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CHAPTER 11

Choosing Cross-Border Financial Guarantee Instruments—Economic Implications and Hidden Risks

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11.1 INTRODUCTION

Billions of cargo containers cross international borders annually, in order to deliver goods to end consumers or simply to be consigned to next production stages and transformed into semifinished or finished products (Hummels, 2007). An important stakeholder in cross-border movements is represented by customs administrations (Widdowson, 2007), which have three important roles: (1) to protect society from safety and security threats (e.g., health or terror risks), (2) to facilitate collection of taxes and duties associated with goods passing the borders, and (3) to identify and interdict illegitimate trade such as smuggling or transportation of prohibited items (e.g., weapons, drugs, counterfeit products) as stated in nationally enforced regulatory frameworks (Tan, Bjørn-Andersen, Klein, & Rukanova, 2010; Urciuoli, Hintsa, & Ahokas, 2013).

Taxes and duties are typically charged to end consumers once they purchase the goods (Arvis, 2005; Hummels, 2007). However, it often happens that before reaching the country of destination (where the goods will be sold), cargo will merely transit countries and the transport carriers will need to request a temporary suspension (Arvis, 2005), for instance, through a direct cash deposit (CD) or a financial guarantee (EC, 2017b). This procedure brings additional costs to transport companies, ultimately affecting cash flows and related marginal revenues. Hence, it may be wondered what financial instruments are available to transport companies and how transport companies should choose among them in order to minimize costs.

To the knowledge of the authors, costs and potential risk implications of financial guarantees seem to be under-explored in existing literature. Some studies highlight that tariffs applied on cargo moved cross-border constitute a barrier to trade and ultimately affect distribution network strategies (Anderson & Van Wincoop, 2004; Chopra, 2003; Finger & Yeats, 1976; Hummels, 2007). However, in these studies, there is no indication that cargo may need to transit across several borders, pushing additional costs to transport carriers. The importance of this issue is testified by other available research emphasizing how costs typically affect transport companies' cash flows. Financing many of these costs is a significant issue for carriers, who continuously struggle to keep costs low in order to cope with the aggressive auctions driven by transport buyers (Urciuoli, 2016). Typical cost items are classified as direct fixed and variable expenses, as well as externalities or indirect costs that are collected by governments through mechanisms like congestion prices, environmental taxes/fees, etc. (Levinson & Zhao, 2012). These costs are important to quantify in order to be correctly internalized in freight service prices (Forkenbrock, 2001). Nevertheless, there is no known study exploring the costs of financial instruments to temporarily suspend tariffs.

Hence, this chapter, by means of an illustrative case study in the BSEC region, will elaborate on the impacts of different instruments at the disposal of transport companies to finance temporary suspension of taxes and duties. Focus will be on impacts on costs as well as operational risks.

This chapter is organized as follows: the context and the main focus of the study are introduced in the first section, followed by the second section summarizing the relevant literature in the following research areas: institutionalism, financial and operational risks for transport companies. Next, a case study based in the BSEC region is expounded with specific focus on customs institutional pressure generating financial charges and additional risks to transport companies. Finally, the case is discussed in view of previous research and main conclusions highlighted.

11.2 INSTITUTIONAL PRESSURE

To guarantee compliance with regulatory frameworks by companies, customs require better visibility on carriers' processes and documentation. Depending on the level and quality of information that carriers submit to customs administrations, a physical check of the goods could be triggered (Appeals & Struye de Swielande, 1998). Hence, activities driven by

customs administration have been proven to generate nuisances to companies' operations, hence risks may appear in terms of loss of performance or even economic losses due to penalties or fees (Tan et al., 2010). For this reason, governments worldwide have put in place trade facilitation programs aiming to reduce the negative impacts of customs activities, e.g., through the application of simplified procedures, e-customs platforms, or by simply increasing transparency and professionalism of customs officers (Urciuoli et al., 2013).

The interaction between customs administration and transport operators is important to be explored and understood. In particular, institutionalism is a relevant framework to consider since it defines how external social, political, and economic pressures influence firms' strategies and thereby organizational decision-making (Glover, Champion, Daniels, & Dainty, 2014). The overall idea is that institutional theory does not consider firms as rational actors but rather as entities seeking for legitimacy of their practices by simply following enforced regulations, or adapting to contexts by imitating their peers (Chung & Wee, 2008; Dimaggio & Powell, 1983). In the context of customs institutional pressure toward transport carriers, it can be deduced that customs administrations apply a coercive pressure on companies; specifically, through regulatory frameworks which companies willing to import/export goods have to comply with (Dimaggio & Powell, 1983; Simpson, 2012).

