Trade Finance in Statements:

Firm-level Data of Undelivered Goods and its Impact on Firms' Purchase

企業の財務諸表における貿易金融データに関する分析

──未着商品データとその仕入への影響──

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【Abstract】

　　Trade finance, as a part of the financial aspect of international trade, started to gain more attention than ever after the 2008–09 financial crisis. Together with the attention, researchers have been accumulating empirical evidence that supports the importance of trade finance. However, data availability problem of trade finance is preventing the researches from further development. To address this issue, this paper suggests a new proxy for trade finance with higher accessibility. The data in focus is undelivered goods as a reporting item in firms' financial statements and from the business practice of international trade, this item captures the trade finance (especially bank intermediated trade finance). The estimations based on undelivered goods data are conducted for two purposes. First, to explore the factors that affect the trade finance and second, to quantify the impact of trade finance on the purchased amount. For both purposes, this paper documents economically and statistically significant results. The results suggest that assets held by companies seem to be the most prominent factor and the results constantly support the importance of trade finance even after controlling for other factors. Although the purpose of the analysis is well seen in previous researches, this paper is the first to utilize the unique dataset of undelivered goods and to document the evidence with strong significance.

【Key Words】　Firm-level data, International trade, Japan, Trade finance, Undelivered goods

## 1. Introduction—Why Trade Finance Matters and What is the Challenge

Trade finance did not receive as much attention as it deserves until the outbreak of the 2008–09 financial crisis. While evidence supporting the importance of international trade is unmistakable, trade finance was given little attention before the trade took a nosedive during the crisis. The phrase nosedive was not an exaggeration since the world trade dropped almost 20%–point at the peak of crisis. In an effort to explain the causes and consequences of the crisis, researchers have been trying to provide an explanation for the steep drop in international trade. The well cited Eaton et al. (2016)[1] documented empirical results that suggest 80% of the diminishing world trade during the 2008–09 crisis can be explained by shrinking demand. However, this result did not end the discussion but raised the focus on the remaining 20%. Since then, trade finance has been focused more than before from both theoretical and empirical perspectives as a part of the supply side story of international trade.

The long distance of delivery and business process with counterparties in different jurisdictions are the reasons why trade finance deserves such attention. Long shipping distance generates time gap between production and payment. In the longest case, exporters could be left with no incoming fund for *more* than 90 days that could severely damage other business activities. From a legal perspective, different jurisdictions have different degrees of law enforcement. In regions with a relatively lower degree of law enforcement, there exits incentive for local businesses to deviate from initial trade contract by delivering below-the-standard products or refuse to make the payment. These risks are crucial in terms of the international transaction and business activities, and trade finance (including methods of payment and financial instruments) is designed to mitigate the above-mentioned risks[2]. Figure 1 shows some of the most commonly used trade finance and their security levels. As obvious from the figure, even the importer and exporter agree to carry out the trade, the two parties always have opposite interests.

As a part of the stylized fact related to trade finance, Asumundson et al. (2011) have calculated the cover ratio of trade finance over worldwide international trade. With estimation based on national data, academic studies and authors' own survey, they concluded that 38–45% of world trade is covered by open account payment, 35–40% by bank intermediated trade finance and 19–22% by cash in advance in 2008[3]. Report from BIS (2014) gave a similar result estimating 36–40% of inter-

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[1] The earliest version was in 2011 and has been revised several times.

[2] Trade finance such as letter of credit (LC) and documentary collection (or documentary bill) are the well know examples. As these two types of trade finance both involve bank as intermediary, they are also referred as bank intermediated trade finance.

Figure 1.　Payment Risk Diagram of International Trade
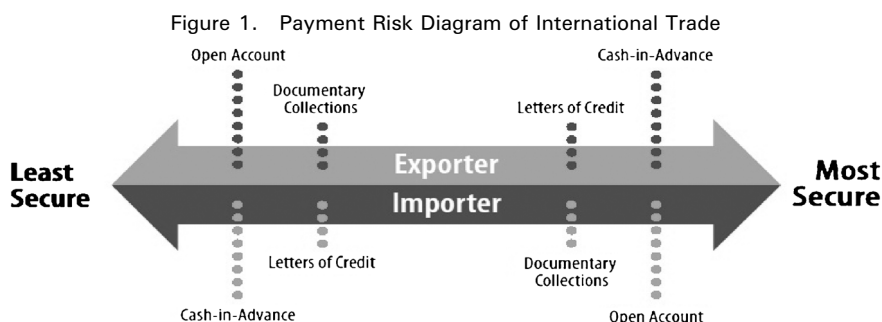
Source: Trade Finance Guide 2011, US Department of Commerce.

national merchandise trade covered by bank intermediated trade finance in 2011[4]. The report also points out regional heterogeneity in use of trade finance. It ranges from 2％ in Mexico, 5–10％ in North America, Latin America, Africa and the Middle East to more than 40％ in China and India. Niepmann and Schmidt-Eisenlohr（2017 a）have calculated the coverage of the letter of credit（LC）over international trade as 13％ in 2011 based on data from SWIFT[5]. Under the broadest definition of trade finance, Auboin（2009）concluded that 80–90％ of world trade involves some form of trade finance when conducting transactions.

While the anecdotal evidence suggests relatively wide coverage of trade finance, data availability has always been the biggest challenge to the empirical studies. In addition to the custom data from a few countries with the legal obligation to report the trade finance methods and the SWIFT, comprehensive trade finance data are exclusive to a limited number of researches[6].

In addressing this issue, this paper suggests a new variable as a proxy for（especially bank intermediated）trade finance that is available on the financial statements with higher accessibility. As the record of a company's financial activities, financial statements contain almost every financial movements made by the business. The motivation of this paper starts with the question that if a company utilizes trade finance, does it also categorize and report it in its' financial statements? The answer to this question is yes and it leads to the variable in the focus of this paper called 'undeli-

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[3] Even though the definition of trade finance covers all payment methods and bank intermediated trade finance, sometimes trade finance purely refers bank intermediated trade finance and the 40％ cover ratio is cited in many studies.

[4] The report also stressed the possible bias on the result as the existing data sources only covers part of the trade finance market.

[5] SWIFT, Society for Worldwide Interbank Financial Telecommunication is a private company that provides telecommunication system for sending and receiving financial instructions with more than 11,000 financial institutions from 200 countries as participants.

