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The Motives of Trade Credit Usage and the Importance of Risk Perception for Decision-Making Behavior

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THE MOTIVES OF TRADE CREDIT USAGE AND THE IMPORTANCE OF
RISK PERCEPTION FOR DECISION-MAKING BEHAVIOR

by
Kun Zhao

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Economics
Advisor: C. James Hueng, Ph.D.

Western Michigan University
Kalamazoo, Michigan
August 2012

THE GRADUATE COLLEGE
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WE HEREBY APPROVE THE DISSERTATION SUBMITTED BY

Kun Zhao

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for Decision-Making Behavior

AS PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

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Economics

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August 2012

THE MOTIVES OF TRADE CREDIT USAGE AND THE IMPORTANCE OF RISK PERCEPTION FOR DECISION-MAKING BEHAVIOR

Kun Zhao, Ph.D.

Western Michigan University, 2012

The objective of this study is to discuss two motives of trade credit usage for large and small firms. To examine one of the motives—transaction motive—the study models a circulation mechanism in trade credit. The nature of the mechanism is such that firms are motivated to balance their trade credit inflows (accounts payable) with their outflows (accounts receivable). An empirical test is therefore needed to examine this issue. The findings in Chapter 1 support the theory of transaction motive that firms with more bank tolerance are more likely to advance the flow of trade credit to their clients. In particular, a one-unit increase in trade credit acceptance would raise the credit lending by approximately 0.44 units. Meanwhile, the financially healthy firms with positive net cash flow are better able to lend trade credit to their clients. As one of the contributing factors, bank lending is positively and significantly related to trade credit lending.

To refine and extend the literature on trade credit allocation, the study moves to a focus on financing motive of trade credit in a presence of transaction motive. The two forces (transaction and financing) either aid or resist the flow's movement from suppliers to clients, and the resistance to the movement is thereby seen as a diversion for self-financing. This study generates two models measuring in-stream credit flows and diversion, in response to the two different motives. From the estimation of seemingly unrelated regression equations (SURE), the findings in Chapter 2 show that (1) borrowing constraint as the major driving force results in a diversion toward self-financing in small firms, and (2) large firms are less financing-constrained, and as a result advance more trade credit flows

from suppliers to clients.

Meanwhile, a study on risk perception was conducted. Investors who perceive risk awareness get ready to cope with uncertainty and changes in their financial account. Risk perception, as an extension of the Expected Utility (EU) framework, will lead to a better understanding of participation in risky financial activity. An evaluation of risk perception is carried out in the following aspects: (1) health risk (2) inflation pressure (3) economic depression. A binary logistic model is employed to measure the effect of these risk perception factors on the odds ratios of risky asset investment. This study on people nearing retirement shows that a person's capacity to perceive risk from surroundings, either in a statistical sense or in an economic context, is closely related to the risky asset share in pension plans.

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CHAPTER 1

TRANSFER OF TRADE CREDIT—INVESTIGATION ON HONG KONG DATA

Introduction

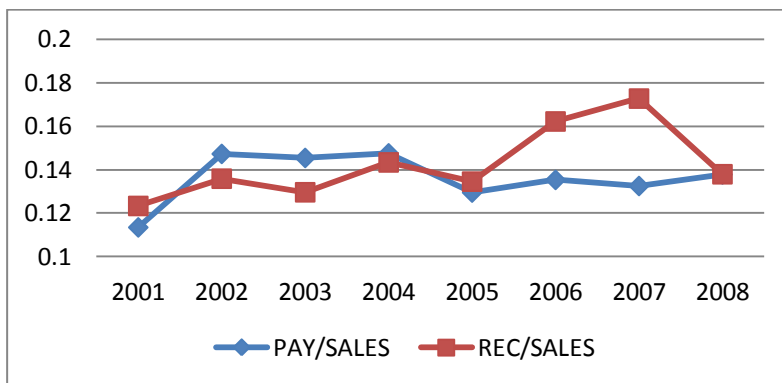
Trade credit facilitates firms to buy without carrying cash. Firms buy raw materials and goods from their suppliers in exchange for repayment within a certain period. Payment beyond this period will be charged interest. The same also happens on the opposite side. Firms sell products to clients without demanding immediate payment, instead, firms specify a repayment obligation, a practice that makes firms appear like banks that shift bank credit from depositors to debtors. To further explore the role of trade credit, we perform the study that firms transfer a substantial proportion of trade credit from suppliers to clients. To my knowledge, this paper serves as an initial attempt to test that a firm's willingness to lend credit depends on the availability of credit acceptance from either its suppliers or banks.

