An Exploratory Analysis of the Factors Affecting Incoterms Selection from the Perspective of Firm Characteristics

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Abstract

This study explores the factors affecting Incoterms selection based on statistical analysis. Specifically, it focuses on free on board; cost and freight; and cost, insurance, and freight; and considers the impact of firm characteristics and trust in transaction partners on the selection of Incoterms using 2020 “sell” data from Trade Tie-up Promotion Program. The variables affecting the selection in this analysis are nationality of exporter, industry, nationality of importer, international experience, and using letter of credit. The results of multiple correspondence analysis and cluster analysis, following chi-square testing, show that industry, nationality of exporter, nationality of importer, and international experience are the main factors that affect the selection of Incoterms. Therefore, this study shows that firm characteristics, which were not considered in prior studies, are important factors in this context. In particular, the identified factors are useful for firms with little international trade experience in selecting Incoterms rules.

Keywords: International Business, International Transaction, Exporter, Multiple Correspondence Analysis, Cluster Analysis

1. Introduction

Firms conduct more cross-border transactions due to the globalization of the market and economy. In cross-border transactions, firms face differences in language, rules, and business customs, as opposed to domestic transactions. Therefore, cross-border business is more complex than domestic business is.

To decrease complexity, globally standardized rules are established (e.g., Uniform Customs and Practice for Documentary Credits, rules established by the Berne Union). One of the most important set of rules for the cross-border transactions are Incoterms, which prescribe the cost and range among transaction partners to ensure a smooth transaction process. Incoterms 2020, which is the most recent version, includes 11 rules (i.e., EXW, FCA, CPT, CIP, DAP, DPU, DDP, FAS, FOB, CFR, and CIF). In particular, free on board (FOB), cost and freight (CFR), and cost, insurance, and freight (CIF) are frequently used by firms in cross-border transactions [1,2,3,4]. When firms understand Incoterms and recognize their importance, they can select the most appropriate one among the 11 rules, thus improving their export performance [5,6]. However, prior studies do not clarify the cases under which the specific rules are to be used. Although Soga addresses this research question, his study is limited because of the restricted and small sample, which focuses only on importers (“buy” data) [7]. Additionally, as the factors affecting Incoterms selection are specified from the perspective of the external business environment [5,6], firm characteristics are not clarified in the literature.

Therefore, this study explores the factors affecting Incoterms selection, specifically the selection of FOB, CFR, and CIF, from the perspective of firm characteristics through statistical analysis.

1.1 Factors affecting the selection of terms and conditions

Incoterms stands for international commercial terms and is established by the International Chamber of Commerce. They are the main set of rules used in domestic and international trade to decrease the risk of trade. The firms using them are able to recognize whether the importer or exporter bears the cost and arrangement of transport and customs clearance in international transactions by reference to Incoterms. Concretely, Incoterms shows “a set of three-letter trade terms reflecting business-to-business practice in contracts for the sale of goods” (p. 5) and “mainly the tasks, costs, and risks involved in the delivery of goods from sellers to buyers” (p. 5) [8].

After Incoterms was established in 1936, it was revised in 1953, 1967, 1976, 1980, 1990, 2000, 2010, and 2020. Incoterms 2020, which is the most recent version, is in effect from January 1, 2020. Incoterms 2020 includes 11 rules divided into rules for any mode of transport (i.e., EXW, FCA, CPT, CIP, DAP, DPU, and DDP) and rules for sea and inland waterway transport (i.e., FAS, FOB, CFR, and CIF) [9]. FOB, CFR, and CIF are frequently used by firms. Kobayashi analyzes the usage of the rules for one general trading company in 1995 and shows that the ratio of FOB, CFR, and CIF usage is 95.6% among all the rules [1]. Additionally, Sugiyama