[6] South Korea, Columbia and Chile have legal requirements for businesses located in their jurisdictions to report the payment methods utilized in international transactions.

vered goods' or 'goods in transit'. To be explored in detail in later section, in most cases, trade finance is firmly associated with the ownership document of goods to be exported/imported. The supply of bank intermediated trade finance is based on importer's credibility and the arrangement is backed with the to-be-imported goods itself. While the trade finance document (letter of credit, for example, a document from importer's bank promising payment on behalf of importer) moves from importer's bank to exporter, the ownership document of goods, the shipping bill in practice, is transferred from exporter to the importer. Before the shipped goods reach the importer, importer reports the obtained ownership document as 'undelivered goods' in a financial statements. From the above logic in business practice, it means there is always trade finance behind undelivered goods and this two-sides-of-a-coin nature of trade finance (credit document) and ownership of goods (shipping document) makes it possible to trace down trade finance by tracing the shipping document.

By utilizing this undelivered goods data as a proxy of trade finance, the ultimate purpose of this paper is to estimate its impact on companies' purchased amount. This paper aims to answer two questions through the estimations. First, what are the factors that affect trade finance captured by undelivered goods? Second, does trade finance impact firms' purchase even after controlling for other major factors? The motivation of this paper is to suggest a new proxy data, estimate and emphasize the impact of trade finance by providing supporting evidence to the hypothesis that trade finance have economically and statistically significant impact on firms' purchase. While the hypothesis is simple and well seen in previous researches, exploring and utilizing the data of undelivered goods is this paper's own uniqueness. With two series of empirical estimations of Japanese firm level data, this paper documents a strong relationship between firms' purchase of the product and undelivered goods. Estimations are also conducted for different industries that are included in the dataset and the results remain relevant. To the best of author's knowledge, this is the first paper to address the data of undelivered goods in relation to trade finance and it contributes to the literature and research development by providing a new, easy-to-access indicator and a start to further in-depth analyses.

The rest of the paper is structured as follow: section 2 provides a review of empirical studies of trade finance with direct trade finance data. Section 3 is dedicated to data description and estimation, and section 4 closes the paper with the conclusion.

2. Previous Studies—Empirical Studies with Direct Trade Finance Data

The number of empirical studies is dominant compared to theoretical researches within the field of trade finance study and this section reviews empirical studies with direct trade finance data. As

referred previously, data on trade finance is scarce. Thus, while the studies with direct trade finance data seem to be the most precise ones, the results still need careful interpretation.

Niepmann and Schmidt-Eisenlohr（2017 a）studied trade finance data from a regulatory country exposure report that large banks in the US and US affiliates of foreign banks are obligated to file. By constructing a bank shock measure independent from country-time effect, they found that a one-standard-deviation of a negative shock to a country's trade finance supply reduces US's export to that country by 1.5% points. Del Prete and Federico（2014）have conducted an analysis on Italian Central Credit Register's import/export loan database to establish a relationship between the possible factors that affect banks' loan extension and the firms' export. The uniqueness of this analysis is that the individual firm is matched with its main bank and the result of estimation argued that banks' exposure to foreign finance negatively affected firms' export, especially the impact is signified in the case that banks are under worse-than-average financial condition[7].

Ahn（2013）explored extensive custom/tax data coverage from Columbia that records payment methods of all its import transactions. The research focused on the factors that affect the supply of trade finance（especially LC）and the result of empirical estimation presented banks' liquidity as the biggest positive factor to both trade finance supply and import while credit limit intuitively had a negative impact on these points. Niepmann and Schmidt-Eisenlohr（2017 b）is another research with most direct trade finance data from SWIFT organization. The results from their estimation suggest that the degree of law enforcement has a significant and non-linear relationship with demand for LC. The rationale behind this result is that LC works as a safety measure for importers/ exporters to mitigate the risks related to trade, especially in the regions with weaker law enforcement that provides only limited protection over the right of foreign companies. Hwang and Im （2013）provided empirical results by utilizing one of the most balanced trade finance data sources from South Korea. In addition to the TED spread and exchange rate as the proxies for global liquidity and country risk, they also included foreign trade loans and documentary bills data from The Bank of Korea and Financial Supervisory Service of Korea. The estimated results suggest that global liquidity and country risk both damage the overall financial condition of Korea thus negatively affect the supply of trade loans and documentary bills.

To summarize, the studies with direct trade finance data are motivated in three ways. First is to directly estimate how the supply of trade finance affects trade itself. Second is to establish a causal relationship between the supply/demand of trade finance and the factors that affect it. And third is to see how those factors would ultimately affect import and export. The estimation results so far all

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[7] Foreign finance is defined as the share of deposit held by non-residents on total deposit.

have provided evidence to support the importance of trade finance. Trade finance does affect international trade while the supply of trade finance is largely related to financial condition and demand for trade finance is related to the risk that importers/exporters are facing.

From importers/exporters perspective, intuitively the financial condition of their own and counterparties would affect their demand for trade finance. With the better financial condition, firms would be able to buffer or absorb the outcomes of risks to a certain degree on their own. Counterparty risk would also be perceived to be lower for firms with the sound financial condition and the transaction would be conducted with fewer security measures. Similar logic applies to financial institutions as well. The health of the financial institutions is crucial on the supply side of trade finance and risks taken by the banks are based on the condition of importing/exporting firms and of institutions themselves. In case of crisis, the financial condition of both firms and banks would be deteriorated and under the unhealthy condition, banks would decrease its supply of trade finance while the demand for trade finance would be higher than usual. This is exactly the deadlock situation that occurred during the 2008–09 financial crisis which led to a historical collapse of international trade[8].

## 3. Data and Estimation—Undelivered Goods and Its Impact on Firms' Purchase

As referred in earlier section, the main data of estimation in this paper is Japanese firm-level data of undelivered goods. Utilizing this data as the main variable of analysis, two sets of estimations are conducted to fulfill two purposes. First is to explore how certain factors can affect trade finance captured by undelivered goods data. To reach this aim, several indicators of companies' credibility and profitability are included as explanatory variables to the first set of estimations. The second purpose is to establish a causal relationship between undelivered goods and firms' purchased amount. The hypothesis is that trade finance positively affects firms' purchase through its risk mitigating function. In addition to the undelivered goods data, other factors such as overall financial condition index are also included in the second set of estimations. Both sets of estimations are also conducted for each industry included in the dataset that helps to understand the impact of trade finance in sectoral context.

3.1 Undelivered Goods—Business Practice and the Flip Side of Trade Finance

Before moving to data description, this subsection walks through the accounting perspective of trade finance. As a common example, figure 2 explains the basic concept of trade finance focusing

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[8] For detail review on trade finance studies from both theoretical and empirical perspectives, see Nuermaimaiti （2017）.

