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Editorial

The need to facilitate trade, particularly between major trading partners, is of growing importance. The paragon of trade facilitation is the formation of a customs union in which the customs territories of individual member states are treated as a single customs territory. This allows for the elimination of tariffs and other cross-border regulations among member states and for trade with third parties to be regulated in a uniform manner.

The European Union (EU) is the exemplification of a customs union, providing for frictionless trade among its member states by the removal of internal borders and other regulatory obstacles to the free movement of goods. This year, as we celebrate the 50th anniversary of the EU customs union, we realise that the vision of establishing the customs union was well ahead of its time.

At the same time, we watch with interest as the UK seeks to leave the EU customs union (and the single market), ostensibly to enable the negotiation of free trade agreements independently of its major trading partner, the EU. Brexit has highlighted two important issues—the complexities associated with border management and the critical role played by Customs in managing international trade. At the time of publication, we still have no clear picture of what a post-Brexit environment might look like. And while the least disruptive trade solution for the UK is to continue its membership of both the customs union and the single market, the UK political landscape appears unlikely to allow for this.

A possible way forward would be for the UK to seek agreement with the EU27 to stay in the customs union and single market for the time being, but at the same time to be permitted to negotiate trade agreements in its own right on the basis that no such agreement would be concluded until the associated customs arrangements had been agreed with the EU27. Once the customs arrangements had been settled, a time would be chosen for their introduction, as well as the UK's withdrawal from the customs union (and the single market).

This would enable mutually acceptable customs solutions to be developed pending the negotiation of future trade agreements and provide trade certainty and stability in the interim. It would also enable the UK to develop customs solutions that specifically address the changes brought about by the particular trade agreement under negotiation, noting that these may represent a fraction of the wholesale changes that are currently being contemplated. As further agreements are negotiated, further adjustments to the customs arrangements between the UK and EU could be developed and agreed incrementally.

As we continue to follow developments with interest, the Editorial Board would welcome articles for publication that address this important event in trade history.

David Widdowson
Editor-in-Chief

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Section 1

Academic Contributions

What is the cost of customs and borders across the supply chain?

… and how to mitigate the cost through better coordination and data sharing

Andrew Grainger, Roel Huiden, Boriana Rukanova and Yao-Hua Tan

Abstract

This conceptual discussion paper examines the costs of customs and borders across the supply chain. It does that by considering relevant literature and looking back at the authors' respective contributions in the subject (of almost one and a half decades) with subsequent reflections. A key component of this paper is a cost model that seeks to describe relevant costs that can arise. That model is complemented with two case studies that explore how costs might be reduced. The first case study concerns the import of meat from Mercosur countries into the United Kingdom. The second case study concerns the shipment of flowers from Kenya into the Netherlands. A key finding is the scope for reform through improved information and data sharing and coordinated border management.

1. Introduction

'What is the cost of customs and borders across the supply chain?' A deceivingly simple question to ask, but a fiendishly difficult one to answer when considering how many different parties need to work together to move goods from one country to the next. But, finding answers to this question is important, whether it be in support of trade facilitation policy, performance measurement, cost–benefit-type investment decisions, or simply to advance the current understanding of trade costs. Perhaps most importantly, the ability to understand and describe costs also helps inform discussion about how to reduce them (Table 1).

And researchers have not shied away from the question. There are several helpful macrolevel studies (e.g. Mann, 2012) that provide valuable estimates about the cost of trade and customs procedures, and there are also several studies about the macroeconomic benefits derived from implementing trade facilitation type projects (e.g. Busse, Hoekstra & Königer, 2012). This literature has also helped make the economic case for trade facilitation (e.g. Wilson, Mann & Otsuki, 2005) and why the subject should be at the heart of contemporary trade and customs policy (e.g. WTO, 2017). There are also several studies that go beyond macroeconomic aspirations by focusing on the time and costs experienced at the macrolevel. This includes the largely unpublished WCO time-release studies (Matsuda, 2012; WCO, 2011) and the more broad-brush trade diagnostic studies funded by the World Bank and others (World Bank, 2016).

Table 1: Examples of motivations for better understanding the costs of trade and customs procedures; by subject

Motivation by subject	Examples
Trade facilitation policy	To better understand the administrative impact of trade and customs procedures upon the business community at home and abroad
	Hold other countries accountable to their trade facilitation related performance
	Hold own country accountable to its trade facilitation related performance
	Enable the setting of cost-related performance targets
Performance measurement	Inform trade policy makers about the cost of inefficient procedures
	Establish whether the price paid for outsourced services is fair
	Enable cost-focused benchmarking
	Support better definition of key performance indicators (KPIs)
Cost–benefit analysis	Enable informed investment decisions
	Identify which trade facilitation measures need to be prioritised
	Help companies justify investment into trade compliance capabilities (e.g. AEO)
Research	Test macroeconomic models from a microeconomic perspective
	Better understand the relevance of trade and customs-related costs for logistics and supply chain management
Cost management	To be able to clearly describe costs and better understand the circumstances in which they arise

While macroeconomic models in the evaluations of costs have their place, we argue that the devil is in the detail and must not be overlooked. All too often we hear businesses and policy makers refer to the challenges that follow on from not having cost figures that are robust enough or detailed enough. Subsequently, governments may delay investments in trade facilitation type measures, or not make them at all. Likewise, businesses may fail to enhance their customs management capabilities (e.g. into AEO type programs) and take advantage of advantageous customs procedures (Grainger, 2016). One might joke that 'senior management does not like to say no to trade- and customs-related investment requests, it asks for a cost–benefit analysis instead'—which in the absence of robust cost figures is (almost) the same as saying no.

The challenge of determining costs—and for that matter, identifying scope for improvements—has not gone unrecognised. UN Economic and Social Commission for Asia and the Pacific (ESCAP), for example, recommends the application of business process analysis (BPA) principles in the evaluation of international supply chains and bottlenecks with Customs and other border agencies (UN ESCAP, 2012).

By taking inspiration from the current 'as-is' situation—as opposed to the abstract models prevalent in macroeconomic studies (and some microeconomic studies)—it is easier to identify scope for improvement and find ways to reduce the costs.

What makes the assessment of costs difficult is the fact that any cross-border operation requires a multitude of parties to work together, yet seldom does any one party have full visibility of the operation (Hesketh, 2010). Amongst contracting business, the parties involved in trade include:

- Traders: such as buyers, sellers, their agents and distributors
- Transport operators: such as shipping lines, airlines, railway companies, logistics and trucking companies
- Providers of trade services: such as banking, finance and insurance
- Operators of transport infrastructure: such as port terminals, airports, stevedores and handling agents, warehouses and port/business community systems
- Specialist service providers: such as freight forwarders, shipping agents and logistics service providers (Grainger, 2012).

The regulatory side of trade is equally diverse. While most trade and customs procedures are specific to the control of goods, related controls targeting the vehicles moving the goods (transport) and people operating the vehicles (drivers, seafarers, flight crews) or running the companies (owners, directors and employees) can be equally, if not more, disruptive. Depending on how one categorises the regulatory procedures, the number of regulatory requirements in a country like the UK or Netherlands can easily exceed 60 (e.g. Clark, 2003; Grainger, 2007) and concern themselves with: revenue collection; safety and security; environment and health; consumer protection; and trade policy (Grainger, 2011).

By reflecting back on our research—spanning almost one and a half decades—we wish to flesh out how costs attributable to trade and customs procedures can be categorised. By reference to two case studies, we also wish to share insights into how costs could be reduced. This paper is structured into five parts: a brief review of relevant literature; an overview of our methodology; our proposed trade costs model with specific focus on the costs associated with trade and customs procedures; two detailed case studies in the SPS area—one concerning the trade in meat between Mercosur and the United Kingdom and the other concerning the trade in flowers between Kenya and the Netherlands—with relevant recommendations; and a conclusion that highlights the value of making cost data transparent, for example by building data pipelines—an idea first published in the *World Customs Journal* by David Hesketh (2009).

2. Context

The subject of customs-related costs is not new, although it is still evolving. As mentioned in the introduction, there is an emerging body of macroeconomic literature (Mann, 2012) that concerns itself with our questions. Early examples include the models of Walkenhorst and Yasui (2003), which suggests a 1 per cent reduction in trade-related transaction costs can equate to an estimated worldwide aggregate welfare gain of USD 40 billion, and that of Wilson, Mann, Otsuki, and World Bank Development Research Group Trade (2003), which made a strong case for trade facilitation.

At the risk of overgeneralising, most macroeconomic-orientated authors concede that the detail is fiendishly complex. The details at the micro level are largely avoided or just touched upon in broad terms. But early work by the OECD (2001) does provide for a broad framework that distinguishes between direct and indirect costs. Direct costs are those related to making declarations (e.g. preparing the paperwork and submitting it), while indirect costs are those subsequent to inefficient trade and customs procedures (e.g. missed business opportunities and the loss of competitiveness).

Some inspiration for categorising costs can also be taken from the direct cost literature, where there is an ongoing debate (that unfortunately does not yet extend to the customs domain) about tax compliance costs. Relevant categories, inspired by the helpful work of Chris Evans (2008) are outlined in Table 2. Though, as Evans highlights, untangling costs is not without its challenges. And in international supply chain operations it is equally difficult to untangle costs, especially since responsibilities for shipment and compliance are usually split between the buyer, seller and their respective intermediaries (e.g. ICC, 2010). The overall exposure to cost is difficult to ascertain. Likewise, certain types of costs are fixed in nature (e.g. set-up costs and investment into supporting IT systems) and independent of the number of shipments and declarations. Businesses with low trade volumes (e.g. occasional and smaller traders) will find that the cost of trading is disproportionately higher than for those businesses with high volumes (e.g. freight forwarders) who are able to spread the fixed costs across a wider base (e.g. Verwaal & Donkers, 2003). Another challenge in identifying and allocating costs is that intermediaries, such as freight forwarders and shipping companies, often bundled their border-related services into a wider logistics offering that includes transport and storage. Subsequently, the actual costs incurred by these intermediaries are not transparent to the users of their services.

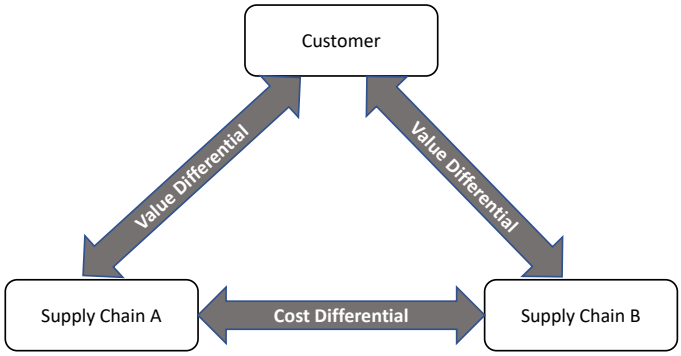
Table 2: Identified compliance cost categories in the related direct tax literature

Cost categories	Examples
Hard core (or direct) compliance costs	The cost of labour and time consumed, the costs of expertise purchased and supporting services, incidental expenses (e.g. computer equipment, software, travel and postage)
Psychological costs	Fear, stress, anxiety and frustrations experienced by those preparing tax declarations
Computational costs	Mandatory requirements associated with paying taxes; for example, the cost of applying for a VAT number or registering with the tax authority
Tax planning costs	The cost of seeking advice or putting special tax planning measures in place
Commencement costs	Any costs that arise from changes, e.g. in procedures, practices and legislations

Source: adapted from the work of Evans (2008)

Yet, understanding costs is critical for businesses if competitiveness is to be assured. One might say that in today's business environment competition does not necessarily take place between competing firms, it takes place between competing supply chains (Christopher, 1992). Ideally, the organisations across the supply chain coordinate their efforts sufficiently well to minimise costs as much as possible. Competitive advantage thus stems from where one supply chain—as opposed to a single business—is able to serve its customers better in terms of cost and value than that of another supply chain (Figure 1). The challenge for managers concerned with weeding out costs is to make invisible—or difficult to disentangle—customs- and border-related costs more transparent. This, we argue, provides opportunities to better manage and reduce them; which in turn aids overall competitiveness.

Figure 1: Value and cost differentials as the source for competitive advantage



Adapted from (Christopher, 1992; Ohmae, 1983)

3. Method

We adopted a mixed method approach. Our cost model builds on various studies over a period of one and a half decades. Some of those studies concern the costs of trade and customs procedures explicitly (Grainger, 2013a, 2013b, 2014), while other studies touch upon those costs in the margins (Grainger, 2010, 2011, 2016). We have also let relevant literature from related fields guide our analysis, such as that of the direct tax literature (e.g. Evans, 2008), that of macroeconomics (e.g. Anderson & van Wincoop, 2004; Mann, 2012), and that of information technology with application in the cross-border domain (Rukanova, Huiden, & Tan, 2017; Tan, Bjørn-Andersen, Klein, & Rukanova, 2011).

Two case studies are presented for illustrative purposes and have also enabled us to test our understanding of costs. The first case study focuses on the meat trade between Mercosur and the UK. It draws on work first conducted in 2009 (Grainger, 2009) for the European Commission and then updated in 2013 (Grainger, 2013b) with specific focus on the cost of UK imports. Although the applicable trade and customs procedures have evolved since this research was originally undertaken, most of the findings—especially with regard to the duplication of costs—still apply. The second case study concerns the flower trade between Kenya and the Netherlands. It draws on recent research that was funded by the European Union and takes advantage of a trade data pipeline initiative—an idea that was first presented in this journal by David Hesketh (2009). It also shows how clever sharing of information can give rise to solutions that drastically reduce costs.

Our reflections about costs, their impact upon the supply chain, and ways to manage them better, were developed in a series of workshops amongst the authors in the first instance. They were then discussed with key informants for further validation and sense making (Klein & Myers, 1999; Miles & Huberman, 1994). Subsequent consultation cycles then led to this paper.

4. Our cost model

The literature in modelling trade costs is well established, although its focus is the macroeconomic (country) level. Key variables include transportation costs, retail and wholesale margins, and the border-related barrier costs (Anderson & van Wincoop, 2004). However, discussions about experienced trade and customs cost—other than in very broad terms (e.g. Sourdin & Pomfret, 2012)—are generally glossed over. One exception is the work of Walkenhorst and Yasui (2003), who distinguish between direct and indirect compliance costs. Considerable work has also been done in business and supply chain

modelling (Neely, 2005), which in turn can be applied to help better manage performance—for example through benchmarking and the setting of key performance indicators (KPIs) (e.g. Grainger & Shaw, 2018; Kaplan & Norton, 1992). Helpful work with a specific focus on the wider activities necessary to trade goods has led to the United Nations CEFACT's 'Buy-Ship-Pay Model', which often is also referred to as the International Supply Chain Reference Model (Clark, 2003).

Table 3 builds upon that work by describing the types of trade costs, while Tables 4 and 5 expand upon those costs specific to complying with trade and customs procedures. We wish to point out that the costs experienced by businesses are also experienced by the administering border agencies—every document that is declared needs to be checked and approved by an official. The corresponding costs of the administrations need to be considered too (Table 6).

Table 3: Trade cost model: transport, insurance, bank and finance, and value chain (excluding compliance costs)

Key variable	Sub variables	Examples of cost areas
Transport costs	Operational costs	Vehicle specific: fuel, crew, depreciation, utilisation
		Route specific: cargo consolidation, storage, route fees and charges, levies
		Terminal specific: handling fees, booking and collecting fees, infrastructure levies, impact of congestion
	Transaction costs with the transport company or freight forwarder	Contracting costs between the buyer/seller and the transport company; performance and service monitoring; integration of IT systems between the shipper and the shipping company; communication costs; cost of making payment for services received
Insurance costs	Managing insurable risks	Cost of identifying and understanding risks; cost of implementing insurable risk reducing measures
	Transaction costs between companies and their underwriter	Procuring policies; amending and adjusting policies; making claims; paying out on claims

Key variable	Sub variables	Examples of cost areas
Bank and finance costs	Securing trade finance	Arrangement fees; charges and interest rates
	Transaction costs	Contracting costs; due diligence checks; fees and charges
	Invoicing and paying for fees and services	Cash-flow costs and credit arrangements; making payment; receiving payment; exchange rate risks (and the cost of any mitigating financial instruments); risk of non-payment for delivered goods and services
Value chain costs	Identifying business partners	Export marketing, cost of building and developing relations, access to 'social capital'
	Cultural costs	Language barriers, conflicting legal systems, conflicting business cultures
	Tariff and other market access barriers	Import duties, requirements to become established in the export market or appoint representatives
Trade compliance cost	Direct costs	See Table 4
	Indirect costs	See Table 5

Table 4: Trade cost model (continued): trade compliance costs, direct (1st level cost category)

2nd level cost category	3rd level cost category	Examples
Transaction costs with specialist third parties (e.g. brokers, agents and freight forwarders)	Initial contract set-up costs (often tied into wider transport/logistics services)	Tenders and negotiation costs; contract award and implementation costs; due diligence checks
		Learning costs that arise at the beginning of the contract, e.g. resulting from bedding-in systems and procedures (the risk of mistakes and operational errors can be very high during this period)
	Communication of instructions	Traditional systems (paper, phone, fax, email); development and implementation costs associated with integrating IT systems between contracting parties
	Performance monitoring	Agreement and monitoring of performance measures (e.g. KPIs)
	Barriers to exiting contract	Legal costs and penalties if contracts are terminated early; sunk costs in shared infrastructure and systems that cannot be recovered once the contract ends
		Opportunity costs that arise through being tied to a specific service provider and unable to use competitors (especially if they are cheaper or more efficient)
	Firefighting	When goods, for whatever reason, are stuck at the border and additional actions need be taken in order to clear the goods (e.g. finding missing documents, correcting wrong information)
	Cost of losing visibility and control	Increased non-compliance risk, loss of strategic capabilities to manage trade directly, increased risk of exposure to 'gold plated services', risk of being unable to work out what good service and a fair price might look like
Staff costs	Employment, supervision and support	Recruitment and management of professionals and experts with all the related administrative overheads
	Training	Specialist training for staff, including the costs of securing professional qualifications that are mandated by law
	Travel to the ports and borders	Vehicles, taxis, public transport

2nd level cost category	3rd level cost category	Examples
Initial set-up costs (so the company can be compliant)	Registration and authorisation costs	Research costs to establish relevant requirements to become registered/authorised
		Applications for permission to trade, take advantage of special trade and customs procedures (e.g. AEO, customs warehousing, etc.); the expense of registering and interfacing with relevant systems (e.g. port community systems, customs systems, veterinary systems, import VAT, excise control, import licencing applications, etc.)
		The cost of so-called 'economic tests' that justify the expense of the administration to give the operator special treatment
		Support services from experts and consultants
		The cost of meeting relevant authorisation conditions (e.g. IT systems, staff and infrastructure)
		The cost of financial securities/bonds needed to take advantage of certain types of customs procedures (e.g. transit, bonded warehousing, duty deferment)
		Inspection and audit costs where authorities seek to periodically verify that authorisation conditions are still met
	Planning costs	To work out the impact of customs duties and other trade taxes upon supply chain location and procurement decisions
	Cost–benefit analysis (to establish whether it is worth applying for relevant authorisations)	Cost of researchers and consultants; cost of collating relevant information
Transaction costs with the authorities	Submitting documents and information to relevant parties as and when required	Interface costs for each and every regulatory agency: electronic systems, software solutions, third party service fees, postage/fax/phone
		Monitoring document and decision status; correcting and updating declared information
	Receiving Information	Acting on information: corrections, appeals, cost of making payments (e.g. import duties)
	Inspection	Inspection related stevedoring and handling; demurrage charges and storage fees; terminal handling charges; lab and testing fees
	Post-clearance costs	Out-gate arrangements (e.g. booking a collection slot for a truck to pick-up a container); document storage

Table 5: Trade cost model (continued): trade compliance costs, indirect

2nd level cost category	3rd level cost category	Examples
Cascading costs; costs that follow on or result from delay	Additional handling and transport costs	Where pre-booked transport connections are missed, and more expensive onward transport options have to be taken
		Demurrage costs arising from prolonged delay at the ports and borders
		Additional handling fees charged by the port or shipping in the event of a prolonged delay
		Additional container rental costs if exceeding the booked period
		Additional handling costs to safeguard the integrity of the cargo while delayed (e.g. refrigeration for temperature-controlled goods, feeding and watering for live animals, security for high value goods)
	Additional staff activities	Rearrangement of delivery slots at the customer's premises (e.g. where access is scheduled, as is the case at large distribution centres)
		Additional communication costs with all parties up and down the supply chain
	Fines and penalties	Disposal costs (e.g. through reselling) where customers have rejected goods because of a missed delivery deadline
		Contractual penalties where delivery deadlines have not been met
	Appeals and other legal expenses	Legal costs; staff costs and time resulting from any appeals and legal challenges against administrations; the perceived risks (including repercussions) associated with confronting government agencies
	Correction costs	The time and expense associated with making corrections to the documents and declarations that gave rise to the delay; and the time and cost related to any requests from the authorities for additional information (e.g. site of supporting commercial documents)
Loss of competitiveness	Economic	Where inefficient procedures undermine profit (and shareholder expectations)
	Impact on customer obligations	Where customer performance expectations are not met
		Loss of business
	Loss of reputation	Repercussions from shareholders, business partners and end customers, e.g. where the risk of non-compliance is high or where the direct costs are deemed excessive
	Rerouting and relocation	The cost of making arrangements to ship cargo via ports/border crossings that are more favourable in the administration of trade and customs procedures but less optimal in terms of transport costs

2nd level cost category	3rd level cost category	Examples
Psychological costs	For employed staff	Stress, reluctance, fears and anxieties amongst key staff (especially where the law makes them personally liable for compliance breaches or where organised crime has undermined the integrity of officials and operators)
	For employers	Risk of key staff leaving; risk of increased exposure to organised crime in the absence of robust staff support systems; undermined organisational productivity
Opportunity costs	Economic	Where red tape ties up money that could be put to better economic use (e.g. investment into new business ventures)
		Where businesses choose to forgo international business opportunities because compliance cost are too prohibitive, too complex, or where trade and customs procedures are viewed as a risk not worth taking
	Infrastructure	Where scarce land (e.g. at ports) is not optimally utilised, for example because space has to be made for government buildings and facilities, or because spaces are blocked by goods that are held longer than need be
	People	Where staff are tied-up in non-profit bearing activities
Commencement costs (when procedures are changed or where new procedures are introduced)	Infrastructure	Build, change, reconfigure supporting IT systems
		Reconfiguration of supporting physical infrastructure (e.g. inspection facilities, storage facilities, port facilities, new buildings) to accommodate the physical aspects of any changes to trade and customs procedures
	Staff	Training and/or recruitment
	Business risk	Increased exposure to non-compliance risks while staff (and the administrations) become familiar with the new or changed requirements

Table 6: Direct and indirect costs of trade and customs procedures for government agencies

First level	Second level costs	Examples
Direct Costs	Administrative	Cost of building administrative systems (legal, technology, staff)
	Processing	Analysis and processing of declarations (paper and/or electronic)
	Communication	Communicating decisions about declarations back to the relevant parties (paper, fax, electronic, phone, in person)
	Inspection	Inspection staff to verify declared information is correct Inspection staff to investigate non-compliant operators and criminals
	Infrastructure	Building and inspection facilities (only applies to instances where the provision of such facilities is not the responsibility of the private sector, e.g. as part of their authorisation conditions)
Indirect costs	Misallocation of resources	Taxes are not spent in the most efficient way
	Inefficiency	Added costs to the administration (and businesses) resulting from false-positives, e.g. where certain types of shipments have been consistently selected for inspection and there is nothing wrong
		Increased scope for organised crime and corruption and other adverse impacts upon society
	Loss of tax revenue	Increased smuggling if smuggling is an easier way for clearing goods across the border
		Deliberate misdeclarations by less reputable businesses
	Undermined national competitiveness	Loss of FDI; reduced tax base; less employment; less economic development
	Societal costs	Border-related crimes can quickly have adverse impacts on society at large (e.g. resulting from smuggling of weapons, drugs, money); counterfeit and non-safe goods may harm consumers; the authority of government is undermined

5. Two case studies

Following on from our cost model we would like to look at how customs- and border-related trade costs are experienced—the 'as is', as well as the scope for making improvements—the 'to be'. In our first case study, we examine the trade in meat between Mercosur and the UK. Our second case study concerns the flower trade between Kenya and the Netherlands.

5.1 Case 1: The meat trade between Mercosur and the United Kingdom (by sea)

Trade and customs procedures and their requirements are complex. The meat trade between Mercosur and the EU is subject to customs controls, tariff quotas (import and export licencing), and veterinary controls. Figure 2 summarises the various compliance steps.[1]

Depending on the Incoterms (ICC, 2010) agreed, either the seller or the buyer contracts the shipping line. Common in the UK's international meat trade is to procure on either CIF (Cost Insurance Freight) or FOB (Free on Board) terms, which means that the seller will arrange for export clearance and the buyer for import clearance. However, in order to enable the trade, the buyer needs to secure an import quota (import licence) first. Without such a licence, import tariffs would be prohibitive. In an attempt to better manage the use of tariff quotas, authorities in some countries control how their business community uses them and exporters need to apply for a corresponding export licence. To prove origin (a condition for taking advantage of import tariff quotas), a certificate of origin issued by the relevant authorities in the country of export is required, too.

Once the trade is initiated, the meat needs to be loaded and sealed in the country of export under the supervision of an official veterinarian. That veterinarian is required to work towards the rules of the EU and issue a health certificate. That health certificate (along with the certificate of origin) needs to be sent (e.g. via express carrier) to the importer. The importer, usually with the help of an agent or freight forwarder, then needs to pre-notify the port health authority (using an electronic system called TRACES). The port health authority in turn is obliged to check the identity of the imported consignment against the original health certificate. That check, as well as any subsequent physical inspections, must take place at a dedicated inspection facility (a border inspection post). Once checked and approved by port health, a common veterinary entry document (CVED) is issued. The CVED in turn needs to be passed on by the importer (i.e. buyer or buyer's agent) to the customs administration. Although, since the research was originally conducted, the UK has now implemented a system that transmits the CVED information held in the TRACES system automatically to the CHIEF customs computer; the importer is no longer required to pass on that information.

The customs administration in the importing country, too, needs to be pre-notified. At the very least, this will normally include an electronic copy of the shipping line's cargo manifest. Once Customs is satisfied that its checks and those of other border agencies (e.g. port health) have been completed, cargo will be released from their control. The port stevedore will release the cargo from the terminal upon confirmation from the shipping line, which in turn will only release the cargo over to the importer's haulier if relevant charges and fees have been paid (e.g. those levied by the shipping line to pay for inspection related terminal expenses). Depending on the customs procedure chosen by the importer, additional information may have to be sent to customs at a later time. Usually, full customs declarations will also require copies of related commercial documents, such as the commercial invoice.

Figure 2: Business process analysis of the applicable trade and customs procedures in the meat trade between Brazil and the United Kingdom (for illustrative purposes only; based on work by Andrew Grainger [2009, 2013b])

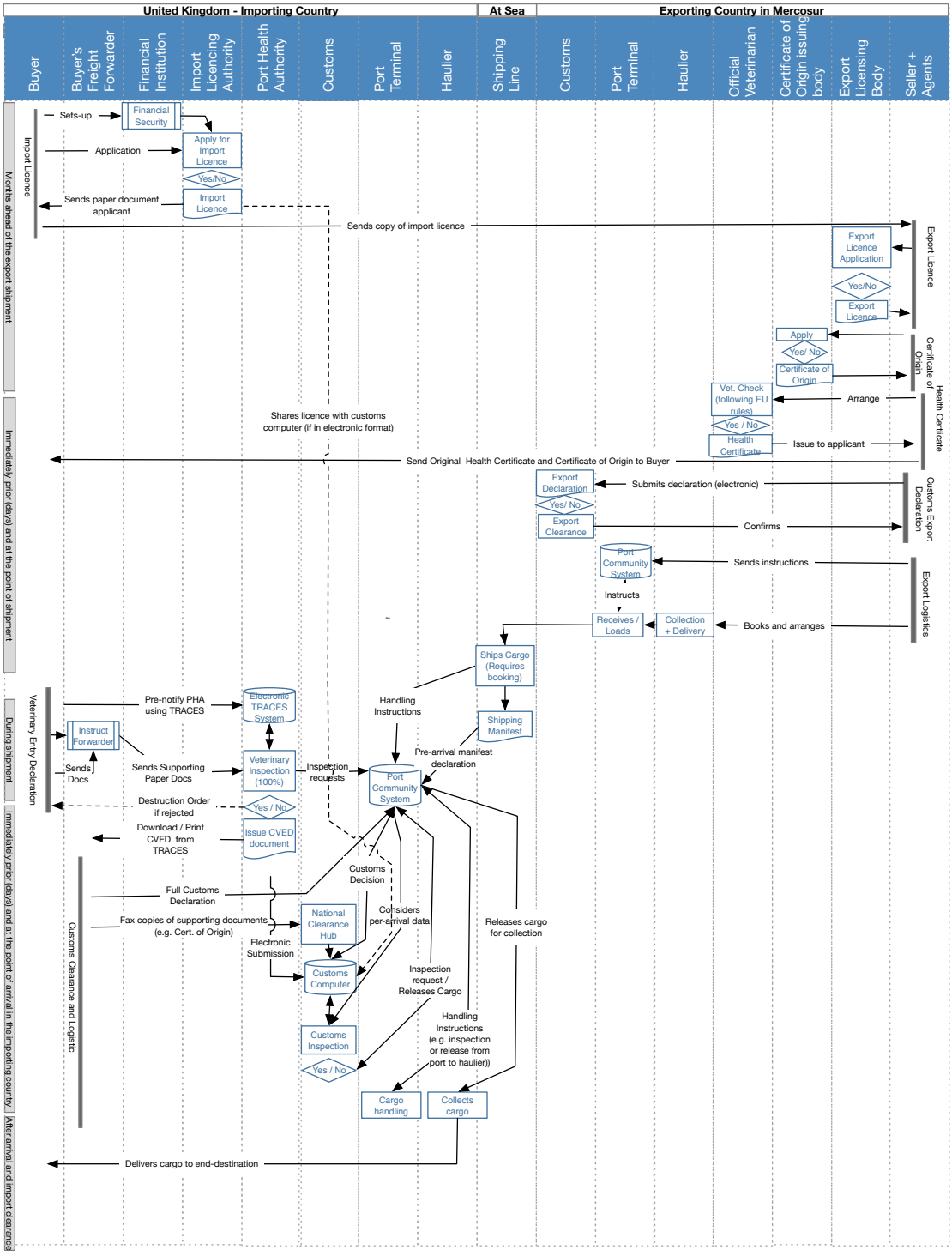


Table 7: Direct compliance costs for United Kingdom meat importers and their agents

Type of direct cost	Specifying organisation	Description of costs
Initial set-up costs; authorisation costs	Rural payment agency (Import licencing)	Fees and charges levied by the bank to set-up the required block guarantee
		The importer's time and staff costs relating to setting up and monitoring the block guarantee arrangements
	Port health authority (veterinary controls)	Set-up a facility with the authority to automatically pay fees and inspection charges
		Time and effort associated with becoming familiar with the (free of charge) electronic system for making veterinary declarations
	Customs	Time and effort associated with registering the company on the electronic customs system
	The respective UK airports	Connection fees charged by the telecoms operator for access to the respective electronic port systems at UK airports
	The respective maritime ports and airports	Annual subscription fees and connection charges for using the respective electronic platforms at UK maritime ports and airports
		Staff and staff training related to the use of electronic systems
		Employment of staff to book collection slots and manage the collection of cargo from the ports
Transaction costs; import clearance	Port health authority (veterinary controls)	Charges levied by the authority for veterinary checks (100%)
	Importer's agent	Service fees for checking the importer's documents before submitting them to the authorities
	Port operator	Fees levied by the port for each container containing goods subject to veterinary controls and requiring use of specialist inspection facilities, so-called BIPs (100%; except for meat originating from New Zealand)
	Importer's agent	Transaction fees levied by the port community system to use their platform for making customs declarations (usually passed on to the importer at cost)
		Service fees by the agent to the importer when making declarations (veterinary and customs) on behalf of the importer
	Shipping line	Load-on and load-off (LOLO), terminal handling charges (THC), and port equipment charges (paid by the agent and passed on to the importer)
	Port operator	Port security charges (paid by the agent and passed on to the importer)
		Infrastructure charges (levied on all handled containers) relating to investments by the port into UK railway infrastructure
		Vehicle booking charges (paid by the agent and passed on to the importer) for the collection of containers
		Fines and penalties when booked collection slots are not used

Table 7: continued

Type of direct cost	Specifying organisation	Description of costs
Inspection costs (in instances where the cargo is examined)	Port operator	Surcharges in addition to the port's standard inspection charges
		Handling charges for taking cargo to the inspection facilities (i.e. customs shed, X-ray scanner and/or the veterinary checks facility [BIP])
	Port health authority	Third party laboratory charges (paid by the agent and passed on to the importer)
	Shipping line	Demurrage fees (levied by the shipping line when goods are delayed at the port; paid by the agent and passed on to the importer) [Note: demurrage fees can vary from one line to the next, irrespective of the charges by the port to the shipping line]

Source: adapted from Grainger (2013b)

The direct costs are extensive and can be attributed to different parties. Table 7 provides a summary of those experienced by UK importers and the agents acting on their behalf. Indirect costs in this case study were specific to each of the interviewed organisations, though it was highlighted that any mistakes in securing preferential tariff quotas (import licencing) can quickly translate into costs associated with higher import duties or finding customers in other markets. It was also highlighted that the cost of delays at UK ports quickly multiplies at ports where the veterinary inspection facilities are not serviced on weekends and where inspection backlogs arise.

Several importers also gave reports of rent-seeking behaviour where shipping lines offer considerably discounted shipping rates to the exporter when selling on a CIF basis.[2] Upon arrival, however, the importer is required to pay above-market rates for the shipping line's terminal handling and demurrage charges (these are charges levied by shipping lines to pay for services provided by the port terminal). Since the importer is not party to the contract between the seller and the shipping line, there is little choice but to accept the shipping line's charges. However, if once burnt, the importer may choose to procure future consignments on a FOB basis[3], or renegotiate the price or buy the meat from another supplier.

What was particularly striking in our research is the overall effort it takes to clear meat for imports into the UK. We counted at least 26 distinct transactional steps. Some activities, like applying for import licences, need to be prepared months ahead. Other activities, like customs clearance, start weeks ahead of the arrival or at the point of arrival. A few activities, such as release from special procedures (such as customs warehousing or inland clearance), take place after the goods are cleared through the port (Grainger, 2013b). We observed that most importers in our case study rely on a select few agents (with less than 10 dedicated staff) to ensure that import clearance is smooth. It was suggested that standard service levels offered by global logistics and freight forwarding companies were insufficient.

We also identified a considerable level of duplication in activities up and down the supply chain (Table 8). Thus, many of the direct costs described in Table 4 may occur more than once. There is considerable scope for exploring how duplication of control and check related activities can be reduced, thus yielding significant cost savings.

Table 8: Levels of duplication with impact on supply chain costs

Duplication of activity	Impact on cost	Cost mitigating measures
Duplication of veterinary checks	The goods are checked by officials in the country of export, who are obliged to work towards EU rules. The goods are checked again in the country of import by officials who also work towards EU rules. The exporter needs to arrange for an inspection, supervised loading and the production of a health certificate. That certificate needs to be sent to the importer, who in turn has to arrange for checks at the port of arrival.	Explore ways by which regulatory objectives can be met with less layers of control without compromising the overall control objectives For example, the EU import check requirements for meat from NZ are considerably less stringent than for meat from other countries. They benefit from reduced check requirements in the EU which in turn reduces the overall costs for the importer. Moreover, NZ authorities are also able to automatically prepopulate key data in the EU's electronic TRACES system. This makes it considerably easier for importers to pre-notify EU authorities that goods are coming. It also reduces possible mistakes that arise when compared to communicating key information in the form of paper documents.
Duplication of EU import licence supervision and duplication of origin checks	The import of meat on preferential terms (with significant duty savings) is subject to an EU import licence. The licence is usually allocated on a first-come-first-served basis. Some countries seek to regulate how their business community takes advantage of these quotas. Subsequently, exporters have to bear the cost of export licencing requirements while importers have to bear the costs of import licencing requirements. Both also have to carry the cost relating of time and postage when sharing relevant documents. Import quotas are country specific. The customs administrations in the EU require a certificate of origin as proof of origin. That certificate needs to be issued in the country of export by the exporter at the exporter's expense. The original document needs to be posted to the importer.	Explore ways by which regulatory objectives can be combined with other regulatory requirements. For NZ meat there is no need to apply for an import licence. The origin certificate issued by the New Zealand Meat Board doubles-up as an EU import licence.

Table 8: continued

Duplication of activity	Impact on cost	Cost mitigating measures
Duplication of customs controls	Every import declaration follows an export declaration in the country from where the goods have been sent. Required information is similar. The exporter needs to bear the costs in the country of export and the importer needs to bear the cost in the country of import.	Explore ways how data can be more efficiently shared. This can be achieved where the contracting businesses share electronic platforms, as is often the case for inter-firm shipments (i.e. the seller and buyer are related). Another model would be for increased cooperation between the two customs authorities, where one authority recognises the controls or the other. This is already happening in customs administered supply chain security controls (the mutual recognition of supply chain security programs (Widdowson, Blegen, Kashubsky, and Grainger, 2014)). It would not be a big leap to imagine similar levels of cooperation for other types of customs controls.
Duplication of activities between the buyer and the authorities	Several importers explained that the value of meat is very high. To ensure that they receive the meat that they ordered, some will arrange for an independent inspection in the country of export or upon arrival.	Explore how official controls can be designed to provide a valued service to the buyer over and above the official requirements. Explore how independent inspection and the subsequent lower risk of non-conformity can provide for preferential treatment at the ports and borders (akin to the trusted trade concept).

Source: extracted from the work of Grainger (2013b)

5.2 Case 2: The flower trade between Kenya and the Netherlands (by air)

The second case study (see also Rukanova, Huiden & Tan, 2017) concerns the import of cut flowers from Kenya to the Netherlands in which flowers land at Amsterdam Airport Schiphol and transported on to the warehouse of an auctioneer. That facility is authorised by both customs and the Dutch phytosanitary authority as an allocation at which inspections may take place.

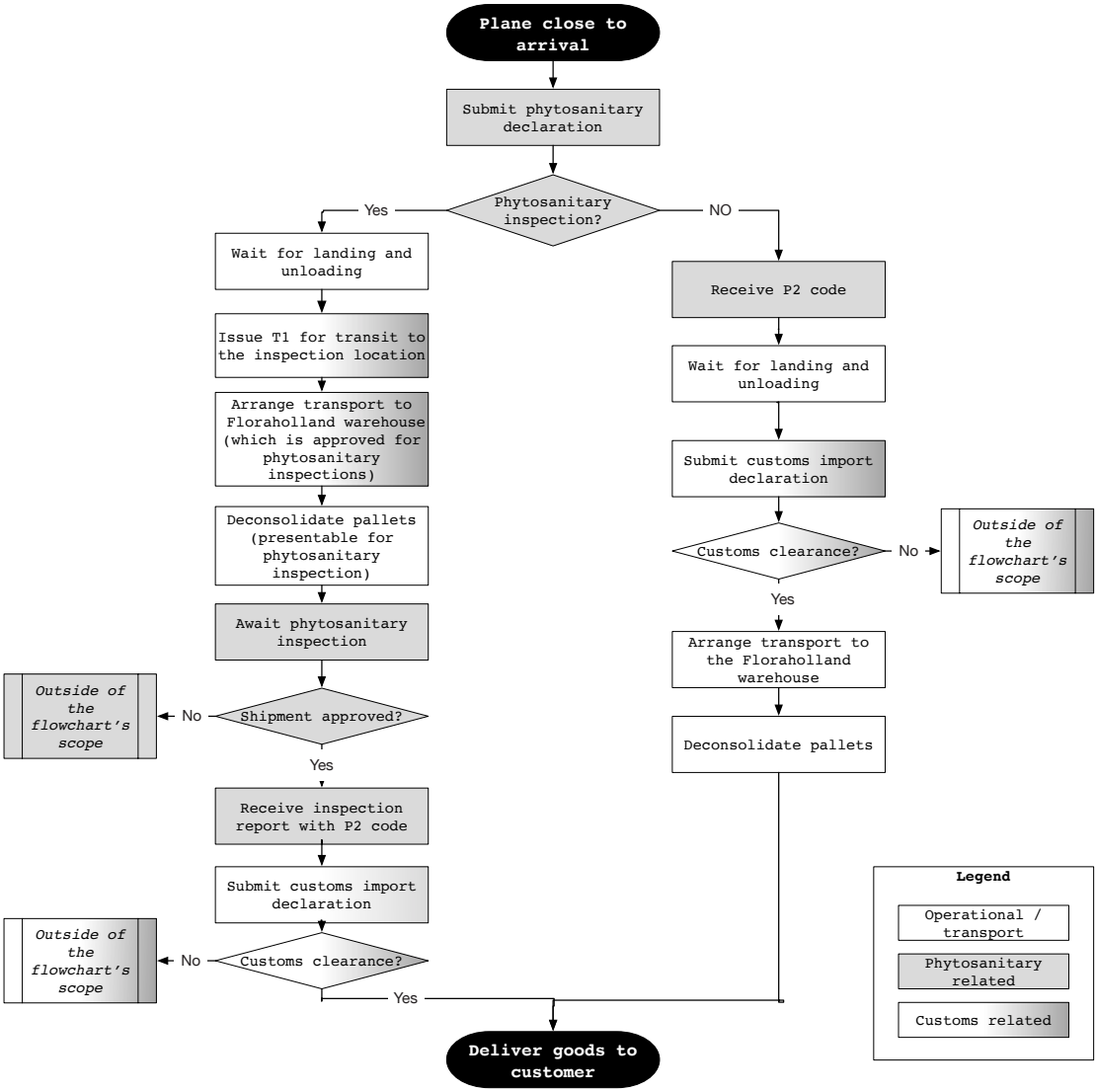
Like Case 1, the trade in flowers is also subject to complex commercial and regulatory arrangements. Import clearance into the Netherlands involves three risk assessment processes: a safety and security risk assessment by Customs at entry into the EU; a phytosanitary risk assessment by the Netherlands Food and Consumer Product Safety Authority (NVWA); and a Customs import risk analysis related to the fiscal aspect and related import duties.

Import compliance steps start with the airline submitting an electronic entry summary declaration (ENS), which contains high level data about the cargo, to Dutch Customs. This must be submitted at least four hours prior to arrival. Dutch Customs uses the ENS information in support of their risk assessment about safety and security. That assessment is made before the plane lands. Providing Customs do not wish to see the goods at the airport, they may be transported on to the auctioneer's warehouse.

However, before the plane lands, the importer or freight forwarder acting on the importer's behalf must also submit a phytosanitary declaration to the Dutch NVWA. The organisation decides whether the flowers need to be subjected to a phytosanitary inspection. That inspection, which applies to about 5 per cent of all shipments, must be made at an approved inspection facility, which in our case is at the auctioneer's warehouse.

Subsequent procedures depend on whether goods have been selected for phytosanitary control or not (see Figure 3). Where they have been selected for a physical examination, they are shipped under customs transit arrangements (EU Community Transit: T1/Domestic) to the auctioneer's warehouse. Once they arrive at that warehouse, relevant phytosanitary checks are performed. One condition for these checks is that the phytosanitary inspector must have the original phytosanitary certificate (which was issued by the Kenyan authorities) to hand. Upon completion of the phytosanitary inspection the freight forwarder is issued with a 'P2' code (which is an electronic message from the Dutch NVWA to confirm the release from phytosanitary control). This code provides the necessary proof that the phytosanitary authority has completed its part of the import control process. With the confirmed P2 code, the freight forwarder is now permitted to make the customs declaration. Following that declaration, Customs may also choose to conduct an inspection, which occurs in about 1 per cent of all cases.

Figure 3: Import clearance sequence for cut flowers into the Netherlands



In the 95 per cent of cases where flowers have not been selected for phytosanitary inspection, the freight forwarder is issued with the P2 code before the plane lands at Airport Schiphol. The freight forwarder can then submit the customs declaration as soon as the plane is unloaded. Providing there is no customs inspection request, the flowers are then released for onward transport to the auctioneer's warehouse. Once at that warehouse, the flowers are auctioned off for sale. However, the importer remains responsible for making sure that the phytosanitary certificate is presented to the NVWA for a document check within 48 hours of the plane's arrival.