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investigates the ratio of usage of FOB, CFR, and CIF for 2,340 proposals under the Trade Tie-up Promotion Program (TTPP), operated by the Japan External Trade Organization (JETRO), and shows that FOB, CFR, and CIF are used in 880 (55.2%), 206 (12.2%), and 300 (17.8%) cases, respectively [2]. Although Incoterms 1990 and 2010 show minor differences from Incoterms 2020, FOB, CFR, and CIF are frequently used in the long term by firms. From the perspective of the business burden, it is desirable that exporter selects EXW, which means that “the seller delivers the goods to the buyer when it places the goods at the disposal of the buyer at a named place (like a factory or warehouse)” (p. 14) [9] and importer selects DDP, which means that “the seller delivers the goods to the buyer when the goods are placed at the disposal of the buyer” (p. 54) [9]. However, unless there is a large power imbalance between the exporter and the importer, it is assumed that the firms select FOB, DFR, and CIF, in which the importer and exporter bear almost same level of business burden such as customs clearance, securing means of transportation, and contracting the insurance through the negotiation. Next, I explain the details of FOB, CIF, and CIF.

First, FOB, which stands for free on board, means “the seller must deliver the goods either by placing them on board the vessel nominated by the buyer at the loading point, if any, indicated by the buyer at the named port of shipment or by procuring the goods so delivered” (p. 70) [9] and the “risk of loss of or damage to the goods transfers when the goods are on board the vessel, and the buyer bears all costs from that moment onwards” (p. 68) [9]. Additionally, the ‘seller has no obligation to the buyer to make a contract of insurance’ (p. 70) [9].

Second, CFR, which stands for cost and freight, means “the seller must deliver the goods either by placing them on board the vessel or by procuring the goods so delivered” (p. 76) and the “risk of loss of or damage to the goods transfers when the goods are on board the vessel, such that the seller is taken to have performed its obligation to deliver the goods whether or not the goods actually arrive at their destination in sound condition, in the stated quantity or, indeed, at all” (p. 74) [9]. Furthermore, “the seller owes no obligation to the buyer to purchase insurance cover” (p. 74) [9].

Third, CIF, which stands for cost, insurance, and freight, means “the seller must deliver the goods either by placing them on board the vessel or by procuring the goods so delivered” (p. 82) and the “risk of loss or damage to the goods transfers when the goods are on board the vessel, such that the seller is taken to have performed its obligation to deliver the goods whether or not the goods actually arrive at their destination in sound condition, in the stated quantity or, indeed, at all” (p. 80) [9]. In addition, the seller must “contract for insurance cover against the buyer’s risk of loss of or damage to the goods from the port of shipment to at least the port of destination” (p. 81) [9]. Therefore, while the buyer bears the cost of shipment in the FOB, the seller bears it in CFR and CIF. Moreover, while the seller has no obligation to purchase insurance in FOB and CFR, it has to in CIF. In other words, the covered range of freight and insurance costs for exporters and importers are different between FOB, CFR, and CIF.

Firms select Incoterms to minimize the risk and uncertainty related to international transactions and maximize profit [5,6]. Hien et al. presume that the external business environment is an important factor when selecting Incoterms rules because this factor affects the choice of foreign market entry mode; they also analyze the relationship between the selection of Incoterms rules and the external business environment and export performance, which consists of financial performance, strategic performance, and satisfaction with respect to exports [5]. Because of the analysis of Canadian firms, it was found that export performance has significant correlation to Incoterms use frequency, knowledge of Incoterms, and importance accorded to Incoterms; and the firms that consider the external business environment when selecting Incoterms rules tend to have high export performance [5]. In addition, based on this result, Yaakub et al. analyzed the selection of Incoterms for Malaysian firms and showed the same results as Hien et al. [5], except for the correlation between export performance and Incoterms use frequency [6]. Therefore, the selection of Incoterms influences export performance and relates to the external business environment.

However, the literature on foreign market entry emphasizes other factors, such as firm characteristics. For example, Musteen et al. consider the economic size of the host country when analyzing foreign market entry mode choice, indicating that the GDP per capita affects entry mode choice [10]. As economic size differs by country in the many prior studies on location choice [11,12], nationality of transaction partners forms an important factor.

Industry is also an important factor. The difference in industry [13] and industry factors, such as uncertainty of demand and competitive intensity [14], are the focus of the literature on foreign market entry. Moreover, Pan et al. show product sector concentration to be the factor that affects market share and ROA [15]. As there are few firms in the market when product sector concentration is low, competitive intensity is low. In this case, the market leader can make the industry standard and easily gain large profits [15]. In other words, industry factors affect international performance.