Figure 2. The Flow of Letter of Credit
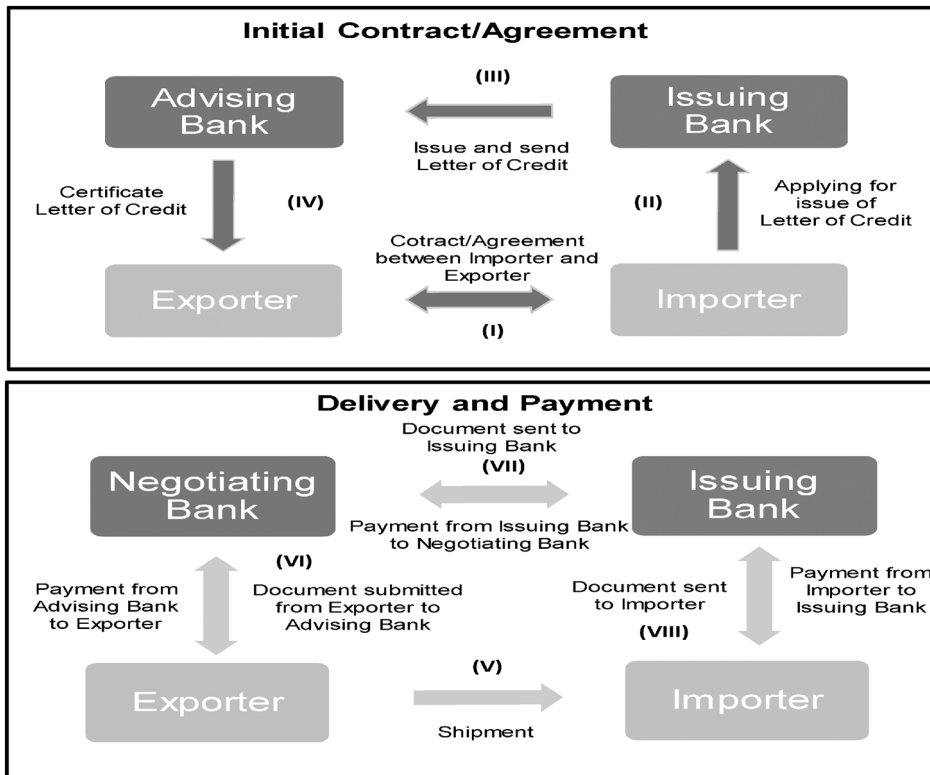
Source: Own illustration, based on Trade Finance Guide 2011, US Department of Commerce.

the case of a letter of credit. The process of international trade starts with phase (I) where importer and exporter negotiate and finalize their trade contract with all the details. Once the contract is confirmed, the importer would apply for a letter of credit to its own settling bank in phase (II). After assessing the financial condition of the importer, the bank issues letter of credit to the exporter's settling bank at phase (III)[9]. The exporter's bank at phase (IV) is called advising bank since it advises exporter that they received a letter of credit from the importer's settling bank. After the goods are ready and on board for shipment, the exporter will be able to receive a bill of lading at (V) as the ownership document of the goods. Together with the bill of lading, the exporter will bring all the necessary document as a documentary draft to negotiating bank to receive the payment at (VI)[10]. In phase (VII), negotiating bank clears its debt with issuing bank in exchange of the

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[9] The risk/credit assessment of bank does not necessarily happen all the time. Bank could provide trade finance within the credit line with the importer (if there is any) or based on past credit history that could make the process less intensive.

[10] The bank that makes the payment to exporter is called negotiating bank because in practice the documentary draft is bought by the bank over certain discount after negotiation. The advising bank and negotiating bank may or may not be the same.

documentary draft. Finally, importer makes the payment to issuing bank in exchange of ownership document（bill of lading）at phase（VIII）.

The basic idea of trade finance is to move the payment risks to banks over a certain amount of fee charge. As the phrase 'letter of credit' says itself, it is a document that provides credit and promises payment on behalf of the importer. Starting from the importer as the applicant, the credit document moves from the importer side to the exporter as the final beneficiary. On the other hand, the ownership document of goods moves from the export side to the importer who is the expected owner of the products that they ordered in the first place. As the importer's bank issues letter of credit（or other forms of trade finance instrument）, the most straightforward way to capture trade finance is to track down this issuance data. However, tracking trade finance issuance is exactly the cause of data availability problem as the data is almost completely limited within the telecommunication system, namely SWIFT.

If the credit document is difficult to trace, as the flip side of the same coin, notionally one can trace the ownership document. In practical business, if exporter wishes to receive payment from the negotiating bank, a complete documentary draft is mandatory. Not only the content of invoice and other documents included in the draft needs to exactly match with the terms agreed in the initial contract, ownership document（bill of lading）and credit document（letter of credit or other forms of trade finance by issuing bank）should also be included. After the negotiating bank purchased a complete documentary draft, it is transferred to issuing bank in exchange for payment. The credit document is then 'cleared' as it returns to its issuer and what remains is the ownership document. Importer needs to make payment to issuing bank to obtain the ownership document to make the goods（still on its way to a destination in most cases）legally belong to the importer. In that case, where does the ownership document, as the flip side of the credit document, goes at the importer side? The answer is that it is reported in the financial statements as undelivered goods. From above explained logic, on the back of the undelivered goods reported in a financial statement, there is always trade finance. The analysis going forward on undelivered goods is conducted on this basis and it differentiates this paper from other researches.

3.2 Data Description—Undelivered Goods Data from Japanese Companies

Reporting item of undelivered goods（or goods in transit）appears on the asset side of the balance sheet as a sub section of inventory. The data of undelivered goods utilized in this paper is obtained on a search basis from Nikkei Value Search database that provides cross-sector financial data based on regulatory financial reports of Japanese companies. The constructed dataset includes annual data of 84 companies covering from 2004 to 2018 with 11 private businesses, 73 listed firms across

6 sectors[11]. Purchased amount of each company is also obtained from Nikkei Value Search on annual basis together with gross profits, ROEs, EBITDA margins, total assets, quick ratios, main banks, stock listing status, interbank offer rate, cash and cash equivalents and external finance dependencies.

EBITDA margin is calculated as EBITDA over total turnover[12]. This index is considered to be an ideal cross-sector measure as it will not be affected by manipulative accounting techniques and the amount of investment the companies have made. The quick ratio is the ratio of the company's liquid asset over current liability. Considering the generally short-term nature of trade finance, the quick ratio would be suitable to measure a firm's short-term solvency. The main bank is the bank that comes at the top of the list of banks that the firm has relationships with. The estimations include this as a dummy index that takes 1 if the main bank is a city bank and this follows the strategy in Amiti and Weinstein (2011)[13]. Finally, external finance dependency is defined as the company's dependency on borrowing from financial institutions. External finance dependency has been stressed in various studies (Rajan and Zingale 1998, Coulibaly, Sapriza and Zlate 2011 and Chor and Manova 2012) as an important sector-specific characteristic that affects the international trade of companies. Interbank offer rate as an explanatory variable is in the spirit of Chor and Manova (2012) as an index of overall financial/credit condition of the economy.

