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Working Paper

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ADBI Working Paper, No. 744

Provided in Cooperation with:
Asian Development Bank Institute (ADBI), Tokyo

Suggested Citation: Bal, Abhinayan Basu; Rajput, Trisha; Alizada, Parviz (2017) : International single window environment: Prospects and challenges, ADBI Working Paper, No. 744, Asian Development Bank Institute (ADBI), Tokyo

This Version is available at:
https://hdl.handle.net/10419/179200

ADBI Working Paper Series

INTERNATIONAL SINGLE WINDOW ENVIRONMENT: PROSPECTS AND CHALLENGES

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No. 744
June 2017

Asian Development Bank Institute

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Suggested citation:

Bal, A. B., T. Rajput, and P. Alizada. 2017. International Single Window Environment: Prospects and Challenges. ADBI Working Paper 744. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/international-single-window-environment-prospects-challenges

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Abstract

Efforts of various international institutions have supported implementation of national/regional single windows and the next logical step would be to internationalize and make them interoperable to allow for greater collaborative information sharing. The purpose of this paper is to review the legal framework necessary for implementing international single window environment (ISWE) and, in that context, examine particular economic and financial aspects of the current developments. The discussion shows that ISWE is desirable as it may contribute towards creating a level playing field for SMEs participating in global supply chains.

The paper discusses ASEAN Single Window to identify prospects and challenges, and highlight the legal and economic viability of interoperability. ASW is examined from transaction cost and information asymmetry theory perspectives to provide a methodology for conducting empirical analysis at country-level. Based on the findings the paper argues that full potential of ISWE can be realised through integration of transport and commercial requirements thereby improving G2G, B2G and B2B information flows. Nevertheless, such integration would require the ability to capture the complex relationships between various transport actors from legal and technical standpoints.

To illustrate this legal complexity from transport and e-commerce law angle, the disadvantageous position of SMEs vis-à-vis use of electronic bills of lading and access to supply chain finance is examined. A critical analysis of selected legal texts is made through the lens of recent developments such as distributed ledger and cloud technologies to suggest solutions for SMEs. The conclusion highlights that transport and commercial requirements in the ISWE has to be incorporated through laws made for e-commerce and not through a piecemeal approach that replicate the functions of paper documents in an electronic environment.

Keywords: single window, SME, ASEAN single window, transport single window, supply chain finance, electronic bill of lading, international single window environment

JEL Classification: F13, P45

Contents

1. INTRODUCTION

The various international and regional institutions that have been engaged in the work on issues related to trade in digital economy has to a certain extent directed their efforts following the mantra of "trade facilitation". Some of those efforts have supported the implementation of national and regional single windows across jurisdictions to fulfil import, export, and transit-related regulatory requirements. Interoperability and internationalization of national single windows is the next logical step, as it will allow collaborative information sharing for both public and private sector stakeholders in global supply chains. The purpose of this paper is to review the legal framework necessary for implementing an international single window environment (ISWE) and, in that context, examine particular economic and financial aspects of the current developments. The past and on-going efforts of some of the relevant international and regional institutions[1] are examined in contextual detail to provide a legal basis for integration of national single windows (NSW) through ISWE. The focus of the discussion is on the necessity for creating ISWE and how it may direct policymaking to respond to global challenges such as participation and financing of small and medium enterprises (SMEs) in international supply chains.

With the progressive ratification of the WTO's Trade Facilitation Agreement (TFA),[2] several WTO Member States are likely to move to the broader use of electronic transactions through use of information and communications technologies (ICT) to meet their multilateral treaty obligations. For example, the TFA suggests that member-states should implement NSW and recommend the use of ICT methods for trade. The paper considers the contribution of the TFA and suggests that once majority of the WTO Member States establish single windows, most of the necessary infrastructure for creating ISWE would be present. In this context the contribution of other international institutions such as, WCO, UN/CEFACT, UN/ESCAP, UNCITRAL, UNNExT, etc., to develop the supplementary legal framework is discussed.

Since 2005, the Association of Southeast Asian Nations (ASEAN) has been working to develop both the technical and legal frameworks for a regional Single Window referred to as the ASEAN Single Window (ASW). This paper discusses the ASW initiative to identify prospects and challenges that may be relevant for creating ISWE. During the past several months ASW has supported electronic exchange of customs declaration and certificate of origin between five Member States on a pilot basis. ASW is utilised to highlight the discussions on legal and economic viability of interoperability. The initiative is examined from transaction cost and information asymmetry theory perspectives to provide a methodology for conducting empirical analysis at country-level. The analysis allows to draw conclusions about aggregate impact of ASW's early implementation on trade among ASEAN Member States.[3]

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[1] The efforts of institutions considered are the United Nations Economic Commission for Europe (UNECE), United Nations Economic and Social Commission for Asia and the Pacific (UN/ESCAP), United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), United Nations Network of Experts for Paperless Trade and Transport Facilitation in Asia and the Pacific (UNNExT), United Nations Commission on International Trade Law (UNCITRAL), World Customs Organization (WCO) and World Trade Organization (WTO).

[2] WTO. 2013. Trade Facilitation Agreement (WT/MIN(13)/36 or WT/L/911) https://www.wto.org/english/thewto_e/minist_e/mc9_e/desci36_e.htm (accessed 14 April 2017) The Agreement entered into force on 22 February 2017 after obtaining two-thirds acceptance from WTO's 164 members.

[3] It is to be noted that the ASW is conducting live operations on a pilot basis. Therefore, the interpretation of the empirical findings should not be related to the fully operating single window. The period analyzed

Building upon the findings from the ASW experience the paper emphasises that full potential of ISWE can be realised through integration of Government-to-Government (G2G), Business-to-Government (B2G) and Business-to-Business (B2B) information. Such integration of information into an interoperable environment will allow flow of real-time data that can offer numerous possibilities to enhance the visibility of international supply chains. It is argued that single window integration at international level should include transport and related commercial requirements in order to improve information flows among all supply chain actors.

The inclusion of the transport stakeholders into the single window system would require complex coordination that can capture the existing relationships between carrier interests, shipper interests, ports, transport authorities, insurance providers, etc., from legal and technical perspectives. Emergence of new technology has opened up the possibilities for creating technical solutions for such complex arrangements. Nevertheless, lack of enabling national laws on transport and e-commerce in most jurisdictions may pose as a challenge.

To illustrate the legal complexity from transport law and e-commerce law perspectives the existing situation with electronic bills of lading is briefly examined. The bill of lading, in addition to being the transport document issued by the carrier to the shipper, serves essential trade functions for the consignor, consignee and banks. The paper explores ways through which the legal concept of a bill of lading can be dematerialised. In this context, the selected provisions of the Rotterdam Rules and the Model Law on Electronic Transferable Records is examined through the lens of recent developments brought through automation in trade and evolving technologies such as distributed ledger and cloud computing.

The paper discusses the necessity for ISWE to channelize the dematerialised information of a bill of lading to fulfil the trade functions in an electronic business environment. In this context the emergence of trade financing techniques such as bank payment obligation (BPO) and supply chain finance (SCF) are discussed to highlight that an ISWE is desirable for creating a level playing field for SMEs participating in global supply chains.

2. TRADE FACILITATION

Over the last several years, numerous multilateral and regional institutions have been engaged in law-making initiatives related to e-commerce, paperless trade, electronic single window, and cross-border e-transaction and commercial law matters. Most of these initiatives feature under the broad heading of trade facilitation.

Trade facilitation initiatives are commonly considered to create standards and guidelines for the exchange of goods and services across borders.[4] Commercial aspects of trade have also been considered within the ambit of trade facilitation by certain institutions.

in this study is significantly short. Therefore, this effect should be interpreted as short-run effect of ASW on exports.

[4] See the definitions of trade facilitation as used by institutions such as WTO, UN/CEFACT and WCO.

WTO defines trade facilitation as:

> the simplification and harmonization of international trade procedures, where trade procedures are the activities, practices and formalities involved in collecting, presenting, communicating and processing data and other information required for the movement of goods in international trade.[5]

UN/CEFACT defines trade facilitation as:

> the simplification, standardization, and harmonization of procedures and associated information flows required to move goods from seller to buyer and to make payments.[6]

OECD defines trade facilitation as:

> the simplification and standardization of procedures and associated information flows required to move goods internationally from seller to buyer and to pass payments in the other direction.[7]

The above-mentioned definitions are particularly interesting because they emphasise on the flow of information connected with the physical movement of goods.[8] This flow of information, which can be enhanced through digitalization of trade processes, help businesses and governmental agencies to manage risks and reduce transaction costs. There exist a positive correlation between digitalization and economic growth.[9] An important practical tool for coordinating trade processes[10] and procedures at the border to ensure smooth flow of information is an electronic single window facility.

Single window is defined by the WCO as:

> An intelligent facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfil all import, export and transit related regulatory requirements.[11]

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[5] WTO, *A Training Package: What is Trade Facilitation?* www.gfptt.org/sites/default/files/refread/Training-guide-final.pdf (accessed 14 April 2017).

[6] UNECE, *Trade Facilitation Implementation Guide.* http://tfig.unece.org/details.html (accessed 14 April 2017).

[7] OECD. 2005.*The Costs and benefits of Trade Facilitation.* http://www.oecd.org/trade/facilitation/35459690.pdf (accessed 14 April 2017).

[8] A typical international supply chain features the physical movement of goods, the financial aspects of the transaction, and the flow of information within the various actors in the supply chain. The three layers exist as parallel processes with limited interaction between them. However, the use of ICT may enhance interaction between the three layers. Basu Bal, A., Rajput, T. 2015. *Creating Sustainable Global Supply Chains Through Single Window and Paperless Trade Initiatives: Efforts of WTO and UNCITRAL in Perspective* presented at UNCITRAL Emergence Conference, Macau, 30 November.

[9] For more discussion on the issue Doing Business-*Trading Across Barriers: Technology Gains in Trade Facilitation*. http://www.doingbusiness.org/reports/case-studies/2016/tab (accessed 14 April 2017).

[10] The concept of Single window is supported by several the border management models. Aniszewski, S. 2009. *Co-ordinated Border Management - A Concept Paper*. WCO Research Paper No. 2. Also see Doyle, T. 2011. Collaborative Border Management. *World Custom Journal* 4(1): 15-21. G. Mc Linden, E. Fanta, Widdowson, D., and Doyle, T. 2011. Border Management Modernization Handbook. http://issuu.com/world.bank.publications/docs/9780821385968. (accessed 14 April 2017) Arvis, J-F., Mustra, M. A., Ojala L., Shepherd, B., Saslavsky, D. 2010. *Connecting to Compete: Trade Logistics in the Global Economy*. http://siteresources.worldbank.org/INTLAC/Resources/ConnectingtoCompete.pdf (accessed 14 April 2017).

[11] WCO, Single Window Information Store http://www.wcoomd.org/en/topics/facilitation/activities-and-programmes/single-window/single-window.aspx (accessed 14 April 2017).

