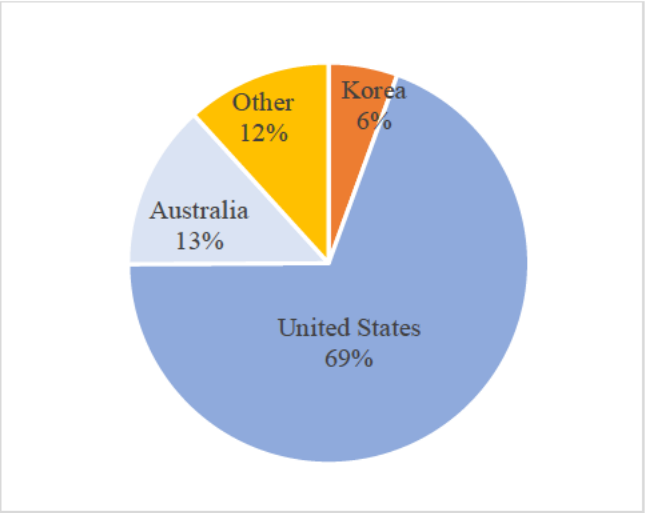


Figure 6.6: Top three TF donors to South Asia, 2008-2016

Source: Based on OECD Aid activities database (CRS), 2018

According to the WTO TFAF, currently 17 WTO individual donor members and multilateral organisations such as the World Bank, World Customs Organisation, and United Nations Conference on Trade and Development have made notifications to support developing countries in implementing the Agreement. The individual member group includes the major South Asian development partners such as the United States, Australia, Germany, Norway, and Canada. WTO TFAF provides information about these donor members publicly to help developing countries identify potential TFA donors.

6.3. Estimation of the potential economic costs of implementing the TFA in South Asia

The literature review identified no empirical published work that has estimated the economic impacts of the TFA implementation, taking into account the benefits as well as the costs of implementation concurrently. There was sufficient evidence, however, of quantitative estimations of implementation that confirmed the significant potential economic benefits for developing countries. The majority of these studies confirm that the benefits of the TFA measures outweigh the costs of implementing them, although these studies neglected to incorporate the TFA costs measures into their models. The current study recognises the importance of identifying the potential economic costs of implementation in the South Asian context as most of the region's members represent developing and least developed economies. Thus, the implementation costs of the Agreement may not be coverable within a country's

existing budget and their own investment in the reforms may hurt the national economy. Additionally, the study seeks to develop a hypothesis to validate the general assumption that the TFA benefits exceed the costs of implementing the measures. The main objective of this section is therefore to provide rough estimates of the economy-wide costs of the TFA in South Asia based on the GTAP model. In order to achieve this objective, the benefits of the full implementation of the Agreement are compared with the costs involved in implementing its measures. The study then offers a potential net benefits/costs analysis of the full implementation of the Agreement in the South Asian context and compares the results with similar analyses for other developing and developed country groups.

6.3.1. Incorporating the costs of implementing TFA measures into the GTAP model

In the GTAP model, the efficiency increase in border transactions due to the improvement in TF is incorporated as a reduction in iceberg costs. However, an increase in border efficiency involves substantial border transaction reforms, which incur adjustment costs in the form of capital and recurrent costs, as discussed in the previous section. There is, however, no proper mechanism for incorporating TFA reform costs into the GTAP model, due to the complexity of the implementation procedures. Further, obtaining an accurate quantitative estimate of the costs of each TFA measure for each country is not possible unless these cost estimates are obtained from particular case studies. Therefore, the lack of data consistency and the need for significant modifications to the GTAP model to depict the TF costs restrict modellers to incorporate the costs of implementing the TFA measures. On the other hand, publicly available qualitative information on the costs and sample-based rough estimates confirm that the costs of TFA are relatively low in comparison to potential benefits. This has caused researchers to estimate only the benefits of the Agreement, without considering the costs in the CGE framework.

Two preliminary and incomplete studies[31] addressed some aspects of the costs of implementation within the CGE framework. One is related to modelling the adjustment costs of Non-Tariff Measures (NTMs) based on GTAP model; the other is directly related to modelling the implementation costs of the TFA measures, based on the Modelling International Relationships in Applied General Equilibrium (MIRAGE) model. These two studies are briefly

[31] These papers were prepared for conference presentations and remain unpublished in journals.

reviewed in this section to provide a background and understanding of a possible mechanism for depicting the costs of TFA reforms in the CGE model. Rau and Verma (2015) introduced a new approach to model NTMs which incorporated both iceberg cost effects and adjustment cost effects necessitated by NTMs, in considering a trade agreement between the EU and Ukraine. Following standard practice, the removal of NTMs was implemented in the GTAP model based on the iceberg approach which reflects the changes in the productivity of products destined for foreign markets. The study mentioned that the adjustment costs occur at the firm level where changes in the production methods are required to upgrade to the necessary standards imposed by NTMs. This is considered as fixed adjustment costs for investing in primary factors in production. In order to depict these costs, the GTAP model was modified to introduce a composite primary value-added factor into the production structure of the GTAP model. To overcome the limited data on adjustment costs, the study approximated such costs by looking at the funds available in the EU for support to Ukraine and calculated the need to include a 50% increase in adjustment costs. The results of this study revealed that the effects of adjustment costs (costs of NTMs) dominate reduced iceberg effects (benefits of NTMs). The authors pointed to two reasons for the larger effects of the adjustment costs. The first is that the shock values of adjustment costs exceed the iceberg shock values. The second reason is the fixed costs variables are used to assign the shocks affecting most of the economic variables in the model, while the iceberg costs variable has an indirect effect. Based on these limitations, the authors suggested that it is necessary to correct the size of the shocks using more accurate implementation costs data and further modifications to the GTAP model.