Trend of Payables and Receivables in Hong Kong from 2001 to 2008

A lack of statistics leaves readers in doubt about the importance of trade credit for sales. Figure 1 might serve to dispel the doubt. In this study of 146 Hong Kong large firms, accounts receivable account for a high portion of total sales with a peak of 17 percent in 2007, and then the ratio of receivables to total sales falls in 2008.¹ The ratio of payables to total sales varies less widely than that of receivables, and falls into the range of 13 to 15 percent of total sales from the years 2002 to 2008. As seen in Figure 2, the aggregated volume of accounts receivable was much closer to payable prior to 2005, and sequentially deviated in the following years. From 2005 to 2007, receivables grew faster than payables,

¹ The fall in the receivables may be understood as a consequence of financial crisis. Firms suffer the bank credit rations during this crisis, and thereby provide less trade credit to their clients.

but eventually converged at 2008. This trend indicates a sign of convergence between payables and receivables. Meanwhile, the balance sheet of firms indicates that more than 90 percent of these firms (92 percent of firms in our sample accept trade credit from their suppliers while 98 percent of firms extend trade credit to their customers) used trade credit from 2001 to 2008. These findings encourage us to further explore the relationship between the accounts receivable and payable.



Notice: The figure presents the aggregate receivable and payable to sales ratio for the selected firms in each year from 2001 to 2008

Figure 1.1 The ratio of trade credit to sales for selected large firms of Hong Kong firms

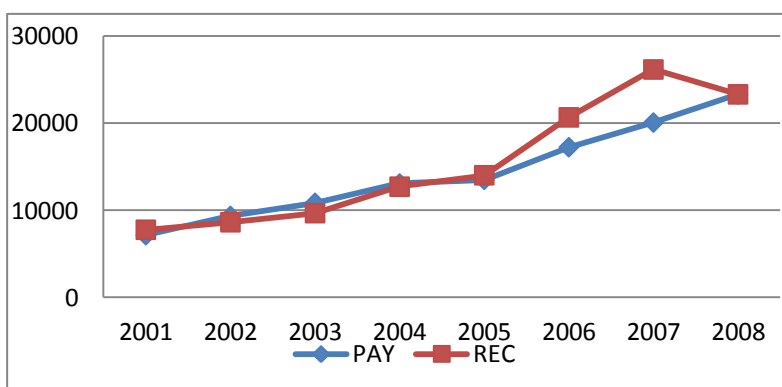


Figure 1.2 Aggregate volume (\$1 million) of accounts receivable and payable for selected high wealth firms of Hong Kong

This paper provides an empirical investigation on transfer of trade credit in large Hong Kong firms from 2001 to 2008. Less attention was paid to unveil the determinants of creating trade credit for these large wealth firms, as previous literature often focused on small wealth firms. It is worth noting that small firms are unlikely to keep a substantial mass in both accounts receivable and payable, whereas large firms are engaged more often in the two aspects. This assumption is supported by the fact that the aggregate of accounts receivable and payable in large firms was roughly equal, even if a slight divergence appeared in years of 2006 and 2007(as shown in Figure 2). The line of payables matches with that of receivables—a fact that reflects the existence of a circulation mechanism in large firms who are willing to smooth the flows. The hypothesis in this paper therefore is confined to large firms where payables and receivables effectively facilitate firms to make deals with suppliers and clients.

The Importance of Trade Credit for Large Firms

Trade credit inflows (accounts payable) occur even at the first stage of a firm's production. However, the outflows (accounts receivable) cannot be released until production is completed. At this point, the supplier plays a role of depositor while the client serves as the debtor. It is important to note the causality between credit inflows and outflows to address a possible endogenous problem in the model. One further issue is raised with regard to the motive of large firms that offer credit to their clients, considering the large firms have already accepted credit from their suppliers. At least two reasons for this issue can be readily seen. (1) Large firms are unlikely to be credit rationed. It implies that large firms with more bank tolerance are able to raise money without difficulty. Free from the worries of financing, large firms are more willing to obey the rules of trade credit to facilitate firms to trade with clients. In fact, long-term bank debts have an obvious advantage over any other short-term source of debts (including trade credit) in terms of reliability and consistency. (2) To stimulate sales, large firms agree to sell goods without demanding payment in money, to their clients.

This paper hypothesizes that firms are willing and able to obey the rules of trade credit, as they have accepted a considerable amount of trade credit from their suppliers. The primary finding of the paper is that large firms apply a set of criteria to allocate the distribution of trade credit. Moreover, a profitable firm makes the credit circulation channel smoother. It is gauged that a one-unit increase in trade credit acceptance is associated with a 0.44 units increase in trade credit lending. It has been suggested in previous studies that bank loans are used to assist and encourage trade credit lending. The relationship is examined and accepted in this study. It is shown that bank lending is significant and positively associated with trade credit lending.

Related Literature

By reviewing the literature, it has been known that the large firm is the primary force driving the advance of trade credit flow from suppliers to clients. Few studies have looked at the nature of the mechanism that large firms are motivated to balance their trade credit inflows (accounts payable) and outflows (accounts receivable).