UN/CEFACT identifies the three basic models for Single Windows[12] that are:

- a single authority receiving information and disseminating this information to all relevant governmental authorities, as well as co-ordinating controls to prevent undue hindrance in the logistical chain;
- a single automated system for the collection and dissemination of information, thereby integrating the electronic collection, use, and dissemination (and storage) of data related to trade crossing the border;
- an automated information transaction system through which a trader can submit electronic trade declaration to the various authorities for processing and approval in a single application.

The benefits of single window system are well established.[13] *Doing Business* data reveals that less time was spent on customs clearance in countries that utilise electronic systems for the submission and processing export and import customs declarations.[14] Many of the upper middle-income countries use single windows and in several other countries the implementation process is underway. Some examples of national single window systems are International Trade Data System (ITDS) of the US, UNI-PASS Customs system and KTNET national trade single window of the Republic of Korea, TradeXchange of Singapore and PortNet of Finland.

3. TFA CAN CONTRIBUTE TOWARDS CREATING ISWE

One interesting aspect that emerges from evaluating the single window reform across countries is that implementation is fragmented than desired.[15] Such fragmentation created the need for a comprehensive trade facilitation reform which would consolidate and multilateralize the commitments of States to create efficient trading processes and procedures at the borders.[16] The Trade Facilitation Agreement (TFA),[17] which is the result of the Bali Ministerial Conference in December 2013,[18] is a step in that direction. Once the TFA is fully implemented, it will result in an environment where WTO Member

[12] UN/CEFACT. 2005. *Recommendation and Guidelines on Establishing a Single Window, Recommendation*, No. 33. http://www.unece.org/fileadmin/DAM/cefact/recommendations/rec33/rec33_trd352e.pdf (accessed 14 April 2017).

[13] Tsen, J.K.T. 2011. *Ten Years of Single Window Implementation: Lessons Learned for Future*. https://www.unece.org/fileadmin/DAM/trade/Trade_Facilitation_Forum/BkgrdDocs/TenYearsSingleWindow.pdf (accessed 14 April 2017). For more discussion, see Lawrence, R.Z., Hanouz, M. D., and Doherty, S. 2012. *The Global Enabling Trade Report 2012 Reducing Supply Chain Barriers: The Enabling Trade Index 2012.* http://www.news1.co.il/uploadFiles/252620875835419.pdf (accessed 14 April 2017); Carballo,. J., Graziano, A., Schaur, G., Martincus, C. V. 2016. *The border labyrinth: information technologies and trade in the presence of multiple agencies.* IDB Working Paper Series; 706. Research has shown that single window systems have positive impact on increasing the number of exporting firms and on improving international trade flows. Implementation of streamlined procedures to process export permits through the single window in Costa Rica resulted in an increase in the number of exporters by 22.4%.

[14] World Bank, Doing Business. 2017. *Equal Opportunity for All*. Washington, DC: World Bank. DOI: 10.1596/978-1-4648-0948-4.

[15] Choi, J. Y. 2011. *A Survey of Single Window Implementation*. WCO Research Paper No. 17.

[16] OECD. 2013. *Interconnected Economies: Benefiting from Global Value Chains* http://www.oecd.org/sti/ind/interconnected-economies-GVCs-synthesis.pdf (accessed 14 April 2017)

[17] WTO. *Agreement On Trade Facilitation* WT/L/931, 15 July 2014. https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm (accessed 14 April 2017).

[18] WTO. 2013. Bali Ministerial Declaration and Decisions. http://wto.org/english/thewto_e/minist_e/mc9_e/balipackage_e.htm (accessed 14 April 2017).

States would have an operational Single Window. Article 10 of the TFA mandates that all Members of the WTO shall endeavour to establish and maintain a single window enabling traders to submit documentation for export, import and transit of goods through a single entry point. It is important to mention that the implementation of a single window system develops on the GATT 1994 Article VIII concerning Fees and Formalities connected with the importation and exportation, where paragraph 1(c) recognizes "the need for minimizing the incidence and complexity of import and export formalities and for decreasing and simplifying import and export documentation requirement". The single window system under the TFA has to be implemented by the Members of the WTO thereby allowing traders to lodge information with a single body for the purposes of all import or export related regulatory requirements. This system seeks to ensure that all procedures, data and requirements related to the trade transaction is handled and overseen by one agency which takes the responsibility of combined controls. In addition to making the procedural requirements for the traders simple and standardized, this system facilitates information flows enhancing efficiency.

It is submitted that the implementation of TFA by 164 Members will establish single windows (to facilitate import, export and transit-related regulatory functions) across jurisdictions that will establish the infrastructure for the ISWE. The concept of the ISWE simply stated refers to an environment which is characterized by interoperability [19] between various national single windows. The interoperable environment reflects the position where national single windows communicate with each other to exchange relevant information. In practice the discussion on ISWE must begin with the deliberation on different technological and organizational models for making interoperability possible. After surveying existing literature it is revealed that two models are proposed for the design of interoperability, namely centralised server model [20] and gateway model. [21] More recently, cloud computing has also been suggested as a way forward to build a supranational single window. [22] The technological framework that is selected for the creation of the ISWE framework may entail distinct legal and political deliberations. If a centralised server model is adopted for ISWE then a central server may be used to host a gateway which will facilitate the trade data exchange. This model seems simple from a practical perspective but it poses problematic political questions. One such question is which Member State will host and be responsible for the maintenance of the central server? The main concern relates to flow of trade-related data between exporting country and importing country transmitted via a third country where the central server is installed. The legal questions pertaining to such a model is connected with data retention, accessibility, archiving etc. The other option is for the Member States' national single windows to be connected to each other through a common gateway application.

[19] The term "interoperability" is defined as the ability of two or more systems or components to exchange and use information across borders without additional effort on the part of the trader. UN/CEFACT. 2015. *Recommendation and Guidelines on Single Window Interoperability: Supporting Cross Border Interoperability of Trade Regulatory Single Window System*: *Draft Recommendation No. 36*; Keretho, S., Pikart, M., 2013. *Trends for collaboration in international trade: Building a Common Single Window Environment* ECE/TRADE/41. https://www.unece.org/fileadmin/DAM/trade/Publications/ECE-TRADE-411.pdf (accessed 14 April 2017) where interoperability is defined as the ability of diverse systems and organizations to work together.

[20] Centralized Gateway Model" whereby the Gateway is installed in a single Central Server for the common use of all participating countries.

[21] "Distributed Gateway Model" whereby the Gateway is installed separately in the national network perimeter of each participating country.

[22] Pugliatti, L. 2011. Cloud Single Window: Legal Implications of a New Model of Cross-Border Single Window. *World Customs Journal* 5(2):3.

One crucial factor which is central to the concept of interoperability is that the national single windows which will ultimately participate to create the ISWE should actually be able to communicate or exchange the relevant information. Simply stated the single windows must be interoperable. For this purpose, it is important that the relevant international standards be used as guidelines for the implementation of single windows across jurisdictions. The TFA provides to this effect. Article 10.3 of the TFA provides that Members are encouraged to use relevant international standards or parts thereof as a basis for their import, export, or transit formalities and procedures, except as otherwise provided for in this Agreement. It is important to note that there are several important international instruments that have been developed by various international institutions with respect to developing or upgrading single windows. There are three important UN/CEFACT recommendations which is specific to single windows. They are as follows:

- UN/CEFACT Recommendation 33 defines the concept of single windows and recommends the government to establish single windows.[23]
- UN/CEFACT Recommendation 34 focuses on the issues connected to the implementation of single windows.
- UN/CEFACT Recommendation 35 focuses on legal aspects of single window facilities.

Single windows need to be supported by a legal framework to formalise and induce trust in the emanating transactions in addition to technological or organizational infrastructure.[24] Many of the legal issues pertaining to the establishment and operation of single windows can be addressed through contracts and memoranda of understandings between relevant participants but others can be addressed through recourse to international standards. There are several standards that are relevant in context of single windows which have been developed by intergovernmental agencies and international organizations such as UNCEFACT,[25] UNNExT[26] and WCO[27].

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[23] UN/CEFACT. 2005. Recommendation and Guidelines on Establishing a Single Window to Enhance the Efficient Exchange of Information between Trade and Government, Recommendation No. 33, (ECE/TRADE/352, July 2005). https://www.unece.org/fileadmin/DAM/cefact/recommendations/rec33/rec33_trd352e.pdf (accessed 14 April 2017).

[24] UN/CEFACT. 2013. *Establishing a legal framework for international trade Single Window (Recommendation No.35)*. http://www.unece.org/fileadmin/DAM/trade/Publications/ECE-TRADE-401E_Rec35.pdf (accessed 14 April 2017).

[25] UN/CEFACT. 2013. *Data Simplification and Standardization for International Trade (Recommendation No.34).* http://www.unece.org/fileadmin/DAM/trade/Publications/ECE-TRADE-400E_Rec34.pdf; (accessed 14 April 2017); UN/CEFACT. 2014. *Revision of Recommendation 14: Authentication of Trade Documents*. http://www.unece.org/fileadmin/DAM/cefact/recommendations/rec14/ECE_TRADE_C_CEFACT_2014_6E_Rec 14.pdf (accessed 14 April 2017).

[26] UNNExT. 2012. *Single Window Planning and Implementation Guide.* http://unnext.unescap.org/tools/implement-guide.pdf (accessed 14 April 2017) recommends single window implementation framework SWIF and identifies ten smaller and easier manageable components critical to single window development. The ten components include: identification and management of stakeholder requirements; single window vision articulation; establishment of stakeholder collaboration platform; business process analysis and simplification; data harmonization and document simplification; design of service functions and application architecture; establishment of standards and interoperability; introduction of legal infrastructure; enforcement of business and governance models; execution of IT infrastructure and solutions; UNNExT, UNESCAP/UNECE. 2012. *Electronic Single Window Legal Issues: A Capacity Building Guide*. http://unnext.unescap.org/pub/tipub2636.pdf (accessed 14 April 2017); UNNExT 2012. *Business Process Analysis Guide to Simplify Trade Procedures* http://unnext.unescap.org/pub/tipub2558new.asp (accessed 14 April 2017); UNNExT. 2012. *Data Harmonising and Modelling Guide for Single Window Environment.* http://unnext.unescap.org/pub/tipub2619.pdf (accessed 14 April 2017); UNNExT. 2012. *Guide for the design of Aligned Forms for Paperless Trade.*

It is important that countries seek recourse to international standards so that the single window architecture is interoperable globally. Important legal issues considered by UNCITRAL related to electronic commerce such as authentication, and the legal status of electronic documents are hugely relevant in context of single window operation. It should be noted that UNCITRAL basic e-commerce laws such as the UN Electronic Communications Convention; UNCITRAL Model Law on Electronic Commerce (MLEC); UNCITRAL Model Law on Electronic Signatures (MLES) provides legal framework for the operation of single window facilities. The new Model Law on Electronic Transferable Records is also relevant because the processes connected with single window transactions are electronic but still based on paper.[28]

For ISWE to work, member countries that participate in creation of the environment must agree on a common standard or mutually recognise the standards in the areas of information exchange, signatures, authentication, privacy, archiving etc. The question that arises is - how can countries achieve this practically? Participating countries may seek recourse to instruments that have been developed by various international institutions such as UNCITRAL,[29] UNESCAP[30] and OECD[31]. The only associated complication is when international standards, model laws and toolkits are implemented in different ways by countries. This in itself can pose a challenge for supporting cross-border transactions. Consider the issue of e-signatures. Although, the importance of concepts of "functional equivalence" and "technological neutrality" has been emphasised in the UNCITRAL Model Law,[32] but countries have adopted different approaches in implementing them in context of e-signatures. Some countries adopt a regulatory approach to e-signatures[33] while the others take a more flexible view.[34] Individually these approaches are fine but in the ISWE context both approaches need

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http://www.unece.org/fileadmin/DAM/trade/Publications/ece_372_ManualForDesignAlignedTradeForms.pdf . (accessed 14 April 2017)

[27] WCO. 2011. *How to Build SW Environment.* http://www.wcoomd.org/en/topics/facilitation/activities-and-programmes/single-window/single-windowguidelines.aspx#{228E2A1B-6B48-4D59-9FF4-1451CBCF62EC}; WCO. 2009. *Data Model (version 3.0)* http://wcoomdpublications.org/data-model-3.html?id=836&___store=english&___from_store=french (accessed 14 April 2017).