Figure 3 provides trends in ratios that undelivered goods account for the overall purchase. The overall undelivered goods ratio of companies included in the dataset is 4.11% and the figure clearly visualizes a drop around 2008 due to the financial crisis[14]. The 6 sectors are divided into 2 groups with relatively higher and lower ratio of undelivered goods. The first group includes foods, manufacturing and oil, coal and metals industries. Food industry generally seems to have the highest ratio of undelivered goods with an average of 22%. Manufacturing has an average of 12% and 9.67% is of oil, coal and metal industry. Commodity sector seems to have had the biggest hit around crisis time and the manufacturing also saw a clear drop while the food sector stays relatively stable. The second group includes chemicals, retail and wholesale industries. The retail industry has an average of 1.62% of undelivered goods ratio, wholesale industry comes next with an average of 1.35% and chemical industry stays at the lowest with an average of 0.48%. Though seems all 3 sectors experienced a decrease in trade finance around 2008, recovery in retail and wholesale indus-

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[11] The sectors are based on TSE Industrial Category by Tokyo Stock Exchange.

[12] EBITDA is company's earnings before interest, tax, depreciation and amortization.

[13] City bank includes Bank of Tokyo Mitsubishi, Mizuho Bank, Sumitomo Mitsui Banking Corporation which are also referred as 'mega banks' in Japan.

[14] The 4.1% cover ratio is close to the trade finance cover ratio of Mexico and considering there exists possible reporting bias, the cover ratio could be higher with comprehensive data.

Figure 3. Ratios of Undelivered Goods Over the Total Purchased
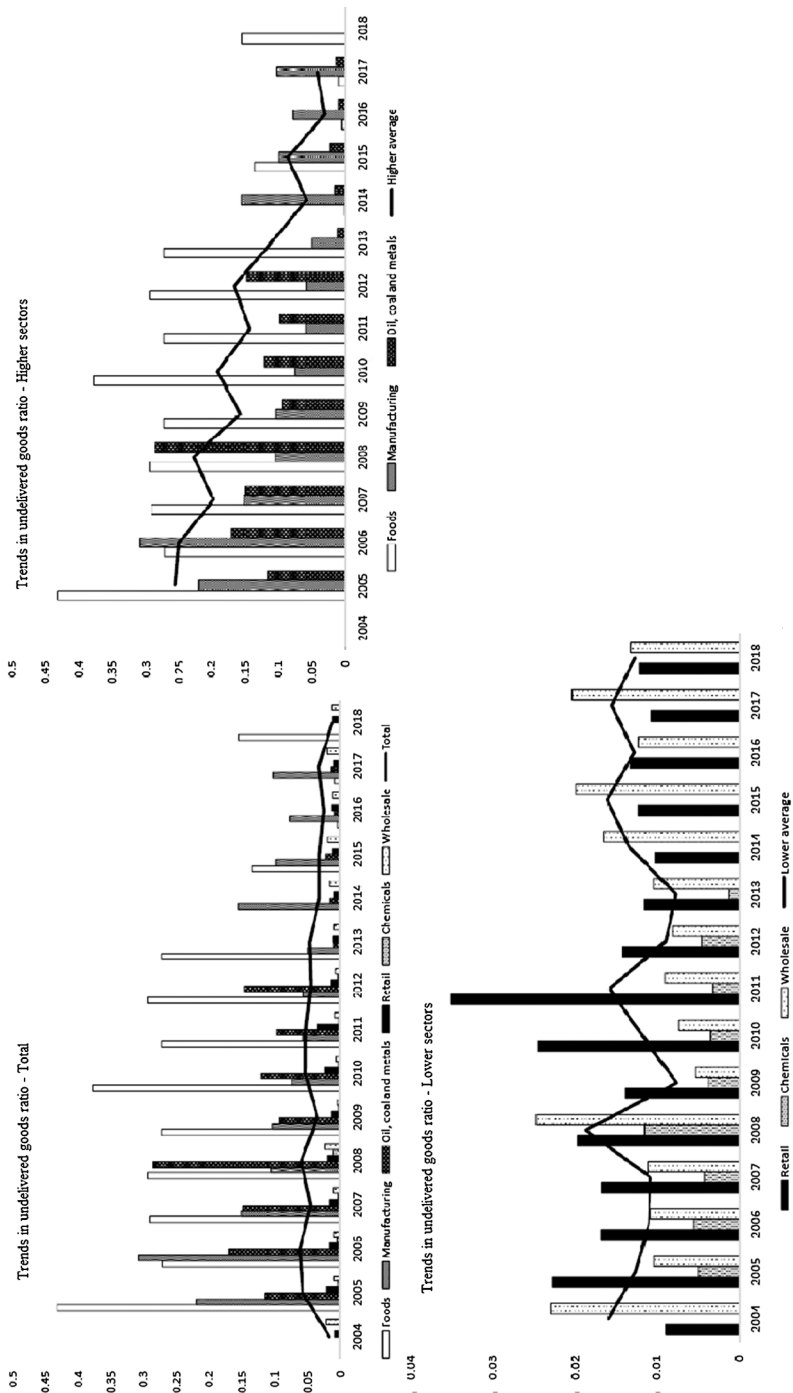
Source: Nikkei Value Search

tries seems to be stronger than chemicals.

3.3 Estimations—Undelivered goods, Credibility, Profitability and Purchased Amount

The ultimate purpose of the analysis is to estimate the impact of undelivered goods, as a newly suggested proxy for trade finance data, on the total purchase of Japanese firms. To achieve this purpose, the analysis is conducted in two series. The first series is to estimate the impact of possible factors that could explain firms' utilization of trade finance by focusing on firms' credibility and profitability. The second series of estimations takes one step further to quantify the impact of undelivered goods to total purchase. In this series, some other relevant factors are also controlled in an effort to estimate less biased coefficients.

3.3.1. Cross-sector Profitability and Credibility Estimations

The credibility and profitability estimations are conducted on a panel dataset with undelivered goods, total assets, quick ratios, gross profit, ROE, EBITDA margin by estimating below specification:

$$U_{it} = \alpha + \beta C_{it} + \gamma P_{it} + \varepsilon_{it} \tag{1}$$

where U_{it} is the natural log value of undelivered goods of firm i at time t. C_{it} are the credibility variables such as total asset and quick ratio of firm i at time t. P_{it} similarly are the profitability measures including gross profit, ROE and EBITDA margin. β and γ are the coefficients that each capture the impact of the explanatory variables, α and ε_{it} are constant and residual. The estimations are first conducted separately for credibility and profitability measures then followed by comprehensive analysis. This set of estimations is in the spirit of Del Prete and Federico（2014）thus would be a picture of the supply side story of trade finance.