Previous research has investigated the influence of institutional theory frameworks in transportation, operations management, and supply chain management. Panayides, Parola, and Lam (2015) study the effect of institutional factors on the application of public–private partnerships (PPP) in ports. In particular, PPP success is influenced by factors such as “regulatory quality,” “market openness,” “ease to start a business,” and “enforcing contracts.” Other authors agree that institutional pressure may affect the performance of supply chains, impacting lead times, response time, picking activities costs and network location choices, risk management practices, etc. (Chopra, 2003; Gebennini, Grassi, Rimini, & Depietri, 2013; Gopal & Gao, 2009; Ketokivi & Schroeder, 2003; Tate, Ellram, Bals, & Hartmann, 2009).

11.3 TRANSPORT RISKS

Several threats could strike a supply chain. Overall risks have been categorized according to the location gaps between the source of the risk and the

focal company of the supply chain. Typical risks addressed are those related to the flows of materials, information and money, and finally demand and supply risks (Manuj & Mentzer, 2008; Viswanadham & Gaonkar, 2008). Another important group of threats considered as supply chain risks are operational disturbances, tactical disruptions, and strategic uncertainties (Lockamy III & McCormack, 2009; Peck, 2006). Overall, the underlying belief is that a risk, originating in some part of the supply chain and involving its flows, triggers a deviation from normal operations leading to a state condition where losses or additional costs are experienced by the supply chain actors (Knemeyer, Zinn, & Eroglu, 2009; Pfohl, Köhler, & Thomas, 2010; Viswanadham & Gaonkar, 2008). Typical operational risks that can take place during transport include delivery delays, traffic jams, and employee work stoppages. Although it is often not possible to precisely predict the occurrence of such events, it is possible to evaluate the probability of their occurrence along with the consequence through the creation of companies' risk profiles (Lockamy III & McCormack, 2009).

Some authors point out that often supply chain risks are triggered by the actions of the external environment, e.g., public authorities, which on one side are meant to safeguard society, but on the other may imply severe economic consequences to supply chains. For instance, Sheffi (2001) suggests that measures taken by governments to improve homeland security might end up burdening supply chains, creating queues at borders and thereby longer and less reliable lead times. Other authors label these threats as regulatory compliance risks (Muradian & Pelupessy, 2005; Urciuoli et al., 2013). Customs controls at borders lead to tedious checks, delays, bureaucracy, and inconvenient form-filling. These checks interfere with the free flow of goods at borders, resulting in delay risks, i.e., additional time to ship and thereby increased costs.

Losses or additional costs related to transport risks can assume different magnitudes depending on several factors such as the type and time length of disruptions, and the recovery measures or strategies put in place by the company. The final outcome that is relevant for the supply chain includes additional costs due to interruptions in business operations, or other undesirable consequences such as delayed deliveries or lost sales (Svensson, 2002).

11.4 FINANCIAL GUARANTEE MODELS

Customs control is perceived as an interference or a disturbance by operators. Cross-border regulatory frameworks are normally enforced through

specific processes, routines, and form-filling to be followed by companies, i.e., additional costs for companies (Appeals & Struye de Swielande, 1998). The bureaucratic workload for carriers or freight forwarders increases exponentially, especially considering that often these companies move mixed cargo, hence different laws and regulatory framework will need to be considered.

One important requirement for border crossing concerns the collection of taxes and duties (Arvis, 2005; Hummels, 2007). While these are normally charged to the buyer of the goods located in the destination country, transport carriers still need to ensure that the relative amounts are secured in the customs bank accounts. Customs duties and other charges applicable to goods are temporarily suspended when goods are released for common/Union transit (EC, 2017b). This implies that a (customs) debt is incurred in the course of a transit operation, and the holder of the procedure is required to furnish a guarantee (Arvis, 2005; EC, 2017b). The supply chain operator (normally the transport carrier) responsible to issue the guarantee has at disposal three options: furnish the guarantee as: (1) a CD, or (2) using a guarantor covering a single transit operation (“guarantor single transactions (GST)” option), or (3) using a comprehensive guarantee covering several operations (“guarantor aggregated transactions (GAT)” option) (EC, 2017b). Finally, an operator has the option to purchase “Transports Internationaux Routiers (TIR)” carnets and use the attached vouchers to automatically cover the necessary guarantees at the country borders (EC, 2017a).

11.5 SUMMARY OF LITERATURE

Fig. 11.1 is a summarized framework deduced from the literature reviewed. In the top part of the figure, customs’ three main pillars of regulatory frameworks are expounded as the main sources of institutional pressure on companies (i.e., safety and security, revenue collection, and interdicting illicit trade). This pressure can be of two types, coercive and mimetic, depending on whether the regulations are mandatory or voluntary (Dimaggio & Powell, 1983; Urciuoli, Mohanty, Hints, & Boekesteijn, 2014). This pressure seems to create additional risks for transport carriers. First of all, the cash flow of the companies involved in cross-border operations is affected due to the necessary deposits to suspend taxes and duties levied at cross-border (Arvis, 2005; Hummels, 2007). Next, the same pressure implies risks like operational delays,

Figure 11.1 Summary of theoretical framework.