Ellehausen and Wolken (1993) illustrates that the motives for different-sized firms on trade credit usage vary differently. To summarize, two motives are suggested: financing and transaction motives. Between the two motives, financing motive is most often seen in small and medium size firms. Those firms without sufficient funds borrow vendor credit to sustain operations, and thereby offer less trade credit to their clients. Stiglitz and Weiss (1981) state that small firms may be expected to provide trade credit to their buyers, but due to financing limitations, they failed to do so. The statistics gathered by Petersen and Rajan (1997) suggest that small firms have a relatively lower ratio of payables and receivables to sales than large firms do. In the study of Petersen and Rajan (1997), only one third of firms in their sample of different-sized firms use credit as a net

source of financing.² In this context, for these high wealth firms with less financing constraints, the purpose of using trade credit is more likely to save transaction costs. Ferris (1981) addresses the issue that trade credit provides information on the amount of cash firms need to repay for each transaction. From this perspective, large firms save transaction costs on cash management.

The existing literature ignores the fact that trade credit given by their suppliers has a significant impact on the firms' decision on credit availability for their customers. The major concern of this paper is the extent to which the trade credit acceptance generates the credit lending.

Bank Loans and Trade Credit Lending

Large firms are willing and able to obey the rule of trade credit that is devised to facilitate firms to buy or sell goods from suppliers or clients. Banks ration firms if they monitor a slide in the firms' sales, inventory, or liquid assets. Bank tolerance varies in a wide range, across different sized firms. Large-wealth firms are less likely to be rationed by banks as long as they keep a healthy performance (Elliehausen and Wolken, 1993). Most financially healthy firms want to keep a steady balance between credit acceptance and lending, regardless of the difficulties in practice³. The previous literature (Petersen and Rajan ,1997; Burkart and Ellingsen, 2004) states that only low and medium wealth firms use trade credit for financing, but high wealth firms do not. Banks always ration small and medium firms during a period of tight monetary policy. Suffering major losses of capital and even facing the risk of shutting down, small firms count on vendor financing as an external short-term source of financing, even though they will be charged a higher interest rate⁴ by their

² Petersen and Rajan(1997) point out that the transaction motive is prevalent in large-wealth firms. However, they do not verify their hypothesis on large-wealth firms due to the limitation of their dataset.

³ The figures in the financial statements display the firms' financial position or condition by a point of time that is often fixed in the end of each period. To the extent, the financial statements could not literally reflect the firms' financial health if their customers repay one day late after the data of financial statements. Another reason leads to the unbalance between receivables and payables is that if the firms involved in a slide in their sales, they might increase account receivables to boost sales.

⁴ Normally, firms accept the offer by their supplier with free interest within certain days, or even with

suppliers. In contrast, large firms with sufficient and slack bank loans will be more likely to sustain in business.

Firms' Financial Status and Trade Credit Lending

Income and cash-flow statements serve as good indicators of firms' financial status. Before making an investment decision, investors should gather income and cash-flow statements at hand. These financial reports contributed to a better understanding of firms' market capability and orientations. These reports, from different perspectives, provide information on firms' financial health. It often happened that opposite results will be drawn after evaluating income and cash-flow statements separately. For instance, a firm reports low earnings shown on an income statement as the firm sold off its products at a price much lower than the market would pay for it. Meanwhile, a substantial cash inflow appears in the cash flow statement as the assets are sold off.

Firms hold large cash balances for a variety of reasons, such as slack trade, investment opportunity, or strategies. Cash balances may serve as an important indicator that measures liquidity and investment opportunities (Alti, 2003; Almeida, Campello, and Weisbach, 2004) adopt the cash flow sensitivity to capture the financial constraints with which the firm has to struggle. They find that firms with a positive cash flow desire to expand. The negative cash flow makes firms defensive. Specifically, a positive cash flow suggests profitability and demand to expand, whereas the opposite is a sign of weakness or overgrown expansion. It is therefore proposed that those profitable firms might offer more credit for their clients in an attempt to expand their size.

a slight discount before the due day. An interest rate will be charged if the firms default the repayment by the due day. The interest rate is higher than the bank's rate. Few firms default the repayment unless they are suffering a severe financing problem.

Model and Data

Model

In order to test the aforementioned hypothesis, Meltzer's model (1960) was adopted. Meltzer examined the determinants of net receivables and the responses to monetary policy. Some changes are needed due to the different hypotheses of this paper from Meltzer's. Since the main concern of the paper surrounds the impact of trade credit inflows on the outflows, net receivables should be disaggregated into individual components: receivables and payables.

The model is formulized as:

$$Rec_{it} = \alpha + \mu_{it} + b_1 Pay_{it} + b_2 Liq_{it} + b_3 Inc_{it} + b_4 Debt_{it} + b_5 Inv_{it} + b_6 Cash_{it} + \varepsilon_{it} \quad (3.1)$$

where i , and t index firm and time period; α is an intercept term; μ controls for firm-specific and time-invariant effect controlling for heterogeneity; ε is an i.i.d error term.

Rec is accounts receivable, Pay represents accounts payable, Liq measures the risk of liquidation by subtracting cash and short term investment from the current liability.