[28] UNCITRAL. 2017. *Draft Model Law on Electronic Transferable Records with explanatory notes*, A/CN.9/920, https://daccess-ods.un.org/TMP/1856461.76338196.html (accessed 14 April 2017).

[29] UNCITRAL. 2005. *UN Convention on the Use of Electronic Communications in International Contracts* http://www.uncitral.org/uncitral/en/uncitral_texts/electronic_commerce/2005Convention.html (accessed 14 April 2017); UNCITRAL.1996. *Model Law on Electronic Commerce* http://www.uncitral.org/uncitral/uncitral_texts/electronic_commerce/1996Model.html; UNCITRAL.2001. *Model Law on Electronic Signatures*. //www.uncitral.org/uncitral/uncitral_texts/electronic_commerce/2001Model_signatures.html; UNCITRAL. 2009. *Promoting Confidence in Electronic Commerce: Legal Issues on International Use of Electronic Authentication and Signature Methods* http://www.uncitral.org/pdf/english/texts/electcom/08-55698_Ebook.pdf (accessed 14 April 2017).

[30] UNESCAP. 2016. *Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific*, 2016E/ESCAP/RES/72/4. http://www.un.org/ga/search/view_doc.asp?symbol=E/ESCAP/RES/72/4&Lang=E (accessed 14 April 2017).

[31] OECD. 2007. Recommendation on Electronic Authentication and OECD Guidance for Electronic Authentication. https://www.oecd.org/sti/ieconomy/38921342.pdf. (accessed 14 April 2017).

[32] See note **Error! Bookmark not defined.** above.

[33] Few countries have prescriptive e-signature laws such as Brazil, India, Israel and Malaysia.

[34] A minimalist approach is adopted by the US. The two-tier approach that is a hybrid of minimalist and prescriptive approaches is adopted by European countries, the People's Republic of China and the Republic of Korea. For more discussion, refer to ADOBE. *A Global Overview of Electronic Signatures* https://acrobat.adobe.com/content/dam/doc-cloud/en/pdfs/adobe-global-overview-of-electronic-signatures.pdf; Spyrelli, C. 2002. Electronic Signatures: A Transatlantic Bridge? An EU and US Legal Approach Towards Electronic Authentication. *Journal of Information Law and Technology* (2*)* https://www2.warwick.ac.uk/fac/soc/law/elj/jilt/2002_2/spyrelli/ (accessed 14 April 2017).

to interoperate. Implementing a common standard for identification, authentication and authorization procedures for transactions seem to be most efficient.

Once the interoperable environment is set up it will allow for collaborative information sharing for both public and private sector stakeholders in global supply chains. More importantly it has the potential to meet the requirements of entire international supply chain as opposed to the piecemeal benefit presented by single point data submission at the national level. This will also reduce the volume of trade-related paperwork required of traders by making them shared electronically. Sharing of trade related documents prior to arrival of goods through the ISWE environment would minimise time and costs associated with cargo clearance.

To build the ISWE that complements the highly interconnected international trading scenario, the border agencies need to work together to encompass the entire supply chain where the goods can be assessed for admissibility and clearance prior to their arrival at the physical border. Measures of co-ordination and co-operation range from policy to documentary and physical control amongst domestic and international border agencies. However, the co-operation and co-ordination between international border agencies is based on a political mandate and can manifest through international agreements and ratification of relevant conventions. In this context the proposed TFA's role can be instrumental in achieving the desired result, as it will lead to political commitment from WTO Members because of its multilateral nature. Article 12 of the TFA is a building block in that direction because it emphasises the importance of customs cooperation. It has to be recognized that the cooperation is not easy to achieve as each Member State may have its own requirements and set of rules that need to be harmonized internally as the first step and then build a relationship based on trust with other Member States. Article 12 of the TFA can be helpful from a futuristic perspective when considering the ISWE because it would establish the process and procedures for the purposes of exchange and interaction between border agencies of different jurisdictions.

4. ASW – A CASE STUDY FOR INTEROPERABILITY

ASW creates an interoperable environment which connects and integrates National Single Windows (NSW) of ASEAN Member countries at the regional level.[35] The legal foundation of the ASW can be found in the Agreement to Establish and Implement the ASEAN Single Window,[36] Protocol to Establish and Implement the ASEAN Single Window[37] (Implementation Protocol) and Protocol on the Legal Framework to Implement the ASEAN Single Window[38] (Legal Framework Protocol). Currently the ASW supports the exchange of intra-ASEAN Customs Declaration Document (ACDD) and Certificate of Origin (ATIGA Form D) on a pilot basis among seven Member States and will be include exchange of other type of data in the future.[39] Singapore, Malaysia,

[35] Several ASEAN countries such as Singapore, Malaysia, Indonesia, Thailand, Viet Nam and Philippines have already developed and implemented the NSW system. Brunei, Lao People's Democratic Republic, Cambodia and Myanmar have not implemented Single Windows.

[36] Signed on 9 December 2005. http://asean.org/?static_post=agreement-to-establish-and-implement-the-asean-single-window-kuala-lumpur-9-december-2005-2 (accessed 14 April 2017).

[37] Signed on 20 December 2006. http://asean.org/wp-content/uploads/images/archive/23084.pdf (accessed 14 April 2017).

[38] Signed on 9 September 2015. http://agreement.asean.org/media/download/20150915020056.pdf (accessed 14 April 2017).

[39] ASEAN Website: http://asw.asean.org/ (accessed 14 April 2017).

Indonesia, Thailand, Viet Nam have already tested ATIGA Form D using the ASW architecture.[40]

Article 1 of the Implementation Protocol defines the ASW as an environment where NSW of the Member States operate and integrate. Further, the purpose of the ASW can be deciphered from Article 5 which defines the ASW. The Article provides that the ASW is a regional facility to "enable a seamless, standardized and harmonized routing and communication of trade and customs-related information and data for customs-clearance and release from and to NSW".[41] It is estimated that the ASW will reduce the cost of trading by 8%.[42]

The ASW architecture is based on the distributed gateway model where the NSW of the ASEAN Member States are connected to the ASW Gateway Application through a secure ASW network. This ASW Gateway Application is regionally developed and installed by each Member State. In addition, the centralized regional services support the interaction of the MSWs. It is a facility which administrates and maintains standard formats, codes and other basic information of ASW.

The ensuing empirical analysis is made to provide a methodology for assessing the benefits of ASW at country-level. The analysis also allows to draw conclusions about aggregate impact of ASW's early implementation on trade among Member States.

4.1 Empirical Analysis

4.1.1 Data Description

The data for empirical analysis have been collected from various sources. The export data have been obtained from UN Commodity Trade database. Since, the main purpose of empirical analysis is to examine export trends around ASEAN SW implementation phase; the data has been extracted for the period January 2012 to last available country-month observation. Export data capture exports from Malaysia and Singapore to selected countries. Malaysian data expand from January 2012 to May 2016 and Singaporean data expand from January 2012 to March 2016. The exports data vary across month, partner country, and HS 2-digit commodity classes.

ASW has been implemented in Indonesia, Malaysia, Singapore, Thailand and Viet Nam since 30 December 2015.[43] Moreover, ASW website reports that the implementation is in Phase 3 from that date and it covers live operations.[44] For this study it is important to obtain trade data for longer period as possible after the implementation of ASW has been in force. Only data for Malaysia and Singapore are available on the UN Commodity Trade database for longer period. Therefore, the empirical analysis is carried out by exploiting monthly commodity export data of these two countries.

[40] ASEAN Website: http://asw.asean.org/about-asw (accessed 14 April 2017).

[41] Article 5, Protocol on the Legal Framework to Implement the ASEAN Single Window.

[42] It is indicated that a large portion of saving is attributed to the reduction in documentation dispatch. UNNExT, *Towards an Enabling Environment for Paperless Trade-ASEAN Single Widow: A Regional Single Window for ASEAN* Connectivity, Brief No. 13, May 2015. http://www.unescap.org/resources/unnext-brief-no-13-asean-single-window-regional-single-window-asean-connectivity (accessed 14 April 2017).

[43] See ASEAN Single Window Overview. ASW Briefing for PH Exporters. Manila, Philippines 2015.

[44] What is the ASEAN Single Window? http://asw.asean.org (accessed 14 April 2017).

Information on PPI, GDP growth, average lending rate, population, exchange rate, inflation and oil prices has been obtained from Thomson Reuters Datastream. GDP growth and population information are reported on yearly basis. Therefore, monthly data for these variables have been estimated by assuming uniform change between periods. For example, if population is 100 in the first year and 112 in the second, average monthly population change is estimated as follows: (112-100)/12=1, and average monthly population will be 101, 102, … 111.