The arrangements for phytosanitary and customs control in this specific way gives rise to a number of observable inefficiencies, which add to costs (Table 9). The main issues are:

1. The freight forwarder is only able to lodge the phytosanitary declaration when the plane is about to land.
2. The Dutch phytosanitary authority only notifies relevant parties about the outcome of the decision on whether to inspect only after the plane has landed; and relevant parties can only make onward transport and inspection arrangements after that decision has been made.
3. If a phytosanitary inspection is needed, onward transport to the warehouse (where the inspection takes place) must be made under domestic transit arrangements (which has a compliance cost).
4. Given the uncertain traffic conditions, it is only possible to alert inspectors and warehouse handling staff that an inspection is about to take place when the estimated time of arrival for the goods at the warehouse is reasonably certain, which is usually about one hour beforehand.
5. Depending on the outcome of the phytosanitary inspection decision, the customs declaration must either be declared at the warehouse (i.e. where a phytosanitary inspection is required) or at the airport (i.e. where there is no phytosanitary inspection).
6. Although only 5 per cent of all shipments are subjected to a physical phytosanitary inspection, the uncertainty about the outcome of the inspection decision with subsequent operational implications affects all imports.

Table 9: Costs associated with the inefficiencies in the information flow relating to flower imports into the Netherlands

Problem statement (as-is)	Type of cost(s): examples
Tight procedural timeframes that require actions to be made at a specific point in time (e.g. ENS 4 hours beforehand; phytosanitary declaration when the place is about to land)	**Opportunity cost** resulting from the inability to plan and schedule resources Increased t**ransaction costs with third parties** related to monitoring time frames and their actions
Uncertainty about when and where the customs declaration needs to be lodged	**Loss of competitiveness (economic):** Importers first need to wait for the phytosanitary inspector to make an inspection decision, and then for the customs officer. It would be more efficient if decisions could be reached in parallel as opposed to in sequence. Increased **transaction costs with the authority** resulting from having to work out where to make the declaration as well as from having to maintain the capabilities to be able to submit at both locations. It is not always clear when exactly cargo will be released, even for those shipments where the phytosanitary officials do not decide to inspect (as is the case for 95% of the shipments). It thus becomes difficult to plan, schedule and coordinate resources. The resulting cost is an **opportunity cost** Increased **communication costs** resulting from having to give relevant parties the necessary instructions **Fines and correction costs** arise in instances where there is miscommunication and goods are accidentally released from the warehouse even though the authorities have not cleared them yet
Uncertainty about if and when a phytosanitary inspection needs to be provided for	**Cascading costs** resulting from having to make customs transit arrangements in the event of an inspection Increased **communication costs** resulting from having to give relevant parties the necessary instructions **Cascading costs** resulting from delays which can quickly result in missed collection and delivery slots. Delays are particularly long when officers are not immediately available, for example when out of hours or over weekends **Opportunity costs** resulting from the inability to reliably plan for inspections (and allocate the necessary resources), especially in adverse traffic conditions between the airport and the warehouse
Customs declarations contain inaccurate or wrong information (which can easily happen when considering the many different document requirements and the number of locations involved)	**Correction costs:** relating to the time and effort involved in making corrections and providing supporting information where requested **Cascading costs:** relating to operational delays, such as those associated with additional handling and storage or making changes to onward transport arrangements

Problem statement (as-is)	Type of cost(s): examples
The risk of failing to present the original phytosanitary certificate during a physical inspection, or failing to submit the phytosanitary certificate within the 48-hour window where no phytosanitary inspection was necessary	**Cascading costs** resulting from: having to find and submit missing documents; or from having to request new documents if feasible **Cascading costs** resulting from additional staff activities **Cascading costs** resulting from a delayed or rejected consignments **Cascading costs** resulting from potential fines and penalties for the importer should the 48-hour deadline be missed

These inefficiencies and the costs associated with them can be removed. Through CORE, an EU-funded project, a redesigned electronic infrastructure was designed that draws on electronic data pipeline principles (Hesketh, 2009). Its two key components are:

a. An electronic facility that enables Kenyan authorities to send the phytosanitary certificate (in electronic format) directly to the NVWA. That certificate also contains accurate information about the seller which can be used by Dutch Customs to validate correlating information in the customs declaration.

b. An electronic platform that gives Customs access to relevant business information to enhance the risk assessment process (e.g. the proforma invoice, which contains detailed and accurate goods descriptions).

By having access to this new electronic infrastructure (coupled with recent legislative changes) Dutch Customs, just like the phytosanitary officials, are now able to make decisions about whether to inspect or not before the goods land (Rukanova et al., 2017)—a concept currently referred to as 'clearance at landing'. The resulting cost savings are significant since most administrative procedures in this trade lane now take place prior to landing; this significantly reduces the number of administrative and physical requirements after landing. Figure 4 compares the two scenarios, the: 'as-is' with the 'to-be'.

Figure 4: Clearance at landing—from the as-is to the to-be

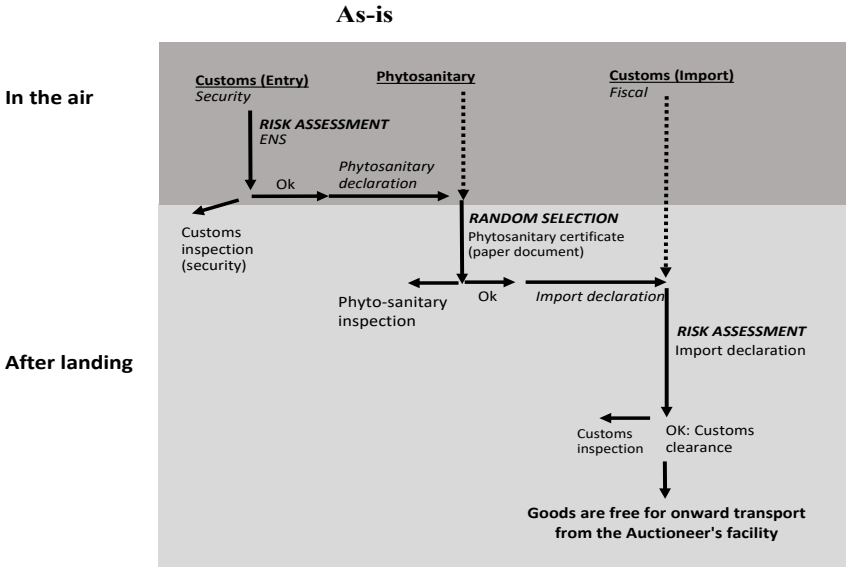
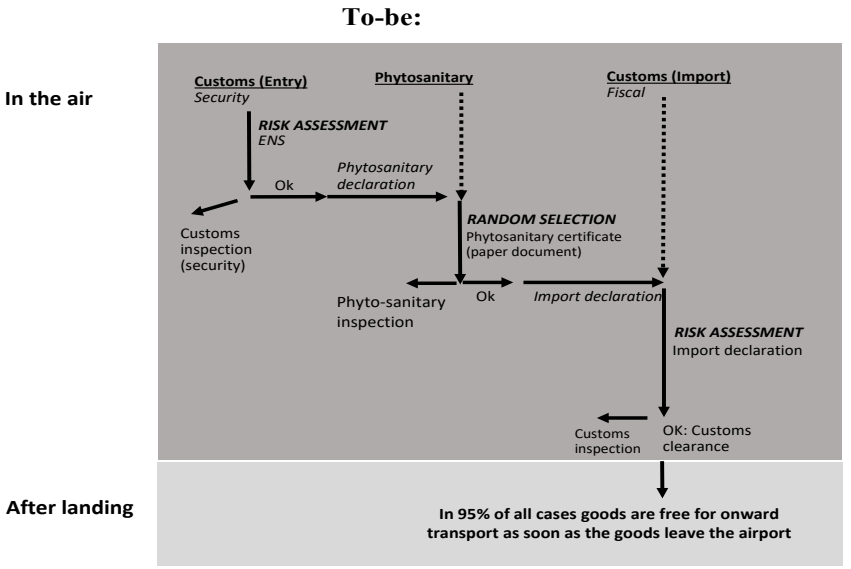


Figure 4: continued



Source: Adapted from Rukanova et al. (2017)

Following on from this case study, it would be useful for the respective parties to explore how these cost-saving benefits can be extended, for example by including shipments made by sea, or by applying it to other types of trades and procedures, for example, to meat imports (as in the first case study) where all imports must be presented to dedicated inspection posts (BIPs), irrespective of the type of checks and subsequent inspections.

6. Conclusion

In this paper we have described the many types of costs that can be found in international trade operations, especially those specific to trade and customs procedures. A key finding is that many of those costs are interdependent, often hidden from decision-makers and not easily untangled. By giving them names and categories, it is easier to discuss and analyse them. It is also easier to explore ideas about how they can be reduced. By knowing and describing the 'as-is' it becomes possible to explore what the 'to-be' might be and to make the cost savings that can arise from a 'to-be' situation more transparent.

A commitment amongst the many parties involved in trade operations to participate in research is an essential prerequisite. As our two case studies show, documenting the 'as-is' provides us with valuable pointers towards the 'to-be', and how costs can or could be reduced. In our two cases, that would be through improved cooperation—especially between Customs and other border agencies (coordinated border management)—and through information sharing (e.g. by developing electronic data pipeline type solutions) that may help businesses mitigate the impact of supply chain disruptions at the border.

The latter point is particularly interesting in the context of trade facilitation policy. While every effort should be made to weed out costs, we also need to be open to solutions that help mitigate the impact of any remaining costs. Reflecting on our second case study, we would argue that the sharing of key information as soon as it is created, as opposed to when it is declared, could significantly help reduce any cascading costs (such as those described in Table 9). For example, the sooner operators become aware of potential risks that could translate into delays at the border, mitigating measures can be put into action, such as by

pre-alerting end customers to potential delay and enabling them to rebook onward transport. The more difficult to calculate, but nevertheless very real, indirect costs can thus be significantly mitigated.

We would also like to propose further discussions about how costs can be translated into performance indicators, which in turn could be used to hold various parties across the supply chain accountable—including government agencies (Grainger & Shaw, 2018). Cost accountability is of course an implied feature within the WTO Trade Facilitation Agreement. Our sense is that research into the details concerning the costs of trade and customs procedures has only begun. We certainly would not want to claim that this paper offers a comprehensive answer to the question of what the costs of customs and borders across the supply chain are. However, we do hope that this paper will spark further discussions and lead to a refined—and perhaps more standardised—cost model which is supported by relevant international organisations.

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Notes

1 This figure applies to a specific context and should only be used for illustrative purposes. It draws on historic data from 2009 to 2013 and was updated through recent follow-up interviews. A detailed discussion about the UK import procedures, including direct cost details, can be found in Grainger (2013b).

2 CIF is an Incoterm (ICC, 2010) that requires the exporter to arrange for export and shipment. The importer is responsible for port and import clearance.

3 FOB is an Incoterm (ICC, 2010) where the importer arranges for shipment and thus has greater influence over the shipping line's port and import clearance related charges.

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Advance rulings and binding pre-entry tariff classification according to Article 3 TFA: Situation 2018—still a long way to go

Carsten Weerth

Abstract

Article 3 of the World Trade Organization (WTO) Trade Facilitation Agreement (TFA) requires each TFA member to issue advance rulings in a reasonable time that are binding on the applicant and the customs authorities of the issuing country. Such binding advance rulings cover, among other things, tariff classification information that is crucial for the calculation of import duties and tariffs. This paper investigates which countries are offering advance tariff classification rulings and which are still not offering such rulings and finds that, in 2018, 72 countries are offering binding pre-entry customs classification. However, without the European Union (EU) member states, only 44 harmonised system member states out of 157 are offering these binding pre-entry customs classifications. Fifty-nine countries that are offering advance rulings on tariff classification have ratified the TFA, but 16 countries are offering this service without having ratified the TFA.

1. Introduction

Article 3 of the World Trade Organization (WTO) Trade Facilitation Agreement (TFA) states that each TFA member shall issue an advance ruling in a reasonable time which is binding on the applicant and the customs authorities of the issuing country. The required binding advance information relates to origin and customs (tariff) classification information that is crucial for the calculation of import duties and tariffs. This paper investigates which countries are offering advance customs classification rulings and which are not.

2. The Harmonized Commodity Description and Coding System

The Harmonized Commodity Description and Coding System (Harmonized System Convention, Brussels 14 June 1983; in short, Harmonized System or HS) for the classification of goods into the tariff scheme of the HS nomenclature (also tariff classification) has resulted in the worldwide strengthening of tariff nomenclatures since its first usage in 1988. It is in use in 209 countries and economic regions of the world (WCO, 2018b), however, since May 2018, 157 countries have been contracting parties (Weerth, 2017a, 2017b; WCO, 2018e) and more than 98 per cent of all trans-border trade has been statistically and economically classified with the help of the HS nomenclature (Wind, 2007; WCO, 2018c). The customs classification of goods is complex and depends on numerous rules, in particular on the terms of 1,222 HS headings and 380 notes according to General Rule (GR 1), and on the terms of 5,387 HS subheadings, 9,528 subheadings and 56 subheading notes (within the EC) (Weerth, 2017a) according to GR 6 (Weerth, 2008a).

The HS nomenclature (HS 1988) has been revised in 1992, 1996, 2002, 2007, 2012 and 2017, and certain headings that are not in use any more have been cancelled. The HS is the most successful legally binding instrument of the WCO (Weerth, 2016a, 2017a), and has a membership that continues to grow (Weerth, 2008b, 2009b, 2011b, 2012, 2014, 2016a, 2017b).

In 2008, the WCO published, for the first time, background information on the usage of the nomenclature by the contracting parties of the HS, which shed new light on the issue of the introduction of pre-entry customs classification data, as was recommended by the WCO in 1996 (WCO, 2008). This resulted in the first study of the application of binding pre-entry customs classifications (Weerth, 2008).

Since then, the HS membership has grown from 133 contracting countries to 157 member states (Weerth, 2017a, 2017b; WCO, 2018e), and the TFA was signed in 2013 and entered into force in February 2017.

Article 3 of the TFA rules that advance rulings are to be introduced by the 137 TFA member states that have ratified the TFA (WTO, 2018b). Therefore, this paper examines the application of advance rulings on tariff classifications in the HS contracting parities according to the most recent WCO data available (WCO, 2018d). It also takes into account the TFA status (WTO, 2018b) and Revised Kyoto Convention (RKC) status of the countries (WCO, 2017, 2018e).

3. Recommendation for the introduction of binding pre-entry customs classification

On 18 June 1996, the WCO issued a recommendation on the introduction of national programs for binding pre-entry customs (or tariff) classification in order to provide higher levels of legal security on the complex issue of how to classify certain goods and commodities (WCO, 1996). This recommendation is not legally binding.

Recommendation of the Customs Co-operation Council (WCO) on the introduction of programmes for binding pre-entry classification information (18 June 1996)

The Customs Co-operation Council,

NOTING that the Harmonized System has been widely adopted by countries and Customs or Economic Unions,

NOTING that many Customs administrations have implemented or intend to implement programmes for binding pre-entry classification information on the basis of the Harmonized System,

RECOGNIZING the benefits of programmes for binding pre-entry classification information in facilitating international trade, in particular, by ensuring certainty and predictability in the application of the Harmonized System,

RECOGNIZING that such programmes are useful for promoting uniform classification in the Harmonized System,

TAKING ACCOUNT of the advisability of replacing, by a Recommendation, the Council Resolution of 25 June 1991 on the introduction of pre-entry classification information programmes,

RECOMMENDS that Members and Contracting Parties to the Harmonized System Convention take all appropriate action to introduce programmes for binding pre-entry classification information, as soon as possible, while respecting the basic principles set out in the Annex hereto, and

REQUESTS Members and Contracting Parties to the Harmonized System Convention to notify the Secretary General of their acceptance of this Recommendation and of the date of its application. The Secretary General will transmit this information to Members and to Contracting Parties to the Harmonized System Convention.

ANNEX

Basic principles of programmes for binding pre-entry classification information

4. Any person may make a request in writing to a duly designated authority for binding information on the classification of goods in the HS-based nomenclature in respect of an actually envisaged import or export operation. The request shall contain, in particular, a full description of the goods as well as any necessary additional details to enable their identification (brochures, samples, etc.) so that the authority is able to classify them.

5. The information shall be communicated in writing to the applicant as soon as possible.

6. The information thus communicated is binding, in accordance with the terms set out therein, on the Customs authorities as against the holder of such information in respect of the tariff classification of goods in the country or Customs territory to which the issuing authority belongs, for at least one year from the date of issue, subject to paragraph 4 or 5.

7. The information may be annulled if it was given on the basis of incorrect or incomplete details provided by the applicant.

8. The information ceases to be valid (i) where it becomes incompatible with new tariff measures or judicial decisions taken by the national authority or by the Customs or Economic Union concerned or (ii) where the holder of such information is notified in writing of its withdrawal, revocation or amendment because of, for example, further details that have been obtained and which affect such information.

9. A period of grace may be provided under this programme with respect to paragraph 5.

4. Article 3 TFA—Advance rulings in tariff classification and origin

Article 3 TFA governs advance rulings on customs classification and origin, such as the binding pre-entry information on customs classification. The TFA is legally binding and the ratifying countries are therefore bound to introduce advance rulings in tariff classification in the due time (WTO, 2018c).

Article 3 – Advance rulings

4. Each Member shall issue an advance ruling in a reasonable, time-bound manner to the applicant that has submitted a written request containing all necessary information. If a Member declines to issue an advance ruling, it shall promptly notify the applicant in writing, setting out the relevant facts and the basis for its decision.

5. A Member may decline to issue an advance ruling to the applicant where the question raised in the application:

   (a) is already pending in the applicant's case before any governmental agency, appellate tribunal, or court; or

   (b) has already been decided by any appellate tribunal or court.

6. The advance ruling shall be valid for a reasonable period of time after its issuance unless the law, facts, or circumstances supporting that ruling have changed.

7. Where the Member revokes, modifies, or invalidates the advance ruling, it shall provide written notice to the applicant setting out the relevant facts and the basis for its decision. Where a Member revokes, modifies, or invalidates advance rulings with retroactive effect, it may only do so where the ruling was based on incomplete, incorrect, false, or misleading information.

8. An advance ruling issued by a Member shall be binding on that Member in respect of the applicant that sought it. The Member may provide that the advance ruling is binding on the applicant.

9. Each Member shall publish, at a minimum:

   (a) the requirements for the application for an advance ruling, including the information to be provided and the format;

   (b) the time period by which it will issue an advance ruling; and

   (c) the length of time for which the advance ruling is valid.

10. Each Member shall provide, upon written request of an applicant, a review of the advance ruling or the decision to revoke, modify, or invalidate the advance ruling.

11. Each Member shall endeavour to make publicly available any information on advance rulings which it considers to be of significant interest to other interested parties, taking into account the need to protect commercially confidential information.

12. Definitions and scope:

   (a) An advance ruling is a written decision provided by a Member to the applicant prior to the importation of a good covered by the application that sets forth the treatment that the Member shall provide to the good at the time of importation with regard to:

      (i) the good's tariff classification; and

      (ii) the origin of the good.

   (b) In addition to the advance rulings defined in subparagraph (a), Members are encouraged to provide advance rulings on:

      (i) the appropriate method or criteria, and the application thereof, to be used for determining the customs value under a particular set of facts;

      (ii) the applicability of the Member's requirements for relief or exemption from customs duties;

      (iii) the application of the Member's requirements for quotas, including tariff quotas; and

      (iv) any additional matters for which a Member considers it appropriate to issue an advance ruling.

   (c) An applicant is an exporter, importer or any person with a justifiable cause or a representative thereof.

   (d) A Member may require that the applicant have legal representation or registration in its territory. To the extent possible, such requirements shall not restrict the categories of persons eligible to apply for advance rulings, with particular consideration for the specific needs of small and medium-sized enterprises. These requirements shall be clear and transparent and not constitute a means of arbitrary or unjustifiable discrimination.

5. Advanced rulings in General Annex Standard 9.9 of the Revised Kyoto Convention

It has also been argued that the advance rulings in tariff classification, origin or customs valuation are already part of the international customs law because of General Annex Standard 9.9 of the RKC, which requires signatory countries to introduce binding customs rulings (Wolffgang & Kafeero, 2014).

> **General Annex of the RKC**
>
> 9.9. Standard
>
> The Customs shall issue binding rulings at the request of the interested person, provided that the Customs have all the information they deem necessary.

The RKC is the second most successful legally binding instrument of the WCO (Weerth, 2016a), with 114 contracting parties in June 2018 (WCO, 2017, 2018e).

The WCO has published data on the implementation of the RKC (WCO, 2017), however the actual implementation of the General Annex is not reported. The wording of the RKC Standard 9.9 is vague. It has been argued that it is sufficient, but the wording of the HS recommendation and article 4 TFA are more precise regarding tariff classification.

6. Examination of WCO and TFA data regarding the introduction of binding advance rulings

This study examines published data from the WCO (WCO, 2018a–m) and WTO (WTO, 2018a, 2018b) websites regarding the implementation of the WCO recommendation, the RKC ratifications and the ratifications of WTO member states regarding the TFA.

A very early paper on this topic was published in 2008, but this paper only focused on the introduction of the binding advance rulings on tariff classification according to the WCO recommendation (Weerth, 2008e).

The WCO background paper of February 2008 (WCO, 2008) showed the application of the nomenclature in each of the then 133 HS contracting parties and whether or not the above said recommendation was applied. Not all of the 133 HS contracting parties were issuing binding pre-entry information on the customs classification of goods; this result was rather unexpected since this information is vital to legal security in global trade—economic operators strongly rely on customs classifications for calculating their prices and therefore certainty is of the utmost importance. This topic had not been subject to research before, since no data was available prior to the first background paper of the WCO in 2008. Since then, the WCO has published background papers on a yearly basis. This study has been undertaken using the 2018 version of the WCO background paper (WCO, 2018d, data updated with new WCO data, see WCO, 2018e).

Table 1 shows all HS contracting parties that are applying advance rulings on tariff classification in 2018 and their TFA and RKC status.

Table 1: HS contracting parties with binding advance rulings on tariff classification and their TFA and RKC status

No	HS contracting party	TFA	RCK
1	Angola	–	+
2	Argentina	+	+
3	Australia	+	+
4	Austria	+	+
5	Azerbaijan	–	+
6	Belarus	–	+
7	Belgium	+	+
8	Brazil	+	–
9	Bulgaria	+	+
10	Canada	+	+
11	China	+	+
12	Columbia	–	–
13	Croatia	+	+
14	Cuba	+	+
15	Cyprus	+	+
16	Czech Rep.	+	+
17	Congo, Democratic Republic	–	+
18	Denmark	+	+
19	Ecuador	–	–
20	Egypt	–	+
21	Estonia	+	+
22	European Union	+	+
23	Fiji	+	+
24	Finland	+	+
25	France	+	+
26	Germany	+	+
27	Ghana	+	–
28	Greece	+	+
29	Hungary	+	+
30	India	+	+
31	Iran	–	+
32	Ireland	+	+
33	Italy	+	+
34	Japan	+	+
35	Kazakhstan	+	+
36	Korea, Republic	+	+
37	Kuwait	–	+
38	Latvia	+	+
39	Lebanon	–	–

Table 1: continued

No	HS contracting party	TFA	RCK
40	Lithuania	+	+
41	Luxemburg	+	+
42	Macedonia/FYROM	+	+
43	Madagascar	+	+
44	Malaysia	+	+
45	Maldives	–	–
46	Malta	+	+
47	Mexico	+	–
48	Mongolia	+	+
49	Netherlands	+	+
50	Norway	+	+
51	Pakistan	+	+
52	Poland	+	+
53	Portugal	+	+
54	Qatar	+	+
55	Romania	+	+
56	Russia	+	+
57	Serbia	–	+
58	Slovakia	+	+
59	Slovenia	+	+
60	South Africa	+	+
61	Spain	+	+
62	Sri Lanka	+	+
63	Sweden	+	+
64	Switzerland	+	+
65	Syria	–	–
66	Tanzania	–	–
67	Tunisia	–	+
68	Turkey	+	+
69	Ukraine	+	+
70	United Kingdom	+	+
71	USA	+	+
72	Uzbekistan	–	–
73	Vietnam	+	+

Only 72 HS contracting parties out of 157 (and the EU that is not considered as Country) have introduced the WCO recommendation on binding advance rulings on tariff classification in their national customs legislations. Of these, 56 have ratified the TFA, while 16 have not, and 62 have ratified the RKC, while 10 have not.

In 2008 the picture was different, with only 64 HS contracting parties out of 133 HS member states having introduced the WCO recommendation (Weerth, 2008e). All 28 European Union (EU) member states (and the EU itself, which is also a HS contracting party) are applying the advance rulings on tariff classification.

Only 44 HS contracting parties are applying the binding advance rulings on tariff classification which are not EU member states (Table 2). Of these, 27 have ratified the TFA, while 17 have not, and 34 have ratified the RKC, while 10 countries have not.

In 2008 only 36 HS contracting parties that were not EU member states were applying the binding advance rulings on tariff classification (Weerth, 2008e).

Table 2: HS contracting parties that are applying the binding advance rulings on tariff classification but that are not EU member states and their TFA and RKC status

No	HS contracting party	TFA	RKC
1	Angola	–	+
2	Argentina	+	+
3	Australia	+	+
4	Azerbaijan	–	+
5	Belarus	–	+
6	Brazil	+	–
7	Canada	+	+
8	China	+	+
9	Columbia	–	–
10	Cuba	+	+
11	Congo, Democratic Republic	–	+
12	Ecuador	–	–
13	Egypt	–	+
14	Fiji	+	+
15	Ghana	+	–
16	India	+	+
17	Iran	–	+
18	Japan	+	+
19	Kazakhstan	+	+
20	Korea, Republic	+	+
21	Kuwait	–	+
22	Lebanon	–	–
23	Macedonia/FYROM	+	+
24	Madagascar	+	+
25	Malaysia	+	+
26	Maldives	–	–
27	Mexico	+	–
28	Mongolia	+	+
29	Norway	+	+

No	HS contracting party	TFA	RKC
30	Pakistan	+	+
31	Qatar	+	+
32	Russia	+	+
33	Serbia	–	+
34	South Africa	+	+
35	Sri Lanka	+	+
36	Switzerland	+	+
37	Syria	–	–
38	Tanzania	–	–
39	Tunisia	–	+
40	Turkey	+	+
41	Ukraine	+	+
42	USA	+	+
43	Uzbekistan	–	–
44	Vietnam	+	–

When only 72 HS contracting parties (and the EU) are using the binding advance rulings on tariff classification this means that 83 HS contracting parties of the HS are not using this advance tariff classification ruling system (Table 3).

Table 3: HS contracting parties without binding advance rulings on tariff classification and their TFA, and RKC status

No	HS contracting party	TFA	RKC
1	Albania	+	+
2	Algeria	–	+
3	Andorra	–	–
4	Armenia	+	+
5	Bahamas	–	–
6	Bahrain	+	+
7	Bangladesh	+	+
8	Benin	+	+
9	Bhutan	–	+
10	Bolivia	+	–
11	Bosnia and Herzegovina	–	–
12	Botswana	+	+
13	Brunei Darussalam	+	–
14	Burkina Faso	–	+
15	Burundi	–	–
16	Cambodia	+	+
17	Cameroon	–	+
18	Cape Verde	–	+

Table 3: continued

No	HS contracting party	TFA	RKC
19	Central African Republic	+	–
20	Chad	+	–
21	Chile	+	–
22	Comoros	–	–
23	Congo, Republic of	+	+
24	Costa Rica	+	–
25	Côte d'Ivoire	+	+
26	Djibouti	+	–
27	Dominican Republic	+	+
28	Eritrea	–	–
29	Ethiopia	–	–
30	Gabon	+	+
31	Georgia	+	–
3 32	Guatemala	+	–
33	Guinea	–	–
34	Guinea Bissau	–	–
35	Haiti	–	–
36	Iceland	+	+
37	Indonesia	+	+
38	Israel	+	–
39	Jordan	+	+
40	Kenya	+	+
41	Kyrgyzstan	+	–
42	Lesotho	+	+
43	Liberia	–	–
44	Libya	–	–
45	Malawi	+	+
46	Mali	+	+
47	Mauritania	–	–
48	Mauritius	+	+
49	Moldova	+	–
50	Montenegro	+	+
51	Morocco	–	+
52	Mozambique	+	+
53	Myanmar	+	–
54	Namibia	+	+
55	Nepal	+	+
56	New Zealand	+	+
57	Niger	+	+
58	Nigeria	+	+

Table 3: continued

No	HS contracting party	TFA	RKC
59	Oman	+	+
60	Palestine	–	–
61	Panama	+	–
62	Papua New Guinea	+	+
63	Paraguay	+	–
64	Peru	+	–
65	Philippines	+	+
66	Rwanda	+	+
67	Sao Tome and Principe	–	+
68	Saudi Arabia	+	+
69	Senegal	+	+
70	Sierra Leone	+	+
71	Singapore	+	–
72	Sudan	–	+
73	Swaziland	+	+
74	Tajikistan	–	–
75	Thailand	+	+
76	Togo	+	+
77	Uganda	–	–
78	United Arab Emirates	+	+
79	Uruguay	+	–
80	Venezuela	–	–
81	Yemen	–	+
82	Zambia	+	+
83	Zimbabwe	–	+

Eighty-three HS contracting parties are not applying the WCO recommendation on binding advance rulings on tariff classification in 2018. Many of these are major trade partners of the EU, the US, China and Japan, such as Algeria, Chile, Morocco, New Zealand, Indonesia, Iceland, Israel, Saudi Arabia, Singapore, Thailand and the United Arab Emirates. Of this group of 83 countries, 56 are party to the TFA, while 27 are not, and 48 are party to the RKC, but 35 are not.

However, there are also countries, economic regions and customs unions that are using the HS nomenclature but are not signatory states to the HS.

Table 4 lists countries that are applying the HS nomenclature and binding advance rulings on classification but are HS non-contracting states, and shows the TFA and RKC status.

Table 4: Countries and economic regions that are applying the HS nomenclature and binding advance rulings on tariff classification but that are HS non-contracting states, and their TFA and RKC status

No	HS non-contracting party	TFA	RKC
1	El Salvador	+	–
2	Liechtenstein	+	–

Table 5 lists countries and economic regions that are applying the HS nomenclature but not the binding advance rulings on tariff classification and are HS non-contracting parties. It also shows the TFA and RKC status of these countries and regions.

Table 5: Countries and economic regions that are applying the HS nomenclature but that are HS non-contracting states, are not issuing advance rulings on tariff classification and their TFA-, and RKC-status

No	HS non-contracting party	TFA	RKC
1	Afghanistan	+	–
2	Antigua and Barbuda	+	–
3	Barbados	+	–
4	Belize	+	–
5	Bermuda	–	–
6	Cook Islands	–	–
7	Curacao	–	–
8	Dominica	+	–
9	Equatorial Guinea	–	–
10	Gambia	+	–
11	Grenada	+	–
12	Guyana	+	–
13	Honduras	+	–
14	Hong Kong, China	+	–
15	Iraq	–	–
16	Jamaica	+	–
17	Kiribati	–	+
18	Laos	+	+
19	Macao, China	+	–
20	Marshall Islands	–	–
21	Micronesia	–	–
22	New Caledonia (French Territory)	–	–
23	Nicaragua	+	–
24	Niue	–	–
25	Palau	–	–
26	Polynesia (French Territory)	–	–
27	Saint Kitts and Nevis	+	–

Table 5: continued

No	HS non-contracting party	TFA	RKC
28	Saint Lucia	+	–
29	Saint Pierre and Miquelon (French Territory)	–	–
30	Saint Vincent and the Grenadines	+	–
31	Samoa	+	+
32	Seychelles	+	–
33	Solomon Islands	–	–
34	Somalia	–	–
35	South Sudan	–	–
36	Suriname	–	–
37	Timor–Leste	–	–
38	Tonga	–	–
39	Trinidad and Tobago	+	–
40	Turkmenistan	–	–
41	Tuvalu	–	–
42	Vanuatu	–	–
43	Wallis and Futuna Islands (French Territory)	–	–
44	Andean Community (CAN)	–	–
45	Caribbean Community (CARICOM)	–	–
46	Common Market for Eastern and Southern Africa (COMESA)	–	–
47	Commonwealth of the independent States (CIS)	–	–
48	Economic and Monetary Community of Central Africa (CEMAC)	–	–
49	Economic Community of Western African States (ECOWAS)	–	–
50	Gulf Co-operation Council (GCC)	–	–
51	Latin American Integration Association (LAIA)	–	–
52	Southern Cone Common Market (MERCOSUR)	–	–
53	West African Economic and Monetary Union (UEMOA)	–	–

Chinese Taipei/Taiwan has also ratified the TFA but it is not a WCO member and therefore not listed in official WCO documents—however, it applies the HS nomenclature.

Out of this group (that is applying the HS but not the pre-entry classification information), 20 states have ratified the TFA and only three have ratified the RKC.

6. Discussion

Advance rulings on tariff classification prior to import is an important issue for economic operators (as well for the customs authorities) in order to calculate the costs of international trade and as an instrument for legal security.

The WCO issued a non-binding recommendation in 1996 (WCO, 1996), which recommended the introduction of binding pre-entry customs classifications.

In 2018, of the 157 HS contracting parties, only 72 (and the EU as a whole) have introduced the WCO recommendation on binding pre-entry customs classification in their national customs legislations (Table 1).

In 2008 the picture was different, with only 64 HS contracting parties out of 133 HS member states (Weerth, 2008e). All 28 EU member states (and the EU itself, which is also a HS contracting party) are applying the advance rulings on tariff classification.

In 2018 only 44 HS contracting parties that are applying the binding advance rulings on tariff classification are not EU member states (Table 2). In 2008 only 36 HS contracting parties that were not EU member states were issuing binding advance rulings on tariff classification according to the WCO recommendation (Weerth, 2008e).

The WCO recommendation is very similar to the EU Customs Code binding tariff information (BTI); however, the WCO binding advance rulings on tariff classification shall be valid for at least one year whereas the EU BTI is valid for three years under the Customs Code of the EU.

Most industrialised nations are applying the WCO recommendation on binding advance rulings on tariff classification, but major trade partners of the EU, China, Japan and the US are not applying the WCO recommendation on binding pre-entry information. In particular, very few developing countries have decided to introduce the binding customs information.

Apparently the WCO has not yet had the means to urge HS contracting parties to apply this useful and rather important recommendation (Weerth, 2008e).

The RKC entered into force in 2006 and governs binding advance customs rulings in General Annex Standard 9.9. Currently, 114 contracting states have ratified this convention on the simplification and harmonisation of customs procedures, but the recommendation of the HS on binding pre-entry customs classification is more specific. However, for the issue of customs valuation and origin information the RKC is an adequate choice, next to the TFA.

The TFA that entered into force in February 2017 is changing the game considerably, since now the ratifying nations are legally bound to introduce such necessary binding advance rulings on tariff classification (valuation and origin information).

There is still a long way to go for most nations because the introduction of binding advance tariff classification rulings is not an easy task. It is not only about customs laboratories or capacity building. The introduction of binding advance rulings on tariff classification requires sound training and an infrastructure that ensures that the requests are answered in an adequate timeframe and binding information is issued (and possibly revoked) according to current HS rules and classification decisions. The WCO has issued a fact sheet on the introduction of a binding advance ruling system for tariff classification (WCO, 2014a, 2014b), because the WCO is helping in the implementation of the WTO TFA (WCO, 2014d, 2016).

Under Article 5 HS, contracting parties from developed countries are asked to assist developing countries by technical (and financial) support on issues of the application of the HS and its nomenclature, when this help is required and asked for. Currently, the WCO is actively supporting, in particular, the least developed countries (WCO, 2014c).

The introduction of binding advance rulings on tariff classification in all developing countries should be assisted by the WCO—the HS council and its developed nations. The implementation of article 3 of the TFA will also be supported by the WCO (WCO, 2016).

The EU and the US (along with other major world trade nations, such as Australia, Brazil, Canada, China, India, Japan, Russia and South Africa) are issuing binding pre-entry information on customs classification and are facilitating global trade by issuing legal security on the tariff rate for their customs services and economic operators.

However, apart from the 28 member states of the EU, only 44 countries are issuing binding pre-entry customs classification rulings, which is a rather low number considering the WTO membership of 164 (WTO, 2018a) and the HS membership of 157 (WCO, 2018d, 2018e).

This legal instrument should also be available for exporters of these countries when importing into other HS contracting parties.

7. Conclusion

1. Application of binding advance rulings on tariff classification

In 2018, binding advance rulings on tariff classification prior to import are being issued by 73 out of the 157 HS contracting countries (46.50%) (Table 1). Of these 72 countries, 56 have ratified the TFA, but 16 have not, and 62 have ratified the RKC, but 10 have not.

In 2008, 64 out of 133 HS contracting parties were issuing binding advance rulings on tariff classifications (48.12%) (Weerth, 2008e).

All 28 EU member states and the EU itself (which is also a HS member state) are issuing binding advance rulings on tariff classification. Therefore, only 44 HS contracting parties that are not EU member states are applying the WCO recommendation and are issuing binding advance rulings on tariff classification (Table 2). Of this group, 27 countries have ratified the TFA but 16 have not, and 34 have ratified the RKC, but 10 have not.

In 2008 only 36 HS contracting parties that were not EU member states were applying binding advance rulings on tariff classification (Weerth, 2008e), and only 34 HS contracting parties that were not EU member states were applying the WCO-recommendation and were issuing binding advance rulings on tariff classification (Weerth, 2008e).

Most major global trade nations are applying this recommendation: USA, Australia, Brazil, China, EU, Japan, Canada, India, South Africa, Russia, Mexico, Norway and Switzerland. Furthermore, two countries that are HS non-contracting parties but WTO member states and TFA ratifying countries are applying binding advance tariff classification rulings: El Salvador and Liechtenstein (Table 4).

2. No Application of binding advance rulings on tariff classification

Of the 157 HS contracting parties, 83 are not applying the WCO recommendation on binding advance rulings on tariff classification in 2018 (Table 3), including major trading partners of the EU, US, China and Japan, such as Chile, New Zealand, Indonesia, Iceland, Israel, Saudi Arabia, Singapore, Thailand and the United Arab Emirates. Of this group of 83 countries, 56 have joined the TFA while 27 have not, and 48 have joined the RKC while 35 have not.

In 2008 advance rulings on tariff classification prior to import were not being issued by 68 of 133 HS contracting parties (Weerth, 2008e), the majority of these being developing countries.

Other recent research has shown that the application of the HS nomenclature differs throughout the HS membership since waivers for developing countries according to Article 4 HS are allowing them to introduce new versions of the HS nomenclature later or not at all (Weerth, 2017b).

3. Implementation of Article 3 TFA by TFA ratifying states

In June 2018, 137 WTO member states have ratified the TFA (WTO, 2018b).

This study has shown that binding advance rulings on tariff classification is being applied by 56 TFA ratifying states (Table 1) and two states that are WTO members but not WCO member states (Table 4)—a total of 58 states (42.34% of 137 TFA member states). Another 56 states that have ratified the TFA are HS contracting parties but are not applying the advance rulings on tariff classification (Table 3) and 20 countries that have signed the TFA are HS non-contracting parties and are also not applying the binding advance rulings on tariff classification (Table 5)—a total of 76 countries.

All in all, 114 countries have ratified the RKC, which governs binding customs information in General Annex Chapter 9.9. The RKC is an adequate legal choice for customs valuation information and customs origin information, but the HS recommendation on binding advance rulings on tariff classification is more specific.

The overall aim should be the application of advance rulings on tariff classification by all 209 countries and economic regions that are applying the HS nomenclature (WCO, 2018d). Many small steps are necessary, and there is still is a long way to go, but Article 3 of the TFA is a game changer in this story—the TFA ratifying countries are forced to introduce these binding advance rulings within the specified time. And the WCO will be supporting them to achieve this (WCO, 2014d, 2016). New introduction projects of binding advance-classification rulings are under way by help of the WCO since the TFA entered into force in February 2017, for example in Bahamas (WCO, 2018h), Costa Rica (WCO, 2018i), Cuba (WCO, 2018j), Ethiopia (WCO, 2018k), Jordan (WCO, 2018l), Botswana (WCO, 2018m), Bhutan (WCO, 2018n), Malawi (2018o), Papua New Guinea (WCO, 2018p), Nepal (WCO, 2018q) and Burkina Faso (WCO, 2108r). More and more countries will introduce binding advance rulings in the near and middle future.

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WCO, see World Customs Organization.

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Enforcement of intellectual property rights in Iran in the light of TRIPS agreement

Alireza Milani and Amir Ahmadi

Abstract

In recent years, the Iranian government has tried to develop its national intellectual property (IP) law in order to engage with the international IP system, prepare for membership of the World Trade Organization (WTO), and fulfil its obligations under the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement.

Iranian IP rights (IPR) contain provisions on civil and administrative procedures and remedies, provisional measures, and special requirements related to border measures and criminal procedures, which specify the procedures and remedies that must be available so that rights holders can effectively enforce their rights.

This study examines the underlying concepts and reasons for IPR infringement and enforcement, and the criminal and civil remedies regarding IPR. Recommendations are provided in the conclusion of this study.

1. Introduction

The TRIPS agreement codifies the international IP standards that are prerequisites to accession to the WTO—indeed, TRIPS is a significant component of the foundation upon which the WTO is established (Broadbent & McMillian, 1997). Developing nations, in their haste to enjoy the benefits of membership of the WTO, are thus bound by an agreement, the full implications of which are not largely understood. Even though most developing countries are net importers of IP and are unlikely to become net exporters (Drahos, 1997), senior policy workers from many such countries have expressed support for the globalisation of IP (Simons, 1999).

Part III of TRIPS outlines the provisions that members must follow to enforce IPRs. Members must adhere to obligations such as ensuring effective enforcement and fair and equitable procedures. The agreement also outlines the civil and administrative remedies that members must provide, including injunctions, damages and—under certain circumstances—the removal from commerce or destruction of the infringing goods. Part III also contains enforcement provisions regarding provisional measures, special requirements related to border measures, and criminal procedures (Blakeney, 2005).

Section 5 of Part III requires members to provide criminal sanctions for, at the very least, cases involving 'wilful trademark counterfeiting or copyright piracy on a commercial scale' (Article 61) and that remedies be sufficient to 'provide a deterrent consistent with the level of penalties applied for crimes of a corresponding gravity' (Article 61) (Blakeney, 2005).

There is a wide range of obligations to provide for enforcement of IPR (Article 41, TRIPS Agreement). Such enforcement procedures must 'not be unnecessarily complicated or costly, or entail unreasonable time limits or unwarranted delays' (Article 41.2, TRIPS Agreement). However, Article 41.5 makes clear that there is no 'obligation with respect to the distribution of resources as between enforcement

of IPRs and the enforcement of laws in general' (Article 41.5, TRIPS Agreement). Thus, the enactment of a legislative IPR framework in compliance with TRIPS is not an end in itself: 'Enforcement is more difficult than it seems, and is often taken for granted by the mere existence of a law or a treaty' (Gakunu, 1989; Simons, 1999).

What seems to be a fairly comprehensive outline of civil, administrative and criminal remedies may be severely limited by virtue of Article 41.5. Narrowly read, the provision merely states that members are not required to put in place a system of judicial enforcement entirely distinct from that state's already existing court system. However, the language that emphasises that a member state's autonomy in distributing resources between IP enforcement and general law enforcement may have a significant impact in developing countries, where governments have limited resources to dedicate to enforcement of IP laws (Simons, 1999).

The TRIPS agreement contained some of the principles of the General Agreement on Tariffs and Trade (GATT), namely that the nationals of countries party to the agreement should accord the same treatment to the nationals of other countries that are party to the agreement: the most favoured nation's concept. The national treatment gives the party to the Marrakesh convention the right to retaliate in another domain of the agreement if the party's IPRs are infringed in a member country if that country hasn't taken any measures against the infringer.

Here we are faced with the anomaly of how to harmonise the national laws with the international agreements. In this sense, we can mention two types of agreements: the self-executing agreement, which should be implemented in its entirety; and the non-self-executing agreement, which needs to be enacted in the national laws with a margin of flexibility in adapting the international provisions to the national legislations.

The TRIPS agreement contains elements that reflect both types of international instruments. Specifically, it contains the imperative part of its provisions (such as the national treatment and the provision of Article 14 concerning the protection of performers, producers and broadcasting organisations), and other provisions, which need to be elaborated and construed in the national laws in a manner more appropriate to them. Of course, the TRIPS agreement excluded Article 6 (bis) of the Berne Convention from its provisions, which concerns the moral rights, and thus it leaves the door open to parties that are not members of that convention to deal with matters in the manner that suits them.

In this regard, the process of joining the WTO, even at the same level of obligation as existing members, may require a substantial adjustment in national law and corresponding industrial policy. The impact of bringing national law into baseline or 'normal' TRIPS agreement compliance should not be underestimated. Iran is required to conform its domestic laws on IP to this agreement. Naturally, this accession would give rise to some rights and commitments for that country.