Different from Meltzer (1960), we use the difference between cash and current liability, instead of the ratio. This action is intended for use on a scale of one million dollars that is consistent with the scale of right-hand side variables. Inc is a net income involved in profit-generating activities. Debt is a long term debt, and the mature period of long term debt normally varies between 3 and 8 years. Bank loan is characterized as a long-term debt, whereas trade credit is required to be paid off with a short period lag of manufacturing or selling. Inv is a lag of inventory. This operation is made due to some degree of correlation between inventory and accounts payable since the inventory grows alongside the accounts payable during one accounting period in the balance sheet.⁵ Last, net cash from cash flow statement are entered in our analysis. The definition for net cash is more general than the

⁵ As the raw materials and goods are provided by the supplier, the firm owns accounts payable under the liability item. In order to balance the balance sheet, the adjustments are needed under the assets item. The adjustments depend on the real economic activity. For example, if firms finish the production and sold within one accounting period, then the adjustments should be made on cash. This happens only when the firms used up all materials and goods from the suppliers. Otherwise, inventory accounts for most changes on account payable in balance sheet.

one in the balance sheet. The “cash”-shown on the balance sheet only represents cash availability. However, on the cash flow statement, the “cash” refers to a variety of activities to collect money, and is a more precise measure to reflect the financial health in terms of liquidity⁶ relative to cash.

Data

Table 1 gives the mean, and other descriptive statistics about the data of large Hong Kong firms. They are taken from Worldscope and One Source database. Hong Kong, as a great financial and trade center of Asia, thrives on its advanced financial industry, as well as an exported-oriented economy. The features of Hong Kong economy meet the needs of this paper, highlighting both transaction and financing motives. The sample period ranges from 2001 to 2008, and it is worth noting that this period contains the recent financial crisis.

I generated dummy variables to monitor the firms’ financial condition. I scored one to the dummy if the net cash flow was greater than zero; otherwise, I scored zero. It is intended to compare financially healthy firms with less healthy firms in terms of credit lending behavior, and thereby introduce an interaction term. This term is given by multiplying the dummy and payables. The expected result by adding this interaction term is that healthier firms will be more likely to extend credit than weaker firms will. With the exception of dummy, all of variables above are measured in one million USD.

A question might be presented regarding the distinction between large firms and small firms. No unique criterion was innovated to identify the firms’ size. It is inappropriate to apply some unique criterion into the overall industries or the countries that are less or more developed. An appropriate approach to deal with the issue is to seek a critical point in the

⁶ See Matolcsy,Z.,Booth,P. and Wider, B., 2005.

Table 1.1

Summary Statistics for Large Hong Kong Firms Measured in One Million U.S. Dollars

Variable	2002						2003						2004				
	Max.	Min.	Mean	Std Dev	N	Miss	Max.	Min.	Mean	Std Dev	N	Miss	Max.	Min.	Mean	Std Dev	N
Accounts Rec.	807.40	0.00	65.32	118.62	132	5	890.80	0.00	72.65	123.72	133	4	2444.70	0.00	94.67	240.10	134
Accounts Payable	1104.10	0.00	76.59	177.05	122	15	1542.80	0.00	89.58	199.91	121	16	2169.10	0.00	101.17	257.51	124
Liquidation	3687.80	-296.40	139.76	453.59	136	1	1651.00	-4041.00	76.94	463.17	136	1	2246.70	-575.80	115.41	320.42	136
Net_Income	1841.40	-100.10	49.63	197.85	137	0	1499.50	-603.60	48.69	179.58	137	0	2416.10	-125.50	108.89	312.82	137
Long term debt	18153.60	0.00	360.35	1655.29	136	1	29648.90	0.00	453.48	2595.30	136	1	33434.30	0.00	467.51	2900.77	136
Inventory_lag	3241.20	0.00	85.72	323.39	129	8	3224.10	0.00	83.31	317.32	132	5	2589.60	0.00	87.04	295.65	129
Cash flow_lag	6074.00	-7.90	176.26	714.95	137	0	5502.90	0.00	173.05	637.53	137	0	14371.50	-1.90	248.41	1294.34	137
Total assets	63878.40	7.50	1939.31	6463.42	136	1	80057.60	0.20	2082.23	7626.56	136	1	83265.00	29.90	2243.94	7968.97	136
	2005						2006						2007				
Accounts Rec.	1911.10	0.00	103.73	222.64	135	2	2594.50	0.00	153.86	352.15	134	3	3712.90	0.00	191.65	466.29	136
Accounts Payable	2210.70	0.00	105.32	279.20	128	9	2850.00	0.00	132.24	385.64	130	7	3489.10	0.00	154.39	477.80	130
Liquidation	4437.70	-571.10	158.45	547.70	136	1	3347.60	-795.10	185.24	509.64	136	1	4015.80	-1050.20	214.82	600.27	136