Table 1: Summary Statistics

Panel A. Whole Sample									
	Whole Sample			Year 2016			2012-2015		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Exports (US$)	422853	4742788	44600000	37902	3824004	35800000	384951	4833251	45300000
ln(Exports)	422850	11.4082	2.9472	37902	11.3726	2.8750	384948	11.4117	2.9542
PPI_exporter	422853	–0.4441	1.6573	37902	–0.4377	1.3951	384951	–0.4447	1.6809
Average lending rate	422853	6.0493	0.6778	37902	6.2682	0.7309	384951	6.0277	0.6685
GDP Growth	422853	0.0031	0.0086	37902	–0.0014	0.0090	384951	0.0036	0.0085
Population estimate	422853	17300000	13200000	37902	20700000	13400000	384951	17000000	13200000
ln(Population)	422853	16.2151	1.0311	37902	16.4525	1.0141	384951	16.1918	1.0298
Distance to Frontier	422853	84.1223	5.1272	37902	80.6351	3.0805	384951	84.4657	5.1602
Brent	422853	87.4366	29.6367	37902	36.1148	6.8398	384951	92.4898	25.9873
WTI	422853	78.7833	25.0279	37902	37.6065	6.0649	384951	82.8375	22.3846
Exchange rate	422853	2.3890	1.1148	37902	3.0472	1.3195	384951	2.3242	1.0709
Inflation (exporter)	422853	0.1376	0.3970	37902	–0.0566	0.3036	384951	0.1567	0.3999
Panel B. Malaysia									
	Malaysia			Year 2016			2012–2015		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Exports (US$)	215591	4169960	35200000	23200	3131299	25300000	192391	4295210	36200000
ln(Exports)	215588	11.8932	2.5043	23200	11.6991	2.5042	192388	11.9166	2.5033
PPI_exporter	215591	–0.2538	1.0637	23200	–0.2729	0.6768	192391	–0.2515	1.1012
Average lending rate	215591	6.7081	0.1239	23200	6.8500	0.0000	192391	6.6910	0.1203
GDP Growth	215591	0.0038	0.0115	23200	–0.0014	0.0114	192391	0.0044	0.0113
Population estimate	215591	30300000	705702.8	23200	31300000	62330.4	192391	30200000	643047.2
ln(Population)	215591	17.2260	0.0233	23200	17.2598	0.0020	192391	17.2219	0.0213
Distance to Frontier	215591	79.4910	1.0014	23200	78.1829	0.0000	192391	79.6487	0.9447
Brent	215591	86.5324	29.8793	23200	38.1060	7.3313	192391	92.3720	26.0202
WTI	215591	77.9982	25.1356	23200	39.1897	6.3220	192391	82.6780	22.3528
Exchange rate	215591	3.4413	0.4177	23200	4.0939	0.1393	192391	3.3626	0.3682
Inflation (exporter)	215591	0.1803	0.3552	23200	–0.0351	0.3769	192391	0.2063	0.3434
Panel C. Singapore									
	Singapore			Year 2016			2012–2015		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Exports (US$)	207262	5338636	52600000	14702	4917104	47800000	192560	5370820	52900000
ln(Exports)	207262	10.9037	3.2709	14702	10.857	3.314	192560	10.907	3.268
PPI_exporter	207262	–0.6421	2.0856	14702	–0.698	2.046	192560	–0.638	2.089
Average lending rate	207262	5.3639	0.0150	14702	5.350	0.000	192560	5.365	0.015
GDP Growth	207262	0.0024	0.0038	14702	–0.001	0.000	192560	0.003	0.004
Population estimate	207262	3850465	34573.06	14702	3907890	2112.463	192560	3846080	31862.43
ln(Population)	207262	15.1637	0.0090	14702	15.1785	0.0005	192560	15.1625	0.0083
Distance to Frontier	207262	88.9398	2.6590	14702	84.5047	0.0000	192560	89.2784	2.4482
Brent	207262	88.3773	29.3528	14702	32.9726	4.4346	192560	92.6074	25.9539
WTI	207262	79.5999	24.8892	14702	35.1083	4.6437	192560	82.9969	22.4153
Exchange rate	207262	1.2943	0.0612	14702	1.3956	0.0272	192560	1.2866	0.0559
Inflation (exporter)	207262	0.0932	0.4318	14702	–0.0905	0.1076	192560	0.1072	0.4439

The tables and graphs are to be found in the annex. Table 1 reports the summary statistics of the dependent variable and independent variables. As it can be observed from the table, there are 422853 exporter-month-destination-commodity observations. The observations are approximately evenly distributed among reporting countries, i.e. Malaysia and Singapore. The independent variables mainly proxy for supply side effects of exports. Producers Price Index (PPI) captures the impact of wholesale prices on exports. Higher PPI means higher volumes of production and therefore higher probability for exports. However, PPI might affect exports negatively too because higher domestic prices would stimulate exporters to sell goods within a country rather than exporting them. Several studies have shown effect of external borrowing conditions on firm outputs and exports.[45] Average lending rate is assumed to capture the effect of the price of bank lending. Ideally, Treasury-Bill rates or Interbank lending rates will be better proxies for credit market conditions. However, not all of the exporting countries in the sample report these rates. Therefore, average lending rate, which is calculated as the average of retail and industry loans' rate, has been used to approximate credit market conditions.

GDP growth is the measure of aggregate output of a country. The higher the output the higher is the probability of goods to be exported. Population variable is the proxy for employed people. WTI and Brent are both oil prices and capture the price effect on exports. Distance to frontier is a comparable measure of Doing Business index. Higher value of Distance to frontier means improved Doing Business opportunities. This data is obtained from the World Bank Doing Business reports. This variable does not vary across months but only across years. Exchange rate and inflation are different measures of macroeconomic factors.

Table 2: Correlation Matrix

	Exports (US$)	ln(Exports)	PPI_exporter	Average Lending Rate	GDP Growth	Population Estimate
Exports (US$)	1					
ln(Exports)	0.2610	1				
PPI_exporter	0.0035	0.0246	1			
Average lending rate	–0.0134	0.1652	0.1071	1		
GDP Growth	0.0007	0.0162	–0.0710	0.072	1	
Population estimate	–0.0134	0.1671	0.1155	0.9948	0.0766	1
ln(Population)	–0.0133	0.1674	0.1155	0.9929	0.0773	0.9998
Distance to Frontier	0.0159	–0.1475	–0.1008	–0.9162	–0.0165	–0.9223
Brent	0.0144	0.0209	0.2323	–0.1074	0.1822	–0.0558
WTI	0.0133	0.0187	0.2321	–0.1061	0.2033	–0.0545
Exchange rate	–0.0147	0.1563	0.1061	0.9815	0.0391	0.9708
Inflation reporter	0.0065	0.0302	0.2767	0.1112	0.2023	0.1096

continued on next page

[45] See for example, Chor, D. and Kalina, M. 2012. Off The Cliff and Back? Credit Conditions and International Trade During the Global Financial Crisis. *Journal of International Economics* 87(1): 117–133; Beck, T., 2003. Financial Dependence and International Trade. *Review of International Economics* 11(2): 296–316; Kletzer, K., and Bardhan, P. 1987. Credit Markets and Patterns of International Trade. *Journal of Development Economics* 27(1-2): 57–70.

Table 2 *continued*

	ln(Population)	Distance to Frontier	Brent	WTI	Exchange Rate	Inflation (Exporter)
Exports (US$)						
ln(Exports)						
PPI_exporter						
Average lending rate						
GDP Growth						
Population estimate						
ln(Population)	1					
Distance to Frontier	–0.9233	1				
Brent	–0.0448	0.3107	1			
WTI	–0.0445	0.3223	0.9811	1		
Exchange rate	0.9665	–0.9196	–0.2341	–0.2294	1	
Inflation reporter	0.1083	–0.0330	0.2185	0.2000	0.0840	1

Table 2 reports cross-correlations across variables. As it can be observed, average lending rate variable is highly correlated with many of independent variables. This might cause a multicollinearity problem; therefore average lending rate is not included in the models with other highly correlating variables. Exchange rate variable also shows similar pattern and is not included in empirical analyses. Correlations among other variables are significantly low.

4.1.2 Identification Strategy and Empirical Method

According to the ASW website the main objectives of the ASW is to provide fast and transparent business opportunities among participating countries. [46] Moreover, by allowing to process information electronically, ASW is expected to reduce administrative costs related to documentation. Consequently, in the long-run the impact of ASW on trade among participating countries is anticipated to be positive. At the moment ASW allows to process certificates of origin and customs declaration electronically. As mentioned before, the processing of documents through ASW has started since 30 December 2015.[47] Therefore, it is expected to have the effect of ASW on exports of the participating countries from this date on. Since the data that is exploited in this study is a monthly data,[48] January 2016 is the "cut-point" for the difference-in-difference analysis. Period after January 2016 is the treatment period and exports from Malaysia to Singapore and from Singapore to Malaysia are treatment group in the sample. Export to other countries is the control group for baseline model. For robustness tests the following treatment and control groups are also analyzed: All ASEAN countries vs. other countries and Malaysia and Singapore vs. other ASEAN countries.

It is important to accurately identify what events have happened during the implementation of ASW and what is meant by "live operations" on ASW reports and webpage. The information on these issues is limited; therefore assumptions made in this paper regarding the implementation of ASW might be not very precise. This paper offers pilot analysis of export trends in ASEAN. The interpretation of the empirical

[46] http://asw.asean.org/about-asw (accessed 14 April 2017).

[47] ASW has been implemented in Indonesia, Malaysia, Singapore, Thailand and Viet Nam from this date.

[48] Reporting date is the last day of each month.

findings should not be related to fully operating single window. Rather, they should be mainly related to early live operations mentioned by ASW webpage.[49]

Baseline empirical model is as follows:

$$Y_{etic} = \beta_0 + \beta_1 Treat_{eic} + \beta_2 Period_{tic} + \beta_3 Treat_{eic} \times Period_{tic} + \gamma X_{et}$$
$$+\alpha_{ci} + \alpha_{si} + \alpha_{is} + u_{etic} \quad (1)$$

Y_{etic} is natural logarithm of exports which varies across exporter-month-importer-commodity and *X* is the matrix of control variables that are presented in Table 1. The interaction term $Treat_{eic} \times Period_{tic}$ captures the impact of ASW on participating countries[50]. β_3 measures the effect of this impact on exports. $\alpha_{ci}, \alpha_{si}, \alpha_{is}$ are destination country-year, industry-year, and destination country-industry fixed effects respectively.

Table 3: Summary Statistics of Treatment and Control Groups Before and After Treatment

Before Treatment	Treatment Group			Control Group		
Variables	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Exports (US$)	8078	33400000	158000000	376,873	4220483	39400000
ln(Exports)	8078	14.5488	2.5637	376,870	11.3445	2.9255
PPI_exporter	8078	–0.4345	1.6807	376,873	–0.4450	1.6809
Average lending rate	8078	6.0375	0.6677	376,873	6.0275	0.6685
GDP Growth	8078	0.0035	0.0086	376,873	0.0036	0.0085
Population estimate	8078	17200000	13200000	376,873	17000000	13200000
ln(Population)	8078	16.2080	1.0295	376873	16.1914	1.0298
Distance to Frontier	8078	84.3863	5.1584	376,873	84.4674	5.1602
Brent	8078	92.6612	25.9641	376,873	92.4861	25.9878
WTI	8078	82.9218	22.3375	376,873	82.8357	22.3857
Exchange rate	8078	2.3385	1.0689	376,873	2.3238	1.0709
Inflation (exporter)	8078	0.1572	0.3995	376,873	0.1567	0.4000
After Treatment	**Treatment Group**			**Control Group**		
Variables	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Exports (US$)	746	25300000	107000000	37156	3392361	32700000
ln(Exports)	746	14.4350	2.6408	37156	11.3111	2.8459
PPI_exporter	746	–0.4555	1.3904	37156	–0.4374	1.3952
Average lending rate	746	6.2749	0.7298	37156	6.2680	0.7309
GDP Growth	746	–0.0015	0.0090	37156	–0.0014	0.0090
Population estimate	746	20800000	13300000	37156	20700000	13400000
ln(Population)	746	16.4618	1.0126	37156	16.4523	1.0142
Distance to Frontier	746	80.6066	3.0758	37156	80.6357	3.0806
Brent	746	36.0174	6.8455	37156	36.1167	6.8398
WTI	746	37.4940	6.0710	37156	37.6088	6.0649
Exchange rate	746	3.0608	1.3180	37156	3.0470	1.3195
Inflation (exporter)	746	–0.0563	0.3026	37156	–0.0566	0.3036

[49] Exchange of the intra-ASEAN certificate of origin (ATIGA Form D) and ASEAN Customs Declaration Document (ACDD)

[50] Malaysia and Singapore in our sample.