For any country that has not been a member of the WTO, there is a strong possibility that the national regime governing IPRs in place prior to the commencement of accession negotiations will be inconsistent with the requirements of the TRIPS agreement.

Accession of TRIPS agreement is necessary for the WTO membership, which ensures Iran's entry into the multilateral trade regime. Hence a country that wishes to join the WTO, like Iran, has to implement the TRIPS agreement.

Iran is not an exception regarding the abovementioned trends. The need to revamp the IP system of the country has been fuelled by WTO membership aspirations as well as internal debates. However, a study that paints a coherent picture of the IP landscape and takes stock of the latest debates is still missing. This paper attempts to achieve this end by drawing on diverse sources of information, including extant literature, legislations, policy documents, official statements and expert commentaries.

Iran joined the Paris Convention in 1959, which protects agricultural, industrial and commercial property. Though Iran has not yet joined to the Berne Convention, by approving different laws regarding the property of authors, composers, artists, software designers and inventors, Iran protects them. In the history of Iranian law, protection of industrial property takes precedence over literary and artistic property. There is dispute among Islamic jurists and scholars about the legitimacy of moral rights and that is the main reason of Iran for not joining to the Berne Convention.

Member states of the WTO must ensure that their national IP legislations compliy with the TRIPS agreement. In this regard, the majority of the WTO members have revised their national IP laws within the framework of the TRIPS agreement. However, taking into account that the enforcement of any law is an important part of any regulation that comes about in the society and is accepted by the people, the question thus arises: How much is the international IP law consistent with Iran law?

Here, we are faced with the core questions of this paper: How can the states' parties deal with the provisions of the TRIPS agreement? Do they adopt or adapt these provisions to their national laws? How can they strike a balance between the national interests and the international obligations dictated by the Marrakesh Agreement? Here we explain how the Iranian legislators dealt with the TRIPS provisions—that is, the paper explains how they adapted their laws to the general principles of TRIPS. It is important to highlight the relationship between the national legislation and the norms of globalisation triggered by the Marrakesh Agreement of 1994, which concluded the Uruguay Round.

Therefore, of great importance to this research is the connection between the implementation of the TRIPS requirements and other laws, and in particular, how the Iran legislators dealt with the TRIPS provisions. In this paper, a case study of the Islamic Republic of Iran IP law will be reviewed. This case study will show how Iran developed their IP laws and consequently prepared their national IP system for enforcing the TRIPS agreement.

On this issue, little discussion and study has been done so far. Once a proper study has been conducted, a proper answer to this question will facilitate the enforcement of the TRIPS agreement provisions by both government and the people. It will also pave the way for further IPR research and new developments in the subject.

This study will analyse and evaluate current Iran's legislation, including trademarks, copyrights and patents. The methodology adopted in this study is reflective of traditional Iran IPR laws and international IPR conventions. This study aims to illustrate the current state of IPRs in Iran in light of certain international agreements, specifically TRIPS, that have informed the Iran legislature in its creation and handling of IP matters.

Thus, this paper describes in detail how enforcement of IPRs should be handled, including rules for obtaining evidence, provisional measures, injunctions, damages and other penalties in Iran's IPR system. It covers the need to have a strong judicial system for dealing with both civil and criminal offences. Further, to deal with such cases the courts have to have an adequate number of judges. The courts should have the right, under certain conditions, to order the disposal or destruction of pirated or counterfeit goods. Wilful trademark counterfeiting or copyright piracy on a commercial scale should be criminal offences. Government should make sure that IPR owners can receive the assistance of customs authorities to prevent imports of counterfeit and pirated goods. Further, Iran sees technology transfer as part of the arrangement in which they have agreed to protect IPRs. The IPRs of Iran include a number of provisions on this. For example, it requires government to provide incentives for their companies to transfer technology to Iran.

This paper deals with domestic procedures and remedies for the enforcement of IPRs. IPRs of Iran contain provisions on civil and administrative procedures and remedies, provisional measures, special requirements related to border measures and criminal procedures, which specify the procedures and remedies that must be available so that right holders can effectively enforce their rights.

The research methodology used in this study is qualitative, using mostly documents and publications. This study utilised many different sources, including books, journal articles, websites and various convention documents and written laws concerning IP and Islamic law. The scholarly publications were used to explore the emerging legal trends in the international context.

Such publications may have revealed things that have taken place before this study started. It was anticipated that the qualitative approach to the study would allow the researcher to do a thorough analysis of written laws and texts of various countries and conventions to evaluate how they are implemented in different contexts.

2. Measures to control abuse of intellectual property rights

2.1 Copyright

The fourth chapter of the Act on the Protection of the Rights of Authors, Composers and Artists (1970) addressed the issues of infringement and punishment, and provided for a punishment of corrective imprisonment for a period from three months to three years.

In accordance with Article 23 of the Act, if a person publishes, broadcasts or communicates to the public, wholly or partially, another person's work which is protected by the Act, in their own name or in the name of the author without authorisation thereof, or in the name of a person they know to be other than the author, they shall be condemned to imprisonment for a period from six months to three years. Further, pursuant to Article 24 of the Act, if a person prints, distributes or publishes another person's translation in their own name, or in the name of a person other than the author without authorisation thereof, they shall be liable to imprisonment for a period from three months to one year. And, by virtue of Article 25 of the Act, the following cases of infringement shall be subject to imprisonment from three months to one year (Azizi, 2003):

1. To make use of the name, title and special hallmark of a work for another work of the same or similar kind in a misleading manner.
2. Failure to mention or introduce the author's name, title or special hallmark of a work along with the work or on the original copy or printed or reproduced copies thereof, on the part of transferees, publishers and those authorised, under the law, to use, refer to, or adapt the work for commercial purposes.
3. Any alteration, distortion or mutilation of the works protected by the law and the publication thereof without the author's permission.
4. Failure, on the part of printing offices, recording companies, workshops and persons in charge of printing, publishing, distributing, recording or reproducing the works protected by the law, to mention the number of printing, recording, reproducing, distributing and publishing as well as the number of printed copies, serial number of phonograms, date and the name of concerning printing office, company or workshop on all copies to be distributed (Naseri, Toorang, & Sheikhmoradi, 2016).

The judicial consideration of infringements shall be terminated by the waiver of the private plaintiff. Furthermore, according to Article 13 of the Act on the Protection of Computer Programs (2000), in case of infringement of the rights protected by the Act, the infringer shall, in addition to payment of the right holder damages, be liable to imprisonment from 91 days to six months, as well as payment of monetary fines from 10 to 50 million Rials.

Pursuant to Article 19 of the Act, buying and making use of illegal textual programs by governmental entities and their affiliated agencies whose subjection to laws and regulations requires mentioning their names are prohibited (Naseri et al., 2016).

Under Article 29 of the regulations, the High Council of Informatics and the Ministry of Culture and Islamic Guidance shall protect copies of programs that are given to them for approval and registration with a view to preventing the access of third parties to their content without the consent of the owners of the economic rights of the programs. In cases where a complaint is lodged by the owner and infringement is established, the case shall be heard by administrative or disciplinary panels and the appropriate administrative punishments shall be imposed (Jalilian, 2015; Shekarchi, 2003).

2.2 Trademarks

There are provisions in the Islamic Penal Code (1996) regarding penalties for illegal uses of the marks of public and private entities. In accordance with Articles 525–530 of the code, if a person forges seals, stamps or marks of public entities or companies, or uses or imports them while cognisant of the forgery or deceit, they shall, in addition to payment of the damages suffered by the rights holder, be subject to imprisonment from one to 10 years; if a person forges seals, punches or marks of non-governmental public entities such as municipalities, or uses them while cognisant of the forgery, they shall, in addition to payment of the damages caused to the rights holder, be condemned to imprisonment from six months to three years; and if a person forges seals, punches or marks of duly established non-governmental companies, or uses them while cognisant of the forgery, they shall, in addition to compensation of the damages sustained by the rights holder, be sentenced to imprisonment from three months to two years. Pursuant to Article 18 of the Trademarks and Patents Registration Act (1931), any beneficiary enjoys the right to file a lawsuit in the courts of Tehran and request the cancellation of a registered trademark (Goodarzi & Bagheri, 2006).

As it is not binding to register a trademark, by virtue of Article 1 of the Act, persons with a priority right based on the continued prior use of a trademark the registration of which has been applied for by another person, can have recourse to the court and restore, subject to the establishment of their continued prior use, their rights with respect to the trademark. If the trademark has not yet been registered, the court shall accord the priority right to the person claiming continued prior use. And if it has already been registered, the court shall order that the former registration is cancelled, and the trademark is registered in the name of the person claiming continued prior use.

Furthermore, pursuant to Article 40.12 of the Customs Affairs Act (1971), a good which, or the wrapper of which, bears an address, the name of an enterprise, a mark or other characteristic which misleads buyers or consumers as to its producer, place of production or main characteristics or qualities, shall not be importable (Soleimani, 2012).

2.3 Patents

According to Article 29 of the Trademarks and Patents Registration Act (1931), the person who first applies for the registration of an invention shall be presumed to be the inventor, unless the contrary is proved in competent courts. And, in accordance with Article 37 of the Act, in following cases, any beneficiary enjoys the right to have recourse to the court and request the cancellation of a patent when:

- the relevant invention is not a new invention
- the patent has been issued without due regard to the provisions of Article 28 of the Act with respect to the items excluded from patentability
- the invention is of a purely scientific nature and not capable of industrial or agricultural application
- no practical use has been made of the invention for five years as of the date of issuance of the patent (Ministry of Commerce, 2009).

3. Enforcement

One of the objectives of regimes putting IPRs on the agenda of the Uruguay Negotiation was the lack of effective enforcement in the existing international IP regime before the TRIPS agreement. For an evaluation of the enforcement of international regulations, one should consider this matter from national and international perspectives (Yu, 2009).

The international dimension of enforcement of the TRIPS agreement is usually discussed under the settlement of the dispute mechanism of WTO, use of trade sanctions or the threat of trade sanctions for the enforcement of the TRIPS provisions (Yu, 2009).

On the other hand, there is the aspect of national enforcement dealing with the subject of the possibility of private individual action before courts of the member states. This aspect is in direct relation to the legal conditions of the member countries of the TRIPS agreement.

The national aspect of the enforcement subject is more important and, in fact, complements the international enforcement mechanisms. International IP laws are insignificant without effective enforcement mechanisms in national law.

Most of the enforcement mechanisms provided in the international IP treaties, including the TRIPS agreement, rely on their members' own judicial systems to enforce their regulations (Cychosz, 2003).

Taking into account the importance of the subject of enforcement, we see that the World Intellectual Property Organization (WIPO) member states decided in 2002 to establish an advisory committee on enforcement to deal with issues such as the coordination among the public and private sectors on combating infringement of IPRs and improving public awareness of IP enforcement issues among the member states. In this regard, Part III of the TRIPS agreement establishes a comprehensive enforcement system (Knapp, 2000). It allocated a large part of its regulations regarding the measures which should exist in the legal system of the WTO members for enforcement of the IPR. It asked its member states to ensure that enforcement procedures as determined in the agreement are made available in their national laws; inter alia, 'expeditious remedies to prevent infringements and remedies which constitute a deterrent to further infringements'. Members to the TRIPS agreement, therefore, have an obligation to specify measures under their national laws to permit effective action against infringement (Article 41.1).

The judicial and administrative procedures concerning IPRs should be 'fair and equitable' and not unnecessarily complicated (Article 41.2), and the decisions of the courts and administrators should be based on evidence. However, the required procedure must be 'applied in such a manner as to avoid the creation of barriers to legitimate trade and to provide for safeguards against their abuse'. The procedure should also be fair and equitable. They must not be unnecessarily complicated or costly (Article 41).

The TRIPS agreement also requires that WTO members provide civil and administrative procedures for the enforcement of the IP provisions (Blakeney, 1996). The document also requires, in Articles 51–60, for its member states to take some special border measures (Reichman, 1996). Iranian IP system also had great developments in enforcement—under the new Iranian IP system, both the administrative and judicial procedures for enforcement of the IP law have been developed.

3.1 Civil judicial procedures and remedies

Pursuant to Article 46 of the Trademarks and Patents Registration Act (1931), civil and criminal actions concerning patents or trademarks shall be considered by the courts of Tehran. As provided by Article 48 of the by-law of the Act, the following documents shall be annexed to the petition lodged by the applicant for registration of a trademark or invention, in case their application is rejected under Article 7 of the Act:

- original or certified copy of the decision rejecting the application for registration
- applicant's complaints against the said decision
- receipt of the deposit as per Article 47 of the by law of the Act with respect to making a deposit to cover the defendant's losses in the event of applicant losing the case
- power of attorney, in case the petition has been submitted through an attorney (Bagherpour, 2013).

According to Article 49 of the by-law, the court shall fix the date of the hearing and notify the plaintiff as well as the officer in charge of the branch office mentioned in Article 6 of the Act to be present on the said date. On the day of hearing, the court shall hear the arguments of both parties and give a verdict (Azizi, 2003). The absence of either party at the hearing shall not stop a verdict being delivered, and the verdict against the absent party shall be deemed as pronounced in their presence.

With regard to complaints about the rights of authors, composers and artists, the plaintiff may bring an action in court, and the court will set the date of hearing and invite the parties to attend (Soleimani, 2012).

The new Iranian IP law simplified the issue of infringements by providing that any use of patent and other exclusive rights which was accounted for under Article 15, including the 'making, importing, offering to the market, selling and storing the goods for selling; and when the patent relates to a process, use of that process and all the abovementioned rights regarding the product as a result of that process', constitutes an infringement of the patent rights. Accordingly, the patent owner has the right to take legal action against the infringer before a special branch of the Public Court of Tehran (Article 59).

The ability to refer all IPR litigations to a branch or branches of the Public Court of Tehran is important from the point of specialty.

The most important difference between the previous Patent and Trademark Law (1931) and the new IP law is that the new law provides extra compensation. Under the new law the infringer may be sentenced to payment of 10,000,000–50,000,000 Rail or three to six months in jail, or both (Article 61).

The second most important difference between the previous patent law and the new law is that under the new law, the judiciary is obliged to allocate a special branch or branches of the Public Court of Tehran for processing the claims relating to IPRs (Article 36). Whereas under the previous IP law, IPR claims proceed only under the general Tehran Public Courts, not a special branch of them (Article 46 of the Trademark and Patent Registration Law 1931).

Another important point is the period of proceedings and expenses. Internationally, IP litigation is a very time-consuming and expensive process—it usually takes several years and at least several thousands of dollars (Cychosz, 2003). However, the IP litigation under the Iranian judiciary system is not so different from other types of litigation and is not a time-consuming and expensive process.

3.2 Provisional measures

In accordance with Article 63 of the by-law of the Trademarks and Patents Registration Act (1931), the owner of a trademark, as well as the owner of a patent, or their legal representative may, upon order of the local court of the place the contested goods are located, make a detailed list of such allegedly counterfeit goods.

The execution of the said order shall be carried out by customs officials, if the goods are still in customs, or else by a bailiff. The attachment of the goods may only be affected if the court expressly so orders (Bagherpour, 2013). If the owner of the trademark or patent petitions for the attachment of the said goods, they shall give sufficient security for the recovery, if necessary, of all damages suffered by the other party, including loss of prospective profits.

By virtue of Article 64 of the by-law, the plaintiff may, at any time, petition the judicial authorities considering the case to issue an injunction to secure the evidence, or to attach the counterfeit goods, or to prohibit the manufacture, sale or importation of those goods. The judicial authorities shall agree to these petitions.

Pursuant to Article 29 of the Act on the Protection of the Rights of Authors, Composers and Artists (1970), whilst considering the private plaintiff's case, the judicial authorities may, as appropriate, order bailiffs to prevent publication, distribution and communication to the public and seizure of the works in question. Such orders shall be issued based upon the recommendations of relevant experts (Soleimani, 2012).

3.3 Any administrative procedures and remedies

The Ministry of Culture and Islamic Guidance is in charge of affairs concerning literary, artistic and scientific works. The relevant disputes are considered there on a conciliatory basis. The procedures of the Commission of Dispute Settlement at the Ministry are as follows: after communicating the petition to the defendant and receiving their reply, the parties to the dispute are invited to participate in a session to consider and determine the commitments of each party. If a compromise is reached in the session, consideration of the case comes to an end; otherwise, further sessions will be held with a view to arriving at an agreement between the parties. If these efforts fail, the case would be referred to the court (Moeini, Bayanati, Givi, & Soheili, 2013).

As regards computer programs, in accordance with Article 46 of the by-law of the Act on the Protection of Computer Programs, the Provincial Disciplinary Council shall consider natural and legal persons' petitions concerning professional, disciplinary and order-related offences. In case the offences are criminalised in penal laws, the Council shall refer the cases to the courts to consider their criminal aspects (Goodarzi & Bagheri, 2006).

Under Article 50 of the by-law, the Provincial Disciplinary Council shall hear all received petitions. In the event that a complaint is deemed irrelevant or beyond the jurisdiction of the Council, the irrelevancy or lack of jurisdiction shall be declared. Otherwise, having heard the defences, the Council shall decide. As per Article 51 of the by-law, the Council may issue an oral warning, written reprimand and/or provisional prohibition of activity. Further, order-related and disciplinary offences and their respective penalties have been enumerated with regard to their conditions, frequency and grades in Article 52.

According to Article 54, decisions of the Disciplinary Council can be appealed within one month. Pursuant to Article 55, every province shall have an Appellate Council to consider all appeals. All judgments and punishments up to grade no. 4 rendered by the Council shall be final and binding, but punishments of grade no. 5 shall, subject to the request of defendant, be reviewable by the General Disciplinary Council. As provided in Article 56, this Council has five members and its decisions shall be valid and binding by three positive votes (Soleimani, 2012).

3.4 Special border measures

Articles 51–60 of Section 4 of the Enforcement Part of the TRIPS agreement makes specific requirements regarding border measures for IPRs. Under this section of the TRIPS agreement, the national customs of the WTO members have an obligation to enforce border control. They should choose the methods that would enable them to protect foreign and national IPRs in a practical way. In relation to this subject, Article 51 of the TRIPS agreement requests that members of WTO provide procedures and systems that enable the owners of the IPRs to request that the judiciary or administrative authorities suspend the release into free circulation a counterfeit trademark, pirated copyright or other IPR infringements by customs authority when they have valid reasons for suspicion. The role of customs staff in the enforcement of these provisions is therefore very important. In this regard, the member countries of WTO also need proper national customs laws to enable their customs authorities to fulfil their obligations (Kumar, 2004).

As noted above, in accordance with Article 40.12 of the Customs Affairs Act (1971), a good which, or the wrapper of which, bears an address, the name of an enterprise, a mark or other characteristic which misleads buyers or consumers as to its producer, place of production or main characteristics or qualities, shall not be importable.

Under Articles 51 and 52 of the Act, the authority responsible to examine disputes arising from enforcement of the customs regulations and general export-import regulations is the Commission for Customs Disputes. In case an appeal is made to the Commission's decision, the decision shall be reviewed by the Revision Commission the ruling of which shall be final and binding (Bagherpour, 2013).

In other cases, customs authorities shall, upon the issuance of provisional injunctions by competent courts, take appropriate measures to prevent the importation of the goods in question and to make a list thereof (Amoli & Shamsavari, 2006).

The new customs law of Iran, ratified by Parliament in 2011, replaced the custom law of 1971. Under the previous custom law only the importation of counterfeit trademarks was forbidden and there was no regulation for the rest of the IPRs. The new customs law was prepared in accordance with the Model Law of the International Customs Organization (Banyi, 2004).

The new customs law provided a way to respond to the country's obligations to the TRIPS agreement in the case of WTO membership.

3.5 Criminal procedures

Petitions concerning trademarks and patents shall be heard only by the courts of Tehran. As to criminal cases, if the crime or infringement takes place or is discovered or the accused is arrested outside Tehran, the preliminary investigation shall be carried out in the place of occurrence or discovery of the crime, or the arrest of the accused, and the records shall be sent to the Court of Tehran for adjudication.

With respect to trademarks and patents, the plaintiff may resort to both civil and criminal procedures. Pursuant to Article 49 of the Trademarks and Patents Registration Act (1931), damages claimed in civil or criminal cases concerning patents and trademarks shall include damages inflicted on the right holder as well as his loss of prospective profits.

In case of a serious and evident infringement of copyright, such as piracy, the right holder may also have recourse to criminal procedures. And, in case of invoking both civil and criminal procedures, criminal case must be instituted and adjudicated first (Rezapour et al., 2007).

4. Conclusion

The case study of the Iranian IP system indicated that there was enormous development in the Iranian IP law. In this regard, a new patents, industrial design and trademark law, within the framework of the TRIPS agreement, was approved by Iranian Parliament in 2008. International IP conventions are the basic tools for harmonising the national IP law of different countries (Sarkissian, 2008).

Iran, in order to facilitate nationally and internationally the protection of IPRs and to prepare the national economic and industrial sectors for the implementation of the international IP law, especially TRIPS agreement and for the purpose of accession to WTO, must meet some prerequisites; among the measures for satisfying those requirements, currently, the issue of Iran's membership in the WIPO is being discussed in the Islamic Consultative Assembly, the Islamic Republic of Iran Parliament. Upon accession to WIPO, Iran will be admitted to many conventions relating to this organisation, inter alia, the TRIPS Madrid and Bern Conventions (Riasi & Amiri Aghdaie, 2013).

Such accessions are important for national and international intellectual property owners because they provide and accelerate protection of all national and foreign IPR in Iran and abroad. The Iranian IP system has also seen great development from the point of the enforcement; the Iranian government has undertaken great steps in this regard. Under the new Iranian IP system, both the administrative and judicial procedures for enforcement of the IP law developed.

The new customs law of Iran, ratified by Parliament in 2011, replaced the custom law of 1971. The new customs law was prepared in accordance to the Model Law of the International Customs Organization and in a way to respond to the country's obligations under the TRIPS agreement in the case of WTO membership.

Merely having IP laws is not enough—they must be enforced in a proper way. The extent of protection and enforcement of IPRs varies widely around the world, and as IP becomes more important in trade, differences crop up between nations, especially in economic relations. Internationally acceptable trade rules for IPRs are a way to introduce more international order and predictability, and for disputes to be settled more systematically.

Enforcement of IPRs is covered under of conventions of IPRs. These conventions say governments have to ensure that IPRs can be enforced under their laws, and that the penalties for infringement must deter further violations. The procedures must be fair and equitable, and not unnecessarily complicated or costly. They should not entail unreasonable time limits or unwarranted delays. Parties involved should be able to petition a court to review an administrative decision or to appeal a lower court's decision. They must be able to take action against infringers in order to prevent further infringement and recover the losses incurred from any actual infringement.

However, there is a change in the attitude in many countries, mainly in view of the alarming growth of piracy activities. A number of countries have introduced heavy penal sanctions for certain kinds of infringements of copyright, in particular such which would be considered as piracy. Penal sanctions should, and in most countries do, include both fines and imprisonment, the maximum of which may be up to several years. If penal sanctions are to work satisfactorily, the objective criteria for the infringement must be clearly defined. This means that the rights should be framed and described in a clear and unequivocal way so that it is obvious which the act or acts are which must not be undertaken without the authorisation of the author or other rights owner. Also, the so-called subjective criteria must be determined clearly. At least in some national laws the penal provisions for copyright violations apply not only to acts that are committed wilfully, but also to those committed with gross negligence. The sanctions should be applicable not only to the person who directly committed the violation but also to those who contributed to it, for instance by providing equipment used for unauthorised reproduction with full knowledge of the intended use of that equipment (World Intellectual Property Organization, 1997).

Due to the importance of the protection of IPRs as one of the necessary infrastructures for supporting and promoting innovation in society, policy makers in different countries are trying to prepare the required backgrounds for promotion and development of IPRs assets at a national level. Therefore, Iranian policy makers should adopt strategies for promoting the protection of IPRs as well as the management and development of IP assets. These strategies are categorised in four main categories (Cowan & Harison, 2001): developing national IPR strategy; formulating and enforcing necessary laws; providing good infrastructures; launching proper educational and training programs; awareness building on different aspects of IPRs; promoting maximum use of worldwide patent information.

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An explorative study into the effectiveness of a customs operation and its impact on trade

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Abstract

There is a lack of overall efficiency in Sub-Saharan Africa's logistics systems, with a large contributor to this problem being inefficient customs processes and unnecessary customs delays. Many comparisons have been drawn between the levels of efficiency of different countries and regions, especially in recent trade facilitation research, and some models have been developed to demonstrate how the efficiency of a customs operation can potentially be improved. The development of effective policies, strategies and operational procedures, supported by business intelligence and predictive models, however, depends on an in-depth understanding of the reasons for long delays in the customs process. There are multiple factors impacting the customs and logistics process; in order to progress towards improved solutions it is essential to identify the areas of worst performance, their common denominators and the underlying causes that contribute to low observed performance. This requires exploratory analysis of a large set of data representative of an overall customs operation. This article describes the first attempt to analyse transaction-level data and derive exploratory statistics representative of customs operations as implemented in South Africa. The most important process outcomes from the perspective of both trade and customs are defined, the key input factors are identified, and performance measures are extracted from data exchanged between the customs authority and cargo consignors during the period September 2014 to September 2016. The time duration per category for the completion of the customs process was measured, as well as the effectiveness of the customs authority in screening consignments for inspection. The study indicates that, for the selected dataset, of all shipments delayed by customs, more than 90 per cent were delayed unnecessarily, indicating inefficient risk identification in the South African customs process. This study highlights the need for improved customs processes in the southern African context to ensure more efficient trade.

1. Introduction and background

Customs authorities aim to balance revenue collection and safeguarding citizens, while facilitating efficient cross-border traffic of people and goods. The increased risk to individuals, and the private and public sectors represented by global goods shipments, has been a driving force behind vigilance by customs and regulatory authorities in different countries.

Historically, many customs administrations have used risk-averse approaches, requiring 100 per cent inspection of all shipments, conveyances, crews and passengers. As this approach today would not be practical, the private sector has applied pressure to minimise government intervention in commercial transactions (Widdowson, 2007, p. 32). Today, a more holistic approach is required to optimise international supply chains. Customs administrations are therefore searching for more efficient risk management processes, including risk identification prior to shipping to ensure compliance while reducing unnecessary time and cost delays. Systematically implementing risk management strategies at strategic, operational and tactical levels ensures that customs administrations better protect their citizens from threats to health, safety and security, while supporting economic growth through efficient transit times (Finger et al., 2010, p. 3).

In the African context, efficient transit times have been a large concern. Many African countries are heavily reliant on the revenue obtained from tax collection, which often results in conflict between customs authorities and the private sector. Delays in the southern African region are especially high, which has a direct financial impact on the private sector (Hoffman et al. 2016, p. 252). Some studies have shown that poor customs procedures are one of the largest contributors to delays in Africa (UNECA, 2013; USAID, 2015).

Customs modernisation in developed countries has also started to shift responsibilities from customs to traders, as per SAFE Pillar II (World Customs Organization, 2015). In the past, customs compliance was checked by customs authorities at the border. Should there be any discrepancy in the documentation, the shipment would remain 'stuck in customs' for as long as it took to resolve the discrepancy (Truel, 2010, p. 65). To alleviate supply chain pressures, traders have demanded a separation between the clearance and the release of goods (Khan & Zsidisin, 2012, p. 56). Customs in many countries have responded by introducing simpler clearances, supported by audit-based controls at the traders' premises (Truel, 2010, p. 45).

Automated risk assessment of transaction-level data can be a useful tool to identify potential risk indicators even before the goods are loaded at the place of origin (Manners-Bell et al., 2014, p. 2; Baldwin, 2016, p. 201). New technologies can also help reduce corruption by eliminating opportunities for tampering with sealable, traceable cargo (Finger et al., 2010, p. 36). Some examples can be found in the literature, as outlined below.

Komarov (2016) studied automated risk assessment by Ukrainian Customs. The system creates risk profiles to enable automated selection of high-risk transactions by dividing transactions into risk categories: high risk or 'red' (representing 4.34% of transactions) are subjected to physical inspections, 'yellow' (15.60%) to documentary checks, 'light green' (6.48%) to 'information massage' while the remaining 'green' transactions (73.58%) are not subjected to further checks. However, Komarov provided little detail about the data used and how the relationships between inputs and risk outcomes are established. Neither the extent to which customs interventions impacted time delays nor the success of the system's ability to find actual infractions were accurately quantified.

In a Senegalese country study, Laporte (2011) applied regression models to calculate a risk outcome that reflects the probability of an infraction on a transaction basis, using six variables: importer, freight agent, HS classification, origin, provenance and customs regime. The study claimed that this model enabled the filtering of high-risk transactions so accurately that more than 96 per cent of all infractions could be found by inspecting only 20 per cent of consignments. In a subsequent study, Davaa and Namsrai (2015) extracted a similar model from Mongolian customs data to predict infraction probability, using the following input variables: HS classification, importer, country of origin, customs terminal code, customs broker and type of transportation means. The level-of-risk prediction accuracy that they achieved was not quite as impressive as those obtained by Laporte; their model could classify consignments so that the incidence of infractions increased from 0.05 per cent in the lowest risk category to 0.22 per cent in the highest risk category.

The existing research demonstrates the value of a non-intrusive data analytics approach to customs risk management. No consistent set of inputs factors have yet been identified to be included in such a customs risk management model. Furthermore, the cited references provided no quantified indication of the relationships between the input factors and the operational customs performance. Such an analysis will indicate which areas of the overall customs operation suffer the most from inefficiencies, and whether specific types of cargo or specific entities seem to be unfairly targeted.

There is little empirical evidence that customs authorities in southern Africa are using well-designed statistical systems to identify possible high-risk transactions. Existing processes combine simple criteria, such as the importer code, the origin of the goods and the applicable tax regime, and do not appear to apply sufficient statistical techniques and data analysis. Laporte (2011, p. 18) highlights the poor application and use of ASYCUDA (Automated System for Customs Data), as well as the use of outdated versions. The authors of this paper have also estimated the impact of long cross-border delays on the southern African region and recommended better data analytics to streamline customs processes (Hoffman et al., 2016, p. 263). This paper aims to continue previous work by investigating input–outcome relationships for customs processes currently applied in South Africa in order to measure the extent and identify the primary reasons for customs delays.

This paper uses transaction-level data that was obtained from South African freight forwarders. The paper aims to quantify the impact on customs delays resulting from stops and inspections, and the efficiency of decisions taken by the current customs system. The paper is structured as follows: in section 2 we describe the data used in the study and in section 3 the methodology used to extract information from this data. Section 4 provides results and findings, and section 5 concludes with recommendations.

2. The data

Data was obtained from several freight forwarders in South Africa, in accordance with an agreement between the North-West University (NWU) and the South African Association of Freight Forwarders (SAAFF). The data represents transaction-level flows exchanged between the South African Customs Authority (SARS) and consignors of goods imported into South Africa between September 2014 and September 2016. The data includes approximately 3.5 million transactions over this time.

For each transaction the following information was obtained:

- times and dates when electronic declarations were submitted by consignors and received by SARS
- name of the customs office where declarations were submitted
- HS code
- customs value
- mode of transport through which goods entered into South Africa
- Customs Procedure Codes (CPC) reflecting the reason why goods were imported into South Africa
- country of origin, export and import (some goods may be in transit via South Africa en route to a final destination elsewhere in southern Africa)
- codified identity of the entity submitting the customs declaration (preserving the anonymity of the declarants)
- detailed set of customs response codes communicated to the declarant for each transaction, together with the time and date for each code.

Table 1 provides a summary of these input factors and the level of detail that was included in the data.

Table 1: Input factors reflecting customs declaration processes

Input factor	Number of categories	Examples
Import /export	7	Imports, Ex-bond, In transit
Customs office	36	Durban, Cape Town
CPC code	31	10, 11, 12
Previous CPC code	23	00, 14, 20
Country of origin	237	GB, CN, GE
Country of export	222	GB, CN, GE
Country of import	197	ZA, ZM, ZW
Transport code	9	Ocean, Road, Rail
Consignors	310	#0, #1, #7
HS code	18	Animal, Chemical

Table 2 provides a summary of the customs response codes that can be received for any given transaction and indicates the actions required by customs for that specific transaction.

Table 2: Customs response codes

Customs response code	Description
1	Release
2	Stop for physical inspection at unpack depot or X-ray scanning
4	Refer to other governmental agency (OGA)
6	Reject declaration
13	Supporting documents required
26	Request adjustment to declaration
27	Accept
31	Request additional supporting documents
33	Supporting documents received
36	Booked for physical inspection

3. Methodology

The approach that was applied to extract meaningful information from the available dataset consisted of the following sequential steps:

1. **Identify the factors impacting customs processes**. Those inputs that could affect the customs process were identified through discussions with SAAFF members and included in the set of data, as reflected in Table 1. The importance of each input factor was also confirmed through correlation analysis.
2. **Define the sequential steps through which consignments are processed.** The customs process is not limited to a fixed number of sequential steps, as described in Table 2. Analysis of the data indicated thousands of different combinations of possible response codes. It was therefore necessary to identify specific combinations of response codes that represent specific types of customs decisions.
3. **Identify the primary customs outcomes.** From the many possibilities the following set of primary outcomes were defined (see Table 3):

Table 3: Description of customs codes and outcomes

Outcome	Condition
1. Not stopped	no code 2, 36, 13, 31, 4
2. Stopped	code 2
a. Not inspected	no code 36
i. Not amended	no code 6 or 26
ii. Amended	code 6 or 26
iii. Accepted	code 27
b. Inspected	code 36
i. Not amended	no code 6 or 26
ii. Amended	code 6 or 26
iii Accepted	code 27
3. Request additional docs	code 13 or 33
i. Not amended	no code 6 or 26
ii. Amended	code 6 or 26
iii. Accepted	code 27
4. Refer other government agency	code 4
i. Not amended	no code 6 or 26
ii. Amended	code 6 or 26
iii. Accepted	code 27

4. **Quantify the time impact for each possible outcome.** After all transactions were categorised according to the above input factors, the following set of statistical parameters were measured for each category:
   i. total time duration per observation measured from the time and date of submission until the final customs outcome (acceptance, rejection, amendment or referred)
   ii. number of observations (each declaration regarded as an observation) per input category and per outcome
   iii. fraction of total observations per input category and per outcome
   iv. average, median and standard deviation of time duration for all observations, per input category and per outcome
   v. fraction of total observations that were found to contain customs infractions[1]
   vi. average, median and standard deviation of time duration for each type of outcome, found to contain infractions
   vii. fraction of all declarations interrupted by customs that contained infractions
   viii. fraction of total time delay represented by each outcome, by different infraction types and by interrupted declarations not containing any infractions
   ix. repeating each measurement (time delays and fractions) for each outcome and for infractions within each input category.
5. **Determine the quantified impact of each input factor on average time delay, probability of an infraction and avoidable time delays**. By comparing the above results between different input factor categories, the following could be determined:
   i. the way in which the customs authority made decisions regarding the consignment
   ii. the time delay to which the consignment of goods was exposed
   iii. the probability of customs finding an infraction within the consignment.
6. **Estimate the saved time through improving customs systems**. An ideal customs system will have the ability to screen all declarations and to identify those containing infractions, allowing customs to stop, inspect and reject or amend only such consignments. The share of consignments that are interrupted by way of either a request for additional documentation or by a stop and/or a physical inspection, and for which no infraction was subsequently discovered (and associated share of total time delay), can be regarded as representing the potential for improvement of the customs systems from the status quo towards the ideal.
7. **Determine the trends of important outcomes.** By calculating all of the above outcomes per time period and plotting the resulting performance levels as a function of time, it is possible to determine if there is a trend over time, and if specific time periods were characterised by specific eventualities (e.g. when Customs may have decided to take special measures at specific offices). In this case we used monthly measurements as the basis for time-dependent behaviour.
8. **Determine correlations between input factors and outcomes**. The most commonly used measure to determine whether there is a significant relationship between an input factor and an outcome is linear correlation. All of the input factors that are considered are, however, categorical in nature.

In order to generate variables associated with the input categories that are continuous in nature to allow the calculation of a correlation coefficient, we implemented the following approach:

- Within each input category (e.g. for Durban customs office) we calculated the accumulated average of each outcome over time (e.g. the average time delay was calculated as from September 2014 until the end of each following month, e.g. November 2015, December 2015, etc.).
- As these accumulated averages represent the behaviour observed within that category up to that point in time, they were used as explanatory variables.
- These explanatory variables were regarded as representing the impact of the respective input factor (e.g. customs office) on a possible outcome (e.g. finding an infraction).
- Each new observation falling into a specific set of categories (e.g. customs office Durban, CPC code 41, Country of Origin CN) was allocated the values of the accumulated averages for each performance parameter calculated for the categories to which it belongs.
- The Pearson correlations were calculated between the explanatory variable values (e.g. the average time delay for Durban up to that point in time) and the specific value for that observation (e.g. its actual time delay).

9. **Compare impact of different input factors**. Repeat the above process within each subcategory (e.g. per customs office), compare the correlations between the different input factors and determine which way of categorisation has the biggest impact on which outcome.

The results of this analysis provide evidence of the basis for customs decisions and of the accuracy of these decisions. It also provides an indication to the private sector of the time delays they could expect for specific consignments that fall within specific categories. The results can be used to improve customs procedures and ensure future systems will reduce unnecessary time and cost delays and improve the predictability of customs operations in South Africa.

4. Results and findings

This section provides an overview of the results extracted from the dataset described in the previous section. First, an overview of the total dataset is given. This is followed by comparisons of results between different categories. This section is concluded by calculating correlation coefficients between the different input factors and the most important outcomes, including the probability of being stopped and inspected, the probability of a request for additional documentation and the probability of an infraction being discovered by Customs. In the process we provide quantified outputs with respect to each of the research questions to be addressed.

4.1 Overview of the dataset

In Figure 1 the number of declarations and average duration (h) the number of declarations available per month and the average duration for processing by customs are displayed. While the number of declarations remain more or less constant over the two-year period, there is a marked increase in average duration over the last six months of the period under consideration.

Figure 1: Time trend over all consignments: Number of declarations and average duration (h)

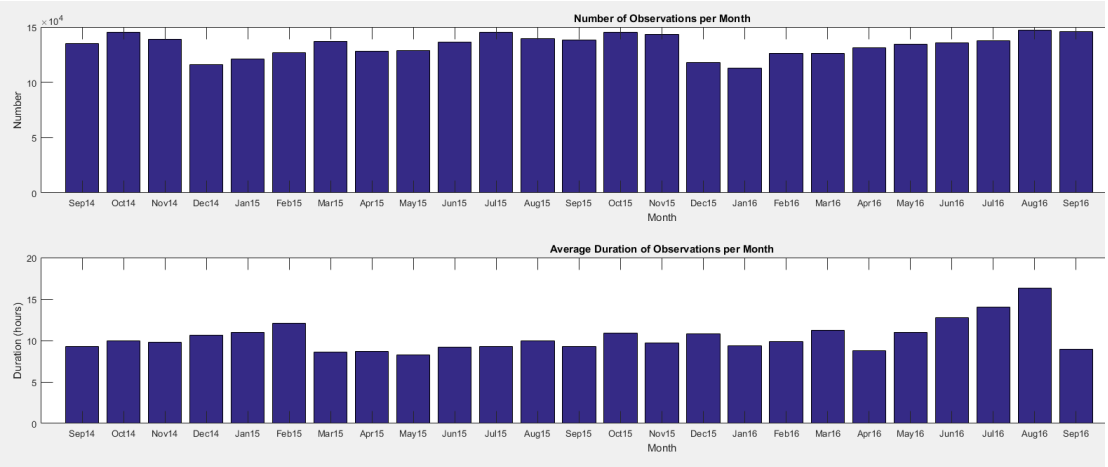


Table 4 displays a comparison between consignments delayed by customs (stopped) versus consignments immediately released by customs (not stopped). Table 4 shows that stopped consignments (all outcomes not falling in the category 'not stopped') represent approximately 22 per cent of the total number but approximately 61 per cent of total delays experienced by all consignments combined. This provides justification for further investigation into the 'stopped' category.

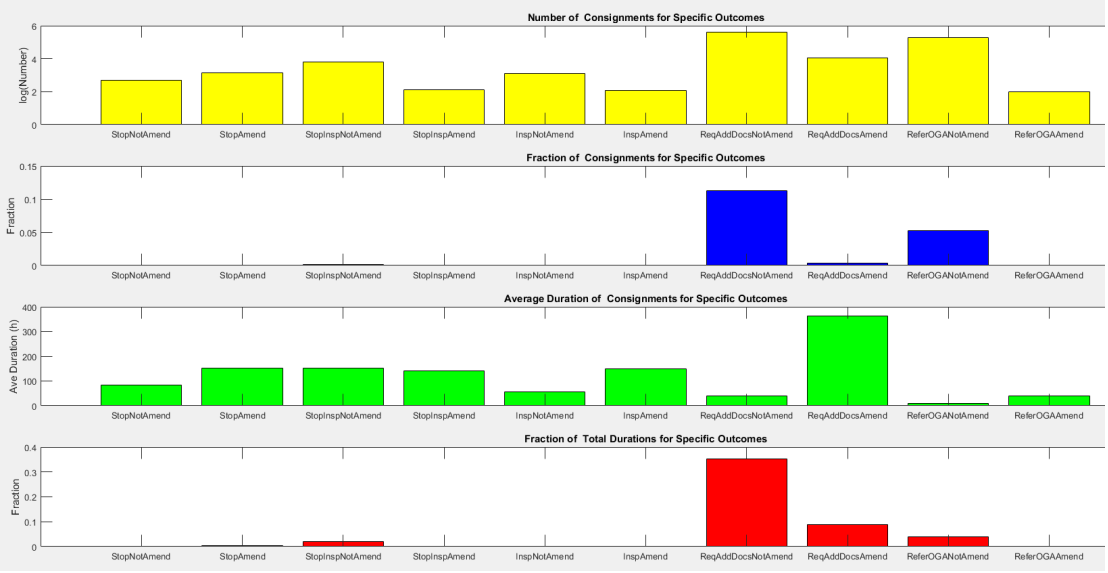
Table 4: Statistics for all consignments over total time period

Category	Number	Average duration	Fraction of total	Fraction with infractions	Fraction of total duration
All	3 520 977	11.3	1.00	0.007	1.000
Not stopped	2 755 894	6.1	0.78	0.000	0.421
Stopped but not inspected	1 995	133.9	0.00	0.742	0.007
Stopped and inspected	7 669	136.9	0.00	0.031	0.026
Request for additional documents	410 951	48.6	0.12	0.027	0.501
Referred to OGAs	187 747	9.6	0.05	0.001	0.045
Infractions	25 706	179.2	0.01	1.000	0.116

Figure 2 breaks down the possible actions for stopped consignments into the categories outlined in Table 3.

Requests for additional documents represent the biggest contribution to stopped consignments, both in terms of the number of cases and the total time duration consumed by this activity. In all cases where an amendment was made, the time delay tended to be much longer compared to cases that are not amended, which can be expected.

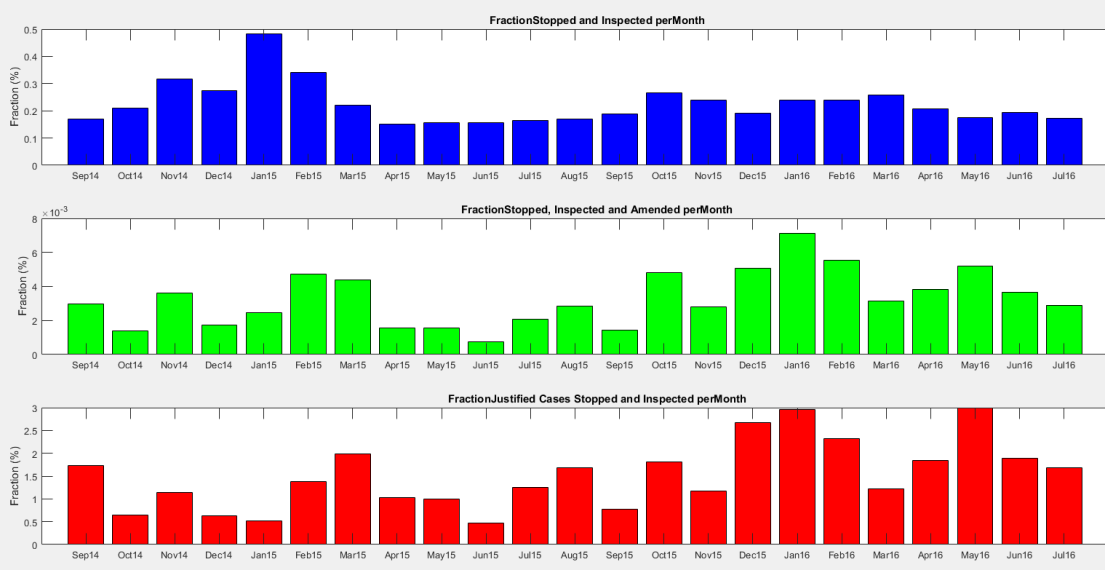
Figure 2: Statistics for different stopped outcomes



A question that arises is whether observed behaviour remains constant over time or if it only occurs sporadically. We calculated time trends for consignments stopped, including the fraction of total cases that are stopped and the fraction of total delay time represented by the various types of stops. For reasons of brevity only one of these graphs is displayed in Figure 3. The following observations were made:

- While the number of observations per month remained approximately constant over the period, the average duration to process consignments increased by approximately a factor of 2 over the same period.
- The number of consignments subjected to physical inspections displays peaks during specific months.
- An upward trend can be observed over the time period for both the fraction of consignments stopped and the average time delay per stopped consignment. A similar trend is observed for consignments with infractions.
- The fraction of consignments for which additional documents were requested increased from 5–10 per cent in September 2014 to 15 per cent by September 2016.
- As the fraction of justified cases for requesting additional documents did not increase similarly, there is an increase in the time lost by trade due to unnecessary requests that did not lead to amendments or rejections.
    - Only a small fraction of consignments subjected to physical inspections or for which additional documents were requested resulted in rejections or amendments.
    - The fraction of customs stops that are justified (i.e. that resulted in amendment or rejection) is consistently small—this aspect of customs performance is not restricted to specific time periods.