Table 1 summarizes the results of credibility factors and total asset serves as a significant explanatory factor in all estimations. Take the letter of credit, for instance, while the credit history of importer matters for sure, bank would also examine the assets on the balance sheet of importer since it could be the collateral. In case the value of imported goods is not enough as the collateral, the bank would turn to other assets of the importer to offset the shortfall[15]. Stock listing dummy (variable *Listed*) is also estimated to be positive which is in line with Kohler, Britton and Yates

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[15] Generally, the value of goods is expected to meet with the payment amount that the issuing bank is promising. However, there are also possibilities that when bank sell the goods to other possible purchaser to recover the loss, they might only be able to sell it in a discounted price.

Table 1. Impact of Credibility Factors on Undelivered Goods—Cross Sector

	Credibility							
	Undelivered goods							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total assets	0.989***	1.006***	0.936***	0.989***	0.927***	0.927***	0.947***	1.145***
	(0.196)	(0.192)	(0.0320)	(0.106)	(0.0340)	(0.0354)	(0.129)	(0.339)
Quickratio				0.000616	0.00226	0.00266	0.000287	0.00384
				(0.00110)	(0.00275)	(0.00281)	(0.00106)	(0.00310)
Listed (dummy)	1.733***		1.096***		1.242***		1.643***	
	(0.362)		(0.208)		(0.243)		(0.397)	
Citybank (dummy)		0.721**	0.587**			0.461*	0.519	
		(0.280)	(0.228)			(0.258)	(0.335)	
External finance dependency * Citybank								0.0477
								(0.113)
Constant	-5.804***	-3.993***	-5.261***	-3.683***	-4.496***	-3.791***	-5.404***	-3.697***
	(1.099)	(0.941)	(0.827)	(0.400)	(0.864)	(0.869)	(0.641)	(1.149)
Observations	528	528	528	527	538	538	527	445
Number of ID	73	73	73	73	84	84	73	61

Note: Total assets is total amount of assets hold in balance sheet of firms. Quick ratio is a measure of firms' short-term solvency and is calculated as the ratio of liquid assets over current liabilities. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** p<0.01, ** p<0.05, * p<0.1 and standard errors in parentheses.

(2000). The result possibly comes from the rationale that listed companies are perceived to have access to the thicker capital resource via market and have higher compliance level including reporting as well as contract enforcing. City bank dummy also had a positive effect on trade finance which could be rationalized from the point that city banks' larger financial power and capital strength could lead to sufficient supply of trade finance. However, when interacted with firms' dependency on borrowing, it loses its explanatory power. This is also intuitive considering the scenario that when the dependency on borrowing exceeds a certain threshold, even the large city banks would become more reluctant to promise anything on behalf of the importer (the bank provides trade finance is most likely to be the bank that the importer borrows the most). Meanwhile, the quick ratio as the indicator of short-term solvency did not have a statistically significant effect. This result simply suggests that asset as possible collateral would be more important that short term solvency or liquidity.

Table 2 are the results of profitability estimations. Gross profit is estimated to be statistically relevant which is in line with Petersen and Rajan (1997) while the other two measures seem to be irrelevant. Stock listing dummy and city bank dummy still work positively and even together with ROE and EBITDA margin. Interactions with external finance dependency are also positive for city bank dummy. The possible rationale behind this result is that together with a business profit, as long as the profit is satisfactory from bank's perspective, it might still extend its capital power to importer even the borrowing amount is large. Table 3 presents the results of a comprehensive estimation using significant credibility and profitability measures from previous estimations. The

Table 2. Impact of Profitability Factors on Undelivered Goods—Cross Sector

	Profitability					
	Undelivered goods					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Gross profit	0.757***	0.747***	0.737***			0.758***
	(0.0399)	(0.0408)	(0.0398)			(0.0244)
ROE				0.000258		
				(0.00278)		
EBITDA margin					0.000805	
					(0.0168)	
Listed (dummy)	1.523***		1.513***	1.793***	1.303**	
	(0.294)		(0.290)	(0.372)	(0.656)	
Citybank (dummy)		1.110***	1.095***	1.856***	1.883***	
		(0.305)	(0.298)	(0.403)	(0.666)	
External finance dependency * Citybank						0.0282***
						(0.00293)
Constant	0.638	1.260	0.131	16.52***	16.85***	1.331**
	(0.968)	(0.965)	(0.966)	(0.510)	(0.820)	(0.563)
Observations	538	538	538	522	534	537
Number of ID	84	84	84	84	84	84

Note: Gross profit is total amount of profit reported in income statement of firms. ROE is the return on equity culculated on annual basis. EBITDA margin is calculated as ratio of EBITDA over total turnover where EBITDA is firms' earnings before intrest, tax, depreciation and amortization. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ and standard errors in parentheses.

Table 3. Impact of Major Factors on Undelivered Goods—Cross Sector

	Comprehensive	
	Undelivered goods	
VARIABLES	(1)	(2)
Total assets	0.867***	0.985***
	(0.0509)	(0.0655)
Gross profit	0.00860	-0.105
	(0.0559)	(0.0627)
Listed (dummy)	1.588***	
	(0.325)	
Citybank (dummy)	0.457*	
	(0.248)	
External finance dependency * Citybank		0.00297
		(0.00557)
Constant	-3.724***	-2.710***
	(0.631)	(0.940)
Observations	527	537
Number of ID	73	84

Note: Total assets is total amount of assets hold in balance sheet of firms. Gross profit is total amount of profit reported in income statement of firms. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ and standard errors in parentheses.

results suggest that when considering assets and profit together, the assets have more power in explaining trade finance. While the two dummy variables still estimated to be relevant, the coefficient of city bank-external finance dependency interaction variable did not have statistical significance. This result also has a reasonable explanation based on previous results. When the focus is on the profit, the positive and significant result of city bank dummy and its interaction with borrowing dependency could be explained by the bank's rationale of weighting profit more than borrowing as

long as the profit is sufficient. But in table 3, the results suggest that asset has higher priority than profit and, on this basis, the positive effect that comes from dealing with large bank diminishes. When assets and external borrowing are considered together, the city bank relationship does not have significance as the smaller banks, even with smaller capital power, might also be willing to extend trade finance when the business has sufficient back assets.