Table 1.1—Continued

Net_Income	2411.70	-77.00	157.34	391.81	13 7	0	2904.80	-321.50	173.15	452.99	137	0	3922.20	-449.50	237.77	597.41	137
Long term debt	30809.50	0.00	476.22	2687.57	13 6	1	35102.40	0.00	554.20	3054.41	136	1	34959.60	0.00	626.96	3075.28	136
Inventory_lag	2561.00	0.00	105.04	332.32	12 7	10	4760.70	0.00	144.19	519.70	127	10	5769.90	0.00	172.21	619.29	130
Cash flow_lag	9488.60	-4.50	240.08	953.43	13 7	0	6730.30	0.40	250.93	836.52	137	0	9832.20	0.20	320.47	1141.16	137
Total assets	77005.20	32.00	2478.47	7814.25	13 6	1	87115.10	35.00	2901.40	8939.87	136	1	102499.00	32.00	3612.04	10773.04	136
	2008																
Accounts Rec.	3489.50	0.00	172.41	426.38	13 5	2											
Accounts Payable	3493.00	0.00	176.19	508.25	13 2	5											
Liquidation	6520.00	-1295.50	265.32	779.14	13 6	1											
Net_Income	3541.30	-103.90	138.45	390.45	13 7	0											
Long term debt	31933.20	0.00	679.62	2875.16	13 6	1											
Inventory_lag	6241.60	0.00	206.26	681.41	13 0	7											
Cash flow_lag	14294.70	-3.50	434.72	1698.39	13 7	0											
Total assets	86214.70	2.60	3819.18	10169.52	13 6	1											

sample data.⁷ In this paper, we place firms with greater than 2.5 million dollars in 2008 into the large-sized firm class, which are similar cutoffs used in previous studies (Carpenter, Fazzari, and Petersen, 1994; Scherer and Ross, 1990; Gertler and Gilchrist, 1994). Attached in Appendix A are robustness checks, which are measured by two optional standards—profitability and employment size. The primary findings of this paper are robust to the different choices of large-firm size.

Estimation Results

The correlation matrix of independent variables is examined as an initial process of estimation. A test for collinearity is arranged. The Pearson correlations shown in Table 2 suggest the presence of multicollinearity. A high degree of multi-collinearity (greater than 0.7) may overestimate standard errors and degrade reliability of estimates. The interaction term involving payables shows a high correlation with payables. As a consequence of high correlation between variable (payables) and its own interaction (payables*dummy), it does not weaken the results. Conversely, a high correlation between predictors (lag of cash and long term debt) appears and, as a result, may provide redundant information about the response. Except lag of cash and long-term debt, the others are safely ensconced in a grey area. An easy way to solve this problem is to eliminate correlated predictors from the model. The reason for running a set of regressions is twofold: (1) To avoid collinearity of independent variables. To treat the co-linearity problem, they will be distributed apart into different regressions (2). To control the effect of dummy variable.

⁷ The criterion for the definition of large firm varies in previous studies. It depends on the specifications you are interested in. For example, Blaso (2005) defines low wealth firms below the 55th percentile of profit in his sample data. Conversely, Gertler and Gilchrist design the 30th percentile of sales as the cutoff for small and large firms. Moreover, Demircuc-Kunt and Maksimovic (1999) discuss firms' debt maturity by dividing the firms into quartiles by value of total assets. In this paper, we apply total assets to identify large firms.

Table 1.2

The Pearson Correlations among Variables of Interest

	Accounts_Payable	Net_Income	Total_Long_Term_Debt	Inventory_Lag	Cash_Lag	AP*Dummy
Accounts_Payable	1					
Net_Income	0.464	1				
Total_Long_Term_Debt	0.619	0.596	1			
Inventory_Lag	0.396	0.618	0.464	1		
Cash_Lag	0.162	0.104	0.219	0.069	1	
AP*Dummy	0.574	0.311	0.346	0.244	-0.142	1

Dummy: Net Cash Flow—1: positive net cash flow; 0: zero or negative net cash flow

According to the Pearson correlation definition, a correlation less than 0.4 would be slight, or small. A correlation less than 0.7 would be moderate, and the remaining is then a problem of high correlation, or very dependable relationship.

As seen in Table 3 from fixed effect linear regression,⁸ all estimates are statistically significant and positive. By examining the first column of Table 3, it is apparent that credit acceptance is highly correlated with lending, indicating that a one-unit increase in payables is associated with a 0.45 units increase in receivables. Long term debt loans have relatively smaller coefficients and lead to a 0.05 units increase in accounts receivable. It indicates that long-term debts including bank loans and other financial institutions could be complementary to trade credit lending. But the effect of a bank loan is not considered to be a major factor associated with trade credit outflows. It indicates that large firms are less likely, though it is significant, to borrow bank loans to create trade credit lending for their clients. Large firms intend to balance the trade credit acceptance and lending, and thus make a substantial proportion of trade credit available to their clients. This is justified by the fact that the marginal effect of payables is estimated to be 0.45, and actually is nine times the effect of bank loan. It reflects the firms' propensity to engage in lending trade credit. As was proposed in the earlier analysis, trade credit allows firms to sustain their operations with a low transaction balances until their credit lending is paid

⁸ The Hausman test has been typically used to determine the fixed or random effect for each regression. It has been verified that the fixed model is the better model for each of regression.

off. . On the other hand, firms have to lend more trade credit to sell products as risk of liquidation increases. As a result, less cash availability and more current liability push firms to increase their sales. A one-unit increase in Liq--a spread of cash and liability, leads to 0.06 units of receivables to clients.