Figure 11.2 Overview BSEC area.

increased bureaucracy, potential fines and fees, and even security in case of theft during transport in the transiting countries. Finally, there is a high level of interrelationship between financial and transport risks. The cash flows from companies that are deposited into customs accounts are time dependent. Hence, any time delays or security issues taking place en route may have incidental effects on financial risks, increasing the complexity of managing these risks as well as the ultimate potential economic losses for companies. By using this framework this study aims to describe type and magnitude of these risks (Fig. 11.2).

11.6 CASE STUDY—THE BLACK SEA ECONOMIC COOPERATION REGION

The Black Sea Economic Cooperation (BSEC) emerged in 1992 and was officially established in 1999 as a multilateral political and economic initiative aimed at fostering interaction among 12 Member States: Republic of Albania, Republic of Armenia, Republic of Azerbaijan, Republic of Bulgaria, Georgia, Hellenic Republic, Republic of Moldova, Romania, Russian Federation, Republic of Serbia, Republic of Turkey, and Ukraine (BSEC, 2017).

Members of the BSEC today cover an area of approximately 20 million square kilometers with a population of 340 million people, representing a large economic potential—reaching an intra-BSEC trade volume of USD 300 billion annually (BSEC, 2017)—with strategic transport and trade routes. According to the data from 2012 (Noyan & Güney, 2012), the region represents 7.6% of the overall world economy and its total GDP amounts to around 3.4 trillion USD. It is becoming Europe's major transport and energy transfer corridor.

The deployment of an efficient transport network among the Member States as well as promoting sustainable transport systems meeting economic, social, and environmental needs of the people in the BSEC region is the main focus of the Economic Agenda of the BSEC region. In fact, most important achievements have been done in the road and maritime infrastructure and the facilitation of road transport of goods.

The priorities for regional and intermodal development in the BSEC region have been integrated into the projects and initiatives since 1993 within the framework of the Asia—Caucasus—Europe transit corridor “TRACECA” supplemented by the Black Sea Pan-European Transport Area (PETra), to guarantee the development of transport, efficient traffic management, safety, and environmental protection of all the countries in the region.

The development of intermodal transport in the BSEC region is crucial due to the capacity of connection between the Euro-Asia network and the Trans-European Transport Network (TEN-T) corridors. In particular, the Orient—East-Med corridor and the Rhine—Danube corridor are connected to the BSEC region, and provide a high potential for the trade and economic relations to the BSEC region and consequently to Europe and Asia (Grosch, 2016; Peijs, 2017). The Orient—East-Med corridor will connect central Europe with the maritime interfaces of the

Figure 11.3 Intermodal transport flow considered in the BSEC case.

North, Baltic, Black, and Mediterranean seas, allowing the optimization of the use of the ports concerned and the related Motorways of the Sea. This corridor will foster the development of those ports as major multimodal logistic platforms and will improve the multimodal connections of major economic centers in Central Europe to the coastlines, using rivers such as the Elbe (Grosch, 2016). The Rhine–Danube corridor will provide the main east–west link between continental European countries, connecting France and Germany, Austria, the Czech Republic, Slovakia, Hungary, Romania, and Bulgaria all along the Main and Danube rivers to the Black Sea by improving (high-speed) rail and inland waterway interconnections (Peijs, 2017).

The case study discussed in this chapter analyzes shipments departing from Serbia to Azerbaijan, crossing the following countries: Bulgaria, Turkey, and Georgia. The shipment includes two intermodal shifts, road to sea in Istanbul, Turkey, and sea to road in Poti, Georgia (Fig. 11.3).

11.6.1 Financial Risks

According to gathered data, financial guarantees that can be used to move cargo across borders from Serbia to Azerbaijan are the following:

1. CD
2. GST
3. GAT
4. TIR carnet.

The four approaches have different financial implications. Four simple models have been developed to measure such impact. The underlying rule

in the models is the same, i.e., analyzing and assessing the opportunity costs for depositing, for a limited time period (time elapsing from when entering the country until leaving it), the suspended taxes and duties.

11.6.1.1 Cash Deposit

In case of CD, the transport or logistics company in charge of the shipment is required to deposit its own financial resources into the bank accounts of the national customs transited. The model to compute the costs for using the CD approach is given in the following formula:

$$CDC_{Serbia-Azerbaijan} = \frac{S}{N \cdot 365} \cdot DIR \cdot \sum_{p=1}^9 \sum_{c=1}^3 [(VAT_{c,p} + DR_{c,p}) \cdot TV_p \cdot TT_c]$$

The model above includes the annual values of taxes and duties to be paid (right term summed over products and countries) on the route, multiplied by the deposit interest rate (DIR) and a conversion factor to calculate costs on a company-shipment basis. Terms used in the equation are:

$CDC_{Serbia-Azerbaijan}$ = annual cash deposit costs on route Serbia to Azerbaijan (€/company).