3.3.2. Sector Specific Estimations on Credibility and Profitability

As referred earlier, there is sectoral heterogeneity in use of trade finance with relatively higher and lower undelivered goods ratio over total purchase. Table 4 are the results from estimating eq. (1) for oil, coal and metal industry and manufacturing industry[16]. For the commodity sector, the results of assets, quick ratio and profit are similar with those from cross-sector estimations. The difference, on the other hand, is the result of listed status which did not have significant explanatory power. As a country with scares resources, Japan depends heavily on import for petroleum, coal and other types of natural resources. Thus, it is safe to say that the import of these natural resources might require larger and constant capital than other industries. With that large and constant capital requirement, one can argue listing status might not help the companies to gaining more credibility[17]. Turning to the manufacturing sector, the importance of assets did not change

Table 4. Impact of Major Factors on Undelivered Goods—Commodity & Manufacturing Sector

	Undelivered goods								
	Commodity sector			Manufacturing sector					
	Credibility	Profitability	Comprehensive	Credibility		Profitability		Comprehensive	
VARIABLES	(1)	(2)	(3)	(1)	(2)	(3)	(4)	(5)	(6)
Total assets	1.260**		1.359***	0.778***	0.663***			0.760**	0.333*
	(0.180)		(0.273)	(0.131)	(0.105)			(0.365)	(0.173)
Gross profit		0.547***	-0.0177			0.761**	0.896***	-0.114	0.479
		(0.142)	(0.127)			(0.365)	(0.133)	(0.528)	(0.263)
Listed (dummy)	-0.930	-1.721	-0.616	1.446**		0.409		-0.415	
	(0.717)	(1.445)	(0.494)	(0.667)		(1.799)		(0.677)	
Citybank (dummy)				0.0919		0.0500		0.240	
				(0.581)		(1.619)		(0.762)	
External finance dependency * Citybank					0.0239**		0.0246**		0.0235**
					(0.0119)		(0.0119)		(0.0117)
Constant	-10.13	10.95***	-12.45***	-1.096	1.823	0.642	-2.661	2.224	-1.091
	(5.057)	(3.910)	(4.701)	(3.187)	(2.602)	(8.126)	(2.950)	(6.376)	(3.227)
Observations	31	31	31	62	62	62	62	62	62
Number of ID	6	6	6	11	11	11	11	11	11

Note: Total assets is total amount of assets hold in balance sheet of firms. Gross profit is total amount of profit reported in income statement of firms. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** p<0.01, ** p<0.05, * p<0.1 and standard errors in parentheses.

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[16] Since all the firms in oil, coal and metal industry included in this dataset are in relationship with city banks, the city bank dummy is dropped from estimations.

[17] In fact, considering the price movement of commodity (namely petroleum) is constantly affected by geopolitical issues and speculative money flow in the market, the listed stock price that is highly correlated with these factors might reflect as a sign of fragility.

and the coefficient of bank dummy is statistically significant in interplay with external finance dependency. This could be explained from the historical perspective of Japanese industries. Generally, the long-term bank-firm relationship in Japan has been having a positive impact on the economic activities of various sectors[18]. In addition, considering that the manufacturing sector has been the drive of the Japanese economy for a long time, the estimated result of significant coefficients reflects the importance of bank relationship in reality[19].

Estimation on the retail sector also generated the same results for assets and profits as summarized in table 5. However, city bank dummy in interaction with external finance dependency reported negative coefficient. The retail industry is generally a cash-rich industry considering its business characteristic. As a type of business that 'earns a daily cash income', the sector generally retains a large amount of cash holdings in hand. Thanks to these large cash holdings, the retail sector businesses have less problem with the cash required for various activities. On the contrary, if retail business demands large external funding, it could mean that the business is experiencing downturn because of unnecessary inventories or excessive outflow of cash due to any reason that could damage the profit. In this scenario, relationship with large could work adversely to retail business because when retail business is borrowing more from banks, it might signal its business difficulties and banks would possibly squeeze trade finance supply. The results for wholesale business also summarized in table 5 is more straightforward. Taking all the credibility and profitability factors into account, the result suggests only assets has the statistical significance in explaining trade finance. As the result of margin taking activity of wholesale business between purchase and sales,

Table 5. Impact of Major Factors on Undelivered Goods—Retail & Wholesale Sector

	Retail sector						Wholesale sector					
	Credibility		Profitability		Comprehensive		Credibility		Profitability		Comprehensive	
	Undelivered goods						Undelivered goods					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Total assets	0.880***	0.838***			1.037***	0.823***	0.811***	0.749***			0.899***	0.771*
	(0.0931)	(0.254)			(0.192)	(0.233)	(0.0437)	(0.0594)			(0.239)	(0.348)
Gross profit			0.850***	0.628***	-0.186	0.0423			0.894***	0.799***	0.0838	0.167
			(0.0884)	(0.110)	(0.207)	(0.194)			(0.0523)	(0.0620)	(0.268)	(0.374)
Listed (dummy)	3.489***		3.394***		3.087***		1.870***		1.755***		2.766***	
	(0.721)		(0.849)		(0.796)		(0.412)		(0.433)		(0.400)	
Citybank (dummy)	0.312		0.168		0.193		2.689***		2.196***		2.763***	
	(0.365)		(0.372)		(0.494)		(0.637)		(0.671)		(0.404)	
External finance dependency * Citybank		-0.00907		-0.0205		-0.0259**		-0.0222		-0.0198		-0.00154
		(0.0265)		(0.0115)		(0.0124)		(0.0118)		(0.0114)		(0.0189)
Constant	-5.770**	-1.312	-4.221*	4.424*	-4.672*	-1.343	-4.549***	0.959	-4.561***	0.856	-9.896***	-3.300
	(2.415)	(6.218)	(2.266)	(2.580)	(2.433)	(3.220)	(1.281)	(1.432)	(1.374)	(1.388)	(1.291)	(3.504)
Observations	131	131	131	131	131	131	238	233	237	236	233	236
Number of ID	16	16	16	16	16	16	34	30	34	34	30	34

Note: Total assets is total amount of assets hold in balance sheet of firms. Gross profit is total amount of profit reported in income statement of firms. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** p<0.01, ** p<0.05, * p<0.1 and standard errors in parentheses.

[18] See Aoki, Patrick & Sheard（1994）

[19] Borrowing and lending between bank and business can work as a factor that deepens inter-dependence. With the highest average external borrowing dependency, the more money the manufacturing business borrows from bank, the deeper the relationship and so is the importance of the city bank connection.

the industry is almost defined by its inventory. This unique feature of business explains why the assets matter the most for wholesale business in considering trade finance[20].

As the summary, the importance of assets is what all the cross-sector and sector-specific estimations have as a common essence. Moreover, the assets no only work as the strong factor among the credibility measures but also presents more explanatory power than gross profit which is another significant factor in terms of profitability. Sector-specific characteristics emerged in the form of difference in results of the stock listing and bank relationship dummies. The results suggest that seems the stock listing status does not help the commodity industry to be perceived as more credible. Meanwhile, with the highest average borrowing dependency among the industries included in the dataset, the relationship with a large bank seems to mean a lot to the manufacturing sector. And for the wholesale sector, the results showed that what the sector has the most explains the most about trade finance and data of retail sector provided a unique result that is opposite to others. To all these results, industrial traits provide rational explanations and the estimation results answer the question set out at the beginning by revealing the eminent factors in explaining trade finance.