Table 1.3

Regression Result on Equation 3.1

VARIABLES	(1)	(2)	(3)	(4)
Accounts_Payable	0.446*** (0.025)	0.485*** (0.024)	0.439*** (0.030)	0.548*** (0.026)
Liquidation	0.056*** (0.011)	0.043*** (0.011)	0.047*** (0.011)	
Net_Income	0.097*** (0.018)	0.112*** (0.018)	0.109*** (0.018)	0.082*** (0.020)
Long_Term_Debt	0.051*** (0.006)			0.062*** (0.008)
Inventory_Lag	0.148*** (0.021)	0.201*** (0.020)	0.197*** (0.020)	0.169*** (0.022)
Cash_Lag		0.065*** (0.008)	0.072*** (0.009)	
AP*Dummy			0.054*** (0.021)	0.050*** (0.020)
Constant	-3.647 (4.546)	-4.704 (4.673)	-4.928 (4.658)	-8.732 (5.514)
Observations	939	939	939	939
Number of id	132	132	132	132
R-squared	0.689	0.684	0.687	0.645

Dummy: Net Cash Flow—1: positive net cash flow; 0: zero or negative net cash flow

Standard errors in parentheses

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

The inventory lag is presented in the first column of Table 3. It can be interpreted such that accounts receivable increases by 15 percent units as a one-unit increase in stock of inventory in the last period. The magnitude of the impact of inventory is found to be the second largest among those independent variables. An overall estimate does not precisely

capture, and even underestimates, the impact of inventory on trade credit transfer. In fact, the inventory consists of three components: raw materials, intermediates, and finished goods. The raw materials and intermediates cannot enter the market until production is eventually completed. Hence, only the finished goods are assumed to play a role in the process of spread of trade credit. Regardless, the marginal effect of inventory is quite large in the case of mixing all kinds of goods. For the limited data available, this study is unable to analyze the significance of different kinds of inventory in terms of composition.

In the second column, the lag of net cash enters the analysis. It is straightforward to see that net cash is a good indicator for financial constraints, as it is positively related to trade credit lending. Trade credit lending grows up 6.5 percent units in response to one-unit increase in the lag of net cash. The other explanatory variables, including accounts payable, are still statistically significant. The marginal effect of accounts payable is raised slightly, as well as the lag of inventory.

An interaction between cash flow and accounts payable is incorporated into the model. We will see whether such an interaction is involved in the trade credit transfer. As shown in the third column, financially healthy firms are better able to lend trade credit to their clients. Specifically, firms with less financial constraints offer 0.49 units of receivables to clients as one unit of accounts payable flows in, whereas the firms with more constraints offer only 0.44.

Conclusions

This paper serves as an initial attempt to assess a circulation mechanism in trade credit. The trade credit circulates from up-stream suppliers to down-stream firms. The circulation mechanism is critical to guarantee the continuous trade credit acceptance and lending among firms. To construct an empirical test on this issue, we collect the information from the balance sheet, income sheet, and cash flow statement to facilitate our analysis. The variables of interest extracted from these financial statements are assumed to enable

accounts for the trade credit allocation. As a result, trade credit acceptance is identified as the most influential factor in explaining credit lending. In particular, a one-unit increase in accounts payable would raise the receivables by approximately 44 percent units. This result coincides with our assumption that large firms embody the circulation mechanism between the trade credit inflows and outflows. Previous literature emphasizes the external factors affecting the trade credit lending, but less attention is paid on the internal factors.

There has been some debate as to the relationship between bank lending and trade credit lending. To test the hypothesis, we find the bank lending has little, though significant, effect on trade credit lending, and even these large firms are not credit rationed by banks. For the sake of safety, they are willing to follow the route of trade credit, instead of creating a new source for trade credit lending. Meanwhile, the circulation mechanism works better for those financially healthy firms.

Another finding of this paper is that the magnitude of the impact of inventory is the second largest among those independent variables as it relates to the receivables. To avoid the risk of liquidation, firms with a large stock are aggressively seeking clients as they become available. They provide trade credit to attract clients in exchange for the repayment obligation within a short term period.

To summarize, the firms' lending behavior on trade credit primarily consists of two methods: (1) They transfer a great amount of trade credit from their suppliers to customers. (2) Firms with relatively large amount of inventory sell goods, without demanding money, to clients.

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CHAPTER 2

THE FINANCING AND TRANSACTION MOTIVES OF TRADE CREDIT ALLOCATION: A COMPARISON OF LARGE AND SMALL HONG KONG FIRMS

Introduction

Trade credit has been a large source of financing and is widely used in business transactions. For example, Wal-Mart has used trade credit as a second largest source of capital after profit, and a larger source of capital than bank borrowing. Trade credit for Wal-Mart is eight times as much as the amount of commercial paper—capital acceptance invested by shareholders (Chludek, 2010). However, trade credit received less attention than it should in literature. The neglect might be due to two reasons: (1) the value of trade credit is reflected in specific goods, whereas bank loans do not confine its activities in goods or capital market. (2) Trade credit should be paid off with a short period lag of manufacturing or selling.