Figure 3: Comparison of time trends: Stopped and inspected vs stopped, inspected and amended



The most important general observation that can be made from the data thus far is that the large majority of consignments that are stopped for one of the identified reasons are not amended at all and are eventually released without an amendment or a rejection. It can therefore be argued that with a more accurate customs screening system in South African Customs, it should be possible to drastically reduce this fraction of consignments for which the normal flow of cargo is disrupted without a valid reason. The following section will provide further breakdown of the results per category.

4.2 Imports, exports, ex-bond and in-transit

The first method for categorisation:

- imports
- imports ex-bond (where goods first went into a bond store before duties eventually became payable)
- exports
- exports ex-bond
- BLNS Transit (goods in transit to other countries in the SACU region, namely Botswana, Lesotho, Namibia and Swaziland).

The vast majority of declarations that formed part of this study was for imported goods; of these about 10 per cent were imports ex-bond. The reason for focusing on imports, rather than exports, is that the customs authority tends to focus more on collecting customs duties on imported goods. A small fraction of export, ex-bond import/export and in-transit consignments were included in the dataset. Some observations made include:

- imports represented the bulk of the available data
- imports ex-bond experienced a smaller fraction of stops compared to other imports; the average duration of delays was however larger compared to other imports

- export ex-bond experienced a small fraction of stops but higher average delay times compared to imports
- for BLNS transit, the average delay for consignments not stopped was much higher compared to imports
- the fraction of total time delays caused by a request for additional documents is higher for imports.
- BLNS transit experienced a much higher fraction of physical inspections compared to average, and also experienced a much higher fraction of infractions.
- The fraction of justified stops (physical stops and requests for additional documents) was consistently low for all categories over the entire time period.

Performance per customs office

The next categorisation was the customs office in South Africa in which the declarations were processed. It would be reasonable to expect significant differences in performance between these categories due to the volume processed (e.g. Durban, Africa's busiest freight port, compared to small border offices like Vioolsdrif or Ficksburg), as well as the mode of transport (e.g. Durban processes mostly large maritime consignments vs OR Tambo Airport processing mostly small air cargo consignments).

The purpose of this section is to identify those offices that may be causing the most delays and to verify if deviations between sample averages and the population average are statistically significant. For this purpose, we calculated the t-statistics for the averages calculated per category as follows:

$$t - statistic = \frac{\mu_s - \mu}{\sigma_s / \sqrt{N_s}} \qquad \textit{(Equation 1)}$$

with μ_s the average of the sample of which the t-statistic is determined, μ the population average, σ_s the standard deviation of the sample and N_s the sample size. If the t-statistic > 3, there is only a 1 per cent chance that the deviation of category behaviour from population behaviour is due to the randomness in the data—in such cases there is an underlying reason why observed category behaviour is different.

In Figure 4 the average duration per customs office, as well as the t-statistics of these averages, are displayed in ranking order from highest to lowest average duration. Vioolsdrif (VLD) displayed the highest average duration of more than 300 hours. While the average for Beitbridge (BBR), the busiest road freight border post, is much lower at 46 hours, its t-statistics is the highest (about 40) due to the much larger number of consignments moving through that border. Durban (DBN) seems to be only slightly above overall average; its t-statistic, however, indicates a significant deviation from the overall mean, given the very large numbers processed by Durban. This illustrates the value of using additional statistical measures to evaluate performance.

Figure 5 displays the fraction of consignments stopped and inspected per customs office. Upington experienced the highest fraction stopped and inspected, followed by Komatipoort and Bloemfontein. Skilpadshek experienced by far the highest average duration for stopped and inspected consignments. As can be seen, many of the figures per category have very high t-statistics, implying that there must be underlying reasons why their behaviours deviate so much from population averages.

The statistics for stopped and inspected but not amended is almost identical to those for all consignments stopped and inspected—in almost all cases only a small fraction of consignments stopped and inspected were in fact amended or rejected. This is indicative of a high potential for reduction in unnecessary stops without a negative impact on customs compliance levels. For many customs offices, 100 per cent of

consignments stopped and inspected were not amended or rejected. The customs offices performing the best only achieved a 'hit rate' of around 25 per cent for consignments stopped and inspected. Durban has the highest t-statistic for unjustified stop percentages.

Figure 4: Average duration to process declarations per customs office

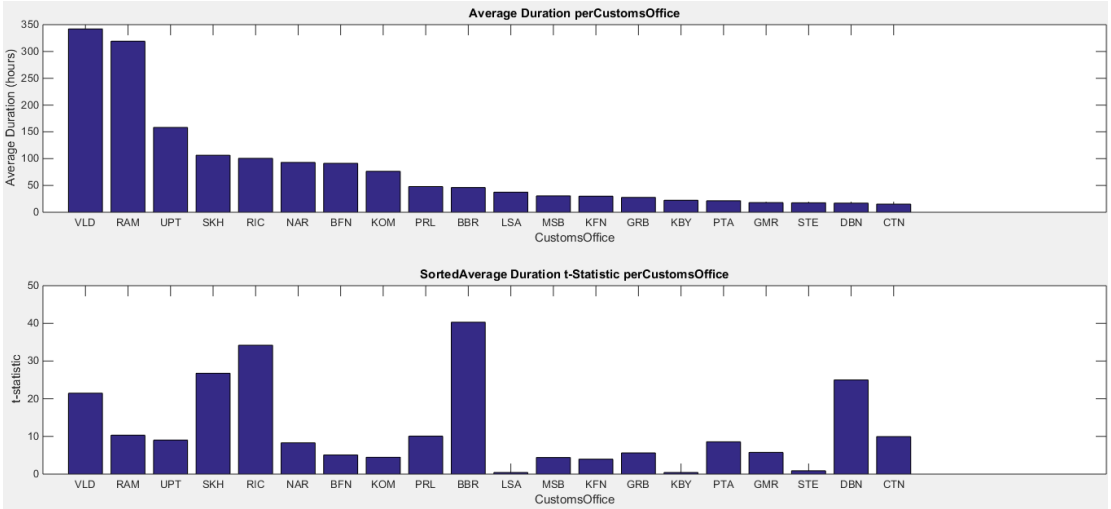
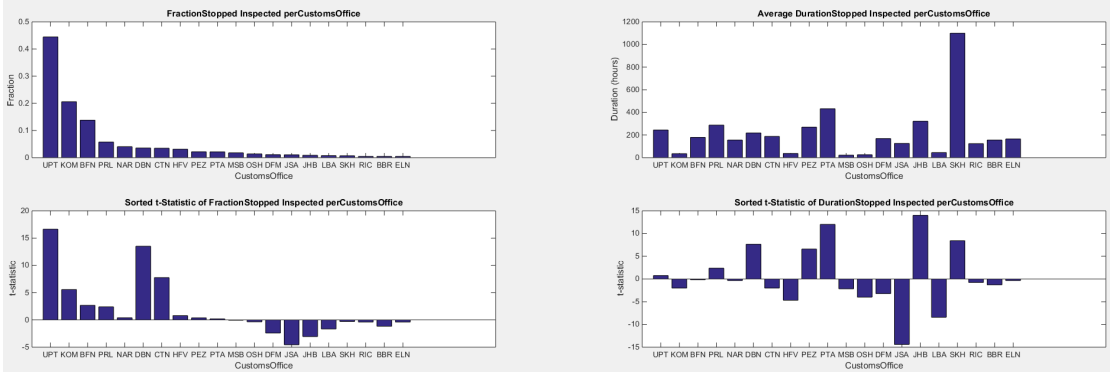


Figure 5: Comparison of share stopped and inspected between different customs offices

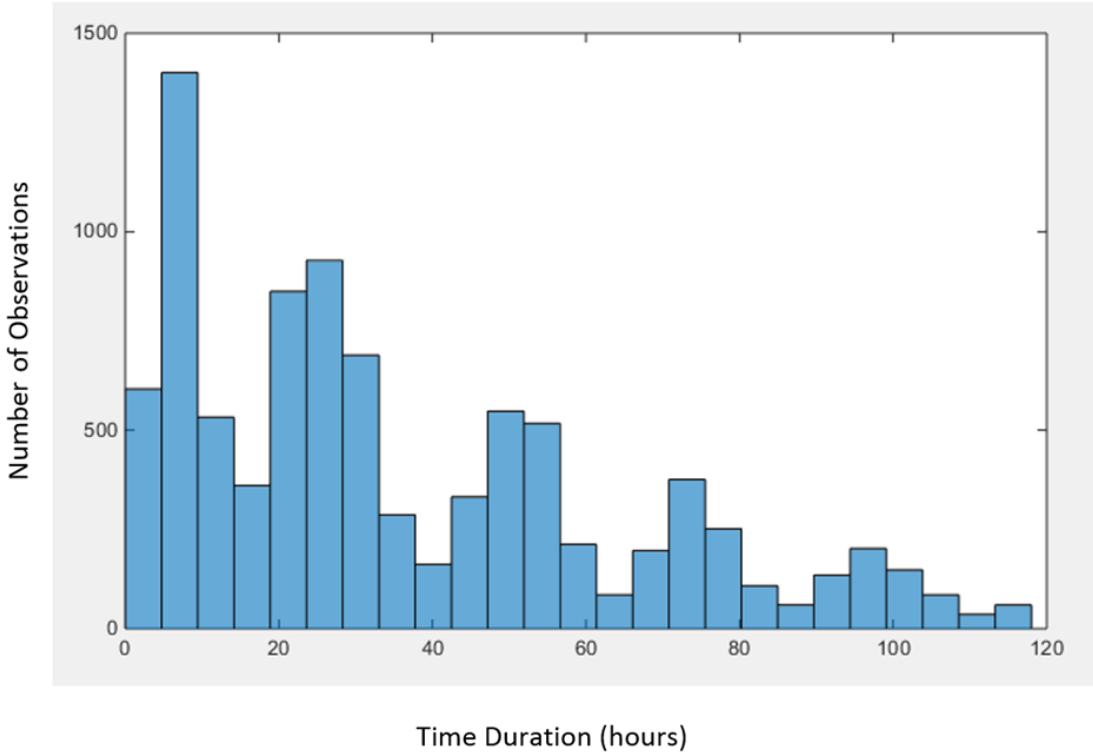


From similar results for requests for additional documents, the following comments can be made:

- Some customs offices (e.g. Komatipoort) request additional documents for more than 40 per cent of consignments; in such cases consignments can be delayed for more than two weeks (300–350 hours).
- One customs office (Komatipoort) did not amend or reject 90 per cent of the 40 per cent consignments for which additional documents were requested—most of the delays ranging from several days to two weeks were thus unnecessary.
- As in previous cases, the t-statistics for many categories indicate systematic deviations from average behaviour rather than mere random fluctuations.
- The fraction of unjustified requests for additional documents is even worse than for unjustified stops and inspections—on average around 95 per cent.
- Only one customs office (HFV) achieved a 'hit rate' of better than 20 per cent.

Further insight into the nature of the customs process can be obtained by observing the histogram of time duration per border post. For example, Beitbridge border post's time delays reflect specific aspects of operation and suggest possible reasons for delays. As can be seen in Figure 6, delays at Beitbridge display a clear 24-hour cyclic behaviour: consignments processed on the same day take a few hours; if not completed it typically takes another 24 hours, resulting in peaks within the 24-hour cycle time. The large fraction of consignments not amended but also not cleared on the same day is indicative of the presence of extraneous factors justifying further investigation. In some studies, interviews with trucking companies and clearing agents provided possible reasons for this behaviour. Truck drivers often spend several hours after reaching the border post on personal activities before handing in their documentation at a clearing agent; quite often this may only happen the next morning, even though the goods had arrived on the previous day.

Figure 6: Histogram of customs processing time in hours at Beitbridge border post



By quantifying the total contribution to unjustified stops, it is possible to identify the customs offices that present the biggest overall delay. Figure 7 shows that Durban contributes most to the total duration of unjustified stops, followed by JSA (OR Tambo airport). They are also amongst the customs offices that spent the largest fraction of overall time on unjustified stops. Durban is therefore selected for further investigation.

In Figure 8 it can be seen that the approximately 6.5 per cent of consignments that are stopped at Durban contribute more to total time delay than the approximately 93.5 per cent of consignments that are not stopped, and that approximately 90 per cent of the time delays for stops were unjustified as they did not lead to a rejection or amendment. As this is a very busy port that requires all available space for fast processing of cargo, the time wasted on unnecessary customs stoppages is a cause for concern.

We then analysed time trends for the performance of the six busiest customs offices: OR Tambo Airport (JSA), Durban port (DBN), Johannesburg dry port at City Deep (JHB), Durban freight terminal (DFM), Cape Town (CTN) and Port Elizabeth (PEZ). A gradual increase in the average duration to process declarations can be observed for most of these customs offices over the two-year period. The fraction of consignments subjected to physical inspections tend to show peaks during specific periods, as is evident from Figure 9. The number of infractions did not display a similar increase during months of increased physical inspections, leaving the impression that there were periodic efforts of increased intervention by customs officials but with no measurable positive outcomes.

Figure 7: Time durations of unjustified stops per customs office

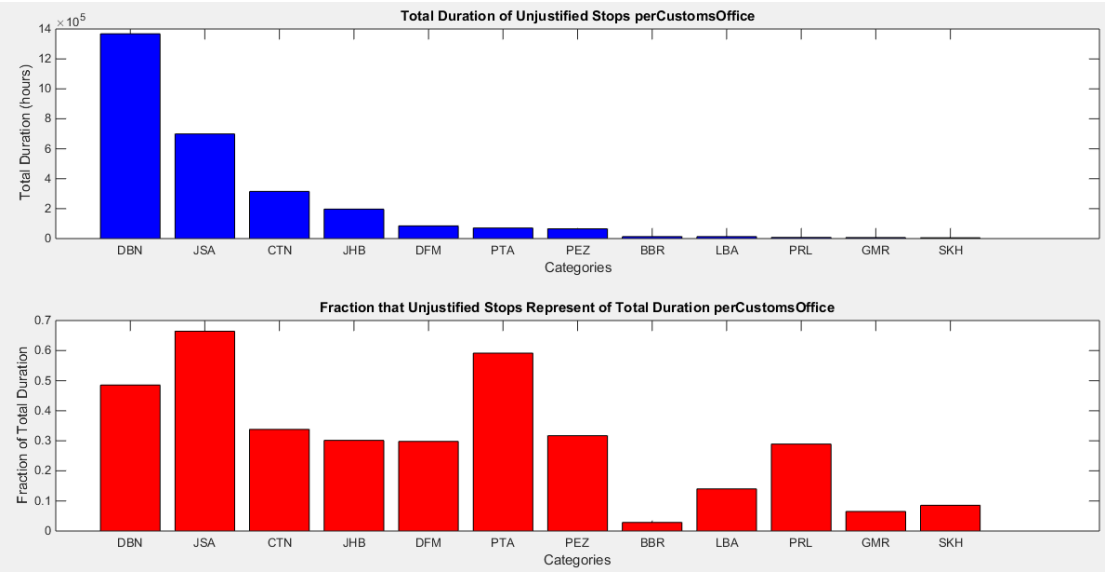
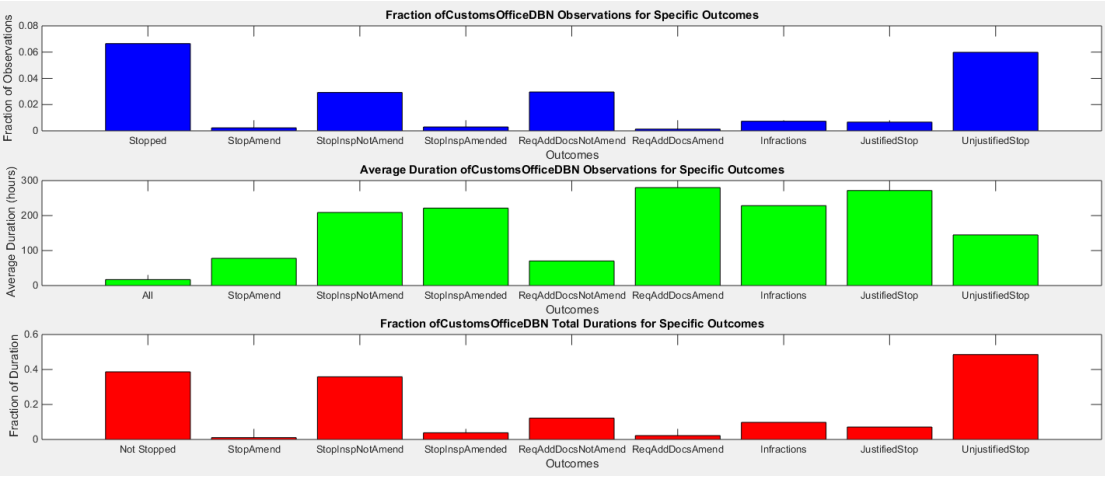


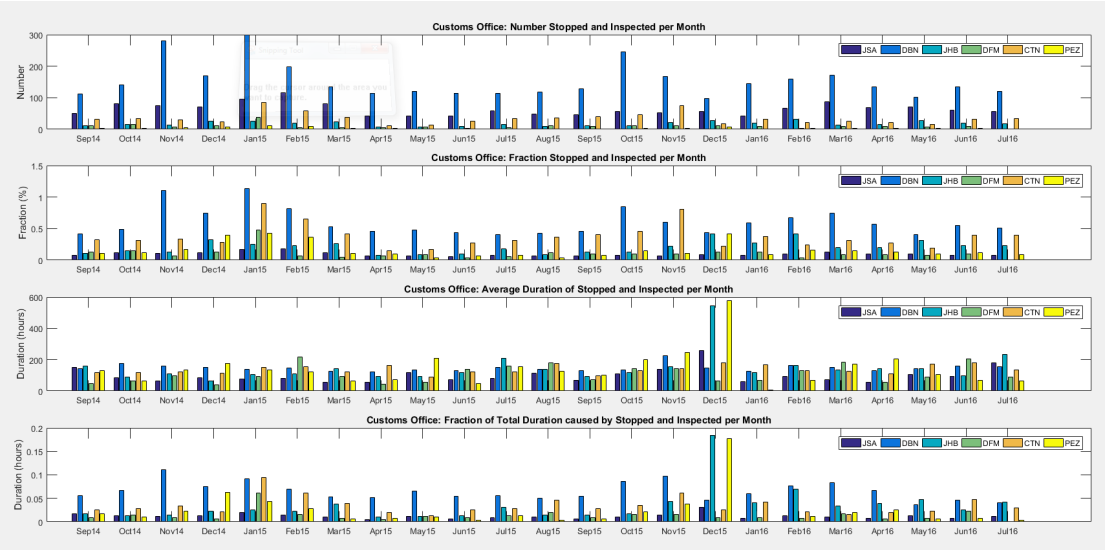
Figure 8: Time durations for different outcomes at Durban customs office



From further analysis the following observations can be made:

- The number of infractions significantly increased at JSA and Durban over the observation period.
- There was a significant increase in the average time to process infractions, from about 150 hours to around 250 hours, mainly due to the increased time caused by requests for additional documents.
- While the number of justified stops show increases at JSA and Durban, the fraction of justified stops is consistently low, particularly if the number of infractions is compared against the much larger number of stops and requests for additional documents.

Figure 9: Time trends: Different customs offices: physical inspections

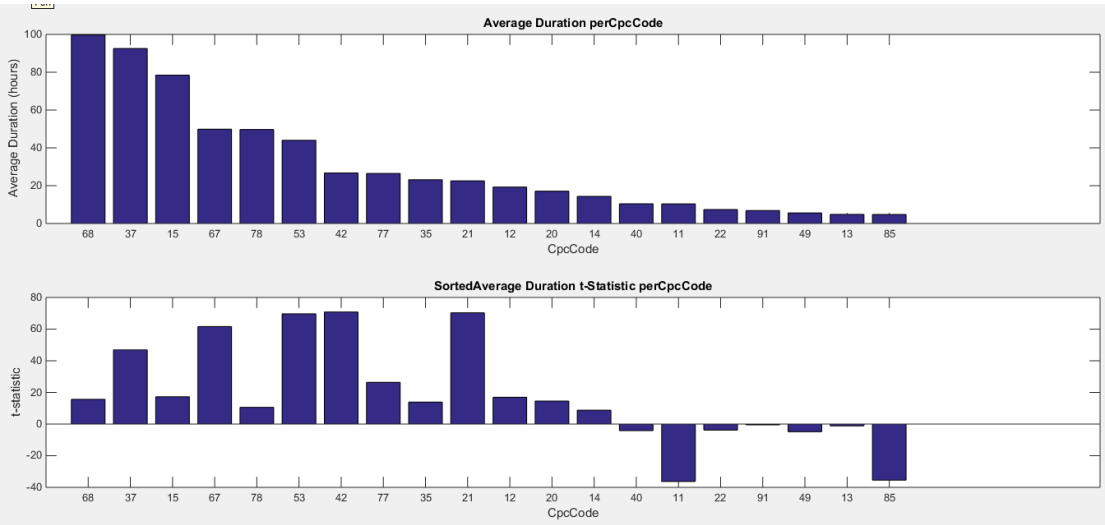


4.3 Performance per CPC code

The average duration and t-statistics by CPC code is displayed in Figure 10. The following is observed:

- Many CPC codes that do not appear frequently have, on average, very high delays of 80 to 100 hours compared to the average of approximately 11 hours.
- The high t-statistic values indicate that, even taking into account the small numbers in those categories, these deviations cannot be attributed to random behaviour.
- Time durations for unjustified stops is dominated by code 11 (imported for local consumption) as could be expected, as this is the most populous category.
- There are large variations between CPC codes in terms of fraction of total time represented by unjustified stops (e.g. for code 77 this fraction is larger than 60%).
- Although only 5 per cent of consignments for CPC code 11 are stopped, these represent approximately 60 per cent of total time delay, of which about 80 per cent are unjustified stops.

Figure 10: Comparison of average durations between different CPC codes

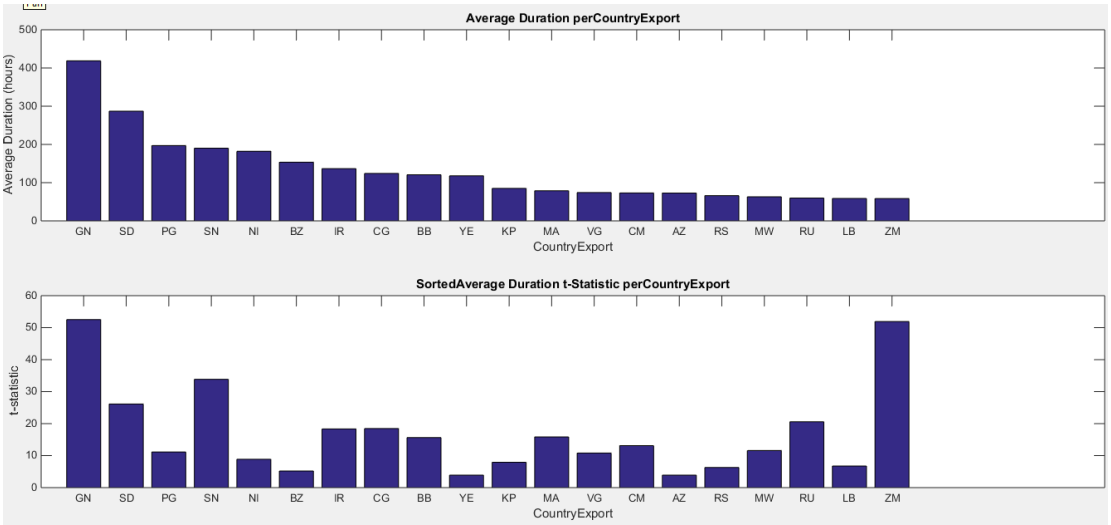


4.4 Performance per country of export

Previous studies (e.g. Laporte, 2011) have indicated that the origin of goods is an important criterion used by customs authorities to estimate the probability of infractions. It could, therefore, be expected to observe significantly different behaviour for different countries of export. Figure 11 displays the average time duration for those origin countries experiencing the longest delays. For many countries the average time duration is far above the population average; in some cases, their t-statistics are above 50. From Figure 11 and further analysis we make the following observations:

- Consignments from many countries of export experience average delays in excess of 100 hours, in some cases more than 400 hours.
- Overall unjustified stops are dominated by imports from China.
- The fraction that unjustified delays represent of overall time delays per country does not deviate from the population mean as much as for other input factors (it varies between 20% and 50%).
    - For other African countries like Zambia, with averages around 50 hours, the t-statistics indicate systematic bias in the system against specific origins for imported goods. Given that most of these goods are imported by road via Beitbridge, the time delay for Zambia is close to that for Beitbridge border post.

Figure 11: Comparison of average durations between different countries of export



4.5 Performance per mode of transport

Imports arrive in South Africa primarily by road (from other African countries), sea (bulk imports from overseas countries) and air (small sized high value goods from overseas). Table 5 provides a description of the codes used for different transport modes.

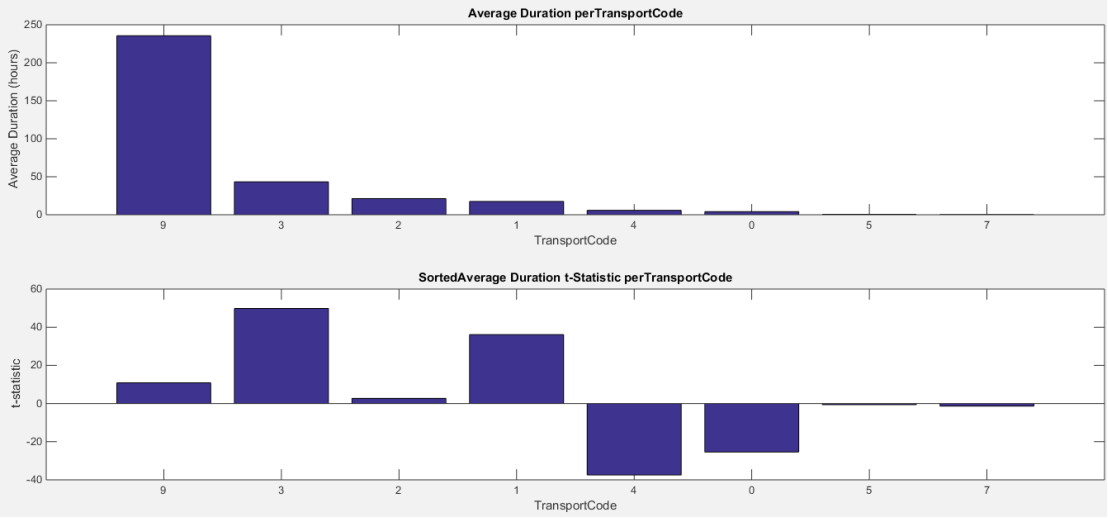
Table 5: Transport mode codes

Code	Description
0	Transport mode not specified
1	Maritime transport
2	Rail transport
3	Road transport
4	Air transport
5	Mail
6	Multimodal transport
7	Fixed transport installation
8	Inland water transport
9	Transport mode not applicable

Figure 12 confirms that the average duration for each of the three main modes of transport more or less equal the time delays for Beitbridge (road), Durban (sea) and JSA (air), as these are the biggest ports of entry handling goods arriving through these modes of transport. We can make the following general observations:

- Amongst the transport modes, road experiences the longest delays, and very significantly so in terms of t-statistics, most likely due to long delays at border posts like Beitbridge.
- Sea transport dominates in terms of total duration of unjustified stops, followed by air and then road.
- For air transport, unjustified stops represent the largest fraction of total delays within its own category.
- A concerning factor in terms of data capture is that the largest average delays occur in the category 'Transport mode not specified', although this category represents only a small fraction of the total population.

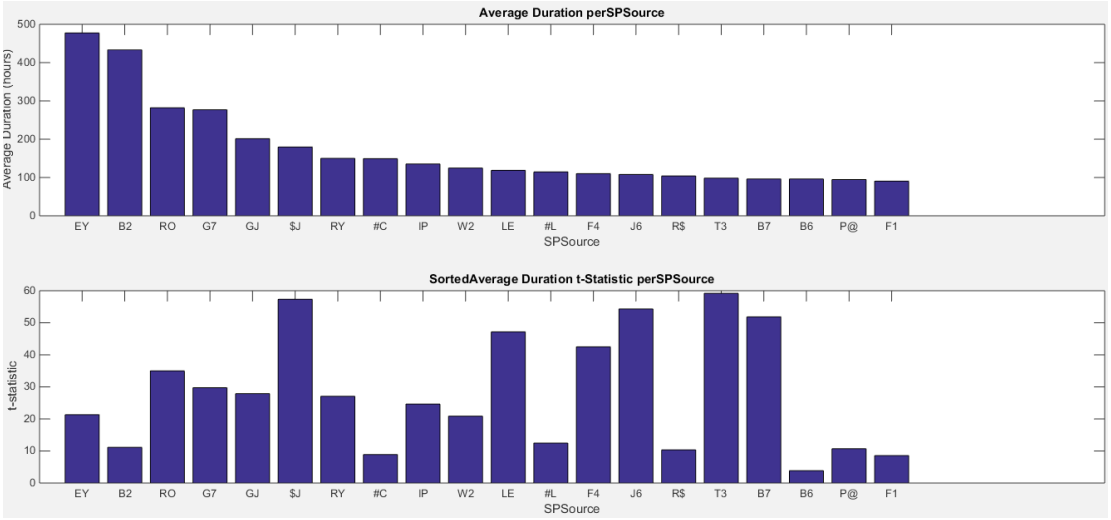
Figure 12: Comparison of average durations between different modes of transport



4.6 Performance per consignor

Previous work (e.g. Laporte, 2011) has indicated that the entity importing the goods is also an important determinant of perceived customs risk. Figure 13 shows that some consignors experience average delays in excess of 400 hours; this confirms that Customs appears to target specific consignors. The t-statistics confirm that there appears to be systematic discrimination against specific consignors. For some consignors unjustified delays represent approximately 80 per cent of total delays.

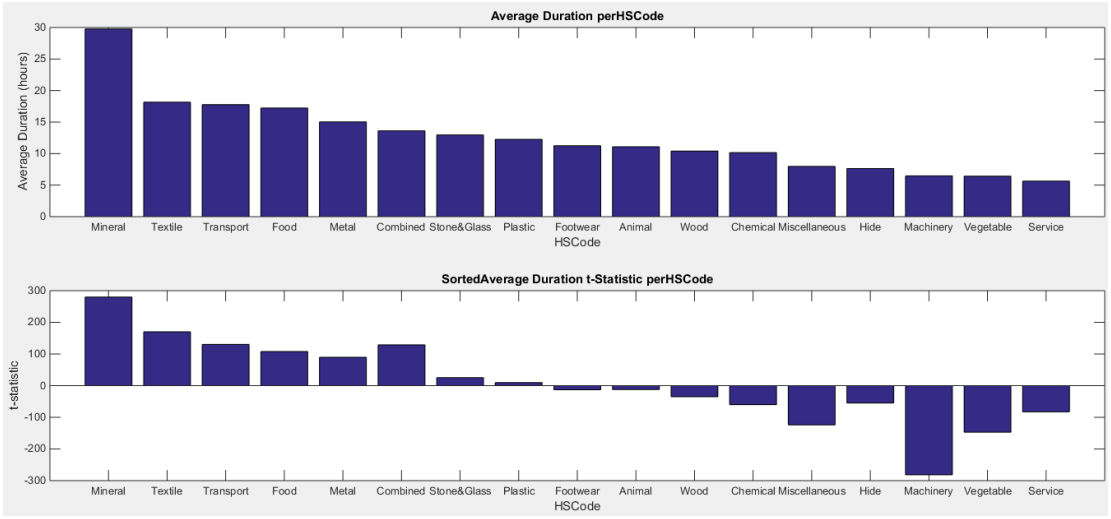
Figure 13: Comparison of average durations between different consignors



4.7 Performance per HS code

The cargo type as indicated by the HS code is important as it determines the level of customs duties payable by the importer. Figure 14 shows that, while minerals experience the highest average delays, differences between HS code categories are not as big as other inputs factors. However, some do experience delays that are five times longer than categories on the low end of the spectrum; t-statistics that are mostly either high positive or high negative also indicate that Customs applies different rules for different HS codes.

Figure 14: Comparison of average durations between different HS codes



The combined category (consolidated consignments) also dominates the total duration of unjustified stops; this could be expected as any of a number of manifests associated with the same consignment could trigger a delay for the entire consignment. Previous studies have shown that, on average, consolidated consignments experience longer cross-border delays than the population average. While the differences

in unjustified stops between HS code categories are not as severe as for some other input factors, it is still interesting to note that the fraction of time represented by such stops is much higher for textiles than for footwear. This may be because there is still some protection in place for the local textile industry in South Africa.

4.8 Correlation analysis between input factors and outcomes

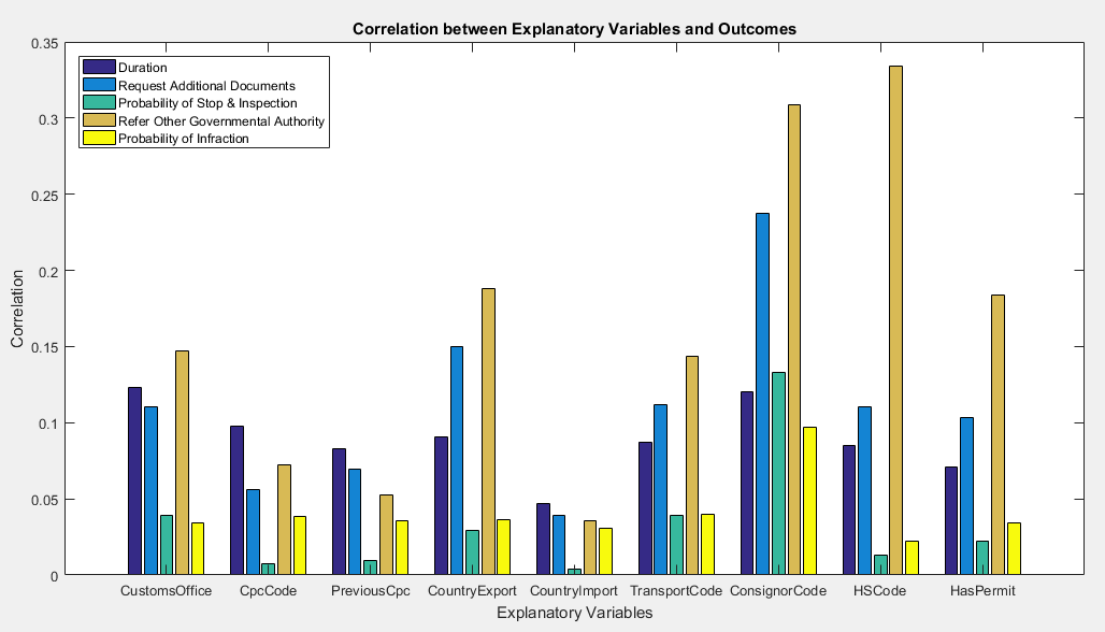
The previous section provided an overview of the extent to which different input factors have an impact on observed time delays and unjustified stops. In order to perform a direct comparison between the impact of each input factor on the various outcomes, we implemented a correlation analysis as described in section 3 above.

Correlations were firstly determined with respect to time delay, as follows: for each new observation and each input factor (e.g. customs office), the mathematical correlation was calculated between the time duration to process that specific consignment and the historical average time to process consignments within that specific category (e.g. Durban).

Figure 15 displays the correlations of various outcomes (customs decisions and resulting infractions) with respect to all the input factors. The input factor that displays the largest correlation with most customs decisions is the consignor code (entity submitting the declaration). This confirms some of the suspicions by the private sector in South Africa that the identity of the importer is used by customs to target specific consignments for scrutiny.

Other input factors with significant correlation with customs decisions are HS code, country of export and customs office. It should be noted that the correlations of the same input factors with resulting infractions are much weaker than the correlations with customs decisions. While consignor code is still the most prominent input factor, the correlation value is much smaller, while the correlation with ‘probability of request for additional documents’ is almost 0.25 and with ‘refer to OGA’ is about 0.32, the correlation with ‘probability of infraction’ is less than 0.1. This indicates that, while consignor identity is used by Customs as the primary determinant for stops, the infractions that are actually found do not fully justify this strategy as consignor identity is not as strongly correlated with actual infractions. It would, therefore, appear that some consignors are unjustifiably discriminated against, with very significant implications in terms of overall time delays.

Figure 15: Correlation between various customs outcomes and 9 explanatory variables



5. Conclusions and recommendations

This study was a first attempt at better understanding the customs risk processes in South Africa, and the impact it has on trade in the region. The study applied statistical data analysis to a set of South African customs data that represents a significant fraction of the total amount of imports over the period September 2014 to September 2016. The study not only delivered interesting results, but also demonstrated that it is possible to generate performance statistics as a function of various input variables and thereby analyse the efficiency of a customs process in much more detail than in previous studies.

The available data for South Africa indicated an increasing trend in the average time consumed by South African customs to process consignments, mostly due to an increase in the number of consignments for which customs request additional documentation. Of this fraction of consignments, only about 5–10 per cent were amended or rejected, which implies that it should be possible to improve the efficiency of the risk identification process applied by the customs authorities. More than 90 per cent of the delays caused by South African Customs could have been avoided if shipments were screened differently. The amount of time consumed by these unjustified stops represents almost 50 per cent of the overall time delays experienced by all consignments in the dataset, which suggests that there is significant room for improvement in the current system.

From the correlation analysis it was clear that Customs use specific inputs factors to target consignments for scrutiny; the most import factors appear to be the identity of the consignor, followed by country of origin and cargo type. The fact that correlations between these factors and infractions found are much lower compared to correlations with number of consignments stopped indicates that the current strategy is not fully justified and does not produce high 'hit rates'.

This study provides an example of the value of detailed statistical analysis based on transaction-level data over a sufficiently long period of time to extract reliable results. Other developing countries in Africa should consider building these kinds of capabilities to drive further trade facilitation in the region.

Future work will include the development of a customs risk model that will allow the more accurate targeting of consignments for inspections, based on historical relationships between input factors and outcomes. It will also be beneficial to demonstrate the use of the performance statistics extracted through this study as benchmarks to be used by individual traders to evaluate their internal performance.

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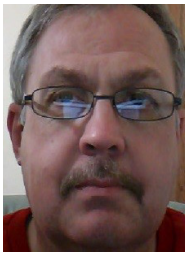
Willem C Venter



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Notes

1 For the purposes of this study, we define the term customs infraction as any customs declaration that was stopped by customs, and either amended or rejected.

Blockchain for trade facilitation: Ethereum, eWTP, COs and regulatory issues

Leonardo Macedo

Abstract

Blockchain is a peer-to-peer (P2P) technology that records and verifies transactions in a decentralised, cryptography-secure manner. Blockchain applications can globally manage records of any sort, such as import-export declarations, invoices, bills of lading (BLs) and certificates of origin (COs). It is a promising technology for several areas, including international trade. This paper presents blockchain, comments on blockchain platforms such as Ethereum, gives examples of private sector initiatives, shares an idea for a CO blockchain application, and discusses regulatory issues. In doing so, the paper aims to attract attention for blockchain in international trade.

1. Introduction

'The technology is not what matters', writes Ursula K. Le Guin (2017, p. 6), 'Words are what matter. The sharing of words. The activation of imagination through the reading of words.'

Thus, it is by sharing words that we free imagination, transform lives and societies. Satoshi Nakamoto did that. He shared words in a paper, *Bitcoin: A peer-to-peer electronic cash system*, published in 2008. According to Nakamoto, electronic cash, now known as crypto-currency, would work in a peer-to-peer (P2P) network using digital signatures and proof-of-work timestamps. In Nakamoto's words (2008, p. 1):

> A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work.

Nakamoto's P2P solution works in a decentralised way, creating hashes[1] of all transactions in a continuous chain, which became known as blockchains.

Many scholars believe that blockchain is a disruptive technology for several areas. For instance, Don Tapscott, co-author of *Blockchain Revolution*, explains in an interview with McKinsey & Company that blockchain is revolutionary because it facilitates P2P transactions without intermediaries, keeps users' information anonymous, and validates and has a permanent public record of all transactions.

> The blockchain is basically a distributed database. Think of a giant, global spreadsheet that runs on millions and millions of computers. It's distributed. It's open source, so anyone can change the underlying code, and they can see what's going on. It's truly peer to peer; it doesn't require powerful intermediaries to authenticate or to settle transactions. (Tapscott, 2016)

According to Tapscott (2016), blockchain sets the foundations for the internet of value, where instead of exchanging information the internet is used to exchange value. In simple words, blockchain solves the 'double spend problem' and its big advantage is that people and business can trust each other without the need, for example, of banks, credit-card companies, governments, associations, and notaries.

2. Ethereum[2] and Dapps moving value in international trade

In the years after Nakamoto's paper, several crypto-currencies appeared in the markets—bitcoin, litecoin, ether, dash, ripple, zcash and other dozens of crypto-currencies are available today.

In 2013 Vitalik Buterin proposed a platform to build and use decentralised applications that run on blockchain: Ethereum. Buterin's platform allows developers to build all sorts of applications to run on blockchain. According to the Ethereum homestead documentation (Ethereum, 2017):

> Ethereum is a programmable blockchain. Rather than give users a set of pre-defined operations (e.g. bitcoin transactions), Ethereum allows users to create their own operations of any complexity they wish. In this way, it serves as a platform for many different types of decentralized blockchain applications, including but not limited to cryptocurrencies.

Hence, Ethereum is an open blockchain platform to build decentralised applications (Dapps). Dapps, also referred to as smart contracts or smart contract codes, are programs that define how value moves. Everything that has a value—such as money, metals, real state, goods and services—can benefit from Dapps.

Some of the advantages of Dapps are the elimination of servers and massive scalability. Authors refer to Dapps as the serverless internet or the post-server internet, meaning the use of applications on the internet that are no longer based on any single server or company. The applications are based on the internet itself.

For me, blockchain and Ethereum matter because international trade requires technological solutions that can run globally anywhere where there are business opportunities. It also matters because it reduces trade costs, increases security and allows for integration with other data systems.

3. B20, G20 (eWTP) and the UN blockchain white paper

The 2016 Business 20 (B20) Summit issued a document recommendation about an Electronic World Trade Platform (eWTP) initiative to facilitate the inclusion of small to medium-sized enterprises (SMEs) in global value chains (B20, 2016):

> Encourage robust international trade and investment by strengthening the multilateral trading system and rolling back protectionist measures, ratifying and implementing the Trade Facilitation Agreement, enabling the e-commerce environment through support of the Electronic World Trade Platform (eWTP) initiative, backing actions to facilitate SME's inclusion in global value chains, and enhancing the global investment policy environment.

The B20's recommendation is aligned with the World Trade Organization (WTO) Trade Facilitation Agreement (TFA) and intends to support SMEs in international trade. About the eWTP initiative, Jack Ma, Alibaba's Chairman, comments:

> The vision for the eWTP is that it will be driven by businesses, with support from governments. Businesses can create hubs for e-commerce and governments can create virtual free trade zones for small business. (Alibaba Group, 2016)

Thus, the main idea of the eWTP initiative is to reduce trade costs for SMEs by creating virtual free trade hubs (eHubs), which use blockchain technology to allow large-scale connection to the eWTP. Malaysia is one of the countries that will have an eHub under the eWTP initiative. The Malaysian e-Hub should have an e-fulfilment hub, a one-stop online cross-border trading services platform and cooperation in e-payment and financing.