3.3.3. Cross-sector Estimations on Undelivered Goods and Purchased Amount

So far, we have been seeing evidence suggesting the importance of assets and bank relationship in most cases considering trade finance. While the argument and results seem trivial, it is unique in its own way as being the result of utilizing the undelivered goods data. As the next step, it would be natural to examine the impact of trade finance on firms' purchase. In addition to the undelivered goods, the estimations also control for other factors such as profit, assets, stock listing and city bank dummies, three-month interbank offer rate and cash holdings. Specifically, the analysis is conducted by estimating the below equation;

$$PA_{it} = \alpha + \beta_1 U_{it} + \beta_2 IB_t * CRISIS_t + \delta X_{it} + \varepsilon_{it} \qquad (2)$$

where PA_{it} and U_{it} are the natural log value of firm i's purchased amount and the undelivered goods at time t. IB_t is the interbank offer rate interacted with crisis dummy ($CRISIS_t$) that takes 1 for 2008 and 2009 and 0 otherwise. X_{it} represents a set of control variables other than the undelivered goods and the interbank rate. β_1 and β_2 are the coefficients for undelivered goods and interbank rate and δ is a set of coefficients of other variables. α and ε_{it} represent constant and residual respectively.

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[20] Since there are only less than 30 observations for chemicals and food, estimations have not been conducted for these two sectors.

Table 6. Impact of Trade Finance and Other Factors on the Total Purchased Amount—Cross Sector

VARIABLES	Purchased amount							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Undelivered goods	0.254***	0.193***	0.281***	0.416***	0.0729***	0.0712***	0.0722***	0.302***
	(0.0190)	(0.0156)	(0.0297)	(0.0114)	(0.0147)	(0.0146)	(0.0148)	(0.0322)
Interbank rate * Crisis dummy	-0.100*	-0.0537	0.219					
	(0.0562)	(0.0436)	(0.141)					
Gross profit		0.480***	0.110**	0.419***	0.541***	0.539***	0.535***	0.0964**
		(0.0353)	(0.0446)	(0.0162)	(0.0329)	(0.0365)	(0.0368)	(0.0451)
Cash and cash equivalent			0.503***			0.00125	0.00150	0.499***
			(0.0480)			(0.0235)	(0.0238)	(0.0507)
Listed (dummy)				0.290***			0.246	
				(0.110)			(0.466)	
Citybank (dummy)				0.663***			1.848***	
				(0.0389)			(0.486)	
External finance dependency * Citybank					-0.00148			0.00417
					(0.00300)			(0.00448)
Constant	18.57***	9.009***	4.934***	5.587***	10.05***	10.13***	8.391***	4.978***
	(0.363)	(0.821)	(0.667)	(0.337)	(0.764)	(0.787)	(0.918)	(0.719)
Observations	517	516	516	538	537	538	538	537
Number of ID	73	73	73	84	84	84	84	84

Note: Undelivered goods is a proxy measure for trade finance. Interbank rate is the 3-month interbank offer rate and crisis dummy is a dummy variable that takes 1 for 2008 and 2009 or 0 otherwise. Gross profit is total amount of profit reported in income statement of firms. Cash and cash equivalent is the amount of total cash holdings in firms' financial statement. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** p<0.01, ** p<0.05, * p<0.1 and standard errors in parentheses.

Table 6 presents the results of cross-sector analysis and undelivered goods variable stays statistically significant throughout the estimations. These results add new solid evidence in supporting the importance of trade finance by its positive impact on firms' purchase. Interbank rate interacted with crisis dummy to capture the adverse credit condition of the 2008–09 financial crisis had a negative effect on firms' purchase, but it disappears when considering gross profit and cash holdings. This result reflects the rationale that when profit (that brings in a certain amount of cash as well) and cash are sufficient, firms might not feel necessary to turn to the credit market under tight credit condition. Moreover, the cash and profit could even buffer the adverse effect of the credit crunch. At the same time, the results also suggest that profit has more power in explaining purchase than cash holdings. This is possibly because that the cash held inside the firms is not always expected to be used for the immediate purpose. Generally, the purchase is conducted on a regular basis (with extra-routine activities of course) to keep the business running smoothly and in the same manner, profit (or loss) is also generated on regular basis[21]. Based on this ground, it is quite straightforward that purchase is affected more by the profit (or loss) that has roughly same nature in terms of flow rather than outstanding cash holdings that could change with different timings and reasons. Meanwhile, cash holdings can and is expected to serve many other purposes including as being buffer and shock absorber in case of emergency. The coefficient of cash holdings estimated to be sig-

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[21] Except for the financial industry, even though the portfolio or other form of investment made by firms desterilizing their cash also generates cash in form of return, generally it is profit that generates cash the most.

nificant when considering the interbank rate also has a reasonable explanation. In case that credit market is tight, cash holdings work as a supplementary role to the credit so to maintain the business continuity. The coefficient of the city bank dummy is estimated to be insignificant in interplay with external finance dependency. Applying the same rationale that cash tend to serve as a buffer, in case the relationship with the large bank is considered together with the dependence on borrowing (most probably from the same bank), the cash that belongs to the business could become more important.

3.3.4. Sectoral Estimation on the Purchase and Undelivered Goods

Table 7 are the results from sector-specific estimations of oil, coal and metal industry and manufacturing industry, and the results also support the importance of trade finance. While the listing status and gross profit did not have a significant impact for commodity industry, cash holding is estimated to be a significant explanatory factor. Following the same argument from the previous set of estimations, constant and relatively large capital requirement of the commodity industry would explain the importance of cash holding as well. The same logic would also fit with gross profit and listing status. Despite the profit and listing status (no matter these factors have a positive or negative impact), firms might need to keep their purchase in a certain level and frequency with a help from cash as the industry provides most fundamental resources to the whole economy. On the

Table 7.　Impact of Trade Finance and Other Factors on the Total Purchased Amount—Commodity & Manufacturing Sector