A firm buying inputs on credit may return products to its supplier if the firm detects defects before the payment is due. Meanwhile, the firm also offers trade credit to its client by specifying a repayment obligation. Trade credit consists of two components: accounts payable, shown on balance sheet as liability, is the money owned by a firm to its suppliers; accounts receivable as an asset, is the money given to its clients.

In this paper, two motives of trade credit usage are discussed by examining the two aspects of trade credit—payables and receivables. Firstly, trade credit stimulates firms' sales by signaling product quality to clients. Meanwhile firms adjust their cash balance given by the information from payables, and get ready to repay the debts to suppliers. Firms, therefore, save transaction costs by using trade credit through suppliers and clients (Ferris, 1981). This so-called transaction motive is related to the conventional features of trade credit

usage, such as saving transaction costs, signaling product quality and screening out inferior material. Thus large firms, less constrained by bank loans and more credit available, are able to facilitate firms to made deals with suppliers or clients. Secondly, another alternative trade credit theory has emerged in recent studies. This alternative theory states that trade credit used for financing becomes more desirable when the availability of other options is scarce. Firms use trade credit as an external source of financing that may substitute for bank loans, as small firms are running out of bank debts when the economy is in a bad state. The financing motive for the trade credit usage is more common for the small firms who are more likely to be borrowing-constrained (Petersen and Rajan, 1997; Burkart and Ellingsen, 2004).

This paper hypothesizes that (1) firms are intended to balance trade credit flows from suppliers to clients. This is a so-called transaction motive. (2) Financing constraint reduces the in-stream credit flows, and as a result increases the trend of off-stream credit flows. This external force, which is called as financing constraint, disperses the major route that is intended from up-stream suppliers to down-stream customers. The term “in-stream flows” refers to firms’ trade credit lending in its natural channel that connects suppliers and customers. Diversion is a shift from origin to destination, where less trade credit flows into firms’ customers, especially for those borrowing-constrained firms. Diversion is obtained by subtracting accounts receivable from payable. The two forces (transaction and financing) either aid or resist the flow’s movement from origin to destination, and the resistance to the movement thereby advances a diversion for self-financing.

Two reasons support my study: (1) Most previous studies show evidence for one of the two motives, but rarely examine both motives. This leaves readers in doubt about the effect of one motive on trade credit in a presence of the other. So far, there are few studies concerning the two motives for the use of trade credit by comparing large and small firms. My paper serves as an initial attempt to test whether or not both financing and transaction motives account for trade credit resources allocation. (2) To my knowledge,

this is the first time to take into account both diversion and in-stream flows of trade credit into analysis. A discussion is made on the extent to which borrowing constraint attracts trade credit from its conventional flow (from suppliers to clients). Further, another goal is to assess the extent to which large firms characterized by transaction motive focus their efforts on keeping a substantial amount of trade credit in a conventional way.

The organization of the rest of this paper is as follow: In Section 2, a review of the literature concerning the different motives in use of trade credit for small and large firms is presented. Section 3 introduces models devised for transaction process and financing process, and then describes data. The results are shown and interpreted in Section 4. Finally, the conclusion is given in Section 5.

Motive of Trade Credit Usage for Small and Large Firms

By reviewing the literature, this section is focused on the reason why different sized firms behave differently towards trade credit usage. For each motive, the related literature is reviewed by a comparison of the motive between large and small firms.

A Variety of Financing Sources

The upper part of Figure 1 shows trade credit flows where trade credit acceptance determines the availability of trade credit to clients. The so-called transaction motive becomes weak as the channels of financing are blocked. Therefore, it is necessary to explain the explicit channels of financing. The lower part of Figure 1 shows the channels of financing. In general, a firm raises money internally and externally. With regard to the internal financing, it is straightforward that firm raises money by making profits, then, the firm invests capital in market. However, a firm during an expansion needs more money than its internal financing supplies, so it seeks external financing. To be specific, there are three ways as displayed in Figure 1 to raise money from outside the company: borrowing from a bank, issuing bonds, or issuing equity in the stock market. Oftentimes, it is not easy to seek funds from an equity market, though, even if they are profitable. Needless to say,

small firms get worse financially as the external financing channels are blocked.

Small Firms Substitute Receivables for Bank Loans

Stiglitz and Weiss (1981) state that small firms should provide trade credit to their buyers, but due to financing limitations, they fail to do so. Burkart and Ellingsen (2004) provide the proof of theories that it is more common in low- and medium-wealth firms to use trade credit for self-financing, but it is rarely seen in large firms.⁹ As shown in Table 1, for small and medium firms, the demand for funds exceeds a maximum supply by banks. It ends up with a strong credit shortage in financing, which causes the vendor financing to serve as an alternative source of funds ($0 < TC \leq \overline{TC}$). In this context, trade credit becomes more desirable as the availability of other options is less likely to satisfy the needs. No matter their sizes, firms rank bank debts as their first-choice ($BC = \overline{BC}$), then get back to trade credit as an alternative source of funds.