Fontagne and Foure (2016) used a MIRAGE model to estimate the economic costs and benefits of the TFA. The benefits of the TFA were assessed considering the reduction of trade costs due to the implementation of the TFA measures while costs were assessed considering the additional costs of hiring customs staff to implement customs administration improvements. Data for developing and developed countries that was available in the literature were gathered to calculate the percentage changes in customs staff in each country, which was then calibrated to the percentage change in labour demand in the public administration sector. These percentage changes were then incorporated into the model, accounting for the factor-specific productivity in the production function of representative firms by introducing shocks to the Public Administration sector. The results of this experiment showed that the benefits of the TFA implementation were only reduced by approximately 0.89% when the costs of implementing these measures were incorporated as a decline in labour productivity in the

public administration sector. However, the authors asserted that the risk of change in exogenous productivity variations in the CGE model could lead to completely ad-hoc results. The authors interpreted the decline in productivity as an increase in labour costs. The introduction of high costs via labour productivity significantly affects the economy in different ways. Due to the limitations of the modelling approach, however, the model outcome cannot be used to provide a strong conclusion and further attention has to be given to modelling the implementation costs of the TFA.

6.3.1.1. GTAP experiment: estimating the TFA benefits and its implementation costs in South Asia

Unlike the approaches just reviewed, the current study employs a straightforward and simple experiment to depict the implementation costs of TFA in the context of South Asia. The objective of this experiment is to assess the costs of implementation measures assuming increased government expenditure due to the introduction of these measures. In order to include the additional government expenditure in the GTAP model, the "dpgov" variable is used. This variable is exogenous in the standard GTAP model and refers to the government consumption distribution parameter. The government consumption expenditure equation in the GTAP model includes the variable "dpgov" in the following format.

$$yg_r - y_r = uelas_r + dpgov_r$$

Where;

yg_r = Percentage change in government consumption expenditure

y_r = Percentage change in regional income

$uelas_r$ = Percentage change in elasticity of expenditure with respect to the utility

$dpgov_r$ = Pecentage change in government distribution parameter

The positive percentage shocks on the *dpgov* variable increase government expenditure depending on its share of regional income, implying that the total income is distributed across private consumption, government consumption, and savings. According to the GTAP specifications, the allocation of the expenditure across these three categories is determined according to a Cobb-Douglas utility function. Therefore, *dpgov* is the Cobb-Douglas distribution parameter in government consumption and thus, any changes to the government

consumption parameter will cause changes in the distribution parameters of private consumption and saving[32]. Hence, an increase in government consumption will cause savings and private consumption to decline, although the effect will not be significant since we are using the comparative static version of the GTAP model.

However, it is possible that the government may not be able to afford these costs within their existing budget. Therefore, it has been assumed that the government finances these costs through an increase in tax revenue, implying that the tax-payer pays for implementation of the TFA measures. In order to increase the income tax payment in the GTAP model, the "to" variable, which represents the percentage change in output or income tax in non-saving commodities in the region, is used. This experiment focuses on costs to the government and assumes no possible costs to the private sector authorities.

While incorporating the costs of the TFA measures into the GTAP model, the outcome of the full implementation of TFA is also considered, which allows us to derive the net economic benefits of implementation (benefits after the deduction of costs). Therefore, a simultaneous simulation is carried out, in which the benefits of the TFA are considered as the reduction of time to export and import due to increased border transaction efficiency. Thus, following the standard iceberg costs approach, the percentage Ad Valorem Equivalents (AVEs) of the reduction in time to import and export are incorporated into the model. The estimation of the AVEs and its implications are discussed in the previous paper and the estimated TFA outcomes shock values are taken from Perera, Siriwardana, and Mounter (2018).

The data for this experiment were gathered from the literature. OECD (2018b) provided the updated TFA implementation cost figures, based on information gathered from 24 developing countries. This is the current most updated and reliable data source available and formed the basis of the TFA implementation cost estimates used to calculate the shock values for the additional government expenditure and tax collection to implement the TFA costs in the GTAP. OECD (2018b) indicated that total capital expenditure to introduce TFA measures ranges between USD 5 and 25 million, while annual operating costs directly and indirectly related to TFA measures do not exceed USD 3.5 million. South Asia, comprising developing and least developed countries, is one of the most inefficient global regions in terms of border transactions. Thus, the highest costs value for introducing the TFA measures and the maximum

[32] See Corong, Hertel, McDougall, Tsigas, and van der Mensbrugghe (2017) for descriptive detail of the allocation of regional income across these three expenditure categories.

annual operating cost are assumed based on current levels of TF in the South Asian region. Therefore, additional government expenditure was estimated as USD 28.5 million for the TFA implementation.