	Purchased amount						
	Commodity sector			Manufacturing sector			
VARIABLES	(1)	(2)	(3)	(1)	(2)	(3)	(4)
Undelivered goods	0.540***	0.321***	0.332***	0.277***	0.0355***	0.0412***	0.0403***
	(0.0727)	(0.0914)	(0.124)	(0.0722)	(0.0110)	(0.0106)	(0.00897)
Interbank rate * Crisis dummy	0.138	0.104		0.363	0.0731		
	(0.210)	(0.186)		(0.325)	(0.0593)		
Gross profit		0.0760	-0.00431		0.266***	0.251***	0.170**
		(0.0590)	(0.0593)		(0.0718)	(0.0937)	(0.0675)
Cash and cash equivalent		0.227**	0.354***		0.0103	0.0197	0.0491
		(0.110)	(0.134)		(0.0504)	(0.0767)	(0.0530)
Listed (dummy)			-1.141			-0.280	
			(0.543)			(0.185)	
Citybank (dummy)						1.199***	
						(0.156)	
External finance dependency * Citybank							0.00619**
							(0.00269)
Constant	12.78***	10.76***	10.23***	17.39***	15.46***	14.60***	16.63***
	(1.641)	(1.644)	(3.650)	(1.313)	(1.334)	(2.202)	(1.139)
Observations	31	31	31	62	62	62	62
Number of ID	6	6	6	11	11	11	11

Note: Undelivered goods is a proxy measure for trade finance. Interbank rate is the 3-month interbank offer rate and crisis dummy is a dummy variable that takes 1 for 2008 and 2009 or 0 otherwise. Gross profit is total amount of profit reported in income statement of firms. Cash and cash equivalent is the amount of total cash holdings in firms' financial statement. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ and standard errors in parentheses.

other hand, profit is estimated to be statistically significant for manufacturing industry and so is the city bank dummy. Unlike the industry of natural resources, purchase in manufacturing businesses might be closely corelated to its business activities and profit. In addition, the result from the long-lasting firm-bank relationship with the large bank is also in line with the previous set of estimations. The retail sector in table 8 also provides evidence on the importance of profit, cash holding and listing status. Bank dummy was not statistically significant and the same rationale as the previous comprehensive estimation would apply. Table 8 also provides similar results for the wholesale sector, emphasizing the importance of profit and cash while the other factors appear to be less significant.

The results from the second set of estimations conducted to quantify the impact of trade finance captured by undelivered goods data documents statistically and economically relevant evidence on the importance of trade finance. By controlling for several other factors, the results also provided insight into the impact of credit condition, profit and cash holding as well as stock listing status and bank relationship. The rationales based on industrial characteristics that offered reasonable explanations for the first set of estimations also hold for the outcome of the second set of estimations. This indicates that the overall analysis of this paper has a consistent backbone that comes from the economic and business reality. Taking into account that the variables in this paper have their starting point in real world business practice (especially for undelivered goods), it seems quite natural that all the estimation results have consistent messages. The research utilizing undelivered goods

Table 8. Impact of Trade Finance and Other Factors on the Total Purchased Amount—Retail & Wholesale Sector

| | Retail sector | | | | Wholesale sector | | | |
| | Purchased amount | | | | Purchased amount | | | |
VARIABLES	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Undelivered goods	0.256***	0.197***	0.0830***	0.147***	0.610***	0.104***	0.0550***	0.136***
	(0.0371)	(0.0464)	(0.0251)	(0.0272)	(0.101)	(0.0227)	(0.00994)	(0.0204)
Interbank rate * Crisis dummy	-0.0148	-0.0110			-1.149	0.0534		
	(0.0862)	(0.235)			(1.859)	(0.128)		
Gross profit		0.642***	0.475***	0.498***		0.723***	0.836***	0.626***
		(0.0945)	(0.0548)	(0.0554)		(0.0688)	(0.0233)	(0.0677)
Cash and cash equivalent		0.279***	0.209***	0.232***		0.136**	0.0479***	0.206***
		(0.0773)	(0.0395)	(0.0372)		(0.0560)	(0.0152)	(0.0580)
Listed (dummy)			0.590***				0.0105	
			(0.212)				(0.130)	
Citybank (dummy)			-0.0971				-0.175	
			(0.200)				(0.253)	
External finance dependency * Citybank				-0.000679				0.000700
				(0.00296)				(0.00258)
Constant	18.59***	-1.038	6.105***	4.413***	13.50***	3.400***	4.022***	3.375***
	(0.679)	(1.052)	(1.099)	(0.902)	(2.005)	(0.490)	(0.427)	(0.566)
Observations	126	126	131	131	233	232	233	232
Number of ID	16	16	16	16	34	34	30	30

Note: Undelivered goods is a proxy measure for trade finance. Interbank rate is the 3-month interbank offer rate and crisis dummy is a dummy variable that takes 1 for 2008 and 2009 or 0 otherwise. Gross profit is total amount of profit reported in income statement of firms. Cash and cash equivalent is the amount of total cash holdings in firms' financial statement. Listed dummy takes 1 when the firm is listed or 0 otherwise. City bank dummy takes 1 if the firm has one of the three big banks (Mizuho, Mitsubishi and Sumitomo-Mitsui) on the top of list of banks that its' has relationship with. External finance dependency is defined as firms dependence on external borrowing. Number of observations and IDs varies across estimations since the dataset is not completely balanced. *** p<0.01, ** p<0.05, * p<0.1 and standard errors in parentheses.

data not only shed new light in the field of trade finance study by suggesting new data with higher availability but also certified the hypothesis on importance of trade finance by providing significant estimation results.

4. Concluding Remarks—Significance of the Analysis and Future Directions

In addressing the data availability problem and emphasizing the importance of trade finance, this paper suggested a new item with higher accessibility that captures bank intermediated trade finance based on the real-world business practice of international trade. The estimations conducted to explore the possible factors that affect trade finance and quantifying the impact of trade finance on purchase provided solid evidence with reasonable rationales behind. To the best of author's knowledge, this is the first paper that focuses on financial statement data of trade finance, namely undelivered goods, and documents empirical evidence that emphasize the constant importance of trade finance. However, there still exists a few shortcomings of the analysis that could lead to possible extension for future studies. First, the data in this paper could be suffering from possible reporting bias as the undelivered goods is not a mandatory reporting item in a financial statements. While including all the existing company in Japan is almost infeasible, difference-in-difference type of analysis with a limited number of firms (e.g. firms listed in first section of Tokyo Stock Exchange) could help to eliminate the bias in the estimation results. Second, data on firms' import would be desirable in analyzing the impact of trade finance while the total purchased amount could also lead to possible bias. Micro/firm-level import data should help to estimate more precise and pure effect of trade finance. Finally, cross-country estimation should also suggest more in-depth insight and help to generalize the evidence that supports the importance of trade finance. Moreover, as referred to in the early section of this paper, there exists not only the sector but also the country heterogeneity in the use of trade finance. Country-specific estimation controlling for country characteristics (e.g., factor endowment etc.) would also provide a new explanation for the use of trade finance in international trade.

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