TT_c = transit time for country c considered in the route (days). Azerbaijan not included due to freedom of transit regime. Georgian duties and taxes considered only for bulk cargo (see Table A.2 for the estimated travelling times).

TV_p = annual traded values in € of each product p considered in the study (€) (see Table A.1).

$VAT_{c,p}$ = value-added tax in each country c , for each product p (%).

$DR_{c,p}$ = duty rates in each country c , for each product p (%).

DIR = deposit interest rate in Serbia (%), deduced from Serbian customs brokers rates issued for financial guarantees.

N = number of transport companies based in Serbia and assumed to be operating on the route Serbia to Azerbaijan (number of transport companies).

S = annual export shipments from Serbia (number of shipments per year).

c = countries selected for this study (1 = Bulgaria, 2 = Turkey, 3 = Georgia).

$p = 1$ to 9, corresponding to products selected for this study (see also [Table A.1](#) in Appendix).

To calculate the annual cost savings, the following data were used:

- Annual trade values per product ([Table A.1](#)).
- Deposit interest rate 7% ([WorldBank, 2016](#)).
- Number of major companies operating in Serbia set to 107, as observed in available European yellow pages.
- Number of annual export shipments, from Belgrade and Dimitrovgrad ([Upravacarina, 2016](#)).
- VAT and duty rates as reported in World Trade Organization (WTO) tariffs database ([WTO, 2016](#)).

11.6.1.2 Guarantor Single Transactions

Using a guarantor means that a company has the option to request loans from national banks, insurance companies, or customs brokers in order to cover the necessary fees to be deposited in the customs' bank accounts. In case the guarantor is used for individual transactions, a company uses a guarantor for each time the company performs an export from Serbia to Azerbaijan. Hence the model that has been developed and applied is the following:

$$GSTC_{Serbia-Azerbaijan} = \frac{2}{73} \cdot \frac{S \cdot LIR}{N} \cdot \sum_{p=1}^9 \sum_{c=1}^3 [(VAT_{c,p} + DR_{c,p}) \cdot TV_p]$$

The model above includes the annual values of taxes and duties expected to be paid (right term summed over products and countries) on the route multiplied by the lending interest rate (LIR) and a conversion factor to calculate cost per company-shipment, but considering the limitation of 10 days maximum lending time. Terms used in the equation are:

$GSTC_{Serbia-Azerbaijan}$ = annual guarantor single transaction costs on route Serbia to Georgia (€/company).

TV_p = annual traded values in € of each product p considered in the study (€) (see [Table A.1](#)).

$VAT_{c,p}$ = value-added tax in each country c , for each product p (%).

$DR_{c,p}$ = duty rates in each country c , for each product p (%).

LIR = lending interest rate in Serbia (%). This value was calculated by using fees of Serbian customs brokers as a reference. According to interviews, customs brokers charge about €35–40 for a value of

maximum €20,000 and a time limit of maximum 8–10 days. This corresponds to a potential lending interest rate of about 9%.

N = number of transport companies based in Serbia and assumed to be operating on the route Serbia to Azerbaijan (number of transport companies).

S = annual export shipments from Serbia (number of shipments per year).

c = countries selected for this study (1 = Bulgaria, 2 = Turkey, 3 = Georgia).

$p = 1-9$, corresponding to the 9 products selected for this study in Table A.1.

To calculate the annual cost savings, the following data were used:

- Annual trade values per products (Table A.1) as reported by WTO in 2015.
- Lending interest rate 9%.
- Number of major companies operating in Serbia set to 107, as observed in available European yellow pages.
- Number of annual export shipments, from Belgrade and Dimitrovgrad, (Upravacarina, 2016).
- VAT and duty rates as reported in WTO tariffs database (WTO, 2016).

11.6.1.3 Guarantor Aggregated Transactions

In case an operator chooses this option, a total amount loaned from the guarantor (a bank, an insurance company, a customs broker, etc.) has to be agreed upon and related costs paid. The guarantor monitors all transactions performed by the company's carriers. Thereafter the guarantor uses and refills the agreed budget respectively every time an amount needs to be deposited to customs' bank accounts, or the other way round, when the customs administrations reimburse the deposit. Using a guarantor for aggregated transactions performed yearly, the model is changed in order to consider to total amount of VATs and duty rates that need to be disbursed by companies to national customs on a yearly basis. Hence, the model is the following:

$$GATC_{Serbia-Azerbaijan} = \frac{1}{365 \cdot N} \cdot LIR \cdot \sum_{p=1}^9 \sum_{c=1}^3 [(VAT_{c,p} + DR_{c,p}) \cdot TV_p \cdot TT_c]$$

The model above includes the annual values of taxes and duties to be paid per shipment (right term summed over products and countries) on the route multiplied by the lending interest rate (LIR) and a conversion factor to calculate costs on company-shipment basis. Terms used in the equation are:

$GATC_{Serbia-Azerbaijan}$ = annual guarantor aggregated transaction costs on route Serbia to Azerbaijan (€/company).