Table 6.2 shows the estimated shock values. The first two columns illustrate the percentage increase in government expenditure due to the additional USD 28.5 million investment on the TFA implementation measures. The last two columns show the percentage increase in income tax payment used to cover the additional government expenditure, as assumed in this experiment. The first four countries, together with the landlocked group, represent the South Asian members. The rest of the world is aggregated according to country income levels, i.e. high-income countries, middle-income countries, low-income countries and the rest of the world. This aggregation is helpful to compare the economic impacts of the TFA in South Asia with other developing country groups and least developed country group.

The high-income and middle-income country groups were assigned zero shocks since the share of the TFA investment costs of the total government expenditure in these countries are negligible and it was assumed that the costs of the TFA implementation are covered within their existing national budgets. Depending on the TFA cost shares, the largest government expenditure shocks were assigned to the landlocked group and Bangladesh, while the largest income tax shocks were assigned to Sri Lanka and the landlocked group.

Table 6.2: Shocks for TFA implementation costs

	Government Expenditure		**Income tax payment**	
	Before TFA implementation (USD million)	Additional expenditure for TFA implementation (%)	Before TFA implementation (USD million)	Additional payment for TFA implementation (%)
India	227,768	0.01	56,081	0.05
Pakistan	22,551	0.13	7,659	0.37
Bangladesh	6,296	0.45	10,931	0.26
Sri Lanka	9,199	0.31	1,386	2.06
Landlocked	5,340	0.53	2,528	1.13
High income	9,358,817	0.00	5,931,765	0.00
Middle income	2,513,601	0.00	728,747	0.00
Low income	21,160	0.13	12,573	0.23
Rest of the world	393,821	0.01	230,068	0.01

Source: Authors' calculations based on GTAP database version 9 (Aguiar, Narayanan, & McDougall, 2016)

6.3.2. Scenarios

The simulation of this experiment includes one major scenario which explains the costs and benefits of the Agreement, as the gross benefits (TFA impacts without costs) that have been already modelled and analysed in the previous paper (Perera et al., 2018). These gross estimates are used in the current paper to derive the net benefits of the TFA and compare these with the TFA implementation costs, inclusive of benefits. In this scenario, the full implementation of the Agreement is assumed, implying that each of the South Asian and other developing country members spent USD 28.5 million on implementing all the TFA measures necessary to achieve the full implementation. The first step simulates the TFA impacts which include the potential benefits and costs to fully implement the Agreement. In the second step, the estimated TFA costs, inclusive of benefits, are subtracted from the gross benefits which were estimated previously in Perera et al. (2018) to calculate the net benefits.

6.3.3. Results

This section discusses the major macroeconomic changes resulting from implementation of the TFA, in terms of both expenditure and benefit. Table 6.3 shows the percentage change in real Gross Domestic Product (GDP) with respect to the costs exclusive and costs inclusive scenarios. Costs exclusive results were taken from Perera et al. (2018). The positive changes in GDP in the costs inclusive scenario which is the focal scenario of the current paper were expected to be lower than the costs exclusive GDP changes since it is assumed that the TFA benefits cannot be achieved at zero costs. The percentage reduction of real GDP due to the implementation costs is reported in column 3 of Table 6.3 and is significantly low. These reductions range from 0.01 for India and 0.69 for the landlocked countries in South Asia.

In the costs inclusive scenario, the increased household income tax was simulated on the basis of increased government expenditure. Therefore, an increase in income tax will lead to a reduction in private household consumption and savings and thus, GDP will fall. The reduction of private household consumption is the highest in the landlocked countries and Sri Lanka (Figure 6.7). Private household consumption will decline by 6.3% in the landlocked countries and by 2.9% in Sri Lanka. As a result, net savings in the landlocked countries and Sri Lanka will fall by 3.57% and 2.08% respectively. This is due to the fact that these countries have to increase income taxes by a substantially larger percentage to cover the costs of the TFA measures, compared to other countries considered. The net GDP gain from the full TFA

implementation in the landlocked countries would be around 5.63%, which is the highest of all members.

Table 6.3: Percentage change in real GDP

	Costs exclusive	Costs inclusive	Reduction due to the costs	Net benefits
India	2.24	2.23	-0.01	2.22
Pakistan	3.34	3.29	-0.05	3.24
Bangladesh	4.67	4.64	-0.03	4.61
Sri Lanka	2.03	1.76	-0.27	1.49
Landlocked	7.01	6.32	-0.69	5.63
High income	0.14	0.14	0.00	0.14
Middle income	1.42	1.42	0.00	1.42
Low income	5.87	5.85	-0.02	5.83
Rest of the world	1.12	1.12	0.00	1.12

Source: GTAP model results.