Table 3 reports the summary statistics of treatment and control groups before and after the implementation of ASW. The observations after the treatment (ASW) constitute approximately 8% of the sample. Only 2% of all observations are in treatment group. The magnitudes of the variables do not vary substantially for before and after treatment periods. Table 4 reports statistical tests of the differences of ln(Exports) before ASW in treatment and control groups. From Panel A it can be observed that exports to the treatment group have been higher both before and after the implementation of ASW. However, the export gap between these groups has declined after the implementation of ASW; thus suggesting that exports have been diverted to control group countries after the treatment occurred. The difference between these groups should not be understood in absolute terms, rather higher exports to the treatment group means qualitative difference between treatment and control groups. Both, Malaysia and Singapore, are major trading partners for each other. Therefore, qualitatively, these two countries trade with each other more than compared to other countries. Additionally, Panel B suggests that both, exports to treatment and exports to control groups of countries have declined after the treatment. However, the decline is not statistically significant for the treatment group.

Table 4: Comparative Statistics of ln(Exports)

				Panel A				
	Before		(i)	(ii)	After		(i)	(ii)
	Treatment	Control	Difference	t-stat (p-value)	Treatment	Control	Difference	t-stat (p-value)
Mean	14.5488	11.3445	–3.2043	–97.6456	14.4350	11.3445	–3.1239	–29.7246
St.Dev	2.5637	2.9255		(0.0000)	0.0967	0.01476		(0.0000)
				Panel B				
	Before	After	(i)	(ii)	Before	After	(i)	(ii)
	Treatment	Treatment	Difference	t-statistic (p-value)	Control	Control	Difference	t-statistic (p-value)
Mean	14.5488	14.4350	0.1138	1.1571	11.3445	11.3111	0.0334	2.1018
St.Dev	2.5637	2.6408		(0.2473)	2.9255	2.8459		(0.0356)

4.1.3 Exports During Sample Period

Figure 1 and Figure 2 illustrate export trends from Malaysia and Singapore during the sample period. As it can be observed from Figure 1 exports have been falling between January 2012 and mid-2016 in both countries. Singapore exports show significantly higher fall from US$40 billion in 2012 to US$ 27 billion in 2016. Moreover, there is a severe fall in Singaporean exports between October 2012 and April 2013. Exports from Malaysia have been steady through the sample period and show moderate fall. There has been 16% decrease in Malaysian exports compared to the January 2012 figures (fall from US$ 17.5 billion to US$ 15 billion).

Figure 2 illustrates both countries' exports to each other and to the rest of the world. Malaysian exports to Singapore have been stable over the observed period. However, Singaporean exports show significant fall, both to Malaysia and to the rest of the world. Dashed line shows the time when ASW implementation has started. Trends of the exports of Malaysia and Singapore after this period do not show obvious patterns of improvement, neither to each other nor to the rest of the world.

Figure 1: Aggregate Exports from Malaysia and Singapore

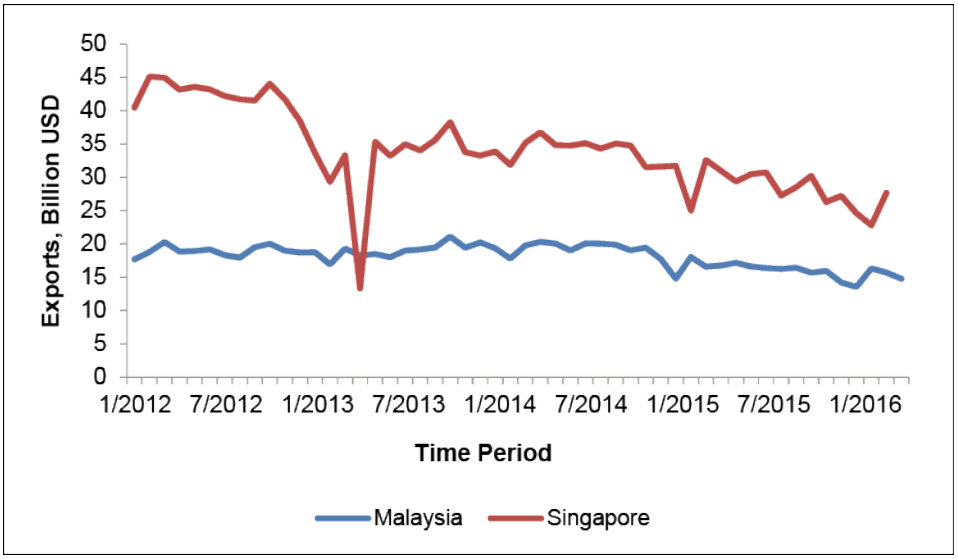
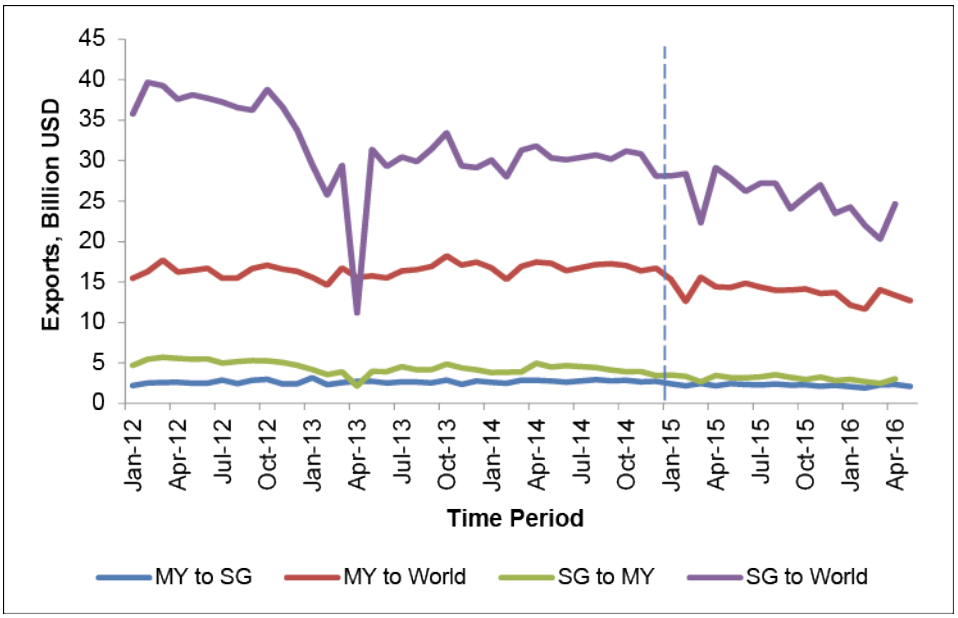


Figure 2: Comparative Graph of Exports to the Treatment and Control Groups



4.1.4 Results

4.1.4.1 Main Findings

Table 5 reports the results of baseline model. Column (1) is the baseline model without control variables, column (2) includes control variables but average lending rate, and column (3) includes average lending rate and excludes other variables which are highly correlated with it. All estimations include destination country-year, industry-year, and destination country-industry[51] fixed effects. Treat is the variable which takes the value 1 when destination country is Malaysia or Singapore and 0 otherwise. This variable

[51] Industry is the sector in exporter's country. The sectors are identified according to HS 2 digit commodity classifications

captures the impact of restricted ASEAN sample. The coefficients of Treat suggest that on average exports to restricted ASEAN countries[52] are 2.6-3% higher compared to other countries. Jan2016 variable captures the ceteris-paribus effect of ASW on exports generally. The coefficients suggest that the implication of ASW did not affect all exports in our restricted ASEAN sample, i.e. it is statistically equal to zero. The third variable, Treat*Period, captures the effect of ASW on the trade between participating countries (this is the main variable of interest). In contrast to what was anticipated from the implication of ASW, the results suggest that exports between Malaysia and Singapore have fallen after the ASW has been in force. However, one should take into account that the period analyzed in this study is significantly short. Therefore, this effect should be interpreted as a short-run effect of ASW on exports. As it was argued in the previous section, the negative effect should not be interpreted as ASW direct effect on exports. Since it is not clear what operations have been carried out during the implementation of ASW after December 2015, the results do not imply an aggregate negative effect of ASW.

Table 5: Main Results

Dependent Variable: ln(Exports)	(1)	(2)	(3)
Treat (MY SG)	3.0143***	2.6598***	2.6735***
	(0.2659)	(0.2482)	(0.2482)
Period	0.2378	0.3329	0.3008
	(0.3112)	(0.2991)	(0.2987)
Treat*Period (Jan2016)	–0.6921**	–0.5865*	–0.5609*
	(0.3502)	(0.3384)	(0.3383)
GDP Growth		0.6782*	0.3529
		(0.3936)	(0.3940)
PPI_exporter		–0.0098***	–0.0123***
		(0.0028)	(0.0028)
ln(Population)		0.4611***	
		(0.0168)	
Inflation reporter		0.0026	–0.0049
		(0.0098)	(0.0097)
Distance to Frontier		0.0180***	
		(0.0036)	
WTI		0.0021***	0.0034***
		(0.0004)	(0.0004)
Average lending rate			0.5825***
			(0.0057)
Constant	11.8555***	2.6624***	8.0341***
	(0.2536)	(0.6219)	(0.2416)
Observations	422,850	422,850	422,850
R-squared	0.395	0.411	0.411

Destination Country-Year, Industry-Year, Destination Country-Industry fixed effects are included.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

[52] Malaysia and Singapore.

This result can be explained from different perspectives. Firstly, ASW might affect exports negatively because exporters might want to postpone their operations to make use of ASW opportunities. Thus, in order take the advantage of trading through Single Window exporters might delay sales in the end of 2015 and the beginning of 2016. This might affect exports between Malaysia and Singapore in the short-run. Secondly, it is possible that the processing through SW is not as fast as it was expected. Moreover, not all exporters might be able to fully utilize the SW application because they are not well prepared (or trained). Finally, the uncertainty about how the SW application would work might also affect the negative impact of its implication. Thus, uninformed exporters might be willing to wait and observe how new application works.

One should notice that the negative impact of ASW is valid only for short period. Therefore, one should interpret these results as short-run effect of ASW. Moreover, there might be another common economic factor driving the results, which might have happened at the same time with ASW. Further improvement of this study should be done through exploiting more data for longer time frame. Additionally, main identifying assumptions shall be improved as more information about the implementation of ASW is obtained.

The analysis of control variables shows that, GDP growth, population, Distance to Frontier and oil prices are positively associated with exports. GDP growth proxies aggregate output or exportable goods and population is a proxy for workforce. These two are important factors of production and therefore factors of exports. Distance to Frontier is a proxy for technology within a country. The better is the index, the more is the probability that new businesses will emerge within a country. Moreover, new ideas and new technologies can be developed. WTI variable shows that the oil price has a positive effect on the exports of both countries. PPI index, which is the price of goods, is negatively associated with exports. The negative effect might be due to better prices offered for goods in the domestic markets. Thus, producers might abstain from exporting and selling within a country when the prices for their goods increase in the country. Average lending rate is positively associated with exports. This implies that as borrowing from banks for consumers become expensive the demand for goods fall within a country. Therefore, producers seek for foreign buyers to sell their goods. All these control variables proxy for demand effect of exports.