Furthermore, international experience is an important factor. For instance, Erramilli analyzes the choice of foreign market entry mode from the perspective of international experience [16]. When firms have little international experience, they do not use resources to invest in foreign markets because they want to avoid uncertainty and risk. Moreover, as firms with little international experience tend to be ethnocentric and the performance of partners in joint ventures (JVs) tends to differ, they largely choose wholly owned subsidiaries (WOS). Therefore, firms with little or no international experience tend to choose high control entry modes such as WOS. Conversely, firms with many international
experiences tend to choose WOS because they already have knowledge of international business and do not need to rely on the knowledge of their partners in JVs. In other words, while firms with few or many international experiences tend to choose WOS, firms with a certain degree of international experience tend to choose JVs [16]. Therefore, the relationship between international experience and choosing the entry mode, JVs or WOS, is not linear, but U-shaped. In other words, there is a trade-off relationship between control and risk for the international business. As firms with a certain degree of international experience are willing to expand the international business, the associated risk increases. Thus, such firms select JVs to mitigate the risk at the sacrifice of control. As international experience affects international business, this study focuses on international experience in addition to other factors.

Trust is also an important factor. Specifically, as trust does not exist between exporters and importers when a firm starts transactions with a new partner, firms fear the opportunistic behavior of the new partner. Therefore, the firms conduct the credit inquiry of the new partner such as character, capital, capacity (3Cs) before or during the negotiation. If the firms fear the solvency of the new partner, they request opening the L/C (Letter of Credit) to the importer. As the banks ensure payment of importer by L/C, the firms can mitigate the risk of payment. Soga implicates the importance of L/C through an empirical analysis that focuses on importers [7].

Therefore, this study analyzes the selection of FOB, CFR, and CIF based on industry factors, exporters and importers, international experience, and L/C.

2. Method

2.1 Variables

The data used in the empirical analyses were collected from TTPP proposals [17]. TTPP is an international matching website that includes various types of proposals, such as those for the export and import of products, business tie-ups, business support, space for offices/factories, technology, and transfer. As this study focuses on the exporter, the “sell” part is considered, which includes exports and import of products/parts. The “sell” proposals mainly include the features and characteristics of a product, product outline, country of origin, port of loading, production/delivery capability, price reference, payment terms, minimum order quantity, conditions of products/parts inventory, orders from individual, delivery time, and trade terms.

As the proposals in TTPP are in the form of text information, this information was converted into categorical variables. First, the variable of nationality of exporter is 1 when the exporter is Japanese (EX_J), and 0 otherwise (EX_W).

Second, industry is classified into 13 industries according to the categories in TTPP. However, as the sample corresponds to business support services, general machineries, information processing, electrical machineries and equipment, transport equipment, and others is small in this sample, these industries are combined into other categories. The industries of chemical (IND_CHE), agriculture and foods (IND_AGR), mining (IND_MIN), miscellaneous manufacturing (IND_MIS), fiber (IND_FIB), wood (IND_WOO), and others (IND_OTH) are labeled from 1 to 7.

Third, as the proposals can show the nationalities of the importers, these are classified into Japanese and others, taking the value 1 when the importer is Japanese (IM_ONJ), and 0 otherwise (IM_W).

Fourth, although proposals can show the experience of selling a product, this information is not included in some proposals. Therefore, the variable of international experience takes 2 when the firm has the international experience (EXP_INT), 1 when the firm has only domestic experience (EXP_DOM), 0 when experience is not described, or unknown (EXP_UNK).

Fifth, L/C takes 1 when the firm requests L/C as payment method (LC), and 0 when the firm does not (LC_N).

Sixth, the variable on Incoterms takes 0 when the firm requests FOB (FOB), 1 when the firm requests CFR (CFR), and 2 when the firm requests CIF (CIF).

2.2 Analysis procedure

Three analyses and tests are conducted to explore the factors affecting Incoterms selection, that is, FOB, CFR, and CIF. First, after cross-tabulation, which consists of the variables on the three rules and the other variables, a chi-square test for independence between FOB, CFR, and CIF was conducted to verify the relationship between the three rules and other variables by BellCurve for Excel version 3.21.

Second, by using the significant variables in the chi-square test for independence, multiple correspondence analysis (MCA) by StatA 16.1 was conducted to determine the relationship among variables. The MCA shows the scores of variables, based on which a scatter diagram is presented.