Interestingly, the net GDP gain for Sri Lanka is 1.49%, which is the lowest among developing countries. The results reveal that TFA implementation costs will reduce its benefits in the landlocked countries and Sri Lanka and thus, the net benefits will be gained at the costs of household income. The implication is that Sri Lanka would fall behind other South Asian members and in a similar situation to the landlocked countries unless financial support is received from potential donors.

However, with the exception of Sri Lanka and the landlocked group, the GDP reductions due to the costs of the TFA implementation measures are generally insignificant in comparison with the benefits, which confirms the existing evidence in the literature (OECD, 2018b, 2018c). Overall, the TFA net benefits exceed the costs for all countries, although the difference between benefits and costs varies from country to country in the range of 1.5 in the case of Sri Lanka and 5.8 in other low-income country groups.

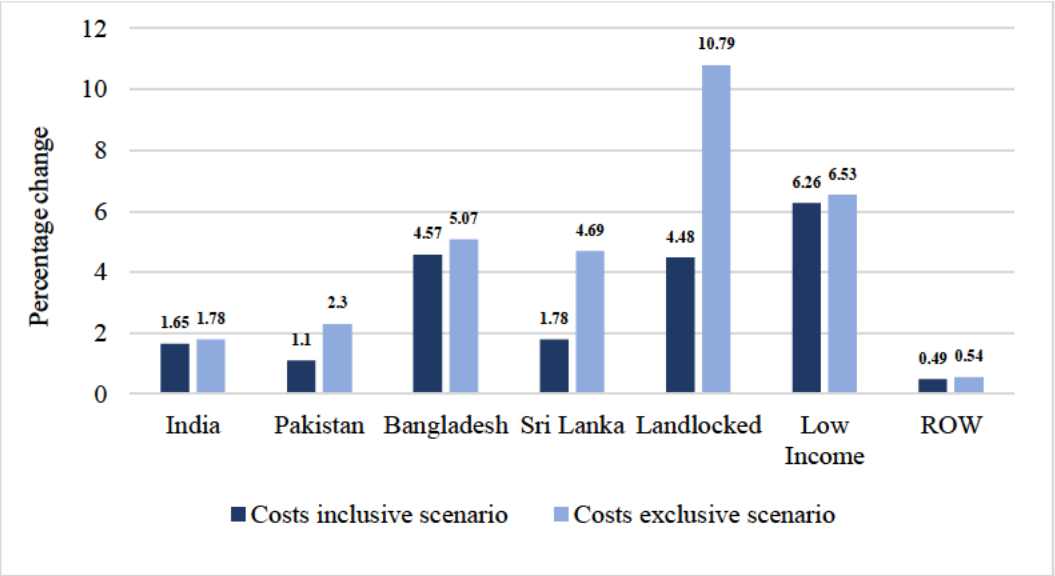


Figure 6.7: Percentage change in private household consumption expenditure in the costs inclusive scenario

Source: GTAP model results

6.4. Conclusion

Covering the TFA implementation costs and challenges by means of information and data derived from related literature and a quantitative estimation of the costs and benefits, this study concludes that South Asia will secure substantial economic benefits by fully implementing the TFA. The study confirms the findings of the literature reviewed that the expenses of TFA implementation do not significantly affect the economy in the case of the majority of countries. However, this does hold for countries in the landlocked group and Sri Lanka, in which the economies are marginally disturbed by the relatively high costs of the TFA implementation measures. The paper found that the benefits of the full TFA implementation in these countries will be achieved at the expense of household income (or reduced consumption). Due to the smaller gains and higher costs, Sri Lanka may fall behind other South Asian members and be in a similar predicament to the landlocked countries unless financial support is received from potential donors. Thus, it is proposed that more of the available Aid for TF implementation should be dedicated to these economies, in order to achieve the full potential benefits of the Agreement.

The literature review in this paper established that South Asia has already received a considerable amount of foreign Aid to improve TF such that total Aid to South Asia has increased from USD 0.96 million to USD 21 million over the period 2008-2016. This implies

that there will be sufficient donor support for these countries to implement the rest of the Agreement measures. Afghanistan has already benefitted by US funding to the score of USD 62.5 million, the highest Aid received by any South Asian member thus far. Sri Lanka received nearly USD 7 million but it may require further support to implement the rest of the measures and thus, remains a nation requiring TFA donor attention.

Information in the literature suggests that most South Asian members have undertaken TFA measures under the framework of normal operating budgets, supported by foreign Aid. India embarked on an intensive implementation in comparison with other South Asian members, having achieved around 70% to date, very intensively and has requested no support to implement the outstanding measures. The GTAP model results of this paper showed that even if India does cover TFA implementation expenses by increasing household tax, it will not affect the economy significantly. The same is applicable to Bangladesh and Pakistan, although these two countries have not progressed well in regard to implementing the TFA measures. In the case of these two countries, the cost estimates show that their economies can absorb costs and the economic impact emanating from such resource diversion to implement TFA is negligible.