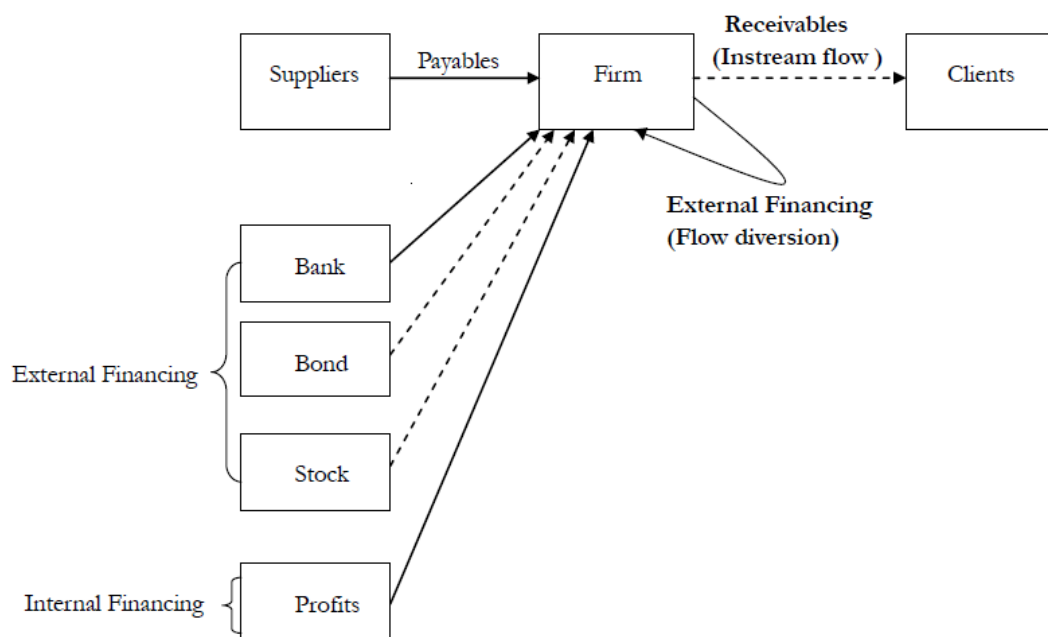


Figure 2.1 The relationship map of firm, suppliers, clients, and bank

⁹ The discussion about the appropriate wealth categories are not involved in this paper.

Table 2.1

The Usages of Trade Credit and Bank Credit as a Source of Self-Financing for Different Sized Firms

	High Wealth	Medium wealth	Low wealth
Bank Credit Usage in Financing	$BC < \overline{BC}$	$BC = \overline{BC}$	$BC = \overline{BC}$
Trade Credit Usage in Financing	$TC = 0$	$TC < \overline{TC}$	$TC = \overline{TC}$

BC—bank credit used for financing.

\overline{BC} -- maximum loans given by bank

TC – trade credit for financing.

\overline{TC} -- maximum trade credit given by firms' suppliers

Note: Source from Cunningham(2004)

Three reasons are responsible for the financing troubles in small firms. (1) Credit rationing: Banks may follow a set of screening criteria that detect risky firms, such as increasing interest in debt, and specifying terms of a contract (Stiglitz and Weiss, 1981). Banks screen out the risky small firms by perceiving a lower probability of repayment.¹⁰ Large firms, selected by the banks, are assumed to be less risky in financing. (2) Monetary tightening: Banks restricts bank reserves during a period of tight monetary policy. A monetary tightening forces banks to contract bank credit growth. This contraction may result in a lack of financing for small firms that do not have access to bond and equity markets. (Berger and Udell, 2002; Nielsen, 2002). (3) Financing disturbances: The disturbances of financing are severe in small firms when debt financing is flexibly suspended and resumed over time (Stiglitz and Weiss, 1981). In this context, small firms are more vulnerable to the financing disturbances as banks are relevantly less tolerant towards small firms in terms of how much risk to undertake.

As discussed earlier, this paper focuses efforts on the presence of diversion away from the conventional route of trade credit where the majority of trade credit flows continuously

¹⁰ A higher interest rate is associated with a lower probability of repayment. Banks screen out the higher risk firms by charging them a higher interest rate.

from suppliers to firms' clients.

Large Firms Advance the Release and Circulation of Trade Credit

In contrast to small firms, large firms are more willing to offer trade credit to clients. Eliehausen and Wolken (1993) illustrate the difference in vendor financing between small and large firms: trade credit is widely used in small firms for the purpose of self-financing as they are running out of bank debts, whereas large firms use trade credit for the purpose of transaction. Estimates conducted by Petersen and Rajan (1997) show that large firms have a relatively higher ratio of trade credit (receivables plus payables) to sales than small firms do¹¹. A high ratio indicates that trade credit works well throughout the entire process of transaction. A low ratio is associated with a suspension or decline in trade credit during the transaction. A high-ratio of trade credit to sales in large firms is due to the fact that large firms are more willing to save transaction costs. Ferris (1981) addresses the issue that trade credit provides the information about cash the firms need to repay for each transaction. This information helps firms to improve cash management, and thus it saves transaction costs.

From our analysis so far, the spread of trade credit is based on the assumption that firms are