Export trends around ASW. In order to further analyze the variation in exports across groups before and after the treatment, the effect of time trends have been examined. For this purpose, exports are estimated with time trend variable which is a continuous variable taking values from 1 to n for the year-month periods from January 2012 until May 2016. This is referred to as a general trend variable and is reported under the columns 2012M1–2016M5 in Table 6. The second trend variable (reported under 2016M1–2016M5 in Table 6) starts from the implementation of ASW and ends in May 2016. The difference of the coefficients of the trend variables shows the impact of ASW on exports.

The results from Table 6 confirm (statistically) the decrease of exports during the sample period; which can also be observed from Figures 1 and 2. General trend variable is negatively correlated with exports and all of the coefficients are highly statistically significant. In column 2 ASW trend variable is positively associated with exports suggesting a positive impact of ASW on the exports. However, when other factors of exports are controlled, ASW trend variable becomes negative and highly statistically significant in column 6. Difference of the coefficients from column 5 and 6 is statistically significant suggesting ASW trend is different from general trend. Thus, decrease of exports of the treatment group has been affected by the introduction of ASW.

Table 6: Comparison of Export Trends across ASW Implication Phase

Dependent Variable: ln(Exports)	(1)	(2)	(3)	(4)	(5)	(6)
Trend Variable:	**2012M1–2016M5**	**2016M1–2016M5**	**2012M1–2016M5**	**2016M1–2016M5**	**2012M1–2016M5**	**2016M1–2016M5**
Trend	–0.0043***	0.1109***	–0.0050***	–0.2167	–0.0048***	–0.1572***
	(0.0003)	(0.0085)	(0.0004)	(0.1561)	(0.0004)	(0.0362)
GDP Growth			0.8447**	8.5192**	0.3309	9.6775***
			(0.4140)	(3.8316)	(0.4120)	(2.5841)
PPI (exporter)			–0.0091***	0.0462*	–0.0150***	0.0369***
			(0.0027)	(0.0244)	(0.0026)	(0.0113)
ln(Population)			0.4681***	45.0256		
			(0.0148)	(109.4967)		
Inflation reporter			0.0136	0.1305**	0.0060	0.1411***
			(0.0102)	(0.0574)	(0.0101)	(0.0546)
Distance to Frontier			0.0186***	14.6859		
			(0.0031)	(36.0193)		
WTI			–0.0009***	0.0190**	0.0015***	0.0179***
			(0.0003)	(0.0075)	(0.0003)	(0.0065)
Average lending rate					0.5942***	0.5440***
					(0.0060)	(0.0225)
Constant	11.8990***	12.4347***	2.8065***	–1,912.3591	8.1799***	9.0920***
	(0.2361)	(0.8976)	(0.5208)	(4,704.5446)	(0.2198)	(0.8515)
Observations	384,948	37,902	384,948	37,902	384,948	37,902
R-squared	0.393	0.428	0.408	0.441	0.408	0.441
z-stat (General Trend – ASW Trend)	–13.5445		1.3562		4.2097	
p values of z stats	0.0000		0.1751		0.0000	

Destination Country-Industry fixed effects are included.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

4.1.4.2 Robustness Tests

Table 7 reports the results of estimations of the baseline model with different cut-off points. The main objective is to test whether the period that is assumed to be the starting date of the implication of ASW is valid. Main variable of interest as in the baseline model is Treat*Period. None of the coefficients are statistically significant. This implies that no major events have happened in a short period before and after the ASW implementation. In other words January 2016 is not a random cut-off point but is a valid date for the beginning of ASW implementation.

Table 7: Test of the Validity of the Period

Dependent Variable: ln(Exports)	Sep 2015	Oct 2015	Nov 2015	Dec 2015	Feb 2016	Mar 2016
Treat (MY SG)	2.6619***	2.6618***	2.6612***	2.6599***	2.6597***	2.6591***
	(0.2482)	(0.2482)	(0.2482)	(0.2482)	(0.2482)	(0.2483)
Period	–0.0659***	–0.0718***	–0.0806***	–0.0322	0.0048	0.0644***
	(0.0165)	(0.0179)	(0.0210)	(0.0281)	(0.0280)	(0.0245)
Treat*Period	–0.0134	0.0097	–0.0163	–0.0229	–0.0977	–0.0249
	(0.1049)	(0.1141)	(0.1359)	(0.1882)	(0.1885)	(0.1687)
GDP Growth	0.7643*	0.6491*	0.5126	0.5851	0.6715*	0.4105
	(0.3945)	(0.3936)	(0.3956)	(0.4010)	(0.4000)	(0.4086)
PPI_exporter	–0.0084***	–0.0094***	–0.0106***	–0.0102***	–0.0099***	–0.0108***
	(0.0029)	(0.0028)	(0.0028)	(0.0028)	(0.0029)	(0.0028)
ln(Population)	0.4617***	0.4613***	0.4613***	0.4615***	0.4609***	0.4563***
	(0.0168)	(0.0168)	(0.0168)	(0.0168)	(0.0168)	(0.0169)
Inflation reporter	0.0014	0.0047	0.0073	0.0031	0.0026	0.0037
	(0.0098)	(0.0098)	(0.0099)	(0.0098)	(0.0098)	(0.0098)
Distance to Frontier	0.0182***	0.0180***	0.0180***	0.0180***	0.0179***	0.0170***
	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)
WTI	0.0016***	0.0016***	0.0018***	0.0020***	0.0021***	0.0020***
	(0.0005)	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0004)
Constant	2.6823***	2.6905***	2.6815***	2.6539***	2.6679***	2.8289***
	(0.6219)	(0.6219)	(0.6219)	(0.6219)	(0.6225)	(0.6249)
Observations	422,850	422,850	422,850	422,850	422,850	422,850
R-squared	0.411	0.411	0.411	0.411	0.411	0.411

Destination Country-Year, Industry-Year, Destination Country-Industry fixed effects are included.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Table 8 reports the results of baseline model for different treatment and control groups. In columns (1) to (3), treatment group is all ASEAN countries and control group is countries other than ASEAN. Thus, in these estimations it is assumed that as if ASW has been implemented in all ASEAN countries from January 2016. In columns (4) to (6), treatment group is Malaysia and Singapore and control group is other ASEAN countries. The results from the columns (1) to (3) suggest that, on average, Malaysia and Singapore export to ASEAN countries more than they export to other countries. Columns (4) to (6) suggest that Malaysia and Singapore export to each other more than they export to other ASEAN countries. Treat*Period variable suggests that ASW has no impact on all ASEAN countries. Thus, in our restricted sample it has impact only on those countries where it has been implemented from January 2016. The coefficients from column (4) to (6) confirm the findings of baseline model. Thus, ASW pilot implementation has relatively decreased exports between Malaysia and Singapore.

Table 8: Additional Robustness Tests

Dependent Variable: ln(Exports)	Treatment: ASEAN vs Others			Treatment: Malaysia and Singapore vs Other ASEAN		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	2.4809***	2.8676***	2.8530***	3.6390***	3.5316***	3.5258***
	(0.2668)	(0.2491)	(0.2491)	(0.1104)	(0.1109)	(0.1107)
Period (Jan 2016)	0.2378		0.3008	0.2256*	0.2929*	0.2583*
	(0.3112)		(0.2987)	(0.1339)	(0.1513)	(0.1489)
Treated*Period	0.5644	0.5189	0.5175	–0.2940*	–0.3052*	–0.2949*
	(0.3894)	(0.3768)	(0.3768)	(0.1658)	(0.1666)	(0.1659)
GDP Growth		0.6782*	0.3529		1.8122*	1.7234
		(0.3936)	(0.3940)		(1.0684)	(1.0693)
PPI_exporter		–0.0098***	–0.0123***		–0.0056	–0.0063
		(0.0028)	(0.0028)		(0.0072)	(0.0072)
ln(Population)		0.4611***			0.1531***	
		(0.0168)			(0.0455)	
Inflation reporter		0.0026	–0.0049		0.0091	0.0095
		(0.0098)	(0.0097)		(0.0257)	(0.0255)
Distance to Frontier		0.0180***			0.0126	
		(0.0036)			(0.0098)	
WTI		0.0021***	0.0034***		0.0009	0.0012
		(0.0004)	(0.0004)		(0.0012)	(0.0012)
Average lending rate			0.5825***			0.1505***
			(0.0057)			(0.0154)
Constant	11.8555***	2.6624***	8.0341***	11.2772***	7.6579***	10.2692***
	(0.2536)	(0.6219)	(0.2416)	(0.0800)	(1.5649)	(0.1715)
Observations	422,850	422,850	422,850	61,868	61,868	61,868
R-squared	0.395	0.411	0.411	0.363	0.364	0.364

Destination Country-Year, Industry-Year, Destination Country-Industry fixed effects are included.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

4.2 Further Legal Challenges

As mentioned above, the quantifiable benefits of the ISWE environment, particularly in the context of the ASW empirical analysis made in this paper still remains to be seen as and when more data is available. However, the expected benefits of the ASW will be for both governments and business. For example, the pre-arrival information received will enable expedited movement of goods that would benefit traders. It will also allow the border authorities to apply risk management procedures more efficiently. Most importantly, ASW has the potential to harmonise and streamline national procedures that will be beneficial for businesses.

Currently, there are several challenges for a fuller implementation of ASW both from participation and functional perspectives. The first challenge is that ASEAN Member States are at different levels of economic development. Some of the Member States do not have a single window yet which can be integrated into the ASW environment. Implementing a single window at the national level is a matter of resources, expertise and national priority and political will.

The second challenge is that the ASEAN Member States have their own customs regimes and laws governing issues relevant for their respective NSW. This can pose a challenge for interoperability and legal certainty. The notion of legal certainty has been in demand since centuries with respect to the commercial transactions. The quest for induction of the *ubi commercium, ibi ius* has been the propelling force towards emergence of commercial customs and emergence of institutions for the settlement of commercial disputes.[53] In other words, the Latin adage reflects the insight that the efficiency of markets and trade depend on legal certainty. In the context of the ASW, the notion of legal certainty is related to the ability of the businesses to predict and ascertain the meaning and effect of the legal framework. The hope is that a predictable rule oriented framework of the ASW will reduce risk associated with cross-border trade processes for businesses. In the same context, the success of the ASW will depend on how legal regimes of ASEAN Member States interoperate, especially to support cross-border transactions. In addition, some other legal issues crucial for providing the legal framework such as functional equivalence of paper and electronic documents, mutual recognition of digital signatures, etc. still need to be addressed.