Conversely, most other South Asian members issued notifications of their need to implement the TFA measures under the SDT provisions over a considerable transitional period, together with additional technical and capacity building support. The qualitative analysis in the paper identified Nepal as the country most in need of capacity building support, followed by Afghanistan and Sri Lanka. This was confirmed by the model estimates, as discussed above and thus, implementation support priorities, in terms of capacity building as well as TF Aid must focus on these three countries. In terms of capacity building support, the study ascertained that the most difficult and expensive measures for South Asian countries are those comprising Article 7, concerning practices related to the clearance of goods at the borders, and Article 8 relating to external and internal border agency cooperation and coordination. The least costly and easily implemented measures are included in the Article 1 and that deal with the publication of information, excluding the establishment of inquiry points.

Overall, this study confirms that the financial costs of the TFA implementation do not significantly hinder attainment of the promised benefits. However, South Asia needs greater technical and capacity building support to identify areas requiring improvement and to develop strategic plans for introducing, maintaining, and sustaining of these reforms. The study concludes that while it is an unavoidable fact that TFA measures cannot be implemented

without any costs, implementation can be impeded not necessarily by financial issues, but by time and lack of capacity building for proper planning to ensure the sustainability of the reforms.

References

Beverelli, C., Neumueller, S., & Teh, R. (2015). Export diversification effects of the wto trade facilitation agreement. *World Development, 76*, 293-310. doi:https://doi.org/10.1016/j.worlddev.2015.07.009

Corong, E. L., Hertel, T. W., McDougall, R., Tsigas, M. E., & van der Mensbrugghe, D. (2017). The standard gtap model, version 7. *Journal of Global Economic Analysis, 2*(1), 1-119. doi: http://dx.doi.org/10.21642/JGEA.020101AF

Fontagne, L., & Foure, J. (2016). Is Trade facilitation a free lunch? a general equilibrium approach. Global Trade Analysis Project, Purdue University, https://www.gtap.agecon.purdue.edu/resources/download/8314.pdf.

Moise, E. (2006) Special anddifferential treatment in the area of trade facilitation. *Trade policy papers, No.32*. OECD Publishing: http://dx.doi.org/10.1787/877434146062.

Moise, E. (2013) The costs and challenges of implementing trade facilitation measures. *Trade Policy Papers, No. 157*. OECD publishing: http://dx.doi.org/10.1787/5k46hzqxt8jh-en.

OECD. (2009). *Overcoming Border Bottlenecks: The costs and benefits of trade facilitation*. OECD publishing, Paris.

OECD. (2018a). OECD Stat: Creditor Reporting System (CRS) OECD: https://stats.oecd.org/Index.aspx?DataSetCode=crs1

OECD. (2018b). OECD Trade Facilitation Indicators: An overview of available tools *trade policy* OECD*:* Note http://www.oecd.org/tad/policynotes/oecd-trade-facilitation-indicators-available-tools.pdf.

OECD. (2018c). *Trade Facilitation and the Global Economy*. OECD Publishing, Paris: http://dx.doi.org/10.1787/9789264277571-en.

OECD/WTO. (2015). Aid For trade at a Glance 2015: Reducing Trade Costs for Inclusive Sustainable Growth. OECD. doi: https://doi.org/10.1787/22234411

Perera, S., Siriwardana, M., & Mounter, S. (2018). Economic impacts of the WTO Trade Facilitation Agreement on trade transaction efficiency at the South Asian borders. The Journal of *International Trade and Economic Development, Under review.*

Rau, M. L., & Verma, M. (2015). *NTMs in CGE models – Is reducing iceberg trade costs enough? An experiment of modelling EU DCFTAs in GTAP*. The 2nd

Macroeconomics of Agriculture and Development (MAD) workshop (November 19-20, 2015).

Walmsley, T., & Minor, P. (2015). Willingness to Pay in CGE Models *ImpactECON Working Paper No. 04*. ImpactECON: https://impactecon.com/?attachment_id=1014.

WTO. (2014). Protocol Amending The Marrakesh Agreement Establishing The World Trade Organization: https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm.

Zaki, C. (2014). An empirical assessment of the trade facilitation initiative: econometric evidence and global economic effects. *World Trade Review, 13: 1, 103–130*. doi:https://doi.org/10.1017/S1474745613000256

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

We, the PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

	Author's Name	% of contribution
Candidate	Manel Ahangamage	90%
Other Authors	Mahinda Siriwardana	5%
	Stuart Mounter	5%

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

The Chapter 6 will be published as a policy brief.

We, the PhD candidate and the candidate's Principal Supervisor, certify that the following text, figures and diagrams are the candidate's original work.

Type of work	**Page number/s**
Policy Brief	184-208

Name of Candidate: Manel Ahangamage

Name/title of Principal Supervisor: Professor Mahinda Siriwardana

[redacted]

Candidate

05.10.2018

Date

[redacted]

Principal Supervisor

5-10-18

Date

Chapter 7. Conclusion

7.1. Introduction

This chapter presents the main findings of the study according to the objectives stated in Chapter 1. The policy implications, study limitations, and challenges identified during the research are discussed and potential areas for future research are recommended.