Third, based on these scores, cluster analysis using BellCurve for Excel version 3.21 was conducted, which shows a tree diagram with the relationships between variables.

3. Results

The data were for the period from January 1, 2020, to December 31, 2020, from the “sell” category of TTPP. As a result, 2,579 proposals were collected, with 1,623 for “sell” (export). After omitting the data on domestic transactions and those that do not describe the rules of Incoterms, we obtained 828 observations. After omitting the data that describe the rules of Incoterms other than FOB, CFR, and CIF, the number of observations was reduced to 684. This result indicates that 82.6% of the “sell” proposals in TTPP use FOB, CFR, and CIF. Furthermore, some observations describe the Incoterms, but not the payment terms. Finally, the sample size used in the analysis was 678.
First, a chi-square test was conducted. The result shows significant differences in terms of industry, nationality of importer, and international experience between FOB, CFR, and CIF at the 0.05 level and those for nationality of exporter and L/C at the 0.1 level (Table 1). In other words, these five factors are different between the three Incoterms rules.

Using these significant factors and the three Incoterms rules, MCA was conducted. The result shows that two axes with 36.7% and 18.17% contribution rates have more than 50% of the cumulative contribution rate, as shown in Table 2. A scatter diagram is depicted by using the coordinates of the points on axes 1 and 2 in Figure 1.

By using the scores of the two axis, cluster analysis was conducted. The tree diagram shows that four clusters and three in four clusters exhibit the characteristics of FOB, CFR, and CIF (Figure 2). The first cluster includes FOB, being related to industry of miscellaneous manufacture, agriculture and foods, mining, and fiber, nationality of exporter without Japan, L/C, no L/C, international experience unknown, and Japanese nationality of importer. The second cluster shows the relationship between CFR and the industry of wood. The third cluster that includes CIF has relation with the chemical industry, international experience, and nationality of importer not restricted to Japan.

| Table 1 Results of the chi-square difference test |
|-----------------------------------------------|
| Nationality of Exporter | FOB | CFR | CIF | Chi-square |
| EX_W | 330 | 95  | 162 | 4.7964† |
| EX_J | 59  | 7   | 25  | 50.1147** |
| IND_CHE | 60  | 21  | 47  |  |  |
| IND_AGR | 90  | 47  | 61  |  |  |
| IND_MIN | 28  | 9   | 18  |  |  |
| IND_MIS | 49  | 7   | 16  |  |  |
| IND_FIB | 50  | 4   | 13  |  |  |
| IND_WOO | 35  | 8   | 9   |  |  |
| IND_OTH | 77  | 6   | 23  |  |  |
| Nationality of Importer | FOB | CFR | CIF | Chi-square |
| IM_W | 63  | 29  | 38  | 8.0261* |
| IM_ONJ | 326 | 73  | 149 |  |  |
| IND_CHE | 219 | 56  | 91  | 9.5087* |
| IND_AGR | 33  | 9   | 8   |  |  |
| IND_MIN | 137 | 37  | 88  |  |  |
| IND_MIS | 169 | 57  | 83  | 5.1873† |
| IND_FIB | 220 | 45  | 104 |  |  |
| IND_WOO | 0.144 | 0.671 | 0.017 | 0.443 | 0.600 | 0.028 | 0.218 | 0.072 | 0.007 |
| IND_AGR | 0.022 | 0.671 | 0.112 | -2.857 | 0.600 | 0.183 | -1.404 | 0.072 | 0.044 |
| IND_MIN | 0.031 | 0.799 | 0.044 | -0.554 | 0.081 | 0.010 | 2.348 | 0.719 | 0.173 |
| IND_MIS | 0.049 | 0.252 | 0.063 | 0.810 | 0.187 | 0.032 | -0.675 | 0.064 | 0.022 |
| IND_FIB | 0.014 | 0.370 | 0.016 | -0.375 | 0.344 | 0.015 | -0.419 | 0.026 | 0.002 |
| IND_WOO | 0.016 | 0.309 | 0.025 | 1.999 | 0.328 | 0.051 | -0.051 | 0.000 | 0.000 |
| IND_OTH | 0.026 | 0.747 | 0.077 | -2.429 | 0.732 | 0.154 | -0.490 | 0.015 | 0.006 |
| IM_W | 0.032 | 0.483 | 0.094 | 0.587 | 0.043 | 0.011 | 2.671 | 0.440 | 0.228 |
| IM_ONJ | 0.135 | 0.483 | 0.022 | -0.139 | 0.043 | 0.003 | -0.634 | 0.440 | 0.054 |
| EXP_UNK | 0.090 | 0.677 | 0.053 | 0.836 | 0.435 | 0.063 | -0.886 | 0.242 | 0.071 |
| EXP_DOM | 0.012 | 0.496 | 0.031 | -1.669 | 0.407 | 0.034 | -1.108 | 0.089 | 0.015 |
| EXP_INT | 0.064 | 0.592 | 0.070 | -0.849 | 0.243 | 0.046 | 1.440 | 0.349 | 0.135 |
| LC | 0.076 | 0.718 | 0.072 | 1.327 | 0.688 | 0.134 | -0.392 | 0.030 | 0.012 |
| LC_N | 0.091 | 0.718 | 0.060 | -1.112 | 0.688 | 0.112 | 0.329 | 0.030 | 0.010 |
| FOB | 0.095 | 0.429 | 0.051 | -0.472 | 0.153 | 0.021 | -0.901 | 0.276 | 0.077 |
| CFR | 0.026 | 0.563 | 0.073 | 1.971 | 0.500 | 0.099 | 0.999 | 0.063 | 0.026 |
| CIF | 0.046 | 0.386 | 0.038 | -0.119 | 0.006 | 0.001 | 1.309 | 0.380 | 0.079 |