LIR = lending interest rate in Serbia (%). This value was calculated by using fees of Serbian customs brokers as a reference. According to interviews, customs brokers charge about €35–40 for a value of maximum €20,000 and a time limit of maximum 8–10 days. This corresponds to a potential lending interest rate of about 9%.

TV_p = annual traded values in € of each product p considered in the study (€) (see [Table A.1](#)).

TT_c = transit time for country c considered in the route (days). Azerbaijan not included due to freedom of transit regime. Georgian duties and taxes considered only for bulk cargo (see [Table A.2](#) for estimated travelling times).

$VAT_{c,p}$ = value-added tax in each country c , for each product p (%).

$DR_{c,p}$ = duty rates in each country c , for each product p (%).

N = number of transport companies based in Serbia and assumed to be operating on the route Serbia to Azerbaijan (number of transport companies).

c = countries selected for this study (1 = Bulgaria, 2 = Turkey, 3 = Georgia). Azerbaijan not included because of freedom of transit conditions.

$p = 1-9$, corresponding to the 9 products selected for this study in [Table A.1](#).

To calculate the annual cost savings, the following data were used:

- Annual trade values per products ([WTO, 2016](#)).
- Lending interest rate 9%.
- Number of major companies operating in Serbia set to 107, as observed in available European yellow pages.
- VAT and duty rates extracted from WTO tariffs database ([WTO, 2016](#)).

11.6.1.4 *Transports Internationaux Routiers Carnet*

As established in the TIR Convention, companies have the possibility to cover customs duties and taxes throughout a journey, by exploiting the international guaranteeing chain managed by the International Road

Transport Union (IRU). Hence, the TIR carnet can be used by companies both as a customs declaration and as a guarantee for the duties and taxes suspended when cargo is transiting a country. National offices throughout the world have the responsibility to sell and distribute TIR carnet. For instance, in Serbia, the ministry of transport in cooperation with the chambers of commerce has this responsibility.

The economic model for the cost calculation associated with the TIR carnet is quite trivial. The costs for the suspended levied duties and taxes do not depend anymore on the value of the cargo nor on the transit time, or any loans borrowed from banks or insurance companies. Operators need merely to purchase a TIR carnet and automatically financial guarantee will be covered.

$$TCC = \left\| \frac{S}{N} \right\| \cdot TCP$$

where:

TCC = TIR carnet annual costs (€).

TCP = TIR carnet price (€).

S = annual export shipments from Serbia (number of shipments per year).

N = number of transport companies based in Serbia and assumed to be operating on the route Serbia to Azerbaijan (number of transport companies).

To calculate the annual costs of using TIR carnets, the following data were used:

- TIR carnet with 14 vouchers price €106.81 (UNECE, 2016).
- Number of major companies operating in Serbia set to 107, as observed in available European yellow pages.
- Number of annual export shipments (Upravcarina, 2016).

11.6.1.5 Numerical Analysis

A numerical analysis was performed by using the following underlying assumptions and/or data sources:

- *Georgian financial guarantees*: During interviews and observations performed in Georgia, customs post Sarpi, it was unveiled that financial guarantees in Georgia are not required, for all cargo except bulk. The information was verified by means of follow-up interviews with Georgian Revenue Services and analysis of legislative material. As it was explained, the freedom of transit is ensured by Article 230 of the Tax

Figure 11.4 Trade Serbia to Azerbaijan in value (2015, in 1000 USD).

Code of Georgia and secondary legislation.¹ Hence, “transit in Georgia is free of any customs duties and does not require a guarantee in a form of surety, deposit, or other monetary or nonmonetary means.” Additional interviews with customs brokers in Serbia confirmed that transit in Georgia is free of any duties and taxes, except for bulk cargo.

- *Azerbaijan financial guarantees*: Interviewed experts confirmed that all cargo products are free of duties and taxes in Azerbaijan as well.
- *Cargo value and product category*: Data collected from the WTO show that there are totally 72 types of products that are exported from Serbia to Azerbaijan, for a total 6,930,935 (thousands of USD). In order to limit the analysis but still keeping it significant in terms of results, it was decided to apply the Pareto principle and select merely products accounting for the 80% of the traded value between the countries of interest (Fig. 11.4). The selected products and related

¹ Instruction on Movement and Clearance of Goods across the Customs Territory of Georgia, approved by Order No. 290 of July 26, 2012, of the Minister of Finance of Georgia and Instruction for Implementation of Procedures Related to Entering Goods the Customs Territory of Georgia/Leaving the Customs Territory of Georgia and Declaration, approved by Order No. 12858 of August 1, 2012, of the Director General of the Georgia Revenue Service.

traded values are given in Table A.1, according to interviewed experts, TIR carnets are normally not used for transport of military cargo, hence product category (9306) has not been considered in the analysis (Table A.1).