The main objective was to assess the economic impacts on trade costs, arising from the faster border transactions due to Trade Facilitation (TF) process and to identify strategies to enhance South Asian trade to mitigate persisting regional development challenges. The specific objectives were to:

1. Review the current TF status and examine how TF affects trade, economic development, and poverty in South Asia.
2. Review TF-related studies to understand the techniques employed to estimate trade costs and delays and the methodological approaches used to assess the economic impacts.
3. Assess the impact of regional commitment to trade delay reductions and tariff removals on economic development in South Asia.
4. Estimate the economic impact of the World Trade Organisation (WTO) Trade Facilitation Agreement (TFA) on South Asian economies.
5. Investigate the cost implications of implementing the TFA measures in South Asia.
6. Provide policy options to reduce trade delays through improved TF in South Asia.

7.2. Key findings of the study

7.2.1. Trade Facilitation, economic development, and poverty alleviation: South Asia at a glance

The initial research revealed that South Asian trade is hampered by serious TF issues. Trade statistics indicate that the region returns the slowest deliveries of imports and export to their destinations, largely attributable to border transactions delays which increase trade costs. Complex regional trade procedures including administrative red tape and laborious documentation led to times to trade, far in excess of global averages. Inefficient customs

procedures and port handling, inefficient use of Information Communication Technology (ICT), poor border agency cooperation, and transit barriers are a few of the major TF issues facing South Asia. Such barriers to trade affect landlocked countries more adversely, with duplication of order transaction delays and additional red tape imposed by transit governments. These landlocked countries currently exhibit fragile economic growth and a rural population among the poorest in the region. There are substantial regional border disparities. Despite India's position as regional leader in terms of economic development, the national TF performance is relatively weak and demonstrates more trade delays than other members of the region. However, this analysis reveals that paying greater attention to TF will allow South Asian nations to participate more actively in global trade, stimulate economic growth and reduce the poverty lags that hinder the economies of the region.

7.2.2. Trade Facilitation – measurement difficulties in the Computable General Equilibrium (CGE) model

The literature review highlighted two basic approaches to the estimation of trade delay costs. The first estimates Ad Valorem Equivalents (AVEs) of trade delays and is based on the demand function derived from commodity and country-specific estimates of the willingness of consumers and producers to pay to avoid time delays. Thus, trade delay costs are reflected in related price changes. Developing this type of database is complex, costly, and time-consuming. The existing database is based on US trade and transportation data and the validity and accuracy of applying these AVEs to other nations and regions requires careful evaluation. The alternative approach estimates the parameters of specific TF components to fit the gravity model and incorporates these into the CGE model. This approach is important for analysing the specific aspects of trade delays and enables modellers to establish which TF components should be prioritised. The review highlighted the lack of research on the development of a standard AVEs time to trade database as a supplementary input to the main GTAP database that can accurately represents the delay costs in developing countries.

7.2.3. Economy-wide impacts of regional commitment to trade delay reductions and tariff removals in South Asia

The simulation results of the Global Trade Analysis Project (GTAP) model demonstrated a substantial improvement in both South Asian extra- and intra-regional trade volumes with the reduction of trade delays, leading to increased regional real Gross Domestic Product (GDP)

and the generation of additional employment in South Asia. The findings also highlighted that reductions in delays associated with inland transport would increase trade in landlocked regions, while reductions in delays in ports, terminal handling, and customs procedures would produce substantial trade gains in neighbouring regional nations. The study also compared the negative impacts of border transaction delays with those of import tariffs in South Asia and confirmed that timeliness in the arrivals of parts and components at production plants is essential for the efficiency of highly-segmented production chains. Overall, the study revealed that a facilitated trading system is the key to trade expansion.

7.2.4. Economic impacts of the WTO TFA on South Asian economies

Econometric estimates revealed that the TFA policy variables relating to Advance rulings and Formalities-procedures most strongly influenced the TFA outcomes. These two provisions cover a wide area of TF and the results of the scenario analysis pointed to their high level of influence, as was expected. The successful implementation of provisions in developing countries reduces import times dependent on the level of changes implemented as a result of domestic TFA measures; whereas developed countries where such measures were already in force prior to the TFA agreement, can further reduce export times based on the quality of trading partner implementations. The scenario analysis showed that the largest portion of gains is attributable to imports, derived from the increased border transaction efficiency achieved by the country's own implementation, with a lesser portion attributable to exports derived from greater border efficiency already achieved by trading partners prior to the Agreement. The scenario analysis also predicted that regional trade would more than double if South Asian countries were to fully implement the TFA. Real GDP and welfare will increase significantly in individual South Asian countries due to their own TFA implementation measures. The final consumption of Agricultural sector imports and intermediate inputs in the Manufacturing sector will contribute significantly to real GDP increases. However, the full implementation process is far from complete and hence, the full global benefits of the TFA have yet to be achieved.