The eWTP initiative made by B20 was officially included in the 2016 G20 Leaders' Communique as follows (G20, 2016):

> **2016 G20 Statement**
>
> 6. Promoting e-commerce development
>
> G20 members take note of the B20's initiative on an Electronic World Trade Platform (eWTP).

In sum, the eWTP initiative runs on a blockchain and is intended to manage eHubs around the globe and facilitate trade for SMEs.

In 2017, as part of their exploration of possibilities for blockchain, the United Nations (UN) Centre for Trade Facilitation and Electronic Business (CEFACT) published a project proposal to write a white paper on the use of blockchain for trade facilitation:

> Blockchain technology has an immense potential for facilitating supply-chain and trade processes. The purpose of this project is to look at this technology in the context of UN/CEFACT's mandates in order to provide input to the Bureau, Programme Development Areas and Domains on: 1) Possible future work and a possible common approach to Blockchain-related projects; 2) Blockchain developers as a potential new user group for UN/CEFACT standards. (UN, 2017)

Reading the UN CEFACT proposal, it is evident that the UN recognises the need for the trade community to work on the topic. It also recognises the need to engage blockchain developers, thus people and companies that can develop Dapps to work with UN/CEFACT standards and systems.

In sum, international bodies and organisations, such as the B20, the G20 and the UN CEFACT, are acting on the use of blockchain to support international trade.

4. IBM blockchain trade pilot projects

On the use of blockchain for international trade, companies like International Business Machines (IBM), Microsoft and SAP are exploring possibilities. For instance, IBM is already testing blockchain on two pilot projects: the Singapore Customs Declaration initiative and the cross-border shipping operations of flowers from Mombasa (Kenya) to Royal Flora (Netherlands).

The Singapore Customs Declaration initiative is led by IBM's blockchain innovation center in Singapore in partnership with several Singapore entities, including the Monetary Authority of Singapore (MAS), the Port of Singapore Authority, the Infocomm Development Authority of Singapore (iDA) and PSA Singapore Terminals. About the initiative, Robert Morris, vice president, global labs, IBM research, said:

> This is IBM's first collaboration with the private sector and multiple government agencies within the same country to explore the use of Blockchain and cognitive technologies to improve business transactions across several different industries. (IBM, 2016)

Hence, multiple government agencies in Singapore are engaged to create an ecosystem that connect emerging financial technologies with the physical world of global trade and logistics.

The cross-border shipping operations of flowers from Mombasa (Kenya) to Royal Flora (Netherlands) is a partnership between IBM and Maersk ocean shipping company, to work with shippers, freight forwarders, ocean carriers, ports and customs authorities to establish transparency among parties. Bridget van Kralingen, IBM's senior vice president, industry platforms, said:

> Working closely with Maersk for years, we've long understood the challenges facing the supply chain and logistics industry and quickly recognized the opportunity for blockchain to potentially provide massive savings when used broadly across the ocean shipping industry ecosystem. (IBM, 2017)

Reading the IBM material for the pilots, it is possible to understand that the blockchain solution intends to reduce documentation, fraud and errors. However, it is still too early to measure the impact of such initiatives.

5. A blockchain application for certificates of origin

In this paper, we explore the idea of a blockchain application to facilitate trade. The scenario is for an application that contributes to security and facilitation in preferential trade, making use of certificates of origin (COs). It is admittedly an application for documentary improvement where chambers of commerce simply make use of the technology to improve trust.

It is a preliminary scenario to illustrate a possible use of a blockchain application in international trade. The scenario (issue, justification and proposal) for the application is below.

5.1 Blockchain for COs

Issue: The multilateral crisis contributes to an increased number of bilateral and regional trade agreements. The WTO recognises this growth, and that all its members have regional trade agreements (RTA):

> Regional trade agreements (RTAs) have risen in number and reach over the years, including a notable increase in large plurilateral agreements under negotiation. Following the notification of the RTA between Mongolia and Japan in June 2016, all WTO members now have an RTA in force. (WTO, 2016)

The increasing number of free trade agreements (FTAs) without clear origin rules creates trade bottlenecks. Consequently, the management of preferential rules of origin is a challenge for governments and companies. Each preferential agreement has its own rules as countries negotiate differently, depending on their trade patterns. In other words, depending on the agreement, countries can have different rules for the same type of goods. This creates a challenge both for companies and border agencies to administer and control.

In the 2017 WCO Global Origin Conference, held in Addis Ababa, Ethiopia, Donia Hammami, Head, Customs and Trade Facilitation, International Chamber of Commerce (ICC) stated:

> Businesses of all sizes find themselves unable to manage the complexity and administrative burden of origin requirement procedures, which gradually form a behind-the-border barrier to trade. Streamlining the certification of procedures will go a long way towards making this easier for traders. (Asia Customs and Trade, 2017)

Many of the preferential agreements require COs as proof of origin of the goods. The ICC defines a CO as:

> A Certificate of Origin (CO) is an important international trade document that certifies that goods in a particular export shipment are wholly obtained, produced, manufactured or processed in a particular country. They also serve as a declaration by the exporter. (ICC, 2017)

COs are important for international trade and can be described as birth certificates for goods. These are normally expedited by different chambers in the country of exportation. The whole operation works similarly to notaries in a country. In fact, there are hundreds of chambers issuing thousands of COs every year around the globe.

Preferential COs are issued by chambers of commerce in export countries and are required by border authorities in import countries to concede preferential treatment to the goods.

Justification: Blockchain is a technological solution for environments where participants don't fully trust each other. The level of sophistication on issuing and storing COs varies greatly among countries and within chambers. For instance, while a few still issue paper-based COs others issue electronic certificates of origin (eCO).

As such, due to the level of sophistication, complexity of rules and requirements, some customs administrations might consider imports of goods under preferential trade as riskier than imports of the same goods from third parties. In other words, there might be a lack of trust in COs.

The lack of trust in COs increases costs and creates trade bottlenecks. Hence, chambers and Customs worldwide would benefit from a solution to promote trust, expedite preferential trade and contribute to trade facilitation. It would increase predictability, avoid fraud and expedite the clearance of goods under preferential trade.

Blockchain CO DApp proposal: The proposal is for the WCO to engage with the International Chamber of Commerce (ICC) and design a pilot project using blockchain to issue, store and share preferential COs for preferential trade agreements (PTAs).

The proposal is aligned with the ICC recommendations to address the growing divergence in origin rules. The ICC recommendations were issued in 2017 when Customs and business representatives from all over the world convened in Addis Ababa, Ethiopia, to discuss the complexities behind rules of origin at the WCO Global Origin Conference.

Some of the advantages of a blockchain application for COs would be immutability of CO registers; unlimited CO storage capacity; scalability; and cryptography. Also, blockchain Dapps would allow for a technological solution that could later integrate with blockchain single windows (BSW) and eWTP.

As for execution, the proposal is that execution should use the Linux Foundation Hyperledger platform.

6. Blockchain regulatory issues

To facilitate the development of blockchain applications, the Linux Foundation created the Hyperledger. The Hyperledger is an open source collaborative effort for blockchain with a community of participants that share information and work together in projects. The Hyperledger (2017) website gives the following reason for its existence:

> Only an Open Source, collaborative software development approach can ensure the transparency, longevity, interoperability and support required to bring blockchain technologies forward to mainstream commercial adoption. That is what Hyperledger is about – communities of software developers building blockchain frameworks and platforms.

Although companies rarely admit it, there is a challenge to regulate the use of the technology. Thus, the main purpose of the Hyperledger is to develop protocols and standards that support different components for different uses. For example, a relevant discussion is about public and private chains.

While public chains allow the submission of all sorts of applications to the chain, in private chains only authorised participants can submit or modify applications in the chain. Thus, standards are necessary to guarantee the interoperability between private and public chains.

Another relevant discussion relates to the operational costs of private and public chains. It is likely that in private chains participants will have to pay to use blockchain applications in a format known as Blockchain as a Service (BaaS). As for public chains, the operational costs of an application mostly consist of the total of transaction fees required to operate it.

In sum, there are key regulatory issues that need attention. In fact, I think that it is time for international organisations to reflect on more serious regulatory issues. In my view, blockchain is supposed to be an open, distributed, global platform and it can only achieve its potential if there is room for public chains in every sector. So, countries should be able to develop their own applications in public chains without being forced to pay for BaaS applications.

On a related matter, on March 2017, Jerry Brito, executive director of Coincenter (a non-profit research and advocacy centre), in a letter to the India Department of Economic Affairs, listed six principles that should be considered when creating regulations for cryptocurrencies. I believe these principles should also be known by non-financial organisations that soon will deal with blockchain applications. Brito's (2017) principles are:

1. understanding who and what can be the subject of regulation
2. clearly articulating the goals of a cryptocurrency regulatory policy.
3. only regulating persons with 'control' over consumers' cryptocurrency
4. cooperating with businesses to preserve visibility
5. treating all cryptocurrencies equally
6. ensuring that regulatory requirements are reasonable.

The principles are intended to guide India in producing a proper regulatory framework for cryptocurrencies such as bitcoin. The letter makes it clear that it is difficult to regulate a decentralised network and that any regulatory framework should focus on clear defined goals, such as consumer protection or money laundering. I believe that for international trade, defined goals would include supply-chain security, trade facilitation and taxation. However, these goals should take into consideration the ability of actors to develop applications.

As with crypto-currencies, any regulation would require cooperation and equal treatment between non-blockchain and blockchain applications. Finally, regulation should be reasonable.

7. Conclusion

Blockchain is a P2P technology that records and verifies transactions in a decentralised, cryptography secure manner. Blockchain applications can globally manage records of any sort such as import-export declarations, invoices, bills of lading (BLs) and COs.

It is a technology with promising applications for many sectors, including international trade, supply chain and financial services. International organisations are discussing blockchain applications. For instance, the B20 eWTP project has several eHubs that can assist SMEs in international trade. Also, IBM has blockchain projects that show great potential to facilitate trade.

This paper suggests a blockchain application for COs. The application involves the ICC and the WCO with an objective to increase trust and facilitate trade for preferential COs.

Finally, and most important, I have concerns on whether standards to implement blockchain applications will promote interoperability, have reasonable costs and be open. In other words, if blockchain applications will run on public chains, private chains or hybrid chains and if the technology will be as inclusive to governments and trade as it is meant to be.

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Notes

1 A hash function is a mathematical process that takes input data of any size, performs an operation on it, and returns output data of a fixed size.

2 Ethereum is a popular blockchain platform, but there are other blockchain platforms.

Leonardo Macedo

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A SCOR model for customs supply chain process design

Lamia Hammadi, Eduardo Souza de Cursi, Vlad Stefan Barbu, Abdellah Ait Ouahman and Aomar Ibourk

Abstract

Integrated supply chain management has gained increased attention from both researchers and practitioners in recent times, including developing models to describe the elements and activities of a supply chain. Among these models, the Supply Chain Operations Reference (SCOR) model, which is considered to be the most well-known approach, enables next-generation supply chain management. This paper proposes a process design model for mapping the customs supply chain network. Such a mapping aims to describe the processes and the management practices that produce best-in-class integration, and a standard alignment to process features and functionality. Moreover, this model provides a general framework to promote better understanding of a particular customs supply chain by means of mapping it in business process terms and furnishes an adaptable formalism to effectively managing any context of the customs environment.

1. Introduction

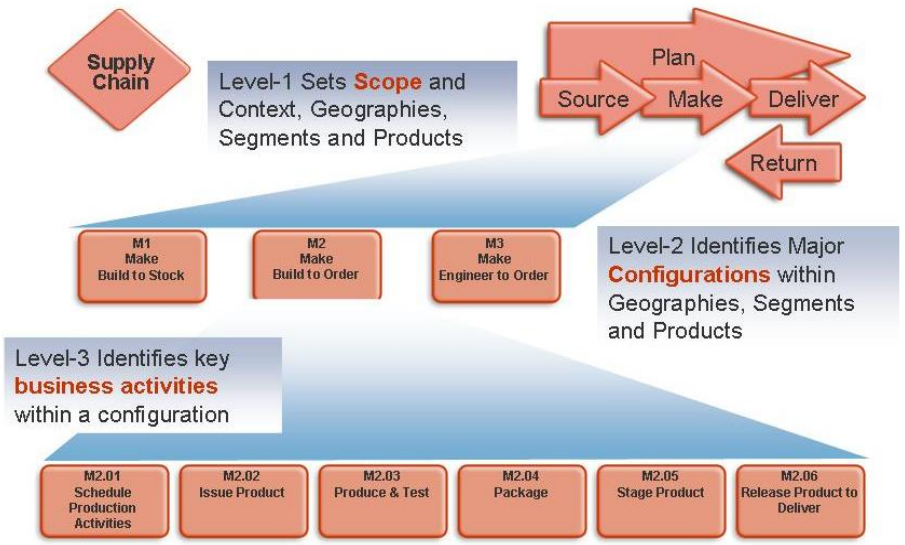
Trade facilitation plays a crucial role in achieving development in countries by making them more effective and competitive by allowing their goods to be traded on time and at low transaction costs. Some countries are unable to benefit from international trade opportunities until they reform their supply chains, especially those dedicated to reforming and modernising customs institutions and investing in infrastructure (World Bank, 2005). In this context, a supply chain is regarded as a series of strong interrelated links. Accordingly, the necessity to coordinate several business partners, business processes and diverse actors across the supply chain (Du Toit & Volk, 2014) gave rise to the field of Supply Chain Process Design (SCPD) (Simchi-Levi, Kaminsky & Simchi-Levi, 2003; Bozarth & Handfield, 2006). At the core of gaining a competitive advantage through SCPD is supply chain integration; when process integration is achieved, the supply chain operates as a single entity (Farhoomand, 2005).

A customs supply chain is a complex system, due to the large number of actors and their complex structural links, and the interactions between these actors. In fact, the theoretical and practical understanding of the concept of a customs supply chain is still marked by ambiguities (Hammadi, Ait Ouahman, & Ibourk, 2014). This study aims to contribute to this area of knowledge by examining both the structural mapping and the process design of customs supply chains as moderators of achieving integration. The study recognises that these shortcomings not only create a theoretical and practical gap in the customs supply chain literature, but leave academics and practitioners without a clear understanding of the concept. Furthermore, as the underlying aspects of process mapping characterise the aspect of customs supply chain integration and a greater understanding of its role in process design, this could provide decision-makers with strategic insights into enhancing the operation management. Therefore, the purpose of this study is to contribute to the literature by addressing these issues within the customs context.

A solution is proposed here to use the Supply Chain Operations Reference (SCOR) model (CSCMP, 2012) to identify and map the relevant processes of a customs supply chain. The SCOR model is a process reference model, which is intended to be an industrial standard that enables next-generation supply chain management. It was developed in 1996 by the Council of Supply Chain Management Professionals (CSCMP) to understand, describe and evaluate supply chains (Wang, Chan, & Pauleen, 2010). It provides a common framework, standard terminology, common metrics and best practices (Huan, Sheoran, & Wang, 2004; Palma-Mendoza, 2014). The SCOR model follows a hierarchical structure with different levels of decomposition, as shown in Figure 1 (Bolstorff & Rosenbaum, 2012). The classical hierarchical composition of the SCOR model is as follows:

- Level 1. Process structure: defines scope and content using five process types: plan, source, make, deliver and return.
- Level 2. Process categories: defines the configuration level, where a supply chain can be mapped using key process categories.
- Level 3. Process activities: This level divides processes in process elements, describing inputs and outputs, process performance measurement and best practices.

Figure 1. SCORE framework levels



Source: Bolstorff and Rosenbaum, 2012

This paper starts with a presentation of the conceptual, structural and functional aspects of the customs supply chain. Next is discussed the proposal of using the SCOR model to identify relevant processes and perform the process mapping of customs supply chain as a means to conduct a process design. Finally, this paper concludes with some reflections and implications of the use of SCOR model for customs supply chain design.

2. Customs supply chain characterisation

It is often assumed that the concept of a customs supply chain uses complicated terminology, which restrains the understanding of the concept and its effectiveness for practical application. This section is dedicated to defining and specifying the concept of a customs supply chain from both an academic and practical perspective. The aims of this section are to develop a comprehensive definition that managers and researchers can employ and to identify the stakeholders in order to characterise the chain.

Customs supply chain terminology

Interest in supply chains has increased in recent years, with the attention of many researchers focusing on the need to build the concept and metrics of supply chains in many fields, such as hospital logistics, import-export logistics, customs logistics and retailing. To deal with the concept of a customs supply chain, researchers have proposed several definitions, but most of them are not itemised. Thus, we propose a structured definition of a customs supply chain as follows:

> Customs supply chain is a set of all aspects that incorporate the moving of cargo and information from the exporter through the transport process, the logistics operations, customs crossing and financial process to the final importer. The customs supply chain is no longer contained within a country's borders, but encompasses all nations, whether they are exporters, importers or manufacturers. (Hammadi, Ait Ouahman, Souza De Cursi, & Ibourk, 2018)

As a result, our supply chain structure is composed of five blocks. That is the proposed building blocks of our definition come from the existing operations management within supply chain, emphasising on customs operations:

Customs operators: the parties that receive and send the goods: an importer in the receiving country and an exporter from the sending country. Importation and exportation are the main financial transactions of international trade.

Transport process: multimodal transport, which covers at least two modes of transport, with the main one being sea transport (CTBL: combined transportation bill of lading).

Customs crossing: includes any point authorised by the customs authorities for the crossing of external borders. It covers declaration processing, custom clearance, data analysis, risk assessment, document checking, scanning, physical inspection, etc. Accordingly, customs crossing is the main bloc for securing the supply chain, due to customs intervention in all stages along the routing of cargo. It includes the border checks both for goods entering and exiting the country.

Logistics operations: encompasses of all activities associated with the flow and transportation of goods, as well as the associated information. Such activities follow three steps: 'organise' (organise the activities for each function of the supply chain to deliver results); 'carry out' (implementing and controlling what was planned); and 'monitor' (which denotes checks and measurement of the functions and results against Customs' policies, objectives and requirements). It comprises activities such as warehousing, inventory, materials, order fulfillment, supply/demand planning, and management of third-party logistics service providers.

Financial process: supports financial transactions between the actors in the supply chain and facilitates the monetary flows.

These elements are presented using generic descriptions.

Stakeholders in customs supply chain

A customs supply chain is a complex network (Christopher, 2016). Based on their roles and responsibilities in the customs supply chain, stakeholders are grouped into categories related to managing their processes and activities and achieving their goals and objectives. These stakeholders are broadly grouped into five different categories, as listed in Table 1.

Table 1: Stakeholders of customs supply chain

Category	Stakeholders
Commercial category	Importer, exporter
Organising category	Forwarder; shipping line agent; logistics service provider
Physical category	Sea terminal operator; shipping line/sea carrier; pre- or on-carrier: air/rail/sea carriers; border highway carriers; logistics service provider; empty container depot operator
Authorising category	Customs; port authorities; seaport police; river police; inspection authorities
Financial category	Bank; insurance company

The commercial category is concerned with the importation and exportation and constitutes the commercial transactions (buying/selling). This category has competencies and direct interests in providing products to end-customers from a foreign country into a domestic country—import, or in the opposite direction, export. For transporting the products, logistics services provided by the second and third categories are employed. The organising category mainly consists of brokers and intermediaries who integrate the cargo transportation, whereas the physical category performs the physical flows. These two categories usually have less interest in products but focus on the operational efficiency of the physical flow of cargo.

The authorising category has the responsibility for monitoring and inspecting the cargo flow for the purpose of enforcing security and regulatory requirements and international standards. Lastly, the financial category supports financial transactions between the actors in the supply chain and facilitates the monetary flows. These five categories depend on one another to achieve the goals of the customs supply chain. These dependencies influence the configuration of a customs supply chain network and affect the many operational, tactical and strategic level decisions of the chain.

3. A SCOR model of the customs supply chain

The purpose of this paper is to develop a process-design-based model of a customs supply chain that shows how process components are related in the supply chain and how they operate. Our model provides a clear image of the customs supply chain's current state and defines its vision for the future by mapping it in business process terms (Zhang & Riemann, 2013). Accordingly, the three levels of the SCOR model—supply chain structure, pillars configuration and process configuration—can be used to identify and map the supply chain processes present. The mapping process starts at level 1 by setting the structure of the chain, followed by identifying the pillars for configuration and interactions. Once the process categories have been established, it is necessary to select which configuration best describes the supply chain processes and their activities with respect to the interactions between the actors of the chain and the functions of each pillar.

Level 1: Customs supply chain network structure

A supply chain network is structured through upstream and downstream linkages among the processes and activities that require the involvement of the actors of the chain. Its network configuration can be built from their missions and functions among inter-and intra-organisations of the supply chain (See Table 1). The customs supply chain structure can be depicted as per Figure 2, in which 13 core processes are linked by three flows (goods flow, information flow and financial flow). These core processes categorise the eight typical function areas in customs supply chain (Hausman et al., 2010) as follows:

Planning the transaction: When the importer places an order with the exporter, the full description of the goods, unit price, incoterms, payment details, insurance, dates and logistics plan are negotiated, and an international contract of sale agreed upon.

Export declaration: A broker/freight forwarder obtains approval from inspection agencies and prepares and transmits export declarations/security filings for export customs clearance. A freight forwarder is engaged by the exporter to manage the export, although this situation depends on the terms of trade (i.e. the Incoterms), for instance the exporter will not engage a freight forwarder if the goods are sold EXW.

Export transport plan: In the case of containerised sea cargo the exporter (or freight forwarder, if applicable) identifies the sea carrier, the port of loading and port of discharge and orders a container from the carrier to be sent to the seller/consignor.

Import transport plan: The container is ready for consigning into the customs supply chain (Consignment Completion Point, CCP). Ocean transport of the goods is complete.

Import declaration: The buyer generates and submits import documents for import customs clearance where required (i.e. this is not always necessary, such as in the case Delivered Duty Paid [DDP]).

Customs control: Customs generally apply risk management strategies to determine whether shipments are selected for documentary and/or physical verification (Martincus et al., 2015).

Import customs clearance and financial process: Inland delivery from the border to the importer's site, receipt of goods, review of landed cost (i.e. landed cost is the total expenditure involved in buying a product and shipping charges for importing it; apart from the cost price of the product, landed cost is made up of different charges, such as customs duties, currency conversion, insurance and other costs up to the destination storing), payment of duty and other taxes and fees (if applicable) and filing for foreign exchange verification and tax refund if applicable (i.e. drawback of duty paid).

The important consideration from structuring of the customs supply chain is that the relations between the importer and exporter run upstream on one side: the exporter provides the importer with goods and information. For the execution of the exchange throughout the chain, information is flowing downstream among the actors who realise the activities. The actors then receive monetary recourses through payment transactions.

Level 2: Customs supply chain pillars configuration

This level defines the configuration level, where a supply chain can be defined using core process categories. Thus, the customs supply chain can be divided into three interrelated pillars: the logistic pillar, the operations pillar and the inspection pillar, as depicted in Figure 3 (Van Oosterhout, 2008).

The **first pillar** relates to physical activities (such as transport and transhipment), storage infrastructure (such as warehouses), unit loads (such as containers, trailers) and the cargo (goods transported) itself.

The **second pillar** is a set of activities and interactions that gather all commercial and non-commercial links between stakeholders in the supply chain. In this pillar information is created, stored and transmitted in electronic format or otherwise.

The **third pillar** is the inspection pillar, in which supply chain decision-makers allocate resources, control performance and cargo flows. This level covers all inspection and verification activities, such as customs and port authorities. The second and third pillar consist of information and financial flows.

Figure 2: ***SCOR Model level 1:*** *Customs supply chain structure*

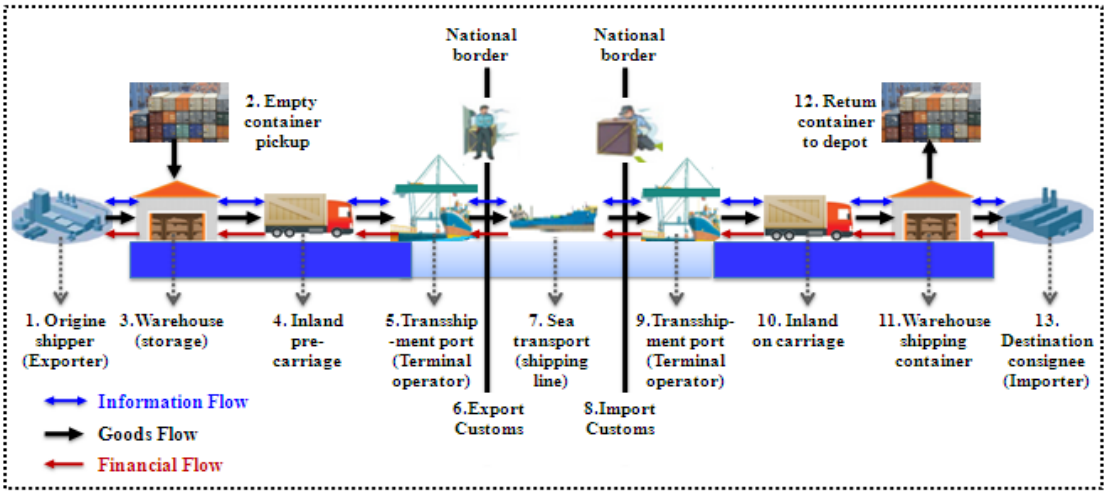
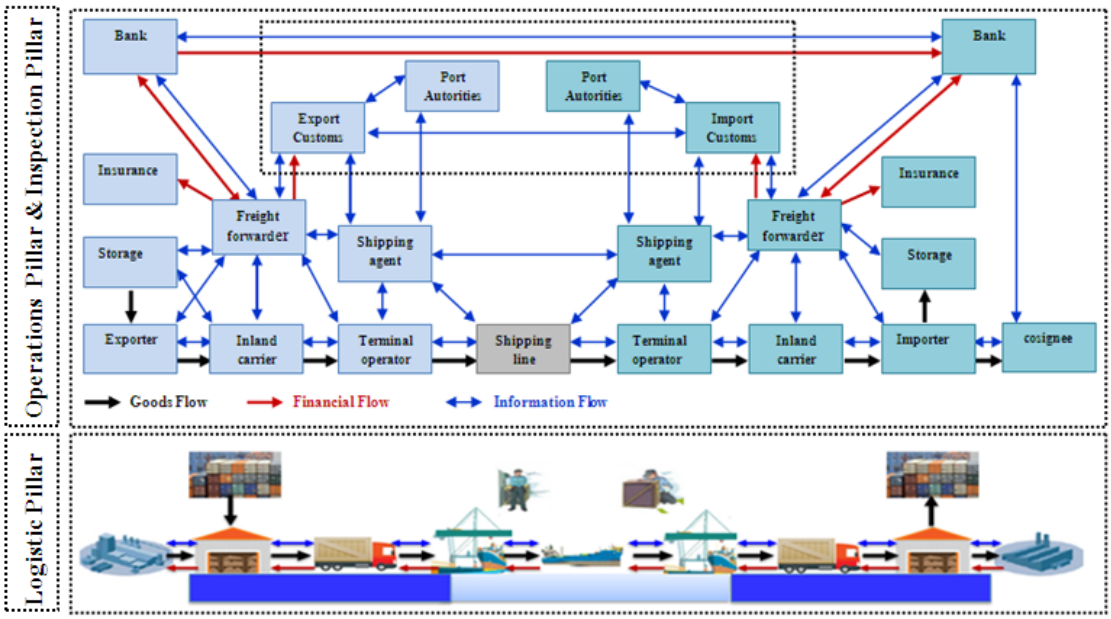


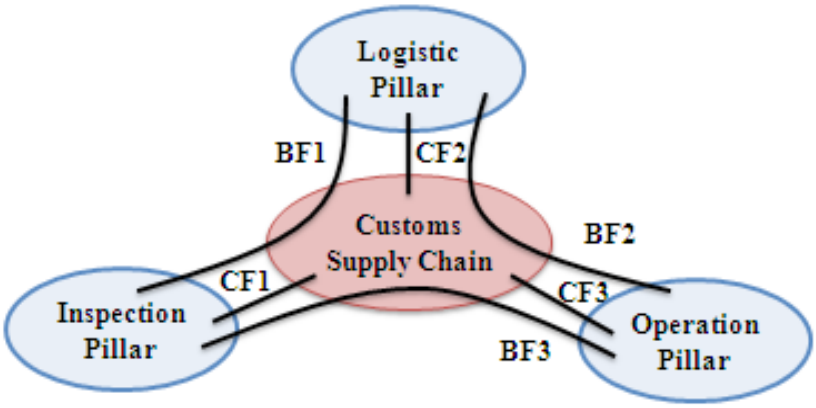
Figure 3: ***SCOR Model level 2:*** *Customs supply chain three pillars configuration*



Source: Inspired from Van Oosterhout et al., 2008

Therefore, the process design model requires definition of the links (i.e. functions) between the three pillars of the system and its environment, namely, functional analysis (NF X 50–100). For this reason, we opted for a functional diagram to identify most of the functions of the system, as shown in Figure 4.

Figure 4: Functional diagram of customs supply chain



The functional diagram consists of the basic function (BF), which links two pillars via the system, and a complementary function (CF), which links each pillar to the system.

BF1: Achieve customs supply chain safety and security; combat illicit trade; control cargo using risk-based selectivity; and comply with customs laws and international regulations and standards.

BF2: Simplify customs clearance procedures, covering the customs duties and other taxes (if applicable); facilitate commercial exchanges; monitor and manage the supply chain; and co-ordinate various activities and actors.

BF3: Integrate and link the processes and communication between actors.

CF1: Secure international trade; comply with international regulations and standards; and control export-import transactions.

CF2: Satisfy trade demand and customer demand.

CF3: Distinguish and clarify the responsibilities within and across the chain; ensure a smooth flow of operation within organisations; and improve process performance.

Level 3: Process configuration

The supply chain paradigm implies a new way of viewing the organisation, based on the integration of its activities into key processes rather than by departments. This statement indicates that the supply chain must be seen as one single unit and managed as a whole in order to achieve its goals (Gayialis, Ponis, Panayiotou, & Tatsiopoulos, 2015). Lambert and Cooper (2000) stated that successful supply chain management requires a change from managing individual functions to integrating activities into key processes. Consequently, the purpose of this paper is to develop a process-based model of the customs supply chain in order to map the structure of a customs supply chain network, and integrate, align and link processes within the chain. A process-design structure may be specified by a set of logically related activities and resources that yield a certain output. Basically, a process is a series of one or more linked procedures or activities that collectively realise a business objective by transforming inputs into outputs by allocating resources, such as people, materials and tools (Zhang, 2005). In this paper, a process in the customs supply chain is a sequence of activities from exporter to the final importer through transport, logistics operations and border crossing.

As mentioned above, the customs supply chain process is described in this phase. To visualise the sequence of tasks and flow of operations, the process configuration is introduced to describe business processes within the customs supply chain. Since a business process can be defined as a series of activities

that require the input of goods and information and which is executed according to appropriate process logic (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001; Trkman, Štemberger, Jaklič, & Groznik, 2007; Lockamy & McCormack, 2004; Mario Holzner & Peci, 2012; Zuñiga, Wuest, & Thoben, 2015), the process approach is applied to describe business processes from the function view, flow view and logistics view.

Figure 5 shows the components of a process configuration of a SCOR model for the customs supply chain. The process configuration stage 1 is used to describe the key processes; the goods, financial and information flows; the logistical requirements; and Customs functions, whereas the process configuration stage 2 is mainly used to illustrate the activities and process logic (executed pathway and sequence). In the function view, functional analysis is used to structure the stratum of functions executed in the process.

As shown in Figure 5, the stage 1 process can be broken down into several functions as needed. At the same time, activities are associated to the functions. The activities (Figure 6, stage 2) or elementary functions indicate those activities that do not need to be broken down further. The flow view indicates the existing relationship types in the customs context, which are linked by goods, information and financial flows. In essence, the relationship can be viewed as upstream and downstream linkages within the supply chain (see Figure 1). Finally, the logistical view shows three steps of a business process. The first step is 'organize', which is performing activities for each function of supply chain to deliver results (what to do and how to do it); the second step is 'carry out', which is implementing and controlling what was planned; and the third step is 'monitor', which denotes checking and measuring the functions and results against policies, objectives and requirements, and reporting the results. Thus, our process configuration of the customs supply chain is a combination of function, flows and actors.

Figure 5: ***SCOR Model level 3:*** *Process configuration for customs supply chain based on multimodal transport—Stage 1*

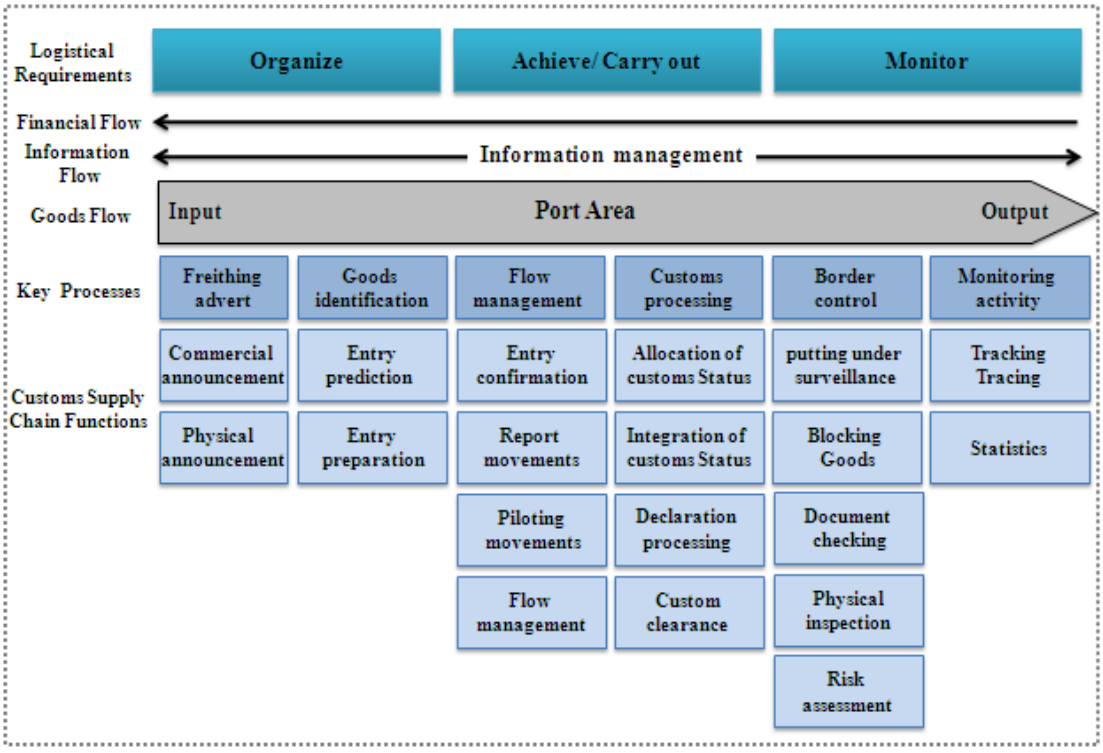
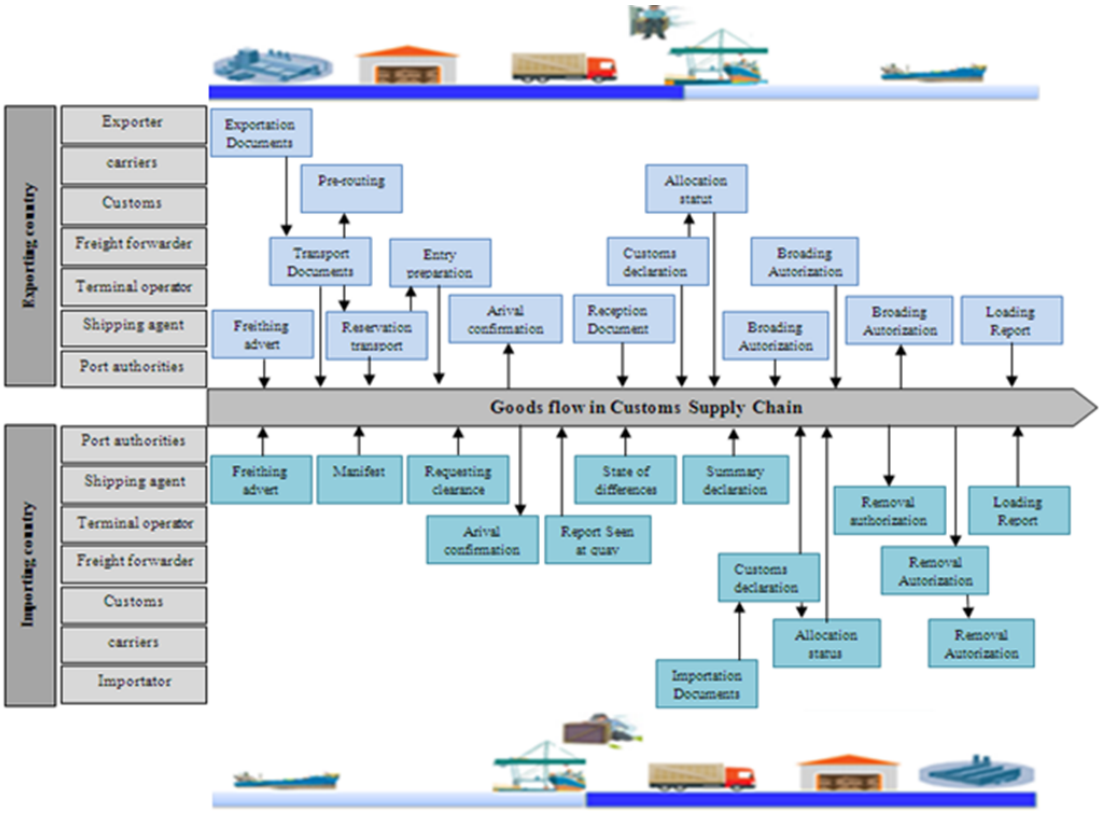


Figure 6: ***SCOR Model level 3:*** *Process configuration for customs supply chain based on multimodal transport—Stage 2*



4. Conclusion

The objective of our study was to determine the key elements of a customs supply chain and current state of process design in the customs context. The findings provide a timely contribution to the management and improvement of operational management in the customs supply chain context, which have not been adequately researched in the current literature. A customs supply chain network is a relatively new concept in the context of supply chain management. This concept is focused on managing the key elements of import and export with respect to border crossing, transportation and logistics operations. This new formulation of a customs supply chain concept has overcome the difficulties in mapping supply chain structure, managing processes and activities and achieving integration.

A SCOR model for process design has been proposed, with the objective of identifying the processes and analysing the structure of a customs supply chain, based on a broader dimension, which consists of a holistic set of activities and processes. Our approach is flexible to accommodate different numbers of partners and able to be implemented in any customs situation. It helps managers to not only prioritise their resources to formulate supply chain designs according to their targeted segments but also to align and integrate the processes. Decision-makers can also use our approach as an evaluation tool for benchmarking their process integration from a bilateral, regional and international perspective. This helps to identify performance gaps and make improvements accordingly.

Acknowledgment

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Trade and tax evasion in Indonesia

Yubiwini and Arianto Patunru

ABSTRACT

Based on an analysis of trade data between Indonesia and Singapore at the six-digit level of classification, we find evidence of import tax evasion: exports from Singapore to Indonesia are under-reported to Indonesian Customs, and the evasion increases in line with duty rates. Interestingly, evasion appears to have more to do with value-added tax, which is imposed on almost all imported goods. We also examine whether tariff discrimination under free trade agreements can result in an increase in goods from other countries being imported via Singapore and then re-exported to Indonesia, potentially violating the rules of origin (ROO). Finally, we find that the presence of non-tariff barriers designed to protect national industries may also motivate smuggling.

1. Introduction

The role of tax collection as the primary source of government revenue is very important, prompting many countries to develop more effective tax collection systems. There are many ways that government can improve their taxation systems, for instance by adjusting tariff rates, increasing the tax base, simplifying the tax reporting system, and minimising tax evasion. Tax evasion has become a significant problem that is regularly discussed at the international level because it can significantly endanger tax collection systems and hence decrease government revenue (Miskam et al., 2013). In this regard, import tax evasion is a well-known form of tax evasion that contributes to huge losses in government revenue.

Smuggling goods or products is one form of import tax evasion—when a product is smuggled, the government loses revenue. The purpose of import tax evasion is to avoid tariff and non-tariff barriers; resulting in both monetary and non-monetary benefits to the smuggler. To address this problem, it is essential to find the best way of detecting import tax evasion and, more importantly, the main reasons behind it.

Researchers have explored various possible determinants of tax evasion. When duty is levied on an imported good, the price of that good will increase. As a result, the potential benefits to be gained by firms or importers might be reduced, and smugglers are using several methods to avoid this outcome. First, they may under-report their goods, or not report them at all. Fisman and Wei (2004) show that tariff levels and tax evasion in export and import between China and Hong Kong is undoubtedly related. They provide evidence of smuggling through under-reporting. Second, smugglers may misclassify their goods as a different (often similar) product on which the tariff is lower or zero. Fisman and Wei (2004), followed by Van Dunem and Arndt (2006), Stoyanov (2012), and Levin and Widell (2014), find evidence of smugglers falsely classifying their goods as other goods that are subject to lower tariff. They show that when the tariff of similar products is lower than that of the actual good, tax evasion tends to increase.

Furthermore, free trade agreements (FTAs) and non-tariff barriers may also encourage tariff evasion. Tariff discrimination under an FTA creates an incentive for smugglers to reroute products from non-member countries through member countries so as to pay a lower tariff. Stoyanov (2012) shows that different tariff rates due to the implementation of FTA among Canada and the U.S. has led to such evasion. Moreover, the presence of non-tariff barriers represents another form of restriction on imported goods. In absence of tariffs, demand for goods will be higher than with tariffs applied. Thus, when

non-tariff barriers are implemented, the potential benefit for smugglers will be high as well. As a result, smugglers will either misclassify or under-report their goods. Margono (2011) shows evidence of this practice, claiming that the non-tariff barrier is statistically significant in causing smuggling.

In Indonesia, smuggling has become a serious problem for the government. In 2015, Indonesian Customs reported an increase in customs enforcement by 33.6 per cent, and recovered IDR 3.7 trillion (approximately USD 284 million) (Jahansyahtono, 2016). In 2017, the government established an anti-illegal imports taskforce to fight against smuggling (Sawitri, 2017). Even though import tax evasion has become a serious problem in Indonesia, unfortunately, the ability to detect it is still limited. The study by Margono (2011) was one of few in this area. He demonstrated that tariffs, products with similar tariffs, and non-tariff barriers contribute significantly to smuggling in Indonesia in 2005 and 2008. On the other hand, whether or not FTA contributes to smuggling remains inconclusive (Stoyanov, 2012).

Thus, in this paper, there are four phenomena to be investigated. First, since it joined the ASEAN Free Trade Agreement (AFTA), Indonesia has reduced import tariffs gradually to 0–5 per cent for almost all imported products. Noting that high tariff rates contribute to high evasion (Fisman & Wei, 2004; Van Dunem & Arndt, 2006; Stoyanov, 2012; Levin & Widell, 2014), we are interested to see how much the reduction of tariffs—both own tariffs and tariffs of similar products—affect import tax evasion in Indonesia. In addition to tariffs, Indonesia also charges other taxes on imported goods, for instance value added tax (VAT) and luxury tax, which are higher than the customs tariff. This condition leads us to the second question: what is the impact of other taxes on tax evasion in Indonesia? Third, even when tariff rates are low or zero, non-tariff barriers might still be present, especially when domestic industries are highly protected. Margono (2011) only looked at the effect of tariffs; in contrast, we will also examine how far non-tariff barriers contribute to smuggling in Indonesia.

Last, we look at the role of trade agreements. According to the World Integrated Trade Solution (2017), in 2013 the average tariff for Singapore under AFTA is just 0.43 per cent, while the average of most favoured nations (MFN) tariffs charged by Indonesia is about 5.37 per cent. This situation might also motivate smuggling, as Stoyanov (2012) has shown. When a good is produced in a non-member country, and it is charged a high tariff in the destination country—the latter being a member of the FTA, a smuggler will be able to enjoy the preferential tariff instead of MFN tariff by falsifying the origin of the good, inferring that it came from the member country. Often, this is done by first shipping the good from the non-member country to an AFTA member. In the latter country the good is just regarded as being in transit, hence, it does not need to pay any tax. Then it proceeds to the destination country with a fake certificate of origin and enjoys the lower tariff. We are interested in investigating whether such rules of origin (ROO) violations due to the implementation of AFTA also occur in Indonesia. In particular, we will examine Indonesia's imports from Singapore under the implementation of AFTA from 2012 to 2016.