- *Duty rates:* Duty rates used for the analysis have been computed by using the tariffs analysis database available from the WTO. The data available consists of the WTO's Integrated Database and Consolidated Tariffs Schedules. The computed duty rates have been identified by extracting applied duties rates averaged on the Harmonize System sub-headings (two digits) of the products considered in this study (see Table A.1), and for each of the countries transited, i.e., Bulgaria, Turkey, Georgia, and Azerbaijan.
- *Transiting times:* Transiting times have been estimated by considering:
 - The necessary traveling times to cross the selected countries. This item was computed by using google maps routing services. These times were slightly inflated considering (1) the necessary rest to be taken by truck drivers every 4–5 hours and (2) the slower trucks' average speed compared to normal cars.
 - The administrative time to file the necessary documents for issuing financial guarantees and request reimbursement where applicable.

In Fig. 11.5, results from the models are drawn in a diagram comparing financial guarantee costs per cargo taxes and duties values. It can be

Figure 11.5 Costs comparison of CDC, GSTC, GATC, and TCC.

observed that three of the models' cost functions (i.e., CD costs (CDC), GST costs (GSTC), and GAT costs (GATC)) increase linearly with the total amount of taxes and duties to be guaranteed. The slopes of the lines tell clearly that among the three options, the cheapest for companies is the CD, followed by the GAT and finally the GST. Costs brought by TIR carnets are instead constant and independent from the value of the cargo up to a maximum of €100,000,² and considering a carnet with 14 vouchers. The total cost of this option is about €98,474. In the same figure, it is possible to notice three cutoff points in correspondence of €42,000, €59,500, and €73,500 (average container values). This implies that considering merely the benefits of financial guarantees, the TIR carnet is definitely an economically valuable alternative starting from containers with an average value of €42,000€ and above. The benefits are given by the respective regions in the diagrams between the cost functions GSTC-TCC, GATC-TCC, and CDC-TCC. For instance, comparing the GST option, benefits would range between €2000 and €140,000 per company. The cutoff points with the alternatives GATC and CDC have higher values, respectively €59,500 and €73,500.

11.6.2 Transport Risks

The most common definition of risk, which is the product of the “impact/consequence of the unexpected event” and “the likelihood of such event happening,” is implicitly employed for transport risks. In this section we identify and discuss main risks in cross-border transport and their interrelationship with the financial instruments utilized by carriers. [Table A.1](#) summarizes the risks of the four financial guarantee options based on the literature reviewed, as well as the data observed and gathered from interviews.

- *Freight demand*: Risk of shipping less or more than planned/budgeted. The number of containers a shipper needs to transport over a year cannot be predicted with certainty (i.e., random), and therefore shipping drastically more or less than the “expected” amount leads to financial losses or gains depending on the financial guarantees used.

² Starting July 1, 2016, the financial guarantee for TIR carnet has been increased from €60 000 to €100 000 for the following countries: Serbia, Azerbaijan, Armenia, Iran, Bosnia, and Herzegovina, as well as Kyrgyzstan.

- *CD model/GST/TIR carnet*: The deposits required are based on the “exact” number of shipments, and therefore there is no such risk for carriers.
- *GAT*: If the “exact” number of shipments is more (less) than the “planned/budgeted,” the shipper ends up paying less (more) in total. Therefore, with this aggregate transactions model, the shipper (whoever deposits the guarantee) will benefit/suffer from the upside/downside risks. If the number of shipments is relatively stable over time, then such risks are minimal.
- *Border delays*: Entry and exit movement can be delayed due to screening of necessary transit documentation, including documents proving that necessary taxes and duties have been guaranteed by a CD, a guarantee, or TIR carnets.
 - *CD/GST/GAT*: Documentation supporting the deposits could vary depending on the bank or insurer used by companies. Lack of standardization increases uncertainty in time delays at borders.
- *TIR carnet*: TIR carnets could decrease these delays due to their high level of standardization, trust, and accreditation across customs administrations.
- *Transit delays*: Risk of the transport time being different than the planned durations. The transit time from the origin to destination also cannot be estimated with 100% accuracy, and therefore the financial guarantees that do not take into account the exact transit time are subject to this type of risk.
 - *CD model*: The deposits required are based on the transit time with the “CD” model, and therefore any delays will result in higher costs for the carrier.
 - *GST/GAT*: When the guarantor model is used, the guarantees are valid for transit times up to 10 days and therefore do not directly depend on the “exact” transit time. As a result, the shipper is subject to downside (upside) risks when the “exact” transit time turns out to be less (more) than the “average” transit time (average would most likely be half the maximum limit given a uniform distribution of transit times).
 - *TIR carnet*: The cost with the TIR carnet system is independent of the transit time, and thus no such risks exist with the TIR system as well.
- *Cargo value*: Risk of the value of shipments being less or more than planned/budgeted. Similar to the number of shipments, the “value” of the shipments over a year is unknown at the beginning of the year,

which causes the risk of paying less or more depending on the “actual value” shipped compared to the planned value. This risk appears only if the carrier uses the CD, the GST, or the GAT options.