For the future of ASW some interesting suggestions have been put forward. The first and foremost concerns the enlargement of scope of regional transactions for cross-border exchange of data within ASEAN and also between ASEAN and its dialogue partners. Other suggestions made in the same report are implementing the ASEAN Customs Transit System for the exchange of data in a single transit declaration directed to facilitate free movement of goods within the region; and launching a central trade repository for trade related information that can be accessed by traders. [54]

An important aspect that merits consideration with respect to the ASW is the identification of key stakeholders. The identification is important because it will help in developing a business model for that can support the architecture's operation and maintenance. UN/CEFACT Recommendation and Guidelines on Single Window Interoperability No. 36 also highlights the importance of identification of stakeholders.[55] The draft Recommendation indicates that it is crucial to identify what stakeholders require from interoperability for the assessment of feasibility. In such a case stakeholders' needs become the key drivers of the system. Identification of the role and benefits of stakeholders of the ASW is crucial for its success. Once the stakeholders and their needs are identified, a suitable business process[56] can be built for the operation and maintenance of the ASW.

[53] Petersmann, E.U.2006. Justice as Conflict Resolution: Proliferation, Fragmentation, and Decentralization of Dispute Settlement in International Trade. *University of Pennsylvania Journal of International Economic Law* 27(2) 273.

[54] UNNExT.2015. Towards an Enabling Environment for Paperless Trade-ASEAN Single Widow: A Regional Single Window for ASEAN Connectivity Brief No. 13.

[55] UN/CEFACT.2015. *Draft Recommendation and Guidelines on Single Window* (Recommendation No.36), http://www1.unece.org/cefact/platform/download/attachments/48562914/150424+Rec36+Internal+Review+v1_1.pdf (accessed 14 April 2017)

[56] UN/CEFACT Rec. 36 defines business processes "as the way participants intend to play their respective roles, establish business relations and share responsibilities to interact efficiently with the support of their respective information systems".

5. INTEGRATION OF COMMERCIAL REQUIREMENTS IN ISWE

The discussion on stakeholders brings us to the consideration about the scope of ISWE. The question that arises is: whether the ISWE environment should focus primarily on trade regulatory issues? This question is of tremendous important because the arguable merit of implementing an ISWE is for creating an information channel which would address the entire supply chain. However, the ISWE which is primarily driven by has trade regulatory processes and data would entail the flow of G2G, B2G data which is not inclusive of the entire supply chain operations. It is submitted that the full potential of ISWE can be realized through integration of G2G, B2G and B2B information which is possible through the interoperability between single windows that include transport and commercial requirements. It is further submitted that the commercial aspects of international trade when enmeshed with transport requirements in the single windows at the country level will form the building block for an ISWE which will encompass G2G, B2G and B2B interactions. The single windows thus proposed should function as an interface between trade, customs and transport stakeholders by developing extensive inter-linkages to share information. Such integration will allow flow of real-time data that can offer numerous possibilities to enhance the visibility of international supply chains. The inclusion of the commercial and transport requirements in the ISWE will entail the participation of transport stakeholders such as carriers, shippers, ports, transport authorities, insurance providers, etc. The participation of such stakeholders is necessary to make the integration of G2G, B2G and B2B information possible.

Regulatory aspects of transport requirements have already been included in certain national single window systems to fulfil reporting and/or customs requirements. For example, the EU Maritime Single Window initiative simplifies and harmonizes the administrative procedures applied to maritime transport by making electronic transmission of information standard and also rationalizes ship-reporting formalities.[57] It is noteworthy that the commercial and financial aspects of international trade which are enmeshed with transport are not captured through the existing transport oriented single window initiatives. The question arises how can commercial and financial aspects of international trade connected with transport be included alongside the regulatory transport requirements in the ISWE. In the above context it is submitted that the emergence of federated cloud computing and distributed ledger technology has opened up the possibilities for creating technical solutions for the complex arrangements of stakeholders in the transport industry. However, the enabling legal framework that is required to implement such technologies for single windows still remains fragmented and incomplete across jurisdictions. For this purpose, the remainder of the paper will focus on evaluating selected issues relevant to the issue of integration of transport and commercial issue in the single window environment such as dematerialization of trade documents. It is one of the important elements connected to the implementation of ISWE.

[57] The Reporting Formalities Directive 2010/65/EU requires all EU Member States to establish National Single Windows (NSW) to enable ships to report formalities when arriving in and/or departing from EU ports.

The exclusion of the commercial aspects in existing transport single windows is understandable as addition of various transport stakeholders into the single window system would require complex coordination that can capture the prevalent relationships between carrier interests, shipper interests, ports, transport authorities, insurance providers, etc., from legal and technical perspectives. Although emergence of new technology has opened up the possibilities for creating technical solutions for such complex arrangements, the lack of enabling national laws on transport and e-commerce in most jurisdictions pose a challenge.

5.1 Electronic Bill of Lading

To illustrate the legal complexity from transport law and e-commerce law perspectives, the situation to develop electronic bills of lading is briefly examined. A bill of lading performs three functions, namely, it serves as evidence of the contract of carriage, acts as receipt for the goods, and is a document of title. The first two functions are easily replicated electronically as they essentially relate to transfer of information. The challenge lies in replicating the document of title function. Bills of lading embodied with the title function have served various essential practical purposes in the commercial world for several centuries. Traditionally, bills of lading acquired their powers to transfer rights represented in them through mercantile usage. This usage transcended national barriers. The use of such documents achieved the same result in different jurisdictions across the world, which was necessary if cross-border trade was to proceed smoothly. The advent of a bill of lading responded precisely to the requirements of the business community, and became a tool that the domestic laws of various countries eventually came to recognise to achieve the effects that the *lex mercatoria* attributed to it.[58]

5.1.1 Title Function

The title function denotes three uses of a bill of lading. First, possession of the document constitutes constructive possession and control over the goods. Second, the document may be used to transfer title to the goods. Third, the document is used to provide security in the goods to financial institutions involved in providing credit to international sale transactions.[59]

The above discussion clarifies that the bill of lading, in addition to being the transport document issued by the carrier to the shipper, serves essential trade functions for the consignor, consignee and banks. Therefore, the questions that arise are - How can the legal concept of a bill of lading be dematerialised? How can the dematerialised information be channelized to fulfil the trade functions in an electronic business environment?

5.1.2 BPO and SCF

The banking industry has made attempts to answer the above two questions for a while and developed contractual mechanisms to create electronic bill of lading platforms that also offer trade finance services to international traders.[60] One such service is called

[58] For a detailed discussion see Basu Bal, A. 2014. Electronic Transport Records: An Opportunity for the Maritime and the Logistics Industries. Journal of Transportation Law, Logistics and Policy, Volume: 81, Issue 1, p. 26.

[59] *Ibid.* p. 27.

[60] For example, Bolero started in the 1990's with support from the maritime and banking industries to provide electronic bill of lading service. It has now grown into a cloud-based platform which optimizes complex international trade chains by providing a multi-bank solution for trade finance processes. See http://www.bolero.net/ (accessed 14 April 2017)

bank payment obligation (BPO)[61], which aim to support international traders of all sizes with payment assurance along with working capital management and supply chain finance (SCF)[62]. However, BPO has mostly benefitted rated multinational corporations and not SMEs.[63] It can be gleaned from the above illustration that a pure contractual approach to form a club may be less complicated when implementing evolving technology but may result in a non-inclusive environment.[64] Therefore, a governing legal framework for electronic bill of lading is necessary and in its absence SMEs are denied a level playing field in global supply chains.

5.1.3 Rotterdam Rules

International institutions have made attempts to create a governing legal framework for use of electronic bills of lading in international trade. In 2008, the United Nations General Assembly adopted the "United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea,"[65] otherwise referred to as the "Rotterdam Rules." One of the objectives of the Rotterdam Rules is to facilitate e-commerce by establishing a legal framework for electronic bills of lading.[66] The provisions on electronic transport records in chapters 3 and 8 of the Rotterdam Rules are specifically designed to fill the gap in the area of carriage of goods in relation to e-commerce. The Rules also contain three separate chapters dealing with delivery of the goods, the rights of a controlling party, and the transfer of rights,[67] which may also

[61] The BPO is a standardized interbank instrument, which is based on electronic information. Unlike a letter of credit, which requires that physical trade documents are manually examined, the BPO requires access to electronic trade data. This data is controlled, verified and matched over time in a highly automated process as new electronic trade data are submitted about progress of the underlying trade transaction. For a brief discussion on BPO see Senechai T., and Casterman, A., *Bank Payment Obligation*, International Chamber of Commerce http://icc.tobb.org.tr/docs/Bank%20Payment %20Obligation.pdf (accessed 14 April 2017)

[62] SCF is defined as the inter-company optimisation of financing as well as the integration of financing processes with customers, suppliers, and service providers in order to increase the value of all participating companies". See Pfohl, H-C and Gomm, M. 2009. Supply Chain Finance: Optimizing Financial Flows in Supply Chains. *Logistics Research* 1(3): 149–161. This definition allows for a broad perspective in terms of the various actors that can benefit from different SCF solutions and highlights the need for coordination and integration throughout the entire supply chain.

[63] See Wynne, G. L. and Fearn H. 2014.The Bank Payment Obligation: Will It Replace The Traditional Letter Of Credit – Now, Or Ever?. *Butterworths Journal of International Banking and Financial Law* 102–104.

[64] For a detailed discussion on this issue see Basu Bal, A., and Lindblom, T. 2015. Transport Intermediaries: New Node in the Network of Evolving International Trade Finance, conference proceedings - Europeisk Integration i Svensk Ekonomisk Forskning, Mölle.

[65] United Nations Publication, Sales No. E.09.V.9, http://www.uncitral.org/pdf/english/texts/transport/ rotterdam_rules/09-85608_Ebook (accessed 14 April 2017). The creation of the Rotterdam Rules was initiated by the Comité Maritime International (CMI) and was subsequently passed on to the UNCITRAL Working Group III (Transport Law). The principal goal underlying the development of the Rules is the creation of a modern and uniform law concerning the international carriage of goods by sea, in order to reduce transaction costs, increase predictability and stability, and engender greater commercial confidence in international maritime commerce. The Rotterdam Rules have so far received 25 signatures and 3 ratifications, by a mix of developing and developed countries, including strong seafaring and trading nations, as well as traditional carrier and shipper nations. See "Status of the Rotterdam Rules" http://www.uncitral.org/uncitral/en/uncitral_texts/transport_goods/ rotterdam_status.html (accessed 14 April 2017). Pursuant to article 94, the Convention requires ratification or accession by at least 20 states to enter into force.

[66] The Rotterdam Rules uses the term "negotiable transport documents" to refer to bills of lading and the term "non-negotiable transport documents" to refer to sea waybills. The Rules uses the term "electronic transport records" to refer to the electronic equivalent of bills of lading.