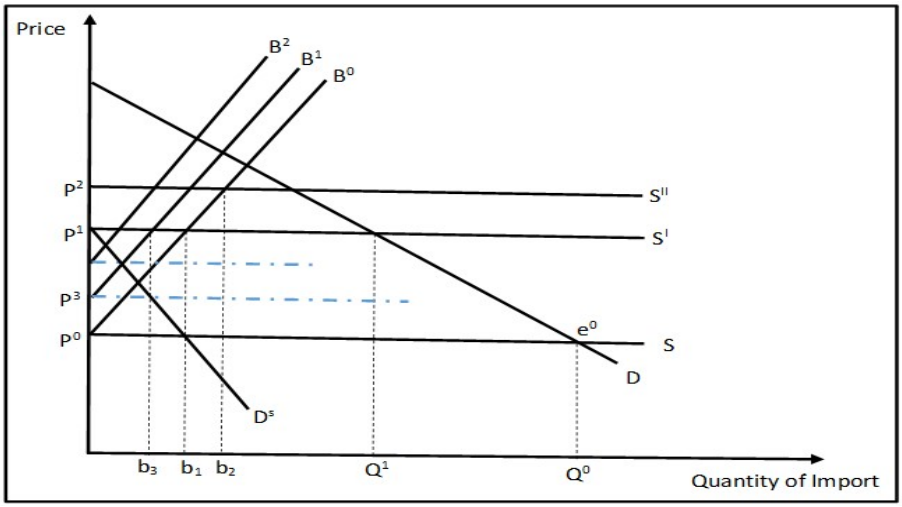
The paper is constructed as follows: the second part provides a preview of the theories and empirics related to import tax evasion; in section three, we explain the data and methodology used in this paper; the empirical evidence will be presented and analysed in the next section; and the fifth section provides a brief conclusion.

2. Literature review

A number of theoretical explanations that discuss tax evasion has been developed. The pioneering work in this area is Allingham and Sandmo (1972). They state that the probability of detection and the rate of tariff are two factors that are highly related to tax evasion. Bhagwati and Hansen (1973) conclude that in the presence of high tariffs, smuggling would be more prevalent. These claims are also strengthened by Sheikh (1977), who, by using the partial equilibrium model, shows how incentives for smuggling work. Furthermore, Sheikh (1989) introduced new approaches to explain the risk of smuggling when the government's effort in detecting illegal trade is taken into account.

In his earlier research, Sheikh (1977) claims that anything that results in a price discrimination between national and foreign markets of a good creates an incentive for smuggling. Thus, when the domestic government puts a high tariff on an imported product, the price of that product will be more expensive. Therefore, considering the trade costs, smugglers will be motivated to illegally sell their goods in order to obtain extra benefits. Figure 1 shows Sheikh's (1977) explanation. In this diagram, when there is no trade barrier, such as tariffs, firms from a foreign country can sell their goods at price P^0. This happens when the supply function (S) intersects with the demand for imported goods (D). As tariffs, or other forms of tax like VAT and luxury tax are imposed, the cost increases. Hence, the price increases to P^1. As a consequence, the quantity demanded for that good falls from Q^0 to Q^1. Thus, the difference in the price before and after tariffs attracts the attention of smugglers.

Figure 1: Demand and supply curve for smuggled goods



Source: Sheikh 1977.

In Figure 1, the supply of illegal goods is described by B^0. This function can be a linear, increasing, or decreasing line depending on many factors, such as enforcement and risk attitude (Sheikh, 1977). But here, following Sheikh (1977), it is assumed that the function is increasing. In this situation, the supply of smuggled goods increases following the after-tariff price. When the after-tariff price is P^1, the quantity of smuggled goods offered is maximised at b_1. When the quantity of smuggled goods increases, the quantity of legal goods offered in the legal market becomes lower (Sheikh, 1977), in this case from Q^1 to b_1 Q^1. If the legal market price is higher than P^1, it will encourage more smuggling. Thus, when the government imposes a higher tariff, prompting the price to move to P^2, more goods will be smuggled, that is, until b_2. On the other hand, when the government cuts the tariff, the supply of illegal goods will decrease. Eventually, when the tariff is zero, there will be no incentive to smuggle. However, one factor

that must be considered by a smuggler is the smuggling costs. Sheikh (1977) argues that trade costs for smugglers is an important factor when determining the level of smuggling. Bribery is one example of this. As an effect of this cost, the supply of smuggled goods will shift from B^0 to B^1. Therefore, a smuggler will be in action when the legal import price (price after tariff) is higher than P^3. Another consequence of this cost is the declining supply of smuggled goods. That is, when the price is at P^1, the quantity supplied falls from b_1 to b_3.

In the case of ROO fraud, where an FTA is in force, the smuggling costs would increase. Before arriving at the destination country, the goods will transit a partner country that belongs to an FTA. As a consequence, smugglers will incur additional costs, for instance transportation and transit costs. Thus, the supply line will shift to B^3. However, the difference in tariffs (preferential and MFN tariffs) create another incentive for smuggling. When the expected benefits exceed the costs, the smuggler will continue detouring the good for transit, forging certificates of origin, and hence pay a lower tariff.

Figure 1 also shows the demand for smuggled goods. According to Sheikh (1977), the demand for illegal products depends on various factors that include risk attitude and moral standards, and also the existence of anti-smuggling laws. Therefore, before deciding to switch from a legal to an illegal market, consumers will consider these factors. Larger price differences between legal goods and illegal goods lead much more people to feel that the gain is worth the risk. Thus, higher tariffs indirectly lead to increases in trade evasion. As shown in Figure 1, when the price changes from P^0 to P^1 because of tariffs, consumers will seek lower prices from illegal markets. The lower the price, the higher the demand for the illegal products.

In contrasts, Sheikh (1989) argues that an increase in tariff is not always followed by higher illegal trade. Tariff is not the only consideration, as smuggling also depends on the risk function of the smuggler. The more risk-averse the smuggler is, the fewer illegal goods will be traded. In addition, when there is an improvement in the law enforcement that increases the probability of detection, the expected profit for smugglers will decrease. This would be a disincentive for smuggling. Ultimately, Sheikh (1989) concludes that the benefits of smuggling increase when customs officials can be bribed or when there is no serious government effort to prevent smuggling. However, a more recent theoretical study argues that the effect of tax rates toward evasion depends on the assumptions used (Slemrod & Yitzhaki, 2002). Therefore, further empirical works are needed to examine the extent to which import tax evasion is at play.

3. Methodology and data

To examine the effects of tariffs, other taxes, non-tariff barriers and FTAs on import tax evasion we first define import tax evasion following Fisman and Wei (2004). They used trade gap as a proxy, that is by calculating the difference between the value or quantity of imports reported from one country and the export value or quantity of the same international transaction reported by the counterpart country. We apply this method at the six-digit Harmonized Commodity Description and Coding System (HS) level. We examine the gap in the reported trade between Indonesia and Singapore by observing the difference between the export data from Singapore to Indonesia as reported by Singaporean authorities and the import data from Singapore to Indonesia as recorded by Indonesia during 2012 to 2016. Therefore, the equation for trade gap is:

$$trade\_gap_{it} = \ln exports_{it} - \ln imports_{it} \quad (1)$$

Where $trade\_gap_{it}$ is the gap in the trade records of product i in period t. In the case of Indonesia, we calculate this gap as the difference between log of exports reported by Singapore (In *exports*) to Indonesia and log of imports from Singapore as reported by Indonesia (In *imports*). The subscript *i* refers to product at the six-digit HS levels, and *t* refers to specific year (between 2012 and 2016). Similar to

Fisman and Wei (2004), we use both value and quantity in measuring the trade gap. In some cases, we might observe 'complete smuggling', where within the six-digit HS code, there is an export transaction to Indonesia recorded by Singapore while Indonesia does not have any record of this transaction, and vice versa. To allow for this possibility, we use Mishra et al.'s (2008) alternative method, that is:

$$trade\_gap_{it} = \ln(1 + exports_{it}) - \ln(1 + imports_{it}) \quad (2)$$

We then regress this trade gap on tariff variables. In particular, we include average tariff, taxes, tariff of similar products, and non-tariff barriers. To investigate the effect of FTA on smuggling, we also add MFN tariff into the model, following Stoyanov (2012). The effect of tariff may be non-linear, so we add the squared-tariff into the equation, too, following Fisman and Wei (2004), Mishra et al. (2008), Van Dunem and Arndt (2006), and Levin and Widell (2014). Hence, the econometric model is:

$$trade\_gap_{it} = \beta_0 + \beta_1 tariff_{it} + \beta_2 tariff_{it}^2 + \beta_3 tariff\_sim_{it} + \beta_4 tariff\_mfn_{it} + \beta_5 tax_{it} + \beta_6 nontariff_{it} + u_{it} \quad (3)$$

In this model, $tariff_{it}$ is defined as the simple average of duties of product *i* (at six-digit HS code) in year *t* (between 2012 and 2016). Since Indonesia and Singapore are members of the AFTA, we will use the ASEAN Trade In Goods Agreement (ATIGA) tariff for all products included in the agreement. Fisman and Wei (2004), Mishra et al. (2008) and Van Dunem and Arndt (2006) found positive relationships between tariff and import tax evasion ($\beta_1 > 0$). If Indonesia imposes a higher tariff on a product, a smuggler would avoid it by reporting or declaring the good falsely. As a result, the export value/quantity reported by Singapore is higher than the import value/quantity in Indonesia's record.

The nonlinearity in equation (3) indicates that the marginal effect of an increasing rate of tariff on evasion differs across different tax rates. Fisman and Wei (2004) and Van Dunem and Arndt (2006) found the relation between tariff and tax evasion to be nonlinear, but Mishra et al. (2008) and Levin and Widell (2014) found no nonlinearity. We are therefore interested to test this in the Indonesian context.

The variable $tariff\_sim_{it}$ is used to detect misreporting of products into similar groups but with lower tariffs. When a smuggler faces a higher tariff for his product, he would falsify the classification of the product so as to enjoy lower or no tariff. In such situations, the export value/quantity reported by Singapore will be higher than import value/quantity recorded by Indonesia at the six-digit HS category. Unlike the previous studies (Fisman & Wei, 2004; Van Dunem & Arndt, 2006; Stoyanov, 2012; Levin & Widell, 2014) that used the average of all other six-digit HS tariffs within the four-digit group, in this paper we use the average of only the lower tariffs within the same four-digit HS. This definition makes more sense, since we are interested to see the effect of 'more competitive', that is, lower tariff compared to the tariff of the good of interest. If we use a simple average of all the other tariffs imposed on the other goods in the same four-digit category, the existence of lower tariffs could be eroded by other, higher tariffs (those higher than the actual tariff for the smuggled good), whereas only the lower tariffs provide an incentive to smuggle. Thus, including all other tariffs will potentially bias the results. Therefore, we define the variable $tariff\_sim_{it}$ as the simple average of all the other, *lower* six-digit HS level tariff within the same four-digit category in period *t*. Similar to $tariff_{it}$, we will use the ATIGA tariff for all products included in the FTA. Similar products' tariff (*tariff_sim*) is expected to be negatively correlated with trade gap ($\beta_3 < 0$), as found by Fisman and Wei (2004), Van Dunem and Arndt (2006), Stoyanov (2012), and Levin and Widell (2014).

$Tariff\_mfn_{it}$ is the simple average of Indonesia's MFN tariffs of product *i* (at six-digit HS category) in period *t* (from 2012 to 2016). When a product from a third country is charged with a high tariff at the Indonesian border, the smuggler will detour the good via Singapore. In Singapore, since it is only a transit movement, the smuggler can ask for a tariff exemption and then continue to ship the product to Indonesia by using a false Certificate of Origin (COO) that claims that the product is made in Singapore and hence is subject to a lower tariff. In the end, Singapore will have no record of the export of this

product (as it is only a transitory movement). But on the other hand, Indonesia will report it as an import from Singapore (due to the fake COO). Thus, we expect that the trade gap negatively correlates with *tariff_mfn* ($\beta_4 < 0$).

Tax_{it} is the simple average of import taxes other than duties that are imposed on product *i* (at six-digit HS category) in period *t* (from 2012 to 2016). There are three different types of taxes charged, namely VAT, luxury tax and import income tax. Similar to $tariff_{it}$, the effect of tax on evasion is expected to be positive ($\beta_5 > 0$). That is, when a smuggler faces a high tax, they tend to under-report or to misclassify it.

To show the non-tariff barrier effect on tariff evasion, we have added one more independent variable to the model, $nontariff_{it}$. This variable represents the non-tariff barriers contained in six-digit HS level *i* in year *t*. According to Margono (2011), when a product is an object of a non-tariff barrier, the importer must prove that the goods satisfy additional requirements. In this paper, non-tariff barriers cover import bans, import licensing requirements, import quotas, import-related non-tariff measures, local sourcing, localisation incentives, public procurement access, public procurement localisation, sanitary and phytosanitary, and technical barriers to trade. An importer who is reluctant or cannot fulfil the requirement tends to mislabel the product or simply not report it. Therefore, implementation of non-tariff barriers might encourage smuggling activities, hence, an increase in the trade gap ($\beta_6 > 0$).

The export and import data used in this study were taken from the United Nations' Comtrade database (www.comtrade.un.org). The trade data from this resource are recorded at the six-digit HS. Next, the data of Indonesia's tariffs, both ATIGA and MFN tariffs, were collected from the regulation of Ministry of Finance of Indonesia. These data are available at the ten-digit HS levels. However, since we need the data at six-digit levels, then we applied the simple average method of the ten-digit HS tariffs within the same six-digit category. In addition, VAT, luxury tax, and import income tax are also counted, based on the regulation of Ministry of Finance. The non-tariff barrier data of Indonesia come from the Global Trade Alert database (www.globaltradealert.org), which contains information of government interventions that affect trade flows in and out of a country. The interventions can be either harmful or liberalising, however, since we focus on the effects of trade barriers, we only took into account harmful interventions.

4. Results

4.1 Descriptive statistics

Table 1 describes some characteristics of data used in this paper. All data are at the six-digit HS level, spanning from 2012 to 2016. During this period, the averages of exports, both in value and in quantity, are higher than those of imports. This indicates that there were less exports from Singapore reported as imports into Indonesia during 2012–2016. Thus, we can suspect that smuggling took place between Singapore and Indonesia. During 2012–2016, tariff applied for exports and imports within the two countries is the ATIGA tariff. From the summary statistics, on average, this tariff is close to zero. However, the maximum tariff in this observation is 100 per cent. Therefore, there is an incentive for under-reporting or misclassification.

Table 1: Summary statistics

Variable	Mean	Median	Min	Max	SD	N
ln import (value)	9.5612	11.0429	0	23.1475	5.2847	18,705
ln export (value)	12.5067	12.7925	0	23.1058	3.1639	18,705
trade_gap (value)	2.9455	1.75710	–19.15	17.9127	4.5839	18,705
ln import (quantity)	6.6056	7.5596	0	23.0877	5.3685	16,505
ln export (quantity)	8.8900	9.7190	0	23.0592	4.5414	16,505
trade_gap (quantity)	2.2844	1.8892	–19.82	22.2831	6.0275	16,505
tariff	0.0033	0	0	1	0.0236	18,705
VAT (value added tax)	0.0961	0.1	0	0.1	0.0189	18,705
Import Income Tax	0.0270	0.025	0	0.1	0.0101	18,705
Luxurious Tax	0.0059	0	0	0.75	0.0467	18,705
tariff_sim	0.00078	0	0	0.3	0.0078	18,705
tariff_mfn	0.0690	0.05	0	1.0167	0.0526	18,705
nontariff	0.4054	0	0	9	0.9518	18,705

Note: SD: standard deviation, N: number of observations.

Source: Author's estimations.

Among the three other taxes outside import tariff, VAT on average, is highest. Even though luxury tax shows higher maximum levels (75%) than VAT (10%), it is only imposed on certain goods while VAT is spread more evenly across almost all goods. Thus, we expect VAT to have a more significant effect on smuggling than the other taxes. Therefore, in our regression we will focus on the effect of VAT.

Furthermore, the tariff imposed for non-members of FTA (tariff_mfn) is very different from the tariff imposed for FTA members. The average of MFN tariff is 6.9 per cent, while the FTA tariff only 0.3 per cent. This huge gap will encourage goods from non-members of FTA to transit firstly in Singapore before being re-exported to Indonesia. Thus, we can suggest that there will be a high possibility of ROO violation within this period.

4.2 Empirical results

In this paper, we applied six-digit HS level panel data for five years. Since we included almost all products in our regression, we needed to control for their own characteristics. Hence, a fixed effect model is more beneficial to show the effect of all variables towards the trade gap. This is also supported by Hausman test (Table 2).

Table 2: Hausman test result

H_0 = Random effect model
H_1 = Fixed effect model

Estimated results:	Dependent variable: trade_gap (value)	Dependent variable: trade_gap (quantity)
chi2(5)	247.02	63.27
Prob>chi2	0.000	0.000

Source: Author's estimations.

Table 2 shows the probability of accepting the null hypothesis is very small, it means we reject this hypothesis and, therefore, the fixed effect model is better than the random effect model. In addition, we also tested whether the fixed effect model is better than the pooled least square model. To solve this, we used the Lagrangian Multiplier test. Table 3 presents the result of this test and confirms that the fixed effect model is better than the others.

Table 3: Breusch and Pagan Lagrangian multiplier test result

H_0 = Pooled Least Square
H_1 = Random effect model

Estimated results:	Dependent variable: trade_gap (value)		Dependent variable: trade_gap (quantity)	
	Var	sd	Var	sd
trade_gap	21.0120	4.5839	36.3304	6.0275
e	8.6318	2.9380	12.2580	3.5011
u	10.2123	3.1957	23.1094	4.8072
Test: Var(u) = 0				
chibar2(01)	11030.73		14249.04	
Prob > chibar2	0.0000		0.0000	

Source: Author's estimations.

Table 4: Variance inflation factor (VIF) test result

Variable	VIF	1/VIF
tariff	4.66	0.2146
tariff2	3.66	0.2732
tariff_sim	1.57	0.6369
tariff_oc	3.05	0.3279
tax	6.21	0.1610
nontariff	1.2	0.8333
year		
2013	1.97	0.5076
2014	1.97	0.5076
2015	2.00	0.5000
2016	2.01	0.4975
Mean VIF	2.83	

Source: Author's estimations.

Table 5: Wald test result

H_0 = sigma(i)^2 = sigma^2 for all i
$H_1 \neq$ sigma(i)^2 = sigma^2 for all i

Estimated results:	Dependent variable: trade_gap (value)	Dependent variable: trade_gap (quantity)
chi2 (3741)	4.30E+08	5.80E+09
Prob>chi2	0.0000	0.0000

Source: Author's estimations.

In addition to the product fixed effect, we controlled for the year fixed effect. We also applied other tests to the data. First, to check the presence of multicollinearity we used the variance inflation factor test, and the result shows there is no problem with multicollinearity (Table 4). Second, the Wald test result exhibits a heteroscedasticity problem in our regression (Table 5). To tackle this issue, we used robust standard error instead of ordinary standard error.

Table 6 describes the results of our estimation. According to this, the value of R^2 in our regression is low. This problem also occured in previous studies. The R^2 value estimated for the model with the trade gap (the dependent variable) in value and in quantity are 0.066 and 0.061 (Fisman & Wei, 2004). Javorcik and Narciso (2008) found the R^2 varied from 0.000 up to 0.769 in several countries. In addition,

Stoyanov (2012) found it ranged from 0.02 to 0.04. Levin and Widell (2014) estimated the R^2 values between 0.000 and 0.14. Fisman and Wei (2004) argued that this appears because of noise in the data, which resulted from misclassification of indirect imports. In addition, the regression included almost all products at the six-digit HS level, and their characteristics are different from each other. Therefore, the effect of our explanatory variables in the model might differ for each of them.

Table 6: Regression results

Variables	Dependent variable: trade_gap (value)	Dependent variable: trade_gap (quantity)
	(1)	(2)
tariff	6.483**	24.258***
	(3.099)	(4.852)
tariff2	7.945	–84.452***
	(22.305)	(29.488)
tariff_sim	1.047	2.498
	(4.716)	(6.006)
tariff_mfn	–0.345	0.104
	(1.979)	(2.125)
tax	40.727**	50.118**
	(17.555)	(21.611)
nontariff	0.109*	0.160*
	(0.066)	(0.095)
F statistic	8.75	106.19
p-value	0.000	0.000
N	18,705	16,505
R2	0.0414	0.0001

*Note: *significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors are in parentheses. All regressions include 6-digit HS fixed effects and year fixed effects. N is number of observations.*

Source: Author's estimations.

Based on these results, almost all variables were significant and are consistent with our hypotheses. The results show a significant relationship between tariffs and tax evasion. The magnitude of tariff variables both in value and in quantity are high. This might happen because, even though the average tariff is very low, there are some product tariffs that remain high. In terms of value, the coefficient of tariff (β_1) is approximately 6.48. This means that when a product's tariff increases by one percentage point, unreported exports increase by 6.48 per cent, if all else is equal. However, the magnitude in terms of quantity is higher. That is, when tariff increases by one percentage point, the quantity of goods being unreported rises by 24.25 per cent. The results for the *tariff*^{2} variable are mixed. In terms of value, it is insignificant. However, in quantity terms, the result shows that as the tariff increases, the tax evasion also increases, albeit at a lower rate.

We found an insignificant relationship between similar products' tariff and trade gap in both value and quantity. This indicates that smuggling through product misclassification is not evident in the Singapore–Indonesia trade flow. Similarly, there is no evidence of ROO violation in trade between Singapore and Indonesia under the AFTA.

In contrast to the tariffs for similar product and MFN tariffs, our estimation on tax shows that VAT and import tax evasion is highly correlated (both in value and in quantity), which is not surprising because almost all goods are subject to 10 per cent VAT. Thus, the effect of VAT on smuggling activity in Indonesia is higher than the tariff effect. This is because, although Indonesia has cut tariffs to a very low level, as mandated by AFTA, other taxes are still imposed. In particular, if the government adds one more per cent of VAT then smuggling will increase by 40 per cent in terms of value and 50 per cent in terms of quantity.

Last, we found that non-tariff barriers affect tax evasion significantly in both value and quantity. Since Indonesia applies non-tariff barriers as a form of domestic industry protection in the absence of tariff, smuggling remains high. The results show that non-tariff barriers encourage smuggling in both value and quantity by approximately 0.11 and 0.16 respectively (Table 7).

Table 7: Robustness check result

Variables	Dependent variable: trade_gap (value)	Dependent variable: trade_gap (quantity)
	(1)	(2)
tariff	6.616**	24.207***
	(3.077)	(4.854)
tariff2	4.981	–84.989***
	(22.178)	(29.513)
tariff_sim	1.289	2.747
	(4.719)	(6.010)
tariff_mfn	–0.24	0.166
	(1.979)	(2.125)

Table 7: continued

Variables	Dependent variable: trade_gap (value)	Dependent variable: trade_gap (quantity)
	(1)	(2)
tax	1.534	0.468
	(1.003)	(1.441)
nontariff	0.109*	0.159*
	(0.066)	(0.095)
F statistic	7.58	57.23
p-value	0.000	0.000
N	18,705	16,505
R2	0.0041	0.0085

*Note***:** **significant at 10%, **significant at 5%, ***significant at 1%. Robust standard errors are in parentheses. All regressions include 6-digit HS fixed effects and year fixed effects. N is number of observations.*

*Source***:** Author's estimations.

To support our evidence on the effect of tariffs, we performed the robustness check. We set up this test by adding together VAT, luxury tax and import income tax into the tax variable. The result of this is presented in Table 7. It shows that the result is indifferent with our previous estimation, and hence, confirms the effect of tariff on trade evasion is robust.

5. Conclusions

We replicated the approaches taken by Fisman and Wei (2004) and Mishra et al. (2008) to measure the effect of tariff on tax evasion for the trade flow between Singapore and Indonesia . Using panel data at the six-digit HS level during 2012–2016, we found evidence that the rate of tariff is highly correlated with import tax evasion in Indonesia. Even though the tariff rate is close to zero during the period 2012–2016, tax evasion is still significant. In addition, the presence of other taxes, in particular VAT, exacerbates the problem as smugglers get more profits if they avoid the tariff and other taxes imposed on their goods. However, the effect of an increasing rate of tariffs on tariff evasion is different between tax evasion in value and in quantity.

We also found that the tariff on similar products does not affect the trade gap in Indonesia in 2012–2016. These results indicate that smugglers prefer underreporting to product misclassification. Our findings with respect to the effect of FTA differ from that of Stoyanov (2012). Even though Indonesia applies very different tariff structures for members and non-members of the FTA, there is no evidence of ROO violation. Furthermore, we saw that non-tariff barriers may also encourage smuggling.

This finding should be of concern to the government, as it indicates that they will continue to lose potential revenue. There are three alternatives that can be taken. First, increase customs enforcement. When it is

implemented, the probability of detecting illegal goods will be higher and increased enforcement will discourage smuggling. Second, increase the penalties. Indonesia applies specific penalty amounts and rates, but they seem to be ineffective. To increase the deterrent effect, the government should increase the penalty. As a result, the risk for smugglers to illegally distribute goods to Indonesia will be higher. Third, charge consumers with penalties. Sheikh (1977) considered the demand for smuggling goods as an integral part of smuggling. When the demand is high, motivation for smuggling rises. Therefore, to keep the demand low, penalty rates should not only be imposed on the smugglers, but also on consumers, hence, it makes the risk of purchasing smuggling goods higher, and demand will be lower.

As a broader contribution to the literature, further research in this area is undoubtedly important. In this paper, we set aside the possibility of bribery, which makes smuggling easier, and hence future research needs to take this into account. It is also beneficial to increase the intensity of customs enforcement to see the effectiveness of customs action towards smuggling. Lastly, since the behaviour of smugglers changes over time, the way smugglers act will be different. Therefore, a more precise methodology is needed to detect tax evasion, and no less important is identifying another determinants of import tax evasion.

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A case study of B2C cross-border e-commerce challenges in China from Customs to consumers

Ti Yu

Abstract

The World Customs Organization (WCO) established a working group on e-commerce in July 2016. While China has experienced substantial growth in e-commerce, it is still in the transitional period in terms of the associated customs control regime. The aims of this paper are to investigate the challenges that consumers face when importing foreign commodities into China, and the challenges that China Customs faces when supervising these commodities; and to provide policy recommendations. The recommendations may serve as a stepping stone for further research into improving the system of customs control for business to consumer (B2C) cross-border e-commerce imports.

1. Introduction

China is the biggest e-commerce market in the world. In 2016, the volume of e-commerce trade in China was 0.585 trillion RMB, with an annual growth of 28.2 per cent, representing 21.4 per cent of total trading volume (Gao, 2017). The overarching aim of this research is to examine challenges faced by cross-border e-commerce consumers when importing goods into China, and the challenges that China Customs faces when supervising these commodities. Here, 'cross-border e-commerce consumers' refers to private individuals who import goods into China subsequent to making purchases on e-commerce platforms (e.g. alibaba.com). Identifying challenges from the perspective of both the private and public sector will enable the customs authority to gain a more complete picture to support improvements in Customs' taxation collection and supervision of cross-border e-commerce commodities, thereby promoting the development of the industry.

2. Literature review

As a new participant and stakeholder in B2C cross-border e-commerce, individual consumers have high expectations of integrity, fairness and responsiveness from government organisations such as Customs (Price & Brodie, 2001). Applying the theory of customer orientation, which considers challenges from the perspective of consumers, can improve operational performance and lead to customer satisfaction (Yeung, Cheng, & Chan, 2004). Adopting a consumer relationship management (CRM) strategy would also help Customs to make better use of electronic systems to reduce the costs of compliance. In this context, CRM refers to a process by which a firm gathers information about the needs of its customers to adjust its offerings to better fit those needs (West, Ford, & Ibrahim, 2016). Technology-facilitated CRM is now an essential way for government to streamline large bureaucratic procedures (Batista & Kawalek, 2004; NOIE, 2003), and in developed countries where governments are faced with increasing political and social pressure to provide cost-effective services, CRM has created a goal of working towards e-government to achieve seamless interactions between agencies, departments and consumers (Kolsky & Keller, 2001).

2.1 International guidelines

The World Economic Forum (WEF) estimated that lowering supply chain barriers could stimulate and increase e-commerce cross-border trade by as much as 60–80 per cent (WEF, 2013). The tools are readily available. International guidelines, such as the World Trade Organization's (WTO) Trade Facilitation Agreement (TFA) and the WCO's Revised Kyoto Convention on the simplification and harmonisation of customs procedures (RKC), have tremendous potential to help achieve these results, but need to be adopted and implemented (GEA, 2015).

The TFA is the WTO's multilateral trade agreement that contains provisions for release and clearance of goods and sets out measures for effective cooperation between Customs and other organisations on customs compliance issues (WTO, 2017a). The TFA entered into force on 22 February 2017 and is expected to reduce trade costs by an average of 14.3 per cent and boost global trade by as much as $1 trillion per year with full implementation (WTO, 2017b). For developing countries, the requirement to implement the TFA is directly linked to the capacity of the country to do so and the 'TFA Facility' has been developed to help ensure that developing and least developed countries obtain the assistance needed to implement and gain benefits from the TFA (WTO, 2017c).

The WCO Revised Kyoto Convention information and communication technology (ICT) guidelines provide details on how Customs can use information and communication technologies to enhance trade facilitation and move towards an electronic environment. For several years, international organisations, including the WTO, Organisation for Economic Co-operation and Development (OECD), WCO, the World Bank and the European Union (EU), have recommended using ICT to improve the processes of customs administrations and enhance trade facilitation (Lewis, 2009). Moreover, the WCO recently developed IT guidelines to provide further information and insights into the strategic management process concerning the use of ICT for senior executives of customs administrations, including managing ICT security risks and the potential loss caused by poor design and operation of the system (WCO, 2017b).

The WCO's immediate release guidelines can also support e-commerce by providing simplified customs clearance procedures for low-value consignments where no duties or taxes are to be collected (WCO, 2014). The guidelines offer a range of solutions for each customs administration to select the practices that are best suited to its own trade patterns and compliance requirements.

The WCO guidelines for single window data harmonisation indicate that if international standards, such as the WCO data model, are being used, a single window environment would help solve the problem of conflicting information and thus improve the accuracy of data (WCO, 2007). The single window is a concept that allows a single agency to collect all necessary information, and then deliver the information to other border agencies, providing trade facilitation by reducing non-tariff trade barriers and delivering immediate benefits to all members of the trading community, including consumers, business and government (UNECE, 2003).

E-customs, an interoperable electronic customs environment with a unified data system to facilitate communication between traders and Customs (EC, 2016), would support and facilitate the clearance of ever-increasing shipments purchased by e-commerce, and serve to enhance the effectiveness and efficiency of customs control and revenue collection.

These and other international guidelines can act as a valuable tool for customs administrations in different nations to control and facilitate the trade of cross-border e-commerce commodities.

2.2 Tax collection

Many companies, particularly those in the retail sector, identified tariffs to be the greatest barrier to cross-border e-commerce as tariffs increase the price of the products sold by e-traders, which in turn reduces their competitiveness (Kommerskollegium, 2012). The WTO, the WCO, the OECD and the International Chamber of Commerce (ICC) have all recommended the adoption of the *de minimis* regime (Holloway & Rae, 2012). It not only enables the government to focus on more efficient revenue sources but also reduces the costs to importers and accelerates the delivery of goods (Holloway & Rae, 2012). According to Hufbauer and Wong (2011), an increase in *de minimis* thresholds can release more resources to address more important problems, such as security and product safety.

In view of the significant increase in the number of small consignments in the EU, the envisaged value-added tax (VAT) measures for e-commerce would focus on advance VAT collection for low-value B2C shipments through alternative models of revenue collection, such as the purchaser collection, vendor collection and intermediary collection models (WCO, 2016).

2.3 Customs procedures

Complex customs procedures tend to create processing problems, especially when dealing with large shipments of small consignments. Some countries of the American region (AMS), such as South America, North America, Central America and the Caribbean, noted that they have a *de minimis* below which the cargoes are released immediately without manual inspection, while European countries have implemented a simplified declaration process that involves the automatic exchange of information about each consignment, including a unique ID, consignee information, weight and value (WCO, 2017a).

2.4 Risk management

As cross-border e-commerce volumes are increasing substantially, increasing illicit transactions are taking place via air cargo and mail. Some customs administrations in Europe have introduced automated customs registration of items and automatic risk assessment and control. Other European countries, and countries in other parts of the world such as Australia, have implemented a system that enables the electronic exchange of information between government and e-commerce companies; acceptance of customs declarations from express couriers; and access to the cargo data found in the company's computer system (WCO, 2017a).

2.5 Exchange of data and information

In June 2015, the UK HMRC (Her Majesty's Revenue and Customs) introduced an initiative that involved the Royal Mail in the exchange of information through the customs declaration system (CDS). The CDS features include the harmonised system (HS) lookup directory and the ability to use barcodes to link data with packages (WCO, 2016). According to the WCO e-commerce survey, the exchange of information between e-commerce operators and Customs is still developing, with only 13 per cent of responding members having MoUs in place with e-commerce operators. Some companies in member countries are unwilling to participate, as they are unable to disclose their clients' personal data.

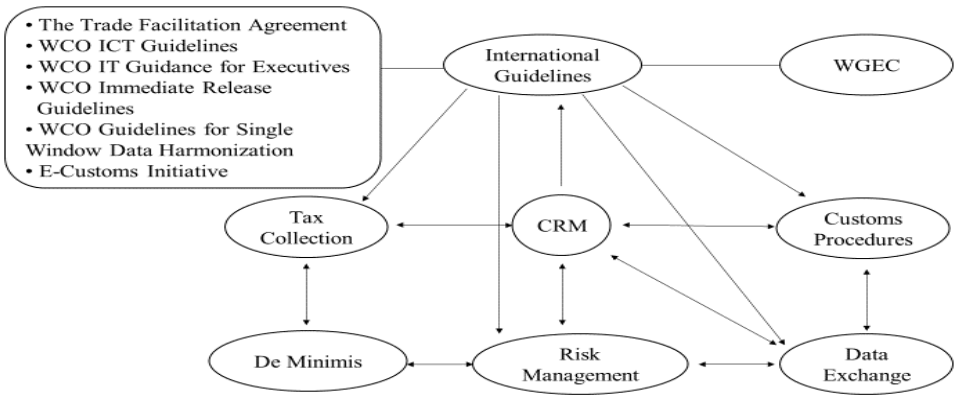
2.6 Working group on e-commerce

In light of the rapid development of e-commerce industry, the WCO working group on e-commerce (WGEC) was established in July 2016. This group is divided into four sub-groups, each addressing a different area of concern: trade facilitation and simplification; safety and security; revenue collection; and measurement analysis. Co-chaired by a representative from a WCO member administration and a representative from the private sector, WGEC has been paying special attention to Customs–business

partnerships by involving the business community in the process of decision-making (WCO, 2017c).

As indicated in Figure 1, the seven actors reviewed above are all interconnected.

Figure 1. Literature review



Source: Author, 2017.

3. Methodology

This research followed a two-step process:

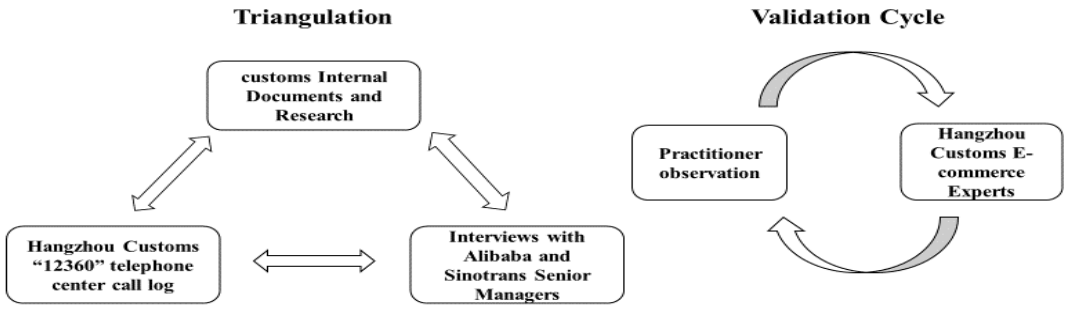
Step 1: Data collection and analysis through triangulation. Triangulation among three data sources is carried out to develop a comprehensive understanding of the customs-specific challenges that consumers face in China:

1. Qualitative analysis of call log data at Hangzhou Customs '12360' telephone service.
2. A review of customs challenges towards cross-border e-commerce control and taxation in China.
3. Qualitative analysis of two interviews: one with a senior manager of the e-commerce group, Alibaba Group, who is responsible for the group's international government affairs, including cross-border e-commerce policy advocacy, international cooperation, creation and implementation of the electronic World Trade Platform Initiative (eWTP); and the other with a manager from Sinotrans International Supply Chains Company, which is the largest international supply chain company in China. The manager deals with cross-border logistics, bonded warehousing and commercial operations. Both interviews were conducted by the popular Chinese social media tool, Wechat, which is readily available and enabled the interviewees to answer the follow-up questions. To leave space for interviewees to shape direction and content, the use of a strict interview protocol was avoided, which is also beneficial for interviewer–interviewee interaction (Spradley 1979).

Step 2: Policy recommendations are provided by making a validation cycle after discussing with Hangzhou Customs e-commerce experts.

The methodology is illustrated in Figure 2.

Figure 2: Methodology



Source: Author, 2017

4. B2C cross-border e-commerce in China

On 24 March 2016, the Chinese Ministry of Finance issued the Notice on the Tax Policy on Cross-border E-commerce Retail Imports (referred as the 'new policy') and clarified the tax rate on imported retail commodities that are purchased via e-commerce. Before the release of the cross-border e-commerce new policy, Customs regulated the rapidly growing cross-border e-commerce retail imports in the same way as mail items valued under RMB 1,000, subjecting it to 'personal postal articles tax', which includes import VAT and consumption tax under the principle of 'reasonable for personal use'. The new policy put a single transaction cap of RMB 2,000 and an annual cap of RMB 20,000 per person for cross-border e-commerce retail imports and applied an integrated tax, which is a combination of import tax, 70 per cent of VAT and consumption tax, with the tariff rate temporarily being exempted. However, a single transaction value that exceeds RMB 2,000, or an annual total purchase that exceeds RMB 20,000 will be considered as general trade and would be fully taxed (HKTDC Research, 2016). Table 1 indicates the tax policy change for cross-border e-commerce retail imports before and after the implementation of the new policy.

Table 1: Tax policies for cross-border e-commerce retail imports before and after the new policy

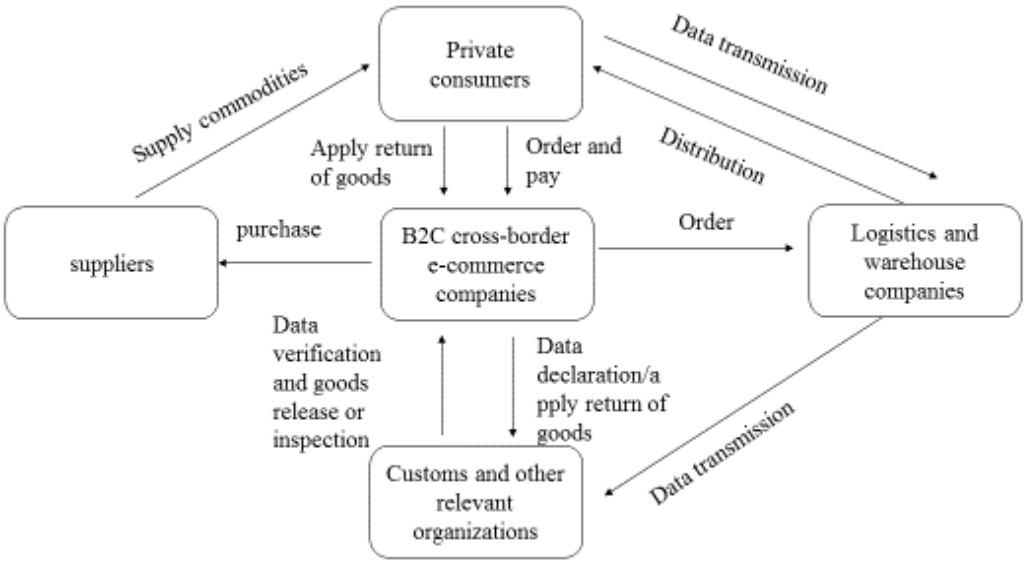
	Personal Postal Articles Tax under Old Policy	Integrated Tax under New Policy
Maximum value of each transaction	RMB 1,000	RMB 2,000
Annual total for each person	Nill	RMB 20,000
Purchase of an inseparable item that exceeds the maximum value for single transactions	Taxed under personal postal articles tax	Taxed in full using the general trade tariff
Applicable tax rates	10%, 20%, 30% and 50%, depending on type of goods	Import tariff which is temporarily set at 0%;VAT(17%x70%=11.9%); Consumption tax: rate applicable to type of goods x 70%
Payable duty of RMB 50 or less	Exempted	No exemption

Source: HKTDC, 2016.

On 7 April 2016, the Chinese Ministry of Finance, National Development and Reform Commission, the previous State General Administration of Quality Supervision, Inspection and Quarantine, and eight other ministries, jointly issued the *Announcement on the listed cross-border e-commerce retail import commodities* (referred as the 'positive list'), which clarified that only certain categories of commodities could be imported through the cross-border e-commerce retail channel. This restricted cross-border e-commerce retail imports to goods on the positive list, which includes 1,293 goods, covering most of the commodities being imported in the e-commerce pilot areas, thereby satisfying the demand of most consumers in China (She, 2016). However, all other goods must be imported under the general trade mode, which means that more complicated inspection and quarantine procedures are applied (HKTDC, 2016).

At the same time, GACC issued the *No. 26 Announcement on the cross-border e-commerce retail import and export relevant regulatory issues*, which identified the obligations that different actors have in relation to transmitting data to Customs. Before lodging a declaration for B2C e-commerce consignments, e-commerce platform companies, financial organisations and logistics companies must transmit accurate data of transactions, payments and logistics to Customs through the cross-border e-commerce import unified system (unified system) developed by China Customs. E-commerce companies are then required to submit a declaration manifest (a simplified declaration) of cross-border e-commerce retail consignments to Customs. In China, e-commerce businesses, e-platform providers or logistics enterprises that are registered with Customs are obliged to pay the duties before collecting imported goods for delivery to their clients (WCO, 2017a). See Figure 3 for details.

Figure 3: Data transmission between different actors



Source: Developed from relevant customs regulations by Author, 2017.

4.1 Challenges faced by consumers

The national unified Customs helpline telephone number, 12360, provides citizens and the private sector with services such as assisting with customs clearance inquiries. Table 2 provides data collected from the Hangzhou Customs 12360 helpline centre in the first two quarters of 2017, indicating the 10 most frequently asked questions from consumers engaging in B2C cross-border e-commerce business and purchasing activities.

Table 2: Major customs-specific questions concerning B2C cross-border e-commerce purchases (First two quarters in 2017)

Questions	Number
1. How can the cross-border e-commerce companies be registered?	90
2. How to check annual import value?	16
3. How to pay taxes and how to return the goods and apply the tax refund?	15
4. Whether the foreign countries also have registration procedures required from e-commerce companies?	10
5. How to declare cross-border e-commerce goods to customs?	10
6. Whether Kport is ran by Customs and the information on it is true?	8
7. Whether China Customs have special regulations towards establishing overseas warehouse?	6
8. Whether private consumers can check the tax information online?	6
9. How much tax shall I pay when purchase commodities from e-commerce platform?	6
10. Which bonded warehouse are the goods delivered? Why does it always show the goods are still in process of Customs clearance?	6

Source: Hangzhou Customs 12360 helpline centre, 2017.

It can be seen from this table that the most frequently asked question (which was asked almost six times more frequently than the second most frequent question), was 'How can the cross-border e-commerce companies be registered?' This question indicates that, since the implementation of the new e-commerce retail policy, the private sector is generally concerned about the process for registering of cross-border e-commerce companies. As is required by the new policy, all companies must be registered before engaging in cross-border e-commerce business. Most of the questions relate to the procedural changes since the implementation of the new policy. According to the data, we can infer that, generally, consumers are concerned about the cost and time of customs formalities.

The interviewee from Alibaba Group, confirmed the challenges reflected in the 12360 call logs and mentioned the limitation of the positive list. He suggested that a 'negative list' that replaced the 'positive list' could be more favourable to consumers, providing them with a wider range of commodities and, at the same time, stimulating the cross-border e-commerce industry. The manager from Sinotrans International Supply Chains Company agrees with this view.

Although the new policy aimed to promote the development of cross-border e-commerce by creating a stable, unified tax policy environment, it may in fact result in more costs and restrictions for consumers.