7.2.5. The costs and challenges of implementing WTO TFA in South Asia

The GTAP model results confirmed the findings of the literature review that the expenses of introducing the Agreement measures do not affect the economy significantly in the case of the majority of countries. However, this does not hold for countries in the landlocked group and Sri Lanka, in which the economies are considerably impacted by the relatively high costs of the TFA implementation measures. According to the method employed in assessing the costs of TFA, the net benefits of the full implementation of the Agreement in these countries will be achieved at the expense of increased household expenditure and, thus, some degree of reduction in real GDP. Overall, the study confirms that the financial costs of the TFA implementation measures will not significantly hinder the attainment of the projected benefits of the Agreement for the other South Asian members. In terms of capacity building support, the study ascertained that the most difficult and expensive measures for South Asian countries are those comprising Article 7, concerning practices related to the clearance of goods at the borders, and Article 8 relating to external and internal border agency cooperation and coordination. The least costly and easily implemented measures are contained in Article 1 and mostly deal with the promulgation and publication of information, excluding the establishment of enquiry points. It was assessed that South Asian nations, in general, require additional technical and capacity building support to identify areas requiring improvement and to develop strategic plans for introducing, maintaining, and sustaining TF reforms.

7.3. Policy implications

This section briefly covers possible policy options for improving TF within the WTO TFA framework and within the South Asian agenda for regional trade negotiations, based on the overall empirical findings of the study. The WTO TFA focuses almost exclusively on transaction efficiencies at borders to increase global trade, whereas the responsibility for addressing non-border factors impacting negatively on international trade times, such as road and transport infrastructure development, lies with the regional trade negotiation bodies.

The study identified the need for monitoring the WTO TFA implementation progress and for TF Aid in the form of financial and technical support and capacity building programs to minimize the strain implementation challenges will exert on the relatively fragile South Asian national economies.

The quantitative estimates of this study highlight that developing country TF reforms offer proportionately larger economic gains than the negligible domestic reforms of trading partners among the developed nations. Therefore, South Asian countries should prioritize import time reduction policies at the earliest to increase import border transaction efficiency, particularly the facilitation of faster border transactions for Agricultural sector imports and intermediate inputs related-Manufacturing sector imports.

Econometric estimates showed that the TF reforms relating to advance rulings and formalities-procedures have a major impact on border transaction delay reductions and thus, initial TF development planning strategies should prioritize improvements in these two important areas. The area of advance rulings requires the drafting of policies related to prior statements by the administration, advising traders on the classificatory aspects of their goods, such as origin and valuation method, applied to specific goods at the time of importation, the rules and procedures applicable to such declarations and the formalities and procedures, including policies with respect to streamlining of border controls, single submission points for all required documentation (single window system), pre-arrival processing, release of goods prior to final determination and payment of customs duties, treatment of perishable goods, post-clearance audits, and authorised operators.

TF-related trade barriers affect landlocked countries more adversely due to the additional border transactions, which has created substantial regional disparities. According to the WTO, landlocked South Asian countries can only implement many of the measures on the receipt of capacity building support. Nepal has been identified as the nation most in need of support, in order to implement these measures at the same rate as fellow South Asian members. It may be necessary for the WTO to publish this and similar information to draw it to the attention of possible donors.

Afghanistan has been identified as the weakest performing regional member in terms of the enactment of TF, but with potential the most to gain from TFA. The study noted that the country has already been received donor support for TF-related development activities, however, on an ad hoc basis. Afghanistan has reported the receipt of support for 56% of implementation measures. However, the categories requiring further assistance remain unidentified to date. Similarly, Bangladesh needs to identify the areas that require assistance, in terms of financial and capacity building, which will enable the implementation of 27% of

the measures. It is thus crucial that these two nations determine their support needs, at the earliest.

Due to its smaller potential gains and higher costs, Sri Lanka will fall behind other South Asian members and be in a similar predicament to the landlocked countries unless financial support is received. Sri Lanka will implement 59% of measures with donor support and has already had determined the areas in need of assistance. However, the current level of donor support is insufficient and requires further attention. Pakistan has already determined the type of assistance required. Both of these countries are waiting for the assistance to improve the key areas of ICT, human resources and training, infrastructure and equipment, institutional procedures, awareness-raising, diagnostic and needs assessment, and legislative and regulatory frameworks.

The landlocked countries have the most to gain by reducing trade delays arising from inland transport. The trade barriers of this group of countries may be overcome mostly through improved roads and transport infrastructure which are not covered by the WTO TFA. Bhutan, one of the landlocked countries, is not yet a WTO member and, as such, is not entitled to implement TFA. India is Bhutan's largest trading partner and it has been argued that due to this market convergence, the potential benefits of the WTO TFA for Bhutan will be substantially less even if the country is granted WTO membership, as it is not open to global trade. The Maldives is a WTO member but has not yet ratified the TFA provisions. However, in terms of receiving the long-term benefits of improving international market diversification, Bhutan needs to consider WTO membership and the Maldives government should ratify the Agreement in the near future, in order to derive the potential benefits. The two nations may well be encouraged to acquire the maximum benefits of improving TF by initially being members of the South Asian regional trade negotiations. As highlighted in this study there are various Regional Trade Agreements (RTAs) that are currently in progress and cover most of the TF areas which have not been covered by the WTO TFA. These regional trade negotiating institutions do have the potential to deal with these issues since it has been identified that the regional integration agendas which focus on expanding regional trade cannot succeed without improving TF, the biggest barrier to trade in the region as a whole.