[67] Chapters 9, 10 and 11 of the Rotterdam Rules.

serve as a way to solve the problem of how to provide for negotiable electronic transport records.[68]

5.1.4 Model Law on Electronic Transferable Records

In order to benefit the promotion of electronic communications in international trade, UNCITRAL Working Group IV on Electronic Commerce in November 2016 finalized the Model Law on Electronic Transferable Records.[69] This Model Law aims to facilitate dematerialization of all paper-based transferable documents or instruments that allow to claim the payment of a sum or the delivery of goods.[70] One of the difficult issues that this Model Law will resolve relate to the requirement of physical possession of the paper document. Article 10 of the Model Law provides a functional equivalence rule for the possession of a transferable document or instrument. Functional equivalence of possession is achieved when a reliable method is employed to establish control of that record by a person and to identify the person in control. The notion of control when used as a substitute for possession requires a reliable method for identifying the current party in control of a specific electronic record as the said notion typically focuses on the identity of the person entitled to enforce the rights embodied in the electronic transferable record.[71] The method of identification may be accomplished through a closed system[72], or through an open system[73]. Under the draft model law, the notion of original and uniqueness has been connected to control. Emphasis has been given to reliably ensure that the claim may be presented to the debtor only once.[74]

5.2 SMEs Still Use Paper and are Excluded from SCF

The Rotterdam Rules and the Model Law follows the principles of non-discrimination of electronic means, functional equivalence and technology neutrality. Both the instruments may be applied to electronic bills of lading once States implement them. So far, leading maritime nations have not ratified the Rotterdam Rules. The Model Law would be ready for use by States to draft their national legislation once the UNCITRAL Commission adopts it next year. It is submitted that certain maritime stakeholders have shown limited enthusiasm in accepting the Rotterdam Rules, which has attributed to large trading nations such as United States and the People's Republic of China not

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[68] See van der Ziel, G. J. 2008. Delivery of The Goods, Rights Of The Controlling Party And Transfer Of Rights. *Journal of International Maritime Law* 14: 606. See also, Basu Bal, A. 2014. Electronic Transport Records: An Opportunity for the Maritime and the Logistics Industries. *Journal of Transportation Law, Logistics and Policy* 81(1): 37.

[69] See note 28 above. http://www.uncitral.org/uncitral/en/commission/working_groups/4Electronic_Commerce.html (accessed 14 April 2017).

[70] An indicative list of transferable documents or instruments includes: bills of exchange, cheques, promissory notes, consignment notes, bills of lading, warehouse receipts, cargo insurance certificates and air waybills.

[71] See draft article 9 of the Model Law.

[72] The closed system includes the token model "which identifies the person in the record itself" and the registry model "which identifies the person in a separate registry." See UNCITRAL. 2011. *Legal issues relating to the use of electronic transferable records* A/CN.9/WG.IV/WP.115.

[73] The open system is decentralised and uses block chain token which does not identify the holder in the record, i.e. in the token itself. A block chain ledger displays the addresses in which tokens are kept, the addresses are cryptographic identities (pseudonyms), and the private keys corresponding to the addresses are secret. See Takahashi, K. 2016. Blockchain Technology and Electronic Bills of Lading. *Journal of International Maritime Law* 22: 209.

[74] See draft Article 11, A/CN.9/WG.IV/WP.139/Add.1, note 28 above.

ratifying the Rules.[75] Also, during the negotiation and drafting of the Model Law, the transport and banking industry had low-level of participation in the Working Group IV sessions.[76] Most of the discussions were based on theoretical considerations of existing paper-based rules. At any rate, the answer to the first question of how can the legal concept of a bill of lading be dematerialised can be found in the Rotterdam Rules and the Model Law.

The answer to the second question - how can the dematerialised information be channelized to fulfil the trade functions in an electronic business environment - still remains to be answered. Policymakers alone cannot answer this question. But, the crucial question that policymakers should ask with respect to the Rotterdam Rules and the Model Law is whether they can create the momentum for SMEs as the lack of a governing legal framework is affecting them the most.

Large enterprises see value in using electronic data interchange (EDI) provide by large logistics service providers, such as DHL or UPS. These large logistics service providers have their enterprise resource planning (ERP), transport management and logistics systems that are connected to the ERP system of the large enterprise at one end and with customs and port authorities interface on the other end. Generally, SMEs do not have advanced internal ERP systems and do not use the services of such large logistics service providers. They continue to use a mix of electronic and paper based information and documentary exchange, which puts them at a competitive disadvantage vis-à-vis the large enterprises. Moreover, as discussed above the benefits of new financing techniques such as SCF are not efficiently extended to SMEs as they are outside the range of electronic visibility. BPO in its present form is suited for large enterprises that have a high volume or value of trade with established counterparties. The small suppliers who feed into the supply chains of such large enterprises generally do not participate in SCF.[77]

5.3 ISWE May Help SMEs

This paper has argued earlier that the merit of implementing ISWE is to create an information interaction infrastructure that would facilitate the entire supply chain. Also, it has been pointed out that the regulatory aspects of transport requirements have already been included in certain national single window systems to fulfil reporting

[75] One of the authors of this paper attended the sessions of UNCITRAL Working Group III (Transport Law) that deliberated on the Rotterdam Rules and UNCITRAL Working Group IV (Electronic Commerce) that deliberated on the Model Law on Electronic Transferable Records as an accredited observer. The opinions expressed in this article are entirely those of him and are not attributable to any institution or organization with which he may be associated in any capacity. He is also part of a research project on electronic transport records at the School of Business, Economics and Law, University of Gothenburg, which is currently investigating the role of logistics service providers in enhancing supply chain finance. While conducting research for the project he has interviewed several members of the maritime industry in the United States.

[76] UNCITRAL Working Groups are composed of delegates from States, international governmental organizations and invited international non-governmental organizations. Generally, industry participation is facilitated through observers from international non-governmental organizations who represent the views of their organizations on matters where the organization concerned has expertise or international experience so as to facilitate the deliberations.

[77] One empirical study in India has shown that small suppliers face several challenges which relate to human resource; technology and information technology; finance; inter and intra-firm coordination; collaboration and alliance; organizational policy, strategies and practices; and macro-institutional. See More, D. and Basu, P. 2013. Challenges of Supply Chain Finance - A Detailed Study And A Hierarchical Model Based On The Experiences Of An Indian Firm. *Business Process Management Journal* 19 (4): 626.

and/or customs requirements. However, the commercial and financial aspects of international trade that are enmeshed with transport remain excluded in such transport oriented single window initiatives. To include such aspects of international trade in ISWE, it has to be ensured that there exists legally significant trusted transboundary electronic interaction.[78]

Trusted transboundary electronic interaction is possible if interoperability is agreed at political, legal, organizational, semantic and technical levels. As explained above, large enterprises have already achieved trusted transboundary electronic interaction contractually. However, to be able to include SMEs in such interactions, the issue of legal interoperability of trust has to be aligned through a legal framework so that exchanged data is accorded proper legal weight across jurisdictions. UNCITRAL may serve as a forum to create such legal framework for establishing necessary level of trust between the participants of the trusted infrastructure that will ensure legal significance of transboundary electronic exchange of data issued in different jurisdictions. Also, organizational interoperability and semantic interoperability will require preparation of recommendations that can be agreed and understood by all parties. UN/CEFACT may take a leading role to prepare recommendations on how to build and manage national trust infrastructures in a best way so they would be interoperable with each other for trade facilitation.

In 2015, several proposals were submitted to UNCITRAL recommending that it undertake a project to develop a basic legal framework covering identity management and trust services as well as of cloud computing to facilitate international cross-border interoperability.[79] Working Group IV has now been tasked to move forward with such a project.[80]

Another effort worth noting is the Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific,[81] which was adopted by UN/ESCAP and is open for signature from 1 October 2016. Article 1 of the Agreement states that the objective is to facilitate cross-border paperless trade by enabling data exchange and mutual recognition of electronic trade data among willing ESCAP member States through dedicated intergovernmental framework to develop legal and technical solutions. This Agreement provide ESCAP member States with a digital complement for better implementation of the WTO TFA as well as on-going bilateral and sub-regional initiatives, such as the ASW. Article 5 of the Agreement sets out the general principles to facilitate interoperability between paperless trade systems and to ensure that solutions developed under the agreement lead both to higher levels of trade facilitation and regulatory compliance. Article 12 provides a comprehensive action plan

[78] See UNECE. 2016. *Recommendation for Ensuring Legally Significant Trusted Transboundary Electronic Interaction*. https://www2.unece.org/cefact/display/uncefactpublic/Recommendation+for+ensuring+legally+significant+trusted+transboundary+electronic+interaction (accessed 14 April 2017)

[79] See in general UNCITRAL - Report of Working Group IV (Electronic Commerce) on the work of its fifty-third session (A/CN.9/869); Legal Issues Related to Identity Management and Trust Services (A/CN.9/891); Possible future work in the area of electronic commerce — legal issues related to identity management and trust services — Proposal by Austria, Belgium, France, Italy and Poland (A/CN.9/854); Overview of identity management — Background paper submitted by the Identity Management Legal Task Force of the American Bar Association (A/CN.9/WG.IV/WP.120); Online dispute resolution for cross-border electronic commerce transactions: Submission by the Russian Federation (A/CN.9/WG.III/WP.136); and Possible future work in the area of electronic commerce — Contractual issues in the provision of cloud computing services — Proposal by Canada (A/CN.9/856).

[80] See UNCITRAL. 2016. Report of the United Nations Commission on International Trade Law on the work of its forty-ninth session (A/71/17) 48.

[81] http://www.unescap.org/resources/framework-agreement-facilitation-cross-border-paperless-trade-asia-and-pacific (accessed 14 April 2017).

to develop standardized solutions and protocols for cross-border electronic exchange and recognition of trade-related data and documents, including pilot projects. UNCITRAL participated in the drafting process of the Agreement with a view to ensuring its consistency with UNCITRAL texts on e-commerce.[82]

The efforts of the various international institutions discussed above indicate that trade facilitation initiatives have picked momentum across the globe. The new accelerators are proactive implementation of existing international legal instruments to facilitate building of single window infrastructure and to prepare them for interoperability, proactive implementation of emerging ICT such as federated cloud and distributed ledger technology, and most importantly capacity building.

6. CONCLUDING REMARKS

This paper considered only a sampling of the work currently being done on single windows and associated issues. There are several initiatives focused on single window, paperless trade and e-commerce issues carried out in various parts of the world. What may be found in all such initiatives are a number of interwoven commercial and trade law issues that may need to be addressed. The entry into force of the TFA may serve as impetus to engage in the preparation of a multilateral Framework Agreement to provide the legal basis for ISWE. UNCITRAL has recently started work on identity management and trust services as well as cloud computing to facilitate cross-border interoperability. In the coming years this effort may ensure legally significant trusted transboundary electronic interaction to include the commercial and transport aspects in ISWE.

International and regional institutions are increasingly cooperating to work for global trade in the digital economy. In this context the interaction between law and institutions should be explored in transformative contexts. The transformation may be the manner in which the functions of institutions may change over time; how institutions may act as agents of transformation; and how institutions themselves can be subjected to transformation. If WTO decides to take up the work for creating ISWE, then it would be transformation of an institution engaged in reducing tariff barriers to an institution involved in reducing information barriers in international trade. If UNCITRAL has to transform as an institution engaged in the modernization and harmonization of rules on international business, it has to lay emphasis on equality of opportunities for business actors participating in international trade. Working Group I of UNCITRAL, which is currently engaged in creating rules that would simplify incorporation and develop good practices in business registration of micro, small and medium-sized enterprises (MSMEs) has stepped in that direction. It is hoped that in the future all other Working Groups of UNCITRAL, in addition to what they do, will also explore whether the harmonized rules in their respective domain of work promote equality of opportunities for businesses.

[82] See note 80 in p. 49.