4.2 Challenges faced by Customs

The sudden booming growth of cross-border e-commerce imports has posed huge challenges for China Customs. Through a review of customs documents and research, and through practitioner observations, the following three main challenges for Customs have been identified.

1. **Rising administration costs**. With the elimination of the *de minimis* threshold, most of the cross-border e-commerce commodities would be taxed at a higher rate. As a result, more customs officers are needed to complete administrative tasks, such as filing tax forms and other clearance procedures.
2. **Technical problems.** The new policy has set a cap on individual annual purchase limits through e-commerce channels. However, Customs does not have access to consumers' personal ID information. Observations among the pilot cities, has shown that illegal enterprises have adopted false IDs, including the IDs of other importers, for the purpose of making customs declarations in order to increase their purchases through an e-commerce channel (HCRG, 2016).
3. **An increase in the volume of personal postal articles**, which also increases the potential risk of smuggling. Fragmentation of the trade increases customs control risks, including small consignments of counterfeit goods, which violate intellectual property rights (IPR), and undervalued items. Other risks include the tendency to import goods through personal postal article channels, which has a negative impact on conventional trade and results in national revenue leakage. What could be even more serious, is that criminals may seek opportunities and loopholes to import prohibited products, such as endangered animal and plant products, drugs, and biochemical and nuclear weapons, which pose a potential threat to the overall national security.

5. Policy recommendations

Table 3 lists the major challenges faced by Customs and consumers and how these can be addressed together through global guidelines. Thereafter, policy recommendations are developed to address each category of the challenges according to the international guidelines and OECD practices.

Table 3: Findings, global practice and recommendation

Findings	**Customs challenges**	Administrative cost	Potential risk	Technological problems	
	Consumer challenges	Taxation cost	Customs procedures	Technological problems	
Global guidelines		De minimis Regime, E-customs, WCO Immediate Release Guidelines.	TFA, E-customs, WCO Immediate Release Guidelines.	WCO ICT Guidelines, IT guidance for Executives, WCO guidelines for single window data harmonization, Single Window	
Recommendations		Optimize Taxation Collection	Optimize Customs Supervision	Improve Technology	Department Cooperation

Source: Author, 2017.

5.1 Recommendations for optimising taxation

According to international practice, cross-border e-commerce tax collection should follow the principle of neutrality. In line with the OECD's recommendations, instead of creating a new tax category for e-commerce, improving the existing tax system would be more appropriate. This practice could also avoid cross-border e-commerce commodities being diverted to personal postal articles to increase the risk of customs control and tax evasion through the post (Yang, 2016). It is suggested, therefore, to

implement commercially meaningful *de minimis* thresholds for all customs tariffs and taxes. In this case, an account-based collection model could be adopted, such as the intermediary collection model, which can protect revenue streams while maintaining control of growing numbers of small shipments without slowing down legitimate trade (GEA, 2015).

The efficiency of customs clearance and delivery of low-value consignments is especially crucial in B2C cross-border e-commerce. Lessons could be drawn from WCO's immediate release guidelines. Similarly, the US Customs tax practices indicate that, regardless of whether the imported goods are for personal use or for business purposes, taxes are levied at three levels according to the value of commodities: a tax exemption for the low-value goods; goods valued between $200 and $2500 may be imported using an informal entry; while a formal entry is required to be filed for goods valued over $2500 (CBP, 2017). In doing so, consumers can clearly determine which method to use when declaring import commodities to Customs.

5.2 Recommendations for optimising customs control

It has been stated in the literature review that TFA can provide facilitated transactions for e-commerce suppliers and relevant stakeholders, saving costs for consumers. Thus, it is important to implement international guidelines, such as TFA and WCO immediate release guidelines in order to achieve this.

It is worthwhile considering the establishment of a consumer integrity mechanism by using a cross-border e-commerce company credit model. This could improve the effectiveness of targeting smuggling by having follow-up inspections within the improved customs control system. Lessons could be drawn from Australia, the US and the EU to establish consumer import and export credit archives that include a detailed record of import and export declarations and related information. By building a professional e-commerce enterprise credit evaluation system to constantly monitor and assess risks, a convenient and sound environment for legitimate trade would be created.

Also, several actions must be taken, including working ahead of the border and the supply chain, to prevent the import of prohibited goods. Lessons could be drawn from the international cargo clearance modernisation plan carried out by Australia's Department of Immigration and Border Protection (DIBP) to create an intelligence-led and risk-based international mail environment by leveraging electronic reporting of personal postal articles to significantly reduce the volume of mail that requires real-time assessment. Intelligence-led and risk-based selectivity and targeting technology should be employed to control e-commerce, as should cooperation with legitimate traders to identify high-risk shipments (GEA, 2015).

5.3 Recommendations for technical improvements

A technology-based CRM strategy could be adopted by Customs to involve the private sector, including cross-border e-commerce traders and consumers, to create a more efficient and modern customs administration. According to CRM strategy and the HMRC framework, a consumer unit could be established. In HMRC, a customer unit is responsible for identifying the requirements and behaviours of customers, and the risk associated with them (NAO, 2006). It is worth considering establishing a consumer unit under the e-commerce department of each Customs department so that Customs can improve the consumer experience and compliance while addressing the needs and risks of consumers and the business community. Web links could be introduced to the national unified system used by China Customs for cross-border e-commerce declarations. Pop-up messages that contain information for potential consumers and businesses on their tax and compliance obligations, including the detailed registration process, could also be used. The same measures could address issues such as problems associated with the return of goods and how to check the annual import value and declaration process.

As stated in the literature review, a single window environment, WCO data model, WCO ICT guidelines and IT guidelines would improve the accuracy of data and intelligence to avoid risks. China, in this case, could adopt the single window regime, allowing this unified IT platform for one-stop lodgement of pre-shipment information to provide accurate data and, at the same time, facilitate customs clearance for consumers and businesses. Also, lessons could be drawn from HMRC to form a joint initiative with local post offices on the exchange of information by using the CDS. This would provide Customs with access to information about commodities, including volume, weight, country of origin and ID. In the long term, a higher data-sharing and procedural coordination mechanism could be established to promote trade facilitation and reduce the costs to the business sector and consumers.

5.4 Recommendations for cooperation

Through international customs cooperation and partnerships with businesses, Customs has been working on facilitating legitimate trade, while preventing illicit activities. Stakeholders, such as carriers, border agencies and e-commerce platforms, should collaborate to design efficient and effective policies that secure and facilitate this crucial economic activity. Co-chaired by a representative of a WCO member administration and a representative of the private sector, WGEC is considered to be the perfect platform for Customs and business to communicate with each other. As there are no specific international guidelines for e-commerce, there is an urgent need for WGEC to develop practical cross-border e-commerce guidelines that the business community and Customs in member countries can follow.

Customs in different countries should also cooperate to facilitate cross-border e-commerce. By seeking the common interest of guarding against tax evasion and focusing on cooperation and facilitation of cross-border e-commerce B2C imports, customs authorities could work together to standardise procedures and the automated exchange of information between different countries. By making full use of multilateral and bilateral communication platforms and trade agreements, China Customs could actively promote effective control of cross-border e-commerce and carry out pilot projects based on cooperation with other countries.

6. Conclusion

The increase in both the number of small consignments and the volume of e-commerce trade, as well as the emergence of new stakeholders in the global trade arena, such as individual consumers, has brought new challenges to customs administrations. In order to be successful in e-commerce, Customs and businesses must work together and it is therefore important to establish cooperative mechanisms for Customs and the private sector to improve the regulation of cross-border e-commerce transactions. Notably, the call log data from Hangzhou Customs 12360 helpline revealed that consumers' greatest concerns related to the impact of such regulation.

Most of the figures and tables in this article were originally developed from past customs experiences, the study of current regulations and validation with Hangzhou Customs e-commerce experts. The most interesting implication of this research is the need to consider policy recommendations from the perspective of consumers, an application of the theory of customer orientation and adoption of CRM strategy to develop e-Customs initiatives to save time and costs of border formalities for consumers.

In framing policies with respect to B2C cross-border e-commerce, policy makers should not only consider the objectives of economic growth and national security, but also provide a sound framework to ensure that consumers benefit from quality products, reduced fees, faster delivery and a wider choice, which comes hand in hand with the growing trend of cross-border e-commerce.

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Development of an econometric model of alcohol taxation in Vietnam

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Abstract

This paper presents details of a project that uses available data to construct an econometric model of alcohol taxation in Vietnam. The project was developed through a funding agreement between the Asia Pacific International Wine and Spirits Alliance (APIWSA) and the Research Office of Charles Sturt University (CSU). The purpose of such an econometric tax model is that it allows APIWSA to engage with stakeholders using evidence-based assumptions as to the effect on the Vietnamese alcohol market on any possible taxation reform scenarios. These effects include impact on pricing; consumer responses to price changes and consumption levels; and changes to government revenues.

The current alcohol taxation system of Vietnam

Excise tax plays the central role in the system of alcohol taxation and is found within the Law on Excise Tax (Law on Excise 2008 (No 27/2008/QH12) as amended. This law sets out three categories of taxable alcoholic beverage, which currently include 'beer', 'liquor up to 20% alcohol by volume', and 'liquor which is 20% alcohol by volume or higher'.

All excise taxes on alcohol are applied on an *ad valorem* or value basis, with current excise tax rates being set through an amendment to the Law on Excise, which was passed in 2014 (Law No 70/2014/QH13 to amend Law No 27/2008/QH12). This 2014 amendment essentially set out a 'roadmap' of excise tax rate increases, beginning on 1 January 2016, followed by further rate increases on 1 January 2017 and 2018. These increases are summarised in Table 1 below.

The taxable value for excise purposes within Table 1 was also recently amended, and from 1 January 2016 is based upon a manufacturer's or an importer's selling price to a non-affiliated company (Law No 106/2016/QH13). In relation to imports, this would appear to represent an effective excise tax increase, as taxable value rises from that of the landed price being CIF (cost insurance and freight) and relevant import tariffs, to a taxable value that also incorporates the importers value add and margins (Vietnam Customs, 2015), whereas domestic manufacturers only see an excise tax increase if they are distributing through affiliated wholesalers.

Table 1: Existing alcohol excise policy in Vietnam

Product Category	From 1 January 2016	From 1 January 2017	From 1 January 2018
Beer	55%	60%	65%
Liquor 20% alcohol by volume of higher	55%	60%	65%
Liquor up to 20% alcohol by volume	30%	30%	35%

Source: Law No. 70/2014/QH13

Given that the final excise tax rate increase decreed in 2014 took place on 1 January 2018, it is likely that the Vietnamese tax policy makers will soon begin a process of reviewing the existing excise policies for alcohol with a view to making recommendations to the National Legislative Assembly sometime during 2018 or 2019. As such, it is an opportune time to consider the current excise tax policies over alcohol and, where appropriate, review these against the objectives of the Vietnamese government in terms of alcohol taxation and against what are considered the principles of good alcohol tax policy.

In addition to these excise taxes, the importation of alcoholic beverages also attracts the payment of customs import tariffs at rates. These are found in the relevant schedules to the Law on Export and Import Tax (Law on Export and Import Tax 2005 [No 45/2005/QH11] as amended) and are based on the customs classification of the product and its origin should the import qualify for preferential rates.

For analytical purposes only, import tariffs have to be 'mapped', or generally aligned with the appropriate excise tax category, so that a single alcohol product can have its import tariff and excise liabilities identified. To assist, Table 2, below, links each of the three excise tax categories to the relevant customs import tariff payable. In this regard, that import tariff has been shown as the most favoured nNation (MFN) rate; however, it is noted that certain preferential rates are in place as at 2017 under free trade agreements (FTAs), with both ASEAN member countries through the ASEAN Trade in Goods Agreement (ATIGA) and with China.

Table 2: Existing alcohol import tariffs in Vietnam

Product Category (Law on Excise)	HS Heading	MFN	ATIGA	China FTA
Beer	2203	35%	5%	5%
Liquor 20% alcohol by volume or higher	2208	45%	5%	20%
Liquor up to 20% alcohol by volume	2204, 2205, 2206	50%	5%	5%

Source: Vietnam Customs, Author

Finally, the value added tax (VAT) is applied to the sale of all alcoholic beverages through the Law on Value-Added Tax (Law on Value-Added Tax [No 13/2008/QH12] as amended). The current general rate for VAT in Vietnam is 10 per cent and, when applied to alcoholic beverages, taxable value will include any excise taxes that have been paid and, in the case of imported product, any customs duties that were similarly paid.

Is it time to transition from an *ad valorem* alcohol taxation system?

Vietnam possesses a fully *ad valorem* – based alcohol tax system. Alcohol taxation based upon a product's value may be considered a more progressive approach given that higher tax burdens will fall on products of a premium nature and more likely consumed by those with greater means. However, excise taxation policy, in general, has been moving away from the taxation of products on the basis of their perceived luxurious nature, instead adopting the Pigouvian approach of aligning the excise tax with the external costs associated with harm from consumption of the product (Cnossen, 2007, pp. 6–7). As such, the taxation of alcohol within an excise tax system is more appropriate if it is more closely related to the quantity of alcohol consumed rather than being taxed according to its production and distribution costs.

Specific-rate taxation, or taxation based on quantity, meets this criterion for alcoholic beverages in that the rates applied to beverages will relate directly to the quantity of alcohol that will be consumed (Smith, 2005). There are two possible approaches to consider: an excise rate based on the volume of the product, such as litres of beer, litres of wine or litres of distilled spirits; or an excise rate based on the alcohol content within the product, expressed as litres of actual or 'pure' alcohol in one of those products.

The first option of an amount-per-litre specific rate, whilst being the simplest, does not fully reflect the various external costs associated with consumption of alcohol. To address this, a complex banded or tiered excise tax structure is required under which products of a higher strength are taxed at a higher rate. Without such a complex structure, a one-litre bottle of beer, at say four per cent alcohol by volume, would attract the same excise tax as a one-litre beer that was six per cent alcohol by volume, despite the fact it contains 50 per cent less alcohol for consumption (Preece, 2017).

The second option for specific-rate taxation are tax rates that are based on a 'per litre of pure alcohol' (LPA) measure. This option better reflects the externalities associated with alcohol consumption and overcomes the issues raised above in terms of a per litre rate. The effect of an LPA rate is that the excise tax is being levied upon the actual alcohol content and, as such, the tax liability for the product rises in line with the alcohol content of the beverage. The result is that LPA rates increase the price of higher strength alcoholic beverages relative to lower strength products. Returning to the beer illustrations above, the one-litre beer, which was six per cent alcohol by volume, would be paying 50 per cent more excise than the one-litre beer of four per cent and is thus more likely to result in its retail price being higher when consumers are making a choice of beverage.

Specific excise taxation based on alcohol content is also favoured by experts, particularly those in public health policy. The World Health Organisation (WHO) has publicly advocated for specific taxation of alcohol based on alcohol content as part of its 'global strategy to reduce harmful consumption' (WHO, 2010a, p. 16). In its strategy outline, the WHO recommends that national governments, in setting alcohol tax polic, should:

> *…establish a system for specific domestic taxation on alcohol accompanied by an effective enforcement system, which may take into account, as appropriate, the alcoholic content of the beverage…*

The WHO adds that this approach to taxation of alcohol is most appropriate due to its impact on pricing, where the pricing of products to consumers is key in the strategy to reducing harmful levels of drinking. Where alcohol tax policy is a part of government policy in relation to harmful levels of consumption, academics such as Cnossen (2013, p. 606) and Bird and Wallace (2010, pp. 6–7) agree with the approach, believing that specific rates of alcohol excise tax best work in terms of price signals and correction of the negative externalities arising from excessive consumption; however, they do recognise the regressive nature of specific-rate taxation and thus understand why *ad valorem* rates are still used, particularly in developing economies.

To address this perceived regression to specific-rate alcohol taxation, it may be necessary to include 'mixed' or 'composite' alcohol excise tariff structures that include both a specific and *ad valorem* excise rate. For low- and middle-income countries, a mixed specific and *ad valorem* taxation is considered more appropriate. This mixed tax design is expected to reduce harmful and excessive drinking and prevent drinking initiation among young people by putting a floor price on alcohol beverages (Sornpaisarn, Shield, Osterberg & Rehm, 2017, p. XI). Such an approach has been adopted by both Thailand, the Philippines and Malaysia as a way to transition away from *ad valorem* excises on alcohol and towards policy objectives that see alcohol taxed on a per litre of pure alcohol basis and, thus, are better aligned with externalities being taxed (World Bank, 2015, pp. 12–16). Malaysia has now finished its progression to a fully specific excise tax system for alcohol (Excise Duty Order [Amendment] 2016 taking effect 1 March 2016).

With a potential alcohol tax policy review in mind, this study starts from the point of the policy questions, raised in the discussion above, that Vietnam could consider in the context of the current taxation arrangements. These questions could include:

- Is it still appropriate to retain a full *ad valorem* – based excise tax base?
- What would be the impact of replacing this current structure with either a fully specific system or a mixed or hybrid system?
- What would be the basis of a specific system – the quantity of product or on the actual alcohol content?
- What would be the impact of the relatively high MFN import tariff rates, which then feed into the taxable value for excise, with consideration of some form of possible tariff reduction policy? This would include consideration of the extent to which the current tariffs act as a driver to smuggling or other forms of illicit trade.

To assist in the evaluation of these types of alcohol tax policy questions, the bulk of the research in this project was dedicated to the construction of an econometric model into which various tax policy options could be tested. The basis of this concept is that it seeks to better inform tax policy development by providing capability to predict the effect of future tax policies, based on both an understanding and a measurement of how the alcohol market responds to price changes, such as those that would occur under an amended tax policy.

The proposed model supporting this study needed the flexibility to incorporate new policies, such as use of specific-rate excise taxation, on either a 'per litre' or 'per litre of alcohol' basis. In addition, there also needed to be the ability to test a 'mixed' excise tax system. Finally, it needed to be able to forecast several years forward. This allows for the model to track transition of current tax policies to any new tax policies, as well as predicting the effect of any proposed new '5-year road map' announced by Vietnam. The actual methodology involved in constructing the econometric model is outlined in Annex A.

Approach

Developing an econometric model for Vietnam's alcohol market proved to be a significant challenge, particularly in relation to a lack of transparency in official data relating to clearances into the market and to tax collections. This meant that other sources of information on the market were required and that certain testing of the 'base-line' revenue projections of the model could not be completed. Following is an outline of the model's construction:

Market data collection

One of the major issues to manage was that of a lack of official published tax data in relation to either the level of clearances into the market of products within each of the three tax categories or of any data for excise tax collections for each of these three tax categories. There was not even officially reported data at the 'total alcohol excise' collections level. Therefore, no official data was available to:

- assist in calculating own price and cross price elasticities
- use as inputs to the model as baseline consumption
- confirm the accuracy of the outputs of the model by comparing baseline consumption in 2016 against excise tax collections for the same period.

This resulted in the need to source alcohol market data from a number of market research entities who primarily use an industry-based survey approach to estimate the size, value and overall make-up of the Vietnamese alcohol market by various product categories rather than by clearances related to tax categories (See Annex A re IWSR and Euromonitor Reports). In this regard, two market analysis reports were selected to ensure full coverage of all aspects of the market, namely IWSR and Euromonitor, and products were classified and sorted into the three excise tax categories.

Elasticity calculations

Consistent with past studies of alcoholic beverage markets that assume that demand for alcoholic beverages is dependent upon the price of the beverage, the price of other alcoholic beverages and household expenditure, this study uses the same approach. The estimation of price elasticities was conducted using the Almost Ideal Demand System (AIDS) with the full methodology employed outlined in Annex A. The AIDS model is also confirmed in the literature as an appropriate approach, taking into account other factors in demand such as trends in terms of changes in consumer tastes and preferences over time.

Based on household expenditure, the consumption of beer, spirits and wine has been disaggregated as follows for modelling:

- Beer: Premium priced, mid-priced and economy priced
- Spirits: Vodka, whisky, brandy and 'other spirits'
- Wine: Premium priced, mid-priced and economy priced.

The complicating factor in the calculations was the significant market in untaxed products that had been smuggled through the border or had under-stated their excise tax payable. One market research report was able to offer estimates as to the extent of the untaxed market, and as a result the elasticity calculations were also made with a correction factor for untaxed product. As the study progressed, the question as to the extent of 'smuggling' of imported products resulted in a more thorough investigation and an attempt at quantification; this will the subject of further analysis later in the paper.

The study calculated both 'own price' and 'cross price' elasticities for the 10 product categories listed above (the full final factors can be found at Annex A). However, as a brief overview, brandy, as well as premium and mid-priced wines and beers, were the most price-sensitive products, with signs of some consumers trading down to lower priced beverages of choice as well as some small substitution between wine and spirits.

Representative products

Within the 10 product categories, a number of representatives were identified and were largely based on the largest selling products in each category. The main objectives in identifying such representative products are:

- To establish alcohol strength so that calculations could be made to estimate the litres of alcohol in the product and in the tax categories and, from this, begin to look at possible specific-rate tax scenario proposals based on alcohol content. In many cases, two or more products were identified in each category, in which case a weighted average alcohol strength was determined.
- To start creating 'cost builds' for these representative products with a view to again building a 'weighted average' cost build for each product category. This weighted average cost build will form part of the final model and will be subject to simulation in which proposed tax scenarios impact the tax components of the product and influence the retail price.

For beer, 14 products were identified: three from the low-cost segment; five from the mid-priced beer segment; and six from the premium-priced segment, of which two were imported. For liquor products up to 20 per cent a/v, 15 products were identified: seven from the low-priced segment, of which there was one local product and six imported products; five from the mid-price segment, all of which were imports; and three from the premium-price segment, all of which were imports.

Finally, for liquor products over 20 per cent a/v, 13 products were selected: for whisky, six products were selected, including a local whisky brand; brandy had two products, both of which were imported; vodka had three products, two of which were local brands; and in the 'other spirits' segment, two were imported brands.

The 42 representative products selected represent almost 90 per cent of the taxable volume of sales.

Cost builds

The development of cost builds is an important aspect of modelling as the relationship between pricing and tax must be properly understood, especially in an *ad valorem* tax system such as that in Vietnam. The tax components of the prices must be identified as it is these components that will change with any proposed alcohol tax policy change, such as customs tariffs (for imports), excise or VAT.

Cost builds became a significant issue for the project for several reasons. Commercially, owners of products keep information on key pricing components confidential, such as CIF values (for importers), manufacturing costs and profit margins. These margins and other costs can vary from product to product, or from customer to customer.

Further, as mentioned above, significant volumes of smuggled and tax-avoided product has entered the regular distribution channels and become one with like tax paid product. In some cases, it appears that prices set by wholesalers may have been calculated by 'averaging out' their tax paid and non-tax paid product to offer a single price to retailers or other wholesalers.

As such, no exact cost build could be developed. Rather, a number of assumptions had to be made from the use of other data sources to produce a number of 'generic' cost builds. These sources include:

- Market research reporting of estimates of the ratio of cost components as a percentage of retail price such as 'manufacturing costs and margins', 'wholesale margins' and 'taxes'
- UN trade data for average CIFs per HS code for beer, wines, brandy, whisky, vodka and 'other'

- Market research reports that include surveys for retail pricing, supported in many cases by actual visitations to premises selling alcohol
- VAT being 1/11th of retail price using the 10 per cent rate.

There were also a number of complexities in relation to distribution that needed to be understood and addressed. The distribution of alcoholic beverages has a direct impact on the cost builds of products as each layer of distribution will add to these costs, and the taxable value for excise can move to differing points along the supply chain, dependent on whether product is sold to affiliates or whether the margins of on-sellers is sufficient. In terms of importers, the excise calculation is further complicated by the fact that excise is levied twice: once upon importation of the product, and a second time when the product is sold to a non-affiliated entity (with a compensating credit from the excise paid at import). To overcome these further complexities, the generic cost builds have had to assume manufacturers and importers have not sold to affiliates and that importers have received full credit on the excise paid on customs clearance at import.

Unrecorded alcohol

Unrecorded alcohol also emerged as a significant issue, with two areas impacting on the consumption of alcohol. First is that of 'small scale' non-commercial alcohol produced free of the need of formal licensing and tax payments – usually found in the villages of Vietnam – provided the distilling operation is registered with local authorities (see Article 6 of Circular 39/2012/TT-BCT of December 20, 2012, detailing a number of articles of the Government's Decree No. 94/2012/ND-CP of November 12, 2012, on liquor production and trading). Few attempts have been made to quantify this production, the most comprehensive perhaps being that of Luu et al. (2014) who conducted interviews in three provinces in rural Vietnam, and further cited the work of both Lam (2008) and Lachenmeier (2009) to assist this study quantify both volumes and importantly alcohol strength of non-commercial alcohol.

Based on these studies, non-commercial alcohol has been captured in the modelling as a separate worksheet, as at this stage there is no data to allow for the relationship between non-commercial and commercial alcohol to be understood. Notwithstanding this, Luu et al. (2008, p. 12) suggest that non-commercial production is in decline as new generations of drinking age populations are moving to the cities to find work, or are preferring commercial products, particularly branded beer, that is moving into rural communities.

The last recorded estimates of non-commercial alcohol are almost 10 years old and put total production at approximately 250 million litres. Alcohol strength and sales values have been updated for 2014 and see average alcohol strength of 38 per cent alcohol by volume (a/v) of these products whilst sales values will vary dependent upon the raw materials being fermented, but on average is around VND 20,000 per litre.

The second area of unrecorded alcohol is that of smuggling. An attempt was made to identify the potential extent of this problem using UN trade data statistics (provided by a third-party service). This data is reported by HS classification code in two formats: 'direct data', as reported by Vietnam in its trade reporting systems; and 'mirror data', being reported by the trading partners exporting to Vietnam. When comparing direct and mirror data, a significant anomaly was observed. When comparisons were made between Vietnam's reported 'direct data' for alcohol imports, with 'mirror' trade data, only 6–7 per cent of 'mirror data' has been reported as imported into Vietnam (Trademap, n.d.). The implication is that the gap represented smuggled alcohol. However, further investigation revealed that certain alcohol products sent to Vietnam as a 'hub' are intended for onward export to markets like China. Therefore, adjustments were made to mirror data, which reduced the potential 'smuggling' figure from Vietnam less those exports of locally produced Vietnamese beer and liquors (see Generals Statistics Office of Vietnam, n.d., for details by industry).

Table 3 provides a summary of the data as reviewed by the study and indicates gaps between direct data (for 2015) as reported as mirror data (for 2016) as adjusted for re-exports of mirror data products and indicates the potential quantity of smuggled product in Vietnam. Indicated by the UN mirror data for 2016, total CIF value of wine and spirit reaches 1.37 billion USD in total. However, UN direct data for 2015 shows total landed value at 78.68 million USD. After the adjustment of re-export figures, tariff revenue loss is estimated at 534.32 million USD. If reasonable, this now suggests only around 16 per cent of imported wines and spirits in the market had tax paid for them – a figure not inconsistent with reports of raids by the Market Surveillance Authority before 2018 Tet holidays, suggesting that only 20 per cent of wine products were found to be properly labelled with import stamps only (Vietnam New Agency, 2018; Market Surveillance Agency, 2018).

Table 3: Direct and mirror trade data by HS code – alcohol imports to Vietnam in US Dollars

	Direct and Mirror trade data by HS code - alcohol imports to VN (in Million USD)							Adjustments		Poetntial revenue pool (in Million USD)	
	CIF: UN Mirror Data 2016	MFN	Tariff revenue	CIF: UN Direct Data 2015	MFN	Tariff revenue	Tax paid as % of total	Re-exports	Duty acquitted	CIF of smuggled goods	Tariff revenue lost
Beer 2203	34.25	0.35	11.99	7.52	0.35	2.63	22%	26.73	9.35	0.00	0.00
Wine 2204	94.46	0.5	47.23	23.00	0.5	11.50	24%	0	0	71.47	35.73
Wine 2205	1.33	0.5	0.67	0.02	0.5	0.01	2%	0	0	1.31	0.66
Wine 2206	6.99	0.5	3.50	4.50	0.5	2.25	64%	2.49	1.25	0.00	0.00
Brandy 22082	805.68	0.45	362.55	31.66	0.45	14.25	4%	92.71	41.72	681.31	306.59
Whisky 22083	130.65	0.45	58.79	13.15	0.45	5.92	10%	2.73	1.23	114.77	51.65
Vodka 22086	61.29	0.45	27.58	5.73	0.45	2.58	9%	0.79	0.36	54.77	24.65
Other 2208 (ex 22082, 22083, 22086	266.71	0.45	120.02	0.63	0.45	0.28	0.2%	10.41	4.68	255.66	115.05
Totals	1401.36		632.33	86.20		39.41	6%	136	58.59	1179.30	534.32

Source: Trademap.org, GSO & author

The third-party service provider does issue certain caveats on the data indicating the potential for trading partners to be capturing or reporting inaccuracies and that some reporting times between Vietnam and its trading partners are not aligned. Notwithstanding, figures that suggest only 16 per cent of the CIF value of all alcoholic beverages sent to Vietnam being reported, supported by market raids suggesting only 20 per cent compliance from import tax stamps, there is a real issue for Vietnam in the area of under-reporting, of valuations, or non-reporting or under-reporting of quantities, or a combination of each of these. Smuggling on this potential scale should be part of future alcohol tax policy discussion as current policies may be contributing to incentives to smuggle, or indeed future tax policies may require increased enforcement support to Customs.

Economic model

The purpose of this study was not to dictate alcohol tax policy to Vietnam, but to highlight options. In this regard, the best place to start identifying options is with the government's likely intentions for alcohol tax, which are best captured by press reporting on the 2014 amendments to the Law on Excise Taxation (Vietnam Briefing, 2014):

> *The taxes on alcohol are also in response to what the government sees as the increasing harm caused by excessive drinking throughout the country – Vietnam consumes the third largest amount of beer in Asia, behind only China and Japan. An additional reason for the tax is to help boost state budget income.*

This statement suggests that alcohol tax policy thinking is starting to place a higher priority on the potential harm from unsafe levels of consumption, although growing the revenue contribution to the national budget remains important. In this context, it is time to question the on-going sustainability of a fully *ad valorem* alcohol tax system and introduce an element of, or transition to, a specific rate of excise.

The economic modelling tool allows for this sort of question to be analysed. Looking at Figure 1, users can, in relation to excise tax, select in the 'scenario' field for each of 2017–2020 a new *ad valorem* rate, and or create specific rates as either 'Dong per litre' or 'Dong per LPA' or a combination of these tax bases for each of 'beer', 'liquor up to 20% a/v' and 'liquor above 20% a/v'.

Figure 1: Input screen for economic model

Tax Assumption

		2017		2018		2019		2020	
		Baseline	Scenario	Baseline	Scenario	Baseline	Scenario	Baseline	Scenario
Tariff (%)	Beer	35%	35%	35%	35%	35%	35%	35%	35%
	Liquor & wine up 20% abv	50%	50%	50%	50%	50%	50%	50%	50%
	Liquor above 20% abv	45%	45%	45%	45%	45%	45%	45%	45%
Excise (% Ad Valorem)	Beer	60%	60%	65%	65%	65%	65%	65%	65%
	Liquor & wine up 20% abv	30%	30%	35%	35%	35%	35%	35%	35%
	Liquor above 20% abv	60%	60%	65%	65%	65%	65%	65%	65%
Excise (Dong per litre)	Beer		0		0		0		0
	Liquor up 20% abv		0		0		0		0
	Liquor above 20% abv		0		0		0		0
Excise (Dong per LPA)	Beer		0		0		0		0
	Liquor & wine up 20% abv		0		0		0		0
	Liquor above 20% abv		0		0		0		0

In addition to proposing changes to excise taxation in terms of current *ad valorem* rates or introducing elements of specific rate tax per litre or per LPA, the model also allows for users to propose changes to MFN import tariffs. As with excise taxation, the options to propose tariff changes is against 'beer', 'liquor up to 20% a/v' and 'liquor above 20% a/v'. To assist users, the baseline MFN and excise rates remain in place, with users required to change the MFN or excise rates in the 'Scenario' columns.

How does the model report output from proposed scenarios?

The amendment of any alcohol tax policy has an instant or real time output report in relation to:

- price changing per litre of product categories, in actual VND and percentage changes against the baseline pricing
- consumption in litres (and 000s of 9-litre case equivalents) for product categories and percentage changes against the baseline consumption
- government revenue in VND per product category and percentage changes against the baseline tax revenues for
    - MFN tariffs
    - excise
    - VAT
    - total tax revenue being a sum of MFN, excise and VAT.

Each of these outputs are considered important in terms of analysing potential tax policy scenarios. Pricing, as well as driving the consumer response measurements in the model, is also a factor in discussions of areas such as affordability. The concept of affordability becomes an issue for government revenue in that, where affordability for a great mass of the population decreases so too will tax revenue. This is due to both the consumer not purchasing and therefore not contributing tax, as well as the greater likelihood that smuggling and other forms of tax evasion will become more attractive, offering product on which tax is not collected.

Understanding changes in consumption is also important. Alcohol tax policy should not drive an increase in total consumption, in particular it should not be driving consumption from lower strength alcohols into cheap higher strength products, or to cheaper alcohols of equal strength. Rather, alcohol tax policy scenarios should be designed with a view to reducing overall consumption, or at least maintaining consumption at acceptable non-risky levels. This would include seeing consumers move to more premium products, and in addition seeing lower alcohol strength products remaining equally or more affordable than high strength products.

Tax revenue as a measure would likely be held at a neutral position overall in any alcohol tax reform, even if it is achieved at the end of a transition period. It is unlikely that a sustained tax revenue loss to the government would see the government keen to listen and consider such a policy proposal.

The output of each of price, quantity and government revenue as outlined above, is available in the model for display in both tabular and graphic formats.

Using the model: Looking at some revenue neutral policies

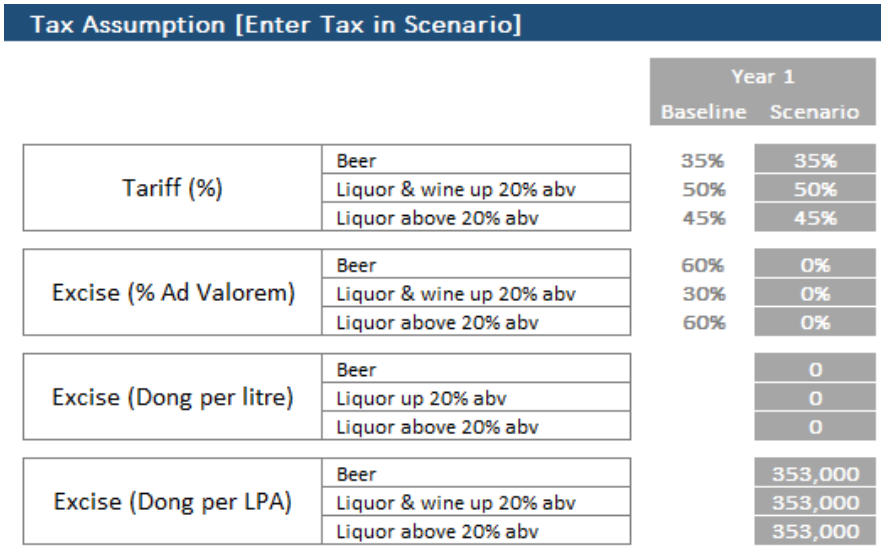
To assist in outlining how to put the model to use, a number of simple scenarios have been developed and the 'input screens' included in this report. As an interesting starting point, and in line with the statement on 'alcohol taxes and excessive drinking' cited above, a 'high level' analysis was performed with the model to look at replacing the existing set of *ad valorem* excise rates with specific based excise rates.

In this regard, there are the two options as outlined and shown in Figure 2: a rate based on a per LPA basis and another on a per litre basis. The rate being sought in each case is that which provides the government with a revenue-neutral (or as close as can be measured) outcome across the entire alcohol tax system.

To achieve this for an LPA rate, Year 1 is selected as a 'test year' and a manual process is undertaken of resetting the current *ad valorem* rates to 0 per cent, and inserting a rate in each of the three tax categories until a rate per LPA is found that results in a government revenue change of 0 per cent. The result of this process is that a single LPA rate for all three categories of VND 353,000 per LPA as shown in Figure 2 gives a tax revenue neutral outcome.

Of interest in such a scenario is that the expected price changes occur with tax increase and therefore price increases to lower end products, offset by slight falls in tax and price at the premium end. However, overall consumption does not change from the baseline, the main observation is a 'trading up' with consumers simply changing to better quality product rather changing consumption amounts.

Figure 2: Input screen for revenue neutral single LPA rate

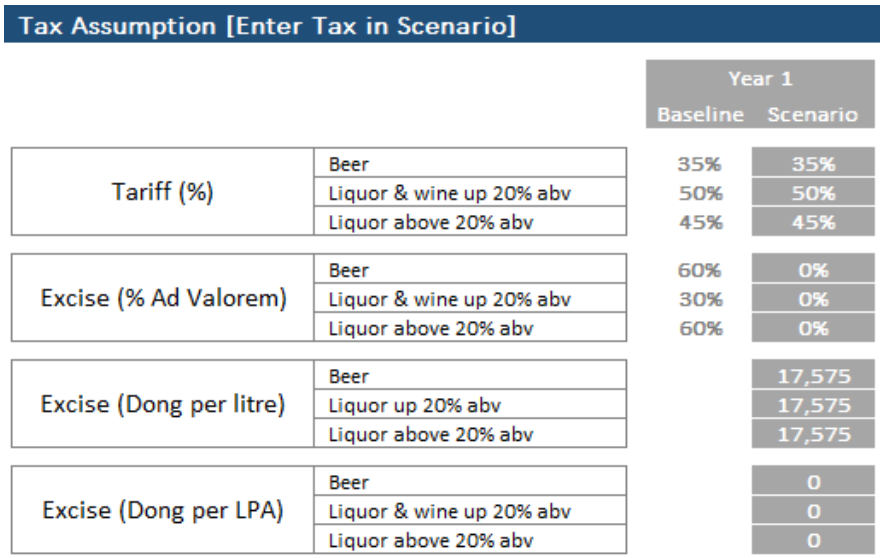


Tax Assumption [Enter Tax in Scenario]

		Year 1 Baseline	Year 1 Scenario
Tariff (%)	Beer	35%	35%
	Liquor & wine up 20% abv	50%	50%
	Liquor above 20% abv	45%	45%
Excise (% Ad Valorem)	Beer	60%	0%
	Liquor & wine up 20% abv	30%	0%
	Liquor above 20% abv	60%	0%
Excise (Dong per litre)	Beer		0
	Liquor up 20% abv		0
	Liquor above 20% abv		0
Excise (Dong per LPA)	Beer		353,000
	Liquor & wine up 20% abv		353,000
	Liquor above 20% abv		353,000

The other specific rate option available to policy makers is that of a 'per litre' approach. Following the same manual approach of re-setting all *ad valorem* excise rates in year 1 to 0 per cent and looking for a 'revenue neutral' single per litre rate across all products. This rate was found to be tax revenue neutral when the model was set at VND 17,575 per litre in all three tax categories. Figure 3 shows the relevant input screen. Also of note is that this single per litre rate set at VND 17,575 results in beer consumption falling by 0.1 per cent. Other outputs are as expected, with lower end products increasing in price, particular low-priced beers, and falls in price for premium beers, wines and spirits.

Figure 3: Input screen for revenue neutral single per litre rate



Tax Assumption [Enter Tax in Scenario]

		Year 1 Baseline	Year 1 Scenario
Tariff (%)	Beer	35%	35%
	Liquor & wine up 20% abv	50%	50%
	Liquor above 20% abv	45%	45%
Excise (% Ad Valorem)	Beer	60%	0%
	Liquor & wine up 20% abv	30%	0%
	Liquor above 20% abv	60%	0%
Excise (Dong per litre)	Beer		17,575
	Liquor up 20% abv		17,575
	Liquor above 20% abv		17,575
Excise (Dong per LPA)	Beer		0
	Liquor & wine up 20% abv		0
	Liquor above 20% abv		0

To further illustrate the capability of the model, users are also able to simulate a transition of a policy over several years of implementation. A significant policy move from, say, *ad valorem* to specific rate taxation and its impact on lower end products could, for example, be transitioned over a four-year period. In this regard, another policy scenario was input to the tax model relating to customs import tariffs and a possible pathway to tariff reduction.

The tax model contains MFN tariff rates, which for wines and spirits could be considered 'high' by international comparison. In Figure 4 below, over a four-year period the MFN tariff rates for wines and spirits were reduced by 5 per cent each year until they met the 35 per cent MFN tariff that currently applies to imports of beer.

This is achieved by replacing the current MFN tariff rates over the four years of the model with rates that reduce for wines and spirits by 5 per cent each year until they reach 35 per cent. This was achieved in Year 3 for wine and in Year 2 for spirits. The effect of this gradual reduction is very interesting from an academic perspective, in that total government revenue from total alcohol tax in Year 1 only falls by 0.05 per cent, and further, the overall policy is virtually fully tax revenue neutral by Year 4. The model is suggesting that the fall in duties from a cut in import tariffs for wines and spirits is offset by a switch to imports of premium wine and spirits by consumers.

Figure 4: Four-year phase in of MFN tariffs to 35%

Tax Assumption [Enter Tax in Scenario]

		Year 1		Year 2		Year 3		Year 4	
		Baseline	Scenario	Baseline	Scenario	Baseline	Scenario	Baseline	Scenario
Tariff (%)	Beer	35%	35%	35%	35%	35%	35%	35%	35%
	Liquor & wine up 20% abv	50%	45%	50%	40%	50%	35%	50%	35%
	Liquor above 20% abv	45%	40%	45%	35%	45%	35%	45%	35%
Excise (% Ad Valorem)	Beer	60%	60%	65%	65%	65%	65%	65%	65%
	Liquor & wine up 20% abv	30%	30%	35%	35%	35%	35%	35%	35%
	Liquor above 20% abv	60%	60%	65%	65%	65%	65%	65%	65%
Excise (Dong per litre)	Beer		0		0		0		0
	Liquor up 20% abv		0		0		0		0
	Liquor above 20% abv		0		0		0		0
Excise (Dong per LPA)	Beer		0		0		0		0
	Liquor & wine up 20% abv		0		0		0		0
	Liquor above 20% abv		0		0		0		0

Transparency

As a cautionary note, as with any model, the output of this model is reliant on the accuracy of the data going into the model during its construction. This means that the quality of the output as it relates to revenue and consumption relies on the level of accuracy of the input data, including: the sales data sourced from the market research entities; the closeness of the generic representative cost builds to actual cost builds; the closeness of alcohol strengths in representative products to actual products; and the unknown impact of such a substantial amount of non-taxed paid product in the market.

Unfortunately, the actual accuracy of the model was unable to be tested, as Vietnam has decided not to publish relevant data, such as clearances or indeed tax collections, to a level that could be used to test the baseline data in the model. An offer to have the model reviewed by the Vietnamese tax policy makers was declined. This lack of transparency is of concern and is not conducive to good tax policy development process as those stakeholders outside the government are unable to develop evidence-based submissions to future tax policy design.

Notwithstanding, this study believes that it has generally been able to capture the impact of various tax policy changes on the Vietnamese alcoholic beverage market and including that on pricing, consumers' responses to price changes, changes in sales volumes and, from these, changes to government revenues in relation to import tariffs, excise and VAT.

Tax model calculations

The final aspect of this report is the technical methodology employed in establishing the various factors that are the basis of the model's calculations and simulations of alcohol tax policy proposals. Annex A is a step-by-step account of this process and supports the underlying credibility of the model.

In short, whenever the model is being demonstrated or output of the model is being used to present a policy position, and there are questions on how the model is constructed, and the extent to which it can be relied upon (including limitations and assumptions), Annex A provides this detail.

Annex A should be read in conjunction with any use of the model, or by any person looking to independently review the model.

Conclusion

The outputs of this project do not include any proposals for specific reforms to the Vietnamese alcohol tax policy—that is a role for the APIWSA membership, working with its local stakeholders in Vietnam, to determine what policies should be taken forward for debate. The project does, however, consider that 'best practice' alcohol taxation includes the use of alcohol content as the basis for taxation, and that efforts should be made to address the illicit market. In this regard, the alcohol tax model allows simulation of a move away from value-based excise taxes to taxes based on alcohol content, and attempts to quantify the untaxed alcohol market simulations' effect on future tax policy proposals on this untaxed market.

Whilst this project has focused on excise taxation, the alcohol tax model can also simulate reforms to customs import tariff policy on imported alcohol and capture the impact of any proposed tax scenarios on the Value Added Tax (VAT) collections.

It is anticipated that Vietnam will commence consideration of its next 5-year plan for excise taxes, including alcohol, sometime in late 2018 or 2019. It is therefore hoped that this alcohol tax model can enable stakeholders to run various policy scenarios through the model with a degree of confidence, and that the output results will add credibility to the debate on potential tax reforms.