- *CD model/GST*: If cargo value increases, the costs of CD and GST will also increase, increasing exposure to cargo value risks.
- *GAT*: With the GAT model, the value of the goods shipped over the year needs to be estimated at the beginning of the year, leading to the risk of the “exact” value of goods shipped deviating from this estimate, again with upside and downside risks.
- *TIR carnet*: The cost with the TIR carnet does not depend on the value of the container, and thus risk free.
- *Interest/loan rate fluctuations*: Due to fluctuations in the interest/loan rates over time, the party that pays for the financial guarantees in advance (i.e., when the goods shipped out of the origin) bears the resulting financial losses/gains. This risk is perceived significant only for the CD, GAT, and GST options.
 - *CD model/GST/GAT*: These options are all dependent on interest/loan rate fluctuations and therefore their pricing schemes could be easily affected in the short–medium term.
 - *TIR carnets*: Prices could also change in view of interest/loan rate fluctuations. However, due to the high number of agencies involved and the high volumes of carnets distributed, we believe that changes could be minimal.
- *Security risks*: In addition to the abovementioned risks, there are “security-related risks” that could be important in the decision-making process when choosing the most appropriate financial guarantee option. These risks are relevant for all the options considered. However, the TIR system offers better protection due to the auditing processed performed by national agencies to authorize the release of the carnets.
 - *CD model/GST/GAT*: Overall, these three options do not necessitate any sort of security requirements from the companies moving the cargo. Hence, these companies could be more vulnerable to attacks. For the same reason, customs risk management systems could classify these companies as high risks increasing border delays (as specified above).
 - *TIR carnets*: Companies that are using TIR carnets need to be approved by specific national agencies. This implies that companies have gone through financial and security checks. Therefore, risks for inspection at borders or during transit are minimized, since authorities trust TIR carriers.

11.7 DISCUSSION AND CONCLUSIONS

This study explores the costs and risks of different financial instruments for transport carriers. The analysis carried out considering transport flows in the BSEC area, from Serbia to Azerbaijan, shows that the choice of financial guarantees depends on the tax and duty value of cargo moved. CDs are the lowest-cost option costing up to €72,000, followed by the TIR carnets as the second cheapest option. Yet, some considerations must be put forward in the analysis shifting the cutoff point to lower values. First of all, companies, especially small-sized ones, hardly have the financial capabilities to afford the guarantees on their own. On the other hand, large enterprises, being often multinational companies, might have access to more attractive interest rates or investments that could significantly increase the opportunity costs of the CD option. Hence, while CDs seem to be an attractive option, it can still be considered a special case that could not materialize as a valid option for all companies. Likewise, the second option, the GAT, is feasible only if the company has been authorized by the local agency and if it can show stable and reliable forecasts of potential transactions along 1 year. Future research might be performed using surveys in order to segment transport carriers based on size, and estimate opportunity costs for depositing in cash the suspended taxes and duties.

In addition to the financial impacts, this study discusses the interrelationships between the financial guarantee options and cross-border/transit risks. Risks identified include freight demand, border and transit delays, cargo value, interests/loans fluctuations and security, and are summarized in Table 11.1. Overall, among the guarantees examined, TIR is certainly a low-risk option, while the remaining CD, GST, and GAT present higher uncertainties, implying that there could be hidden costs in these

Table 11.1 Overview risks impacts of the reviewed cross-border financial guarantees

	CD	GST	GAT	TIR
Freight demand	○	○	●	○
Border delays	●	●	●	○
Transit delays	●	○	○	○
Cargo value	●	●	○	○
Interests/loans fluctuations	●	●	●	○
Security	●	●	●	○

●, High; ○, medium; ○, low.

options. In view of these risks, the TIR could be the preferred choice of companies despite a precise cutoff point cannot be computed. Hence, future studies should look into the quantification of these risks and integration in the cost analysis presented in this chapter.

Finally, the decision as to which financial guarantee model must be selected should not only depend on the costs and risks discussed in this research. There are other criteria which need to be carefully evaluated. We present some of these criteria that might cause the shipper to select a particular financial guarantee model or a combination of them (hybrid approach). At the same time, we suggest the following criteria as potential areas of future research:

- The models that provide coverage up to a certain limit on either the “value of the shipment” or “the time it takes to reach the destination” such as the GATC, GSTC, and TCC models lead to nonlinear cost structures (stepwise cost functions). For example, the GST offers guarantees up to a value of €20,000 and 10 days of transit time. If either the value or the total duration of the journey exceeds these limits, there could be additional costs. This would in general make these models more sensitive to small changes around the “limits” determined in the contracts. Moreover, the fixed cost to be paid to the customs broker under the GAT and the GST schemes might make the TIR and CD options financially more attractive. The CD model does not suffer from this as the cost is linear in the time and the value.
- Geographical coverage of the models (certain financial guarantees cannot be used in some regions across the world) and the customs duties in different parts of the world (e.g., there are no customs duties for Georgia (except for bulk cargo) and Azerbaijan) are important factors that need to be considered. The shipper and the carrier should evaluate how stable the number of shipments over a certain time period (e.g., year), the time in transit, the value of goods shipped for shipments that are destined to (or cross) different geographical regions. Depending on this analysis, a hybrid approach can be taken, where a combination of models is used for different regions. For example, if in Region X, the number of shipments is pretty stable and the volume justifies a “relationship-based model,” then the GAT model can be used as you can predict with high accuracy the shipment frequency in advance. On the other hand, if the randomness in the number of shipments in Region Y is considerably high and there is not sufficient

volume, then the shipper would probably be better off using the GST model and pay for the insurance for each shipment separately (transactional).

- In order to simplify the operations, some firms might go for the financial model that is feasible for all regions and products rather than incurring larger administrative cost of managing a number of different financial models dealing with more intermediaries.
- The product heterogeneity is another factor that would be important as some products do not require duties. Also, the criticality of the products shipped (e.g., military equipment, hazardous materials, etc.) might impact the duties and therefore the choice of the financial model might be more important. Moreover, certain models cannot be used for some products (e.g., TIR cannot be used for the military equipment), which is another detail that needs particular attention in the design of the financial guarantee models portfolio.
- In the relationship-based model as in GAT (as opposed to transactional models such as GST), the carrier needs to “monitor” the shipments and make the payments accordingly using the budget agreed upon with the carrier in advance. There might be issues with the “monitoring,” and therefore certain procedures must be put in place to ensure that the truthful information is being shared between different actors to avoid potential problems with reporting. This might result in some hidden costs that the shipper is not aware of at the time of signing the deal. In certain cases, a neutral third party might be necessary to resolve potential disputes.
- The shipper might consider the factors that lead to “no reimbursement” by the customs. Issues such as fraud, incorrect/incomplete information, security-related issues might increase the likelihood of not being reimbursed by the customs. Certain models could be more attractive if they reduce the probability of such events happening (e.g., the TIR system is supposed to improve information exchange and security). The cost of no reimbursement is not modeled in this research, however, we believe it is an important determinant of the model to be selected.
- The size of the shipper is another factor that might be important when it comes to the choice of the financial model. Whether the shipper/carrier is an small- to medium-sized enterprise or a big firm will impact the interest/loan rates, and therefore the choice of the appropriate model depends on the size of the firm.

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APPENDIX

Table A.1 Selected products and values traded from Serbia to Azerbaijan

Product code	Definition	Quantity	Short name	Value (in 1000 USD)	Cumulative %
9306*	Bombs, grenades, torpedoes, mines, missiles, and similar munitions of war and parts thereof; cartridges and other ammunition and projectiles and parts thereof, including shot and cartridge wads.	48683	kg	1,813,432	26.16
4911	Printed books, newspapers, pictures, and other products of the printing industry; manuscripts, typescripts, and plans.	7	kg	968,581	40.14
3004	Pharmaceutical products.	239602	kg	785,791	51.48
7309	Reservoirs, tanks, vats, and similar containers for any material (other than compressed or liquefied gas), of iron or steel, of a capacity exceeding 300 L, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment.	38918	kg	394,502	57.17
8414	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof.		N.Q.	327,503	61.89
8703	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof.	15	Item	270,603	65.80

(Continued)

Table A.1 (Continued)

Product code	Definition	Quantity	Short name	Value (in 1000 USD)	Cumulative %
3601	Propellant powders	16000	kg	260,651	69.56
8207	Interchangeable tools for hand tools, whether or not power-operated, or for machine tools (e.g., for pressing, stamping, punching, tapping, threading, drilling, boring, broaching, milling, turning, or screw driving), including dies for drawing.	10128	kg	242,167	73.05
9207	Musical instruments; parts and accessories of such articles.		N.Q.	216,333	76.17
8479	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof.		NQ	206,761	79.16

*TIR carnets are normally not used for transport of military cargo, hence product category (9306) has not been considered in the analysis.

Values are in 1000 USD from 2015, kg, kilograms; NQ, not quantifiable, product codes based on H4 nomenclature.

Data extracted from [WITS \(2016\)](#).

Table A.2 Estimated times in days for road and sea transport, as well as administration of financial guarantees

	Serbia	Bulgaria	Turkey	Georgia	Azerbaijan
Road transport	0.06	0.19	0.21	0.29	0.42
Sea transport	0	NA	3.54	NA	NA
Financial guarantee administration	0.08	0	1	2.04	0.04
Total	0.14	0.19	4.75	2.33	0.46

Traveling times were estimated by using google maps; NA, not applicable.