Table 2 Results of the multiple correspondence analysis
4. Discussion

The analyses revealed five main findings. First, the results of the cluster analysis show little characteristics for CFR compared with FOB and CIF. The reason can be that CFR is the intermediate rule between FOB and CIF from the perspective of freight and insurance costs for exporters and importers.

Second, the results of the chi-square test and cluster analysis show that the three Incoterms rules selected by exporters differ by industry. This implies that the selection of Incoterms is affected by the price and characteristics of the seller’s product.

Third, the selection of rules is affected by the nationalities of exporters and importers. Specifically, while exporters select FOB when the exporter is not Japanese and the importer is restricted to Japanese firms, exporters select CIF when foreign exporters do not restrict their transaction partners to Japanese firms. Therefore, it is possible that the selection of Incoterms rules differs by country.

Fourth, firms that have international experience tend to select CIF because they already have experience arranging shipping and insurance.

Finally, the result shows no relationship between payment by L/C and the selection of the three rules. L/C is often used when the transaction partner is not a well-known firm or a firm with a low capacity to pay. Therefore, whether payment by L/C affects selection is important for the capacity to pay and reputation rather than the selection of Incoterms rules.

However, this study is not without limitations. First, it does not focus on the Incoterms rules other than FOB, CFR, and CIF. As such, the results hold only with respect to the rules for sea and inland waterway transport, except for FAS.

Second, this study focuses on the Incoterms rules preferred by exporters. As these rules of Incoterms are decided by negotiation between exporters and importers, the rule in the data can change to another one in real transactions. Therefore, the factors that this study considers are valid as far as the rules preferred by the exporter are concerned.

Third, although this study identifies the factors affecting the Incoterms selection of exporters, it does not clarify the appropriate case in which the rules are used and
relationship between the selection and export performance, and the selection and negotiation. Further research that analyzes the selection of Incoterms considering the external business environment [5,6] and export performance in addition to the factors here, including selection of rules in real transactions, is thus needed.

5. Conclusions

Although prior studies show that the selection of Incoterms rules is important because it influences export performance, they discuss few empirical cases. To address this issue, this study explored the factors affecting Incoterms selection through statistical analysis. Clarifying these factors that do not stem from prior studies leads to development in the academic field of international trade and the improvement of international trade practice. The factors identified in this study are useful for firms with little international trade experience in selecting Incoterms rules. For example, as Japanese firms with many international experiences tend to contract marine insurance by themselves, the Japanese firms with little international experience need to learn the practice relevance to contracting the marine insurance. Therefore, the findings of this study have not only academic relevance but also practical importance.

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