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Annex A: Method

Demand modelling of the Vietnam alcohol market

The standard approach in applied economics to empirically model demand behaviour in alcohol markets is to estimate a demand system. Demand systems are theoretically motivated equations that assume that demand for various alcohol types depends on their own prices, prices of the other alcohol types and household expenditure per capita. Additionally, trends to capture taste behaviour changes over time and lagged variables to capture habit persistence are also often examined. There appears to be no systematic studies conducted for most south-east Asian countries, including Vietnam. In part, the absence of studies for south-east Asian countries results from the paucity of accurate and lengthy time-series data sets.

Demand system modelling

For the estimation of elasticities, we employ the AIDS framework. The AIDS model is flexible and theoretically consistent in the sense that it provides a first-order approximation to any demand system based on utility maximising behaviour; it is derived from the second order approximation of any utility function and satisfies conditions for consistent aggregation across consumers (Deaton & Muellbauer, 1980). Fogarty's (2010) survey of the demand for alcohol literature indicates that at least 18 studies up until 2006 have employed the AIDS framework or its variants. Given the nature and short time span of the data, we employed the simplified 'linear approximate' version of the model (LAIDS). Further, the results from Unit Root tests indicate that the use of a first difference formulation is suitable.

In developing models, various approaches to combining the prices of individual products were employed. Consumer theory consistent indexes, such as the ideal Fisher index (Diewert, 1998) and average unit values (AUV), were considered. Theoretically consistent results were gained with normalised AUVs.

Multi-stage demand budgeting

A common assumption made in demand estimation is weak separability, see Edgerton (1997), Carpentier and Guyomard (2001), Klonairs and Hallam (2003), Gustavsen and Rickertsen (2003) and Mergenthaler, Weinberger and Qaim (2009) for food demand analysis in Vietnam. The approach assumes that commodities can be partitioned into separate groups and that consumers employ a multi-stage choice process, first allocating expenditure between groups of commodities and then within each individual group. Estimates from within group analyses are termed conditional estimates, conditional on the budget allocated to the group. These conditional estimates can then be combined with estimates from across group analyses to produce unconditional demand estimates which capture the total effects of price and expenditure changes on demand. The approximate relation between conditional and unconditional uncompensated price and expenditure elasticities has been developed by Edgerton (1997) and refined by Carpentier and Guyomard (2001).

Forecasting

Kastens and Brester (1996) and Gustavsen and Rickertsen (2003) analysed the abilities of theory constrained demand system models to produce accurate out-of-sample forecasts. In general, forecasts can be developed either through the direct statistically estimated equations or through derived elasticities with multi-stage budgeting. Both studies indicate the superior performance of elasticity-based forecasts. Using estimated elasticities and assuming values for prices, population and total expenditure, forecasts for quantities can be made.

Vietnamese alcohol data

Due to the absence of official statistics on alcohol consumption and prices, two research companies were enlisted to provide data. Euromontior was employed for beer data and the International Wine and Spirits Record (IWSR) for wine and spirits data. Data coverage is limited and relates to annual observations. Euromontior reported only tax-paid statistics for beer. In contrast, IWSR reported total volumes that include both the tax-paid and imported illicit markets for wine and spirits. Estimates of the tax-paid segments of the markets were obtained from IWSR and these varied between wine and spirits and among the various quality segments. The data and analysis were performed on the ***estimated tax-paid segments*** of the markets. The data for beer covers the period 2002–2016; for spirits, 2000–2016; and for wine, 2005–2016. For wine, the absence of price data for the still wine category prior to 2005 limits its duration. As a consequence, the analysis at the three broad alcohol levels relates to the period 2005–2016. The shortness of time-series and estimates of the tax-paid segments suggests that the results should be treated with caution.

We employed a three-stage budgeting process:

Stage 1: Household consumption expenditure allocates to: (1) Alcohol and (2) Other goods

Stage 2: Alcohol allocates to: (1) Beer, (2) Spirits and (3) Wine

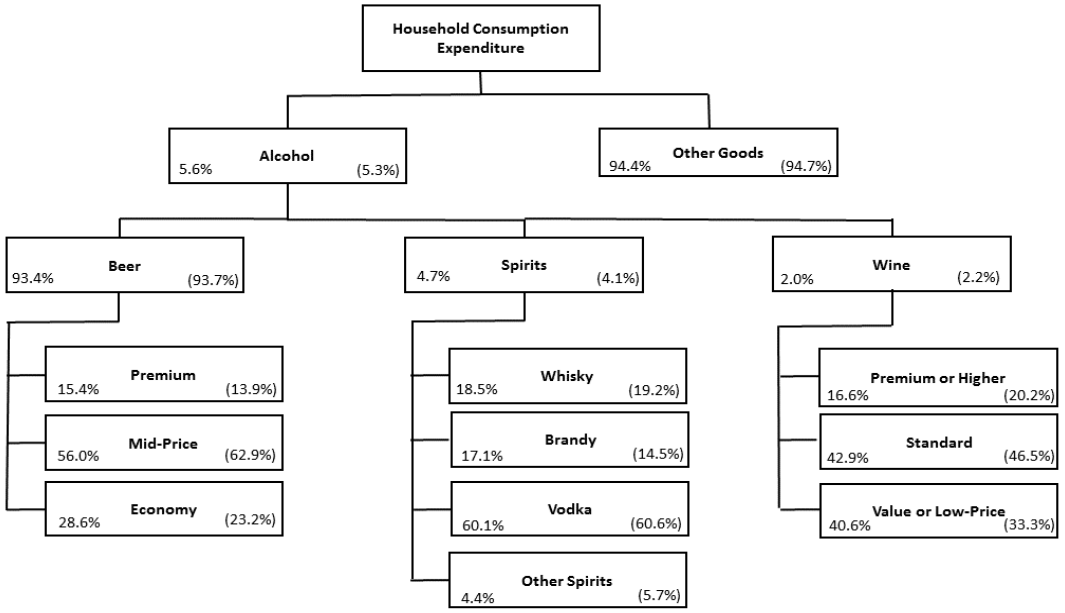
Stage 3: Beer allocates to: (1) Premium, (2) Mid-Priced and (3) Economy

Spirits allocates to: (1) Whisky, (2) Brandy, (3) Vodka and (4) Other sirits

Wine allocates to: (1) Value or Low-price, (2) Standard and (3) Premium or Higher

These groupings reflect natural products differences and are also driven by data availability and estimation results. For wine, the division between still, sparkling and other wine was initially considered. Estimates from this grouping produced theoretically inconsistent results, which, in part, appears to be due to the dominant still wine share of the group, averaging approximately 90 per cent throughout the sample. The expenditure budget shares of the product groupings in the various stages are presented in Figure 1. The figures for final household consumption expenditure and population (15 years or older) are sourced from World Bank (2017).

Figure 1: Alcohol budget shares – Vietnam



Notes: Budget shares based on sample means, 2016 shares presented in parentheses.

Alcohol accounts for approximately 5 per cent of household expenditure and this appears to be slightly higher than estimates from the General Statistics Office of Vietnam (2016) Living Standard Survey (VLSS). The VLSS estimates that the wine and beer percentage share of household consumption per capita monthly expenditure varies from 1.0 per cent to 1.2 per cent over the period 2002 to 2014. Selvanathan and Selvanathan (2006) calculated alcohol expenditure budget shares for over 40 countries and found that average alcohol budget shares are 3.1 per cent for developed countries and 3.3 per cent for developing countries. For some South-East Asian countries, average alcohol budget shares were: Philippines, 2.3 per cent; Sri Lanka, 2.8 per cent; Taiwan, 3.3 per cent; and Thailand, 3.9 per cent. It appears that Vietnams' budget share is slightly higher than other related countries.

Figure 1 clearly indicates that in value terms the market is dominated by beer (93% of market share) followed by spirits (5%) and wine (2%). The beer market is dominated by mid-price beers (63%). The spirits market is dominated by vodka (60%) and whisky (20%), followed by brandy (15%). Standard quality wines dominate the wine market (47%), followed by value/low-price wines (33%) and premium wines (20%).

The Vietnamese beer market

The summary statistics for the beer market are presented in Table 1. Some notable features include:

- the average unit value of premium beer almost doubles that of economy beer
- on average the AUV of mid-price beer is 3,000 VND higher than economy beer
- average per-capita expenditure on beer is approximately 1,100,000 VND per annum over the sample, which at AUVs implies that if only mid-price beer is purchased 34 litres are consumed per annum.

Table 1: Beer: Summary statistics

	Mean	Std Dev	Min	Max
Budget share: Premium	0.154	0.008	0.139	0.170
Budget share: Mid-priced	0.560	0.037	0.497	0.629
Budget share: Economy	0.286	0.033	0.232	0.345
Average unit value: Premium	53.490	10.837	38.729	69.334
Average unit value: Mid-priced	32.311	4.744	24.569	39.604
Average unit value: Economy	29.054	2.857	25.282	34.019
Expenditure per-capita	1109.9	563.1	412.95	2064.3

Notes: N = 15, annual data 2002–2016. AUV per litre and expenditure in 1,000 VND.

The LAIDS estimates based on first differences, with imposed restrictions for beer, are provided in Table 2. Some notable features include:

- an increasing time trend in mid-priced beer increasing the budget share by 0.012 per year, mainly at the expense of premium beer with a falling budget share of 0.007 per year
- a strong degree of habit persistence is apparent in the market with the budget share reflecting 0.45 of the previous budget share.

Table 2: Beer: Demand system estimates first difference model

	Budget share		
	Premium	**Mid-priced**	**Economy**
Log price: Premium	0.0411 (0.96)	–0.0859* (–1.86)	0.0447 (1,28)
Log price: Mid-priced	–0.0859* (–1.86)	0.2234* (1.91)	–0.1375 (–1.38)
Log price: Economy	0.0447 (1.28)	–0.1375 (–1.38)	0.0928 (0.96)
Log expenditure per-capita	0.0774* (3.70)	–0.0464 (–0.79)	–0.0310 (–0.57)
Time trend	–0.0074* (–4.08)	0.0121* (2.33)	–0.0047 (–0.98)
Habit persistence	0.4466* (7.82)	0.4466* (7.82)	0.4466* (7.82)
R2	0.856	0.595	0.624

*Notes: * denotes statistically significant at the 10% level. t-ratios presented in parentheses. N = 13.*

The elasticity estimates at both mean and 2016 values stemming from Table 2 are provided in Table 3. Interestingly, in terms of own price elasticities, premium beer is largest with –0.81, followed by economy beer (–0.63) and mid–priced beer (–0.56). In terms of cross-price elasticities, premium and mid-priced beers are complements with negative elasticities, while premium and economy beers are substitutes with positive elasticities. Mid-priced and economy beers are complements. The most important of these elasticities appear to be for premium volume and mid-priced beer price (–0.84) and economy beer volume and mid-price beer price (–0.43). In terms of expenditure elasticities, premium beer is classified as a luxury with a value greater than unity (1.5), with mid-priced and economy beer being approximately 0.9. Compared to other studies, the own-price and expenditure elasticity are higher than other averages however, they do fall within the range of previous estimates. In part, the higher elasticity values may reflect the dominance of the beer market in Vietnam.

Table 3: Beer: Conditional elasticities

	Premium price	Mid-priced price	Economy price	Expenditure
Premium beer	**–0.8104** (–0.7898)	–0.8406 (–0.9693)	0.1538 (0.1961)	1.4972 (1.5481)
Mid-priced beer	–0.1384 (–0.1264)	**–0.5613** (–0.6030)	–0.2195 (–0.2022)	0.9192 (0.9272)
Economy beer	0.1790 (0.2112)	–0.4340 (–0.5094)	**–0.6339** (–0.5643)	0.8888 (0.8683)

Notes: Evaluated at the means of the data, 2016 values in parentheses. Own price elasticities are in bold.

The Vietnamese spirits market

The summary statistics for the spirits market are presented in Table 4. Some notable features include:

- the average unit value of brandy is nearly 800,000 VND over the sample, and at the other extreme the AUV of vodka is approximately 90,000 VND which predominately reflects very cheap locally produced product sold in large volumes.
- at the means, the AUV of brandy is nearly double that of other spirits.
- the average per-capita expenditure on spirits is approximately 50,000 VND per annum over the sample, which implies that if only vodka is purchased then approximately only one half of litre is consumed per annum.

Table 4: Spirits: Summary statistics

	Mean	Std Dev	Min	Max
Budget share: Whisky	0.185	0.021	0.149	0.215
Budget share: Brandy	0.171	0.024	0.131	0.209
Budget share: Vodka	0.601	0.043	0.536	0.659
Budget share: Other spirits	0.044	0.010	0.032	0.060
Average unit value: Whisky	454.7	201.5	232.3	787.5
Average unit value: Brandy	794.1	394.9	378.6	1404.4
Average unit value: Vodka	91.39	15.09	66.31	112.50
Average unit value: Other spirts	300.6	73.11	215.6	407.1
Expenditure per-capita	50.13	27.86	16.73	91.93

Notes: N = 17, annual data 2000–2016. AUV per litre and expenditure in 1,000 VND.

The LAIDS estimates for spirits are provided in Table 5. Some notable features include:

- an increasing time trend for vodka increasing the budget share by 0.010 per year, mainly at the expense of brandy, with a falling budget share of 0.011 per year.
- a strong degree of habit persistence is apparent in the market, with the budget share reflecting 0.53 of the previous budget share, which is similar to the beer market.

Table 5: Spirits: Demand system estimates first difference model

	Budget share			
	Whisky	**Brandy**	**Vodka**	**Other spirits**
Log price: Whisky	0.0528* (2.26)	0.0397* (1.95)	–0.0754* (–4.18)	–0.0175* (–1.86)
Log price: Brandy	0.0397* (1.95)	0.0018 (0.07)	–0.0381 (–1.43)	–0.0035 (–0.38)
Log price: Vodka	–0.0754* (–4.18)	–0.0381 (–1.43)	0.1343* (4.01)	–0.0209 (–1.44)
Log price: Other spirits	–0.0172* (–1.86)	–0.0035 (–0.38)	–0.0209 (–1.44)	0.0415* (1.76)
Log expenditure per-capita	–0.0394 (–0.94)	0.1554* (2.45)	–0.1267* (–1.85)	0.0107 (0.55)
Time trend	–0.0006 (–0.18)	–0.0105* (–2.32)	0.0095* (1.90)	0.0016 (1.26)
Habit persistence	0.5305*	0.5305*	0.5305*	0.5305*
	(5.18)	(5.18)	(5.18)	(5.18)
R2	0.804	0.452	0.622	0.373

*Notes: * denotes statistically significant at the 10% level. t-ratios presented in parentheses. N = 15.*

The elasticity estimates at both mean and 2016 values stemming from Table 5 are provided in Table 6. In terms of own price elasticities, brandy is largest with –1.15, followed by whisky (–0.67), vodka (–0.66) and other spirits (–0.08). The high elasticity for brandy is expected as it is the most expensive spirit, while both vodka and other spirits have relatively low elasticities due to their relatively cheap nature. In terms of cross-price elasticities, the majority of products are complements with negative estimated elasticities. The most important elasticities appear to be: brandy volume and vodka price (–0.71); other spirits volume and vodka price (–0.60); and other spirits volume and whisky price (–0.43). In terms of expenditure elasticities, brandy has the highest value (1.86), followed other spirits (1.23), with whisky and vodka having similar elasticities (0.79). Compared to other studies, the own price and expenditure elasticities are within the range of other estimates. The major differences from the average of other estimates are the low own-price elasticity for the residual other spirits category and the high expenditure elasticity for brandy.

Table 6: Spirits: Conditional elasticities

	Price				
	Whisky	**Brandy**	**Vodka**	**Other**	**Expenditure**
Whisky	**–0.673** (–0.678)	0.252 (0.239)	–0.288 (–0.292)	–0.084 (–0.080)	0.794 (0.811)
Brandy	0.049 (0.030)	**–1.148** (–1.154)	–0.707 (–0.789)	–0.055 (–0.073)	1.860 (1.986)
Vodka	–0.084 (–0.077)	–0.026 (–0.030)	**–0.656** (–0.675)	–0.027 (–0.025)	0.793 (0.808)
Other spirits	–0.431 (–0.344)	–0.121 (–0.091)	–0.597 (–0.458)	**–0.084** (–0.281)	1.233 (1.173)

Notes: Evaluated at the means of the data, 2016 values in parentheses. Own price elasticities are in bold.

The Vietnamese wine market

The summary statistics for the wine market are presented in Table 7. Some notable features include:

- the average unit value of premium wines is double that of standard wines, which in turn is nearly double that of value/low price wines.
- the average per-capita expenditure on wine is approximately 29,000 VND per annum over the sample, which implies that if only value/low-price wine is purchased then approximately only one fifth of a litre is consumed per annum.

Table 7: Wine: Summary statistics

	Mean	**Std Dev**	**Min**	**Max**
Budget share: Value/low-price	0.406	0.079	0.312	0.536
Budget share: Standard	0.430	0.049	0.353	0.487
Budget share: Premium/higher	0.166	0.031	0.109	0.208
Average unit value: Value/low-price	156.3	5.644	149.0	168.5
Average unit value: Standard	289.6	37.10	241.8	347.0
Average unit value: Premium/higher	577.6	88.50	468.3	699.4
Expenditure per-capita	29.05	15.24	8.61	48.60

Notes: N = 12, annual data 2005–2016. AUV per litre and expenditure in 1,000 VND.

The LAIDS estimates for wine are provided in Table 8. Some notable features include:

- increasing time trends for both premium (0.012 per year) and standard wines (0.006) at the expense of value/low-price wines (–0.018), which is consistent with the absolute falling budget share of low-price/value wines (Figure 12).
- the degree of habit persistence is weaker for the wine market than the other markets, with the budget share reflecting 0.15 of the previous budget share.

Table 8: Wine: Demand system estimates first difference model

	Budget share		
	Value/low-price	**Standard**	**Premium/higher**
Log price: Value/low-price	–0.0875 (–0.65)	–0.0720 (0.89)	0.0154 (0.23)
Lop price: Standard	0.0720 (0.89)	–0.0887 (–0.90)	0.0167 (0.22)
Log price: Premium/higher	0.0154 (0.23)	0.0167 (0.22)	–0.0321 (–0.48)
Log expenditure per–capita	–0.0391 (–0.58)	0.0591 (1.52)	–0.0200 (–0.60)
Time trend	–0.0180* (–1.89)	0.0062 (1.11)	0.0117* (2.48)
Habit persistence	0.1506*	0.1506*	0.1506*
	(3.19)	(3.19)	(3.19)
R2	0.335	0.434	0.384

*Notes: * denotes statistically significant at the 10% level. t-ratios presented in parentheses. N = 10.*

The elasticity estimates at both mean and 2016 values stemming from Table 8 are provided in Table 9. The own-price elasticities for all wine types are similar, being between –1.1 and –1.3. In terms of cross-price elasticities, all estimates are positive but small, indicating some weak substitutability. The most important elasticities appear to be value/low-price wines volume and standard wine price (0.23), and premium wine volume and standard wine price (0.14). In terms of expenditure elasticities, standard wine is 1.1, which is slightly higher than that for both premium and value wines at 0.89. Compared to other studies, the own price elasticities are slightly higher than the average of other studies but still within the range of other estimates. The expenditure elasticities for all three wine types are very similar to averages from other studies.

Table 9: Wine: Conditional elasticities

	Price			
	Value/low-price	**Standard**	**Premium/higher**	**Expenditure**
Value/low-price	**–1.189** (–1.216)	0.233 (0.268)	0.058 (0.068)	0.898 (0.884)
Standard	0.110 (0.110)	–1.257 (–1.245)	0.0148 (0.011)	1.132 (1.126)
Premium/higher	0.133 (0.112)	0.144 (0.127)	–1.164 (–1.142)	0.887 (0.902)

Notes: Evaluated at the means of the data, 2016 values in parentheses. Own price elasticities are in bold.

The Vietnamese alcohol market

We now turn to stage two of the multi-budgeting process and consider the analysis of the three broad alcohol segments: beer, spirits and wine. The summary statistics for the broad alcohol market are presented in Table 10. Some noteworthy features include:

- the average unit value of wine is highest followed by spirits
- the AUV of spirits is approximately five times higher than beer.
- Effectively, the high prices for brandy are mitigated by the low prices of vodka to reduce the average values for spirits to be lower to those for wine
- the average per-capita expenditure on alcohol is approximately 1,300,000 VND per annum over the sample, which implies that if only beer is purchased then approximately 40 litres are consumed per annum.

Table 10: Alcohol: Summary statistics

	Mean	**Std Dev**	**Min**	**Max**
Budget share: Beer	0.934	0.0045	0.928	0.942
Budget share: Spirits	0.046	0.0026	0.041	0.051
Budget share: Wine	0.020	0.0040	0.013	0.024
Average unit value: Beer	34.754	3.890	29.567	40.478
Average unit value: Spirits	153.13	21.98	112.96	176.09
Average unit value: Wine	231.94	28.61	190.42	277.17
Expenditure per-capita	1364.8	545.6	645.96	2203.5

Notes: N = 12, annual data 2005–2016. AUV per litre and expenditure in 1,000 VND.

The LAIDS estimates for the three broad alcohol groups are provided in Table 11. There is little evidence of any preference changes over time. The degree of habit persistence is similar to the beer and spirits markets, with the budget share reflecting 0.49 of the previous budget share.

Table 11: Alcohol: Demand system estimates first difference model

	Budget share		
	Beer	**Spirits**	**Wine**
Log price: Beer	0.0339* (2.24)	–0.0216 (–1.54)	–0.0123 (–1.34)
Log price: Spirits	–0.0216 (–1.54)	0.0138 (1.16)	0.0077 (1.18)
Log price: Wine	–0.0123 (–1.34)	0.0077 (1.18)	0.0046 (0.42)
Log expenditure per-capita	–0.0206* (–1.14)	0.0037 (0.24)	0.0170 (1.63)
Time trend	0.0011 (0.70)	–0.0005 (–0.40)	–0.0006 (–0.62)
Habit persistence	0.4926* (4.48)	0.4926* (4.48)	0.4926* (4.48)
R2	0.731	0.690	0.760

*Notes: * denotes statistically significant at the 10% level. t-ratios presented in parentheses. N = 10.*

The elasticity estimates at both mean and 2016 values stemming from Table 11 are provided in Table 12. The own-price elasticities are reasonably similar across all three groups: beer is largest (–0.94), followed by wine (–0.80) and spirits (–0.71). In terms of cross-price elasticities, wine and spirits appear to be substitutes with positive elasticities, while beer is a complement with both spirits and wine. The most important elasticities appear to be wine volume and beer price (–1.32), and spirits volume and beer price (–0.53). In terms of expenditure elasticity estimates, wine (1.80) is largest, followed by spirits (1.08) and beer (0.98). Compared to other studies, the own price elasticities again fall with the range of previous estimates, however, beer appears to be somewhat larger than the average of other estimates. In general, the expenditure elasticity estimates are slightly larger than the average of other studies for wine and beer.

Table 12: Alcohol: Conditional elasticities

	Price			
	Beer	**Spirits**	**Wine**	**Expenditure**
Beer	**–0.943** (–0.943)	–0.022 (–0.022)	–0.013 (–0.013)	0.978 (0.978)
Spirits	–0.533 (–0.607)	**–0.708** (–0.668)	0.163 (0.186)	1.078 (1.089)
Wine	–1.319 (–1.278)	0.323 (0.317)	**–0.801** (–0.808)	1.797 (1.769)

Notes: Evaluated at the means of the data, 2016 values in parentheses. Own price elasticities are in bold

The Vietnamese household goods market

We now turn to stage one of the multi-budgeting process and consider the analysis of alcohol as a single category and how it compares to the consumption of other household goods. Unfortunately, it appears that no thorough systematic study has been conducted for Vietnam that has isolated the separate impact of alcohol in a household expenditure study. As a consequence, we model the choice between alcohol and all other goods. This analysis serves only as an approximation to the substitutability between alcohol and other goods, given limited data availability. For other goods we employed the general consumer price index as prices and deducted total alcohol expenditure from final household consumption expenditure to represent expenditure on other goods.

The summary statistics for the goods market are presented in Table 13. The budget shares are relatively stable given the small size of the alcohol market in all goods. The average per-capita expenditure on all goods is approximately 25,000,000 VND per annum.

Table 13: All goods: Summary statistics

	Mean	Std Dev	Min	Max
Budget share: Alcohol	0.0559	0.0053	0.0501	0.0662
Budget share: Other goods	0.9441	0.0053	0.9338	0.9498
Average unit value: Alcohol	36.70	4.183	30.92	42.61
CPI: Other goods	180.22	55.89	100.0	249.6
Expenditure per-capita	25.106	11.131	9.761	41.755

Notes: N = 12, annual data 2005–2016. AUV per litre in 1,000 VND and expenditure in 1,000,000 VND.

Initial attempts at modelling the goods market using the methodology applied to other stages proved unsuccessful, with counter intuitive estimated elasticities. In part, the volatile nature of final household consumption expenditure posed problems – in particular, changes due to the global financial crisis (GFC). For example, the growth in total expenditure per capita fell from 32.6 per cent in 2008 to only 3.5 per cent in 2009. To recognise this structural change, the time trend in the LAIDS model was permitted to change as a result of GFC. The estimates incorporating this modification are presented in Table 14. The estimates indicate how the decreasing time trend has been reversed for the alcohol budget share as a result of recognising the GFC. The habit persistence impact is still present and only slightly lower than the markets for the separate alcohol categories.

The estimated elasticities stemming from Table 14 are presented in Table 15. The alcohol own-price elasticity is –0.61 and expenditure elasticity is 1.10. These estimates are very similar to other estimates in the literature. Selvanathan and Selvanathan (2006) estimated alcohol elasticities accounting for other household goods for over 40 countries. For the developing countries in the sample, the average own-price uncompensated alcohol elasticity was –0.61 and the expenditure elasticity 1.13.

Table 14: All goods: Demand system estimates first difference model

	Budget share	
	Alcohol	**Other goods**
Log price: Alcohol	0.0213* (1.81)	–0.0213* (–1.81)
Log price: Other goods	–0.0213* (–1.81)	0.0213* (1.81)
Log expenditure per-capita	0.0053* (0.13)	–0.0053 (–0.13)
Time trend	–0.0042 (–0.93)	0.0042 (0.93)
Time trend * (2009–2016)	0.0047* (1.74)	–0.0047* (–1.74)
Habit persistence	0.4073 (1.62)	0.4073 (1.62)
R2	0.883	0.883

*Notes: * denotes statistically significant at the 10% level. t-ratios presented in parentheses. N = 10.*

Table 15: All goods: Conditional elasticities

	Price		
	Alcohol	**Other goods**	**Expenditure**
Alcohol	**–0.610** (–0.601)	–0.488 (–0.499)	1.098 (1.101)
Other goods	–0.022 (–0.022)	**–0.972** (–0.972)	0.994 (0.994)

Notes: Evaluated at the means of the data, 2016 values in parentheses. Own price elasticities are in bold.

Unconditional elasticities

The elasticity estimates in Tables 3, 6, 9, 12 and 15 are conditional estimates, conditional on the expenditure group employed. These elasticities can to be combined with budget share information to estimate unconditional elasticities. Effectively, the unconditional elasticities capture the entire three-stage budgeting process through a single set of estimates. The unconditional estimates based on mean values are presented in Table 16 and estimates based on 2016 values in Table 17.

Table 16: Unconditional elasticities mean values: Three-stage budgeting

	Price										
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**Expenditure**
1. Wine: Value/ low-price	**–1.088**	0.268	0.101	0.046	0.101	0.150	0.017	–0.126	–0.301	–0.150	1.772
2. Wine: Standard	0.238	**–1.213**	0.069	0.058	0.127	0.189	0.021	–0.159	–0.380	–0.189	2.235
3. Wine: Premium/ higher	0.233	0.179	**–1.121**	0.046	0.100	0.148	0.017	–0.125	–0.298	–0.148	1.750
4. Whisky	0.047	0.063	0.019	**–0.607**	0.214	–0.073	–0.079	–0.020	–0.054	–0.027	0.940
5. Brandy	0.110	0.147	0.044	0.205	**–1.238**	–0.202	–0.043	–0.046	–0.128	–0.064	2.203
6. Vodka	0.047	0.062	0.019	–0.018	–0.064	**–0.440**	–0.022	–0.020	–0.054	–0.027	0.938
7. Other spirits	0.073	0.097	0.029	–0.328	–0.180	–0.262	**–0.076**	–0.031	–0.085	–0.042	1.460
8. Beer: Premium	–0.008	–0.010	–0.003	–0.002	–0.002	–0.005	–0.001	**–0.772**	–0.449	0.360	1.608
9. Beer: Mid-price	–0.005	–0.006	–0.002	–0.001	–0.001	–0.003	–0.001	–0.115	**–0.321**	–0.093	0.987
10. Beer: Economy	–0.004	–0.006	–0.002	–0.001	–0.001	–0.003	–0.001	0.202	–0.202	**–0.511**	0.955

Notes: Own price elasticities are in bold.

Table 17: Unconditional elasticities 2016 values: Three-stage budgeting

	Price										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Expenditure
1. Wine: Value/ low-price	**–1.132**	0.305	0.116	0.047	0.088	0.148	0.02	–0.107	–0.311	–0.109	1.720
2. Wine: Standard	0.217	**–1.197**	0.072	0.060	0.112	0.188	0.026	–0.137	–0.397	–0.139	2.192
3. Wine: Premium/ higher	0.197	0.164	**–1.093**	0.048	0.089	0.151	0.021	–0.109	–0.318	–0.111	1.756
4. Whisky	0.044	0.079	0.027	**–0.605**	0.204	–0.059	–0.069	–0.029	–0.091	–0.032	0.972
5. Brandy	0.108	0.193	0.067	0.209	**–1.238**	–0.220	–0.046	–0.072	–0.223	–0.079	2.380
6. Vodka	0.044	0.078	0.027	–0.004	–0.065	**–0.444**	–0.014	–0.029	–0.091	–0.032	0.968
7. Other Spirits	0.064	0.114	0.039	–0.238	–0.140	–0.122	**–0.265**	–0.042	–0.132	–0.047	1.406
8. Beer: Premium	–0.006	–0.011	–0.004	–0.002	–0.003	–0.006	–0.001	**–0.757**	–0.512	0.376	1.666
9. Beer: Mid-price	–0.004	–0.006	–0.002	–0.001	–0.002	–0.004	–0.001	–0.107	**–0.329**	–0.094	0.998
10. Beer: Economy	–0.003	–0.006	–0.002	–0.001	–0.002	–0.004	–0.001	0.229	–0.253	**–0.463**	0.935

Notes: Own price elasticities are in bold.

In general, the unconditional own-price elasticity estimates tend to be only slightly smaller than their conditional counterparts. The cross-price unconditional elasticities are similar to their conditional equivalents within stage three groups, but relatively small across groups. The main cross-price effects occur within stage three groupings. The largest across stage three cross-price elasticities occur for wine volumes and beer prices. In general, all beer types are mainly complements with all other products, while some slight substitution occurs between spirits and wine. In most cases, the unconditional expenditure elasticities are much larger than their conditional counterparts. In part, this is due to the relatively high conditional expenditure elasticities. This is most evident for brandy and standard wine where the high conditional expenditure elasticities (Tables 6 and 9) combine with the relatively high wine and spirits expenditure elasticities (Table 12).

Forecasting performance

A number of decision choices need to be made in making forecasts. Kastens and Brester (1996) employed elasticities at mean values for forecasting, while Gustavsen and Rickertsen (2003) found that elasticities based on most recent values do not necessarily perform better for forecasting than using mean values. Also, Gustavsen and Rickertsen (2003) found that the use of conditional elasticities performed better than unconditional elasticities for forecasting. This latter finding may be due to either the inadequacy of the separability assumption for the market and/or the uncertainty of estimates may carry across sub-systems. The latter may be the case with our data given the very small sample sizes used for analysis and the three-stage budgeting approach.

To generate forecasts we also need to evaluate trend and habit persistence elasticities. These estimates are provided in Tables 18 and 19. The trend elasticities are not large. On the other hand, even though the conditional habit elasticities appear feasible the use of relatively large expenditure elasticities produces seemingly large unconditional habit elasticities and given the dynamic nature of forecasting this may significantly impact forecasts. Fundamentally, the use of three-stage budgeting appears to amplify the large expenditure effects throughout the system.

Table 18: Trend and habit rlasticities: Mean values

Product	Unconditional trend	Unconditional habit	Conditional trend	Conditional habit
Wine: Value or low-price	–166.61	1.250	–89.25	0.151
Wine: Standard	–68.51	1.537	29.06	0.151
Wine: Premium or higher	65.73	1.236	142.13	0.151
Whisky	–35.98	1.270	–6.51	0.531
Brandy	–192.59	2.264	–123.52	0.531
Vodka	2.33	1.269	31.76	0.531
Other spirits	27.92	1.679	73.69	0.531
Beer: Premium	–113.81	1.780	–96.29	0.447
Beer: Mid-price	32.65	1.266	43.41	0.447
Beer: Economy	–43.45	1.238	–33.05	0.447

Table 19: Trend and habit elasticities: 2016 values

Product	Unconditional trend	Unconditional habit	Conditional trend	Conditional habit
Wine: Value or low-price	–181.12	1.223	–108.88	0.141
Wine: Standard	–65.17	1.534	26.88	0.155
Wine: Premium or higher	43.23	1.259	116.94	0.155
Whisky	–39.68	1.378	–6.29	0.579
Brandy	–227.72	2.512	–145.99	0.558
Vodka	–1.61	1.304	31.62	0.509
Other Spirits	8.20	1.673	56.49	0.518
Beer: Premium	–126.55	1.825	–107.10	0.462
Beer: Mid-price	27.15	1.252	38.81	0.436
Beer: Economy	–51.74	1.231	–40.82	0.467

To examine the choices for forecasting we made in-sample forecasts for the years 2014–2016 using mean and 2016 elasticity values and various combinations of conditional and unconditional elasticities. For cross-price elasticities, unconditional values are employed to allow for non-zero cross price elasticities across the stage three groupings. Mean absolute percentage errors (MPAE) are presented in Tables 20 and 21 for various in-sample forecasts. It appears that the use of unconditional elasticities performs worst with significant over prediction. This mainly results from the large unconditional habit elasticities. In general, forecasts based on 2016 values perform slightly better than those based on mean values. In terms of MAPE, wine is most difficult to forecast, followed by spirits, with beer forecasts being most accurate. Of all the forecasts it appears the use of 2016 elasticities using conditional habit and expenditure elasticities, with unconditional elasticities for trend and cross-price appears to work best. The associated forecast errors are 6.4 per cent (wine), 4.7 per cent (spirits) and 1.8 per cent (beer) for 2014–2016.

Table 20: Mean absolute percentage eError: Mean elasticities 2014–2016 forecasts

Product	Unconditional	Habit Conditional	Habit & trend Conditional	Habit & expenditure Conditional	Habit, trend & expenditure Conditional
Wine: Value or low-price	6.57	5.41	4.23	7.87	5.89
Wine: Standard	17.60	9.27	13.35	5.85	7.47
Wine: Premium or higher	19.17	9.83	13.44	5.27	7.43
Wine average	14.45	8.17	10.34	6.33	6.93
Whisky	6.01	5.24	6.74	4.14	5.64
Brandy	1.68	7.90	11.57	5.21	8.88
Vodka	7.14	4.30	4.80	3.99	4.49
Other spirits	12.71	9.32	11.56	7.68	9.92
Spirits average	6.88	6.69	8.67	5.25	7.23
Beer: Premium	9.01	2.65	3.50	2.16	2.71
Beer: Mid-price	9.29	2.72	3.21	2.26	2.75
Beer: Economy	3.57	2.30	2.81	1.83	2.34
Beer average	7.29	2.56	3.17	2.08	2.60

Table 21: Mean absolute percentage error: 2016 elasticities 2014–2016 forecasts

Product	Unconditional	Habit Conditional	Habit & trend Conditional	Habit & expenditure Conditional	Habit, trend & expenditure Conditional
Wine: Value or low-price	6.70	5.56	4.43	8.60	6.05
Wine: Standard	17.50	9.02	13.03	5.70	7.24
Wine: Premium or higher	18.29	8.79	12.27	4.81	6.32
Wine average	14.16	7.79	9.91	6.37	6.54
Whisky	6.18	5.35	7.05	4.13	5.83
Brandy	2.58	7.24	11.59	4.15	8.49
Vodka	7.18	4.13	4.69	3.78	4.35
Other spirits	11.81	8.40	10.77	6.72	9.09
Spirits average	6.94	6.28	8.53	4.70	6.94
Beer: Premium	9.06	2.42	3.36	2.05	2.52
Beer: Mid-price	9.00	2.45	2.98	2.01	2.50
Beer: Economy	2.85	1.85	2.38	1.37	1.90
Beer average	6.97	2.24	2.91	1.81	2.31

Baseline forecasting

To generate forecasts, predictions for the exogenous prices and per capita household expenditure are needed. These predictions are based on autoregressive integrated moving average (ARIMA) models. This is a common approach used to generate forecasts and was employed by Gustavsen and Rickertsen (2003). ARIMA models performed better than predictions based on various smoothing models. To choose the best ARMIA model Akaike's Information Criterion (AIC) was employed. The best fitting ARIMA models, correlations between actual and in-sample predictions and the relative forecasts for the next three years are provided in Table 22. All predictions appear to work well except for the price of value/low-price wines.

Table 22: Forecasting prices and per-capita household expenditure

Product Price	ARIMA Model	Correlation actual and predicted	Forecast relative change 2017	Forecast relative change 2018	Forecast relative change 2019	Forecast relative change 2020
Wine: Value or low-price	(2, 1, 1)	0.286	–0.037	0.019	0.015	–0.021
Wine: Standard	(0, 1, 1)	0.985	0.024	0.028	0.028	0.027
Wine: Premium or higher	(0, 1, 2)	0.984	0.046	0.042	0.031	0.030
Whisky	(1, 1, 1)	0.977	0.041	0.040	0.039	0.038
Brandy	(0, 1, 1)	0.988	0.046	0.041	0.040	0.038
Vodka	(2, 1, 0)	0.991	0.062	0.035	0.002	0.026
Other Spirits	(0, 1, 1)	0.984	0.018	0.028	0.027	0.027
Beer: Premium	(1, 1, 0)	0.986	0.028	0.028	0.028	0.027
Beer: Mid-price	(0, 1, 1)	0.979	0.027	0.026	0.025	0.024
Beer: Economy	(0, 1, 2)	0.987	–0.011	0.027	0.016	0.016
Per capita expenditure	(0, 1, 1)	0.993	0.079	0.068	0.064	0.060

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Section 2

Special Report

Trump's 'zero tolerance' bluff on the border will hurt security, not help

Alan Bersin, Nate Bruggeman and Ben Rohrbaugh

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Alan Bersin, Nate Bruggeman and Ben Rohrbaugh worked together at U.S. Customs and Border Protection, where Bersin served as commissioner. He earlier was the U.S. attorney in San Diego.

Attorney General Jeff Sessions and Homeland Security Secretary Kirstjen Nielsen recently announced a "zero tolerance" policy on border security. Though its contours have not been described in great detail, at its core, it is a commitment to criminally prosecute every person who illegally crosses the border.

This strategy may provide sound bites, and harsh rhetoric may generate some short-term deterrent effect, but it is impossible for this policy to actually be implemented over any reasonable time period. By announcing a threat that is effectively a bluff, the Trump administration likely will harm border security rather than enhance it.

The federal criminal-justice system is not equipped to handle the flood of cases that would result from referring every single illegal border crosser for prosecution. There is a limited number of federal judges, magistrate judges, federal prosecutors, public defenders and U.S. marshals in the judicial districts along the border. Prosecuting more than 300,000 people (the number apprehended for illegally crossing our southwestern border in fiscal 2017) would overwhelm their resources. And this is to say nothing of inadequate detention capacity; each of the illegal crossers would have to be processed, housed, guarded and fed before trial — and after, if convicted.

The core of effective border security is risk management — focusing law-enforcement resources on the greatest threats. This is why the Border Patrol developed the Consequence Delivery System, a program that matches different types of crossers to different categories of processes or penalties. For example, a known human smuggler receives harsher treatment than a first-time crosser. Referring every illegal crosser for prosecution removes the ability of the Border Patrol to manage risk effectively.

The opportunity cost associated with this prosecution strategy will be even more acutely felt by the U.S. Attorney's Offices along the border. Already handling a massive workload, including drug – and human-trafficking cases, these prosecutors focus their time and effort on cases that have the greatest impact on public safety. The administration's new "mission impossible" will force prosecutors to misallocate resources to economic migrants; but even then, there will not be enough resources to get the job done. In the meantime, organized crime, drug smuggling and financial crimes will receive short shrift.

Meanwhile, the new policy is likely to have little deterrent effect. We know this from experience. For example, in San Diego during the 1980s and early 1990s, enormous numbers of illegal crossers were subject to misdemeanor prosecution. That effort consumed huge amounts of resources simply to create a revolving door in area jails. It was only when the enforcement strategy changed to focus on prevention and deterrence at the border — supported with targeted felony prosecutions and strategically situated walls — did the situation change.

The administration is looking for quick fixes to illegal immigration, but action is instead needed on the difficult policy questions and trade-offs that are inherent in this arena.

For example, the administration needs to strengthen its security partnership with Mexico. Demonizing Mexico may score political points, but it is directly contrary to our border-security interests. All irregular

southwest border crossers transit Mexico, and since 2015, Mexico has stopped more than 500,000 Central Americans at its southern border with Guatemala. If these efforts are halted, the effect on the southwestern U.S. border is clear.

One area of focus should be entering a "first safe country" agreement — which the United States has with Canada — providing that migrants from third countries claiming asylum here would be returned to Mexico to pursue their claims. This arrangement would be a powerful deterrent to economic migrants making false asylum claims, while leaving open a refuge for those fleeing extreme violence directed against them. The United States could provide assistance to Mexico to help implement the system.

Rather than focusing on criminal prosecutions, the administration should be reforming the overloaded immigration court system, where backlogged cases wait years for final disposition. That means adding resources and streamlining procedures so that asylum and other cases can be adjudicated efficiently. This would yield the dividends the attorney general's recent token offer of 35 prosecutors and 18 immigration judges cannot.

"Zero tolerance" looks like an easy way to increase deterrence, but there are no easy solutions or silver bullets for a broken immigration system. While we wait for comprehensive immigration reform and a strategy for tackling the drivers of Central American migration, the administration needs to devise a deterrence scheme that is effective and sustainable. Criminal prosecution will certainly be a part of such a strategy, but if it is the only part, it will fail.

Alan Bersin

Alan Bersin is a former assistant secretary of international affairs and chief diplomatic officer at the US Department of Homeland Security. He was the department's principal adviser regarding Mexico, Canada and North America. Since leaving public service in January 2017, Alan has served as a senior adviser at the global law firm of Covington & Burling as a senior advisor; an inaugural fellow in the Homeland Security Project at the Belfer Center at the Harvard Kennedy School of Government; a global fellow at the Woodrow Wilson Center for International Scholars in Washington DC; and as inaugural North America fellow at the Canada Institute and the Mexico Institute (Wilson Center). He is chairman of BorderWorks Group, a consulting firm specialising in matters of border security and management, including infrastructure projects on US land borders with Canada and Mexico.

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Section 3

Reference Material

Guidelines for Contributors

The *World Customs Journal* invites authors to submit papers that relate to all aspects of customs activity, for example, law, policy, economics, administration, information and communications technologies. The Journal has a multi-dimensional focus on customs issues and the following broad categories should be used as a guide.

Research and theory

The suggested length for articles about research and theory is approximately 5,000 words per article. Longer items will be accepted, however, publication of items of 10,000 or more words may be spread over more than one issue of the Journal.

Original research and theoretical papers submitted will be reviewed using a 'double blind' or 'masked' process, that is, the identity of author/s and reviewer/s will not be made known to each other. This process may result in delays in publication, especially where modifications to papers are suggested to the author/s by the reviewer/s. Authors submitting original items that relate to research and theory are asked to include the following details separately from the body of the article:

- title of the paper
- names, positions, organisations, and contact details of each author
- bionotes (no more than 100 words for each author) together with a recent, high resolution, colour photograph for possible publication in the Journal
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Letters to the Editor

We invite Letters to the Editor that address items previously published in the Journal as well as topics related to all aspects of customs activity. Authors of letters are asked to include their name and address (or a pseudonym) for publication in the Journal. As well, authors are asked to provide full contact details so that, should the need arise, the Editor-in-Chief can contact them.

All items should be submitted in Microsoft Word or RTF, as email attachments, to the Editor-in-Chief: **editor@worldcustomsjournal.org**

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