7.4. Limitations of the study and future research directions

7.4.1. Data considerations

This study confirmed the current lack of valid data from which to develop a standard AVEs of time costs database, as a supplementary input to the main GTAP updated database. The GTAP model estimates of this study were based on the AVEs of time to trade database in which per day AVEs time values estimates were based on US trade and transportation data. The application of generalized AVEs to developing regions, especially South Asia, require local adjustments in order to achieve validity and accuracy of outcomes. The database shows an inherent bias arising from the basic assumptions and specified characteristics of time costs employed. The development of this type of database is complex, costly, and time-consuming and a task for a dedicate project. Access to and collection of country-specific trade and transportation data relating to willingness to pay to reduce trade delays is limited and is fundamental to the development of this type of database, constructed with the purpose of accurately estimating the AVEs of time to trade in developing countries.

There was evidence of the unavailability of sufficient information relating to the TF implementation programs and their investment costs for individual South Asian nations, as well as regionally. Therefore, the costs-benefits analysis of TF implementation in South Asian nations in this study were based on the secondary information gathered previously from 24 other developing countries and the aggregate costs of such reforms were assigned for each South Asia member on the basis of similar investment capacities. This emphasizes the importance of developing a TF reform costs database, including actual TF implementation costs in individual countries, since the costs assessment is integral to determining the net benefits of TF reforms.

It is imperative that future TF-related research should prioritize the development and maintenance of an AVEs time costs database, together with TF reform costs data in developing countries, since this is crucial for assessing the accurate economic impacts of eliminating trade delays.

7.4.2. GTAP modelling

The GTAP model results of this study were derived under the iceberg approach, the most common method employed to model border efficiency, incorporating trade delay costs as iceberg losses. It is accepted that the iceberg approach overestimated the changes in GDP as improvements in border efficiency are incorporated into the model as technical efficiency improvements. The willingness to pay method was recently introduced as an alternative approach to assessing TFA impacts within the CGE framework. The willingness to pay concept describes the increased consumer utility arising from the faster delivery of imported goods by reducing losses due to delays, or eliminating waste and spoilage. It has been suggested that combining the willingness to pay and iceberg methods would produce the best estimates. However, this would produce a significant challenge to model, due to the lack of available data on the values of losses due to delays at transit, as well as the values in consumer utility changes. Primary survey-based data or data from more specific case studies need to be assembled, otherwise, broad assumptions must be included. Hence, it is acknowledged that the estimates of this paper are subject to the limitations that characterise the iceberg approach. Further, the study highlighted the importance of developing a standard mechanism to incorporate the costs of TF reform within the GTAP framework. Properly- defined, inclusive data representing TF reform costs would assist GTAP modellers to re-structure the existing GTAP model to project the net benefits of TF reform with greater accuracy. Future research on the overall impacts of TF on developing economies, based on an upgraded time and reform costs database, incorporated into a modified GTAP modelling structure that explains both iceberg effects and willingness to pay effects are recommended.

7.5. Key contributions of the study

Despite the limitations discussed in the previous section, this research develops an economic and empirical framework on which to estimate the impacts of TF in increasing the potential contribution of trade to economic development in South Asia. Each chapter of this thesis established new theoretical and empirical knowledge and adds important contributions to trade literature:

1. The study provided a detailed assessment of the TF impacts on trade, economic development, and socio-economic inequalities in South Asia, based on the most recent information and discussed the theoretical and empirical aspects of TF. This assessment

points to the priority research areas related to improving border transaction efficiency through the reduction of trade delays and to policy-makers in developing strategies to enhance trade through efficient border transaction measures.

2. The thesis also provides a detailed picture of the existing methodological approaches in estimating the costs of trade delays and the associated economy-wide impacts. This should encourage researchers to initiate development of a standard AVEs of time to trade database, as a supplementary input to the main GTAP database, which accurately represents the delay costs for developing countries.

3. This study qualifies as the first economy-wide assessment of the impacts of trade delays in the South Asian region, by presenting estimates of the economic impacts of delays at major border transaction activities in individual member countries that provide a platform for assessing the most effective country-specific TF policy options.

4. The critical and logical assessment of the impacts of WTO TFA on South Asian economies provides an original overview of the progress of the Agreement in the context of South Asia. The global economic impacts of the Agreement, based on realistic simulations, were critically analysed, making a new contribution to trade literature, which can assist policy-makers in planning the implementation of the provisions of the Agreement and WTO authorities in monitoring the implementation progress.

5. Most significantly, this study presents a novel method of incorporating TF reform costs into the GTAP model, in order to identify the investment needs and the net benefits of the Agreement. This certainly provides guidance for national governments deciding on their resource allocation for TF reforms, in relation to other development priorities, and for policy-makers in structuring and prioritizing the reforms to optimize the benefits of improving TF. Further, this encourages researchers to establish a more coherent analysis of the costs and benefits of the TF reforms based on a modified GTAP model incorporating more accurate costs of time delays and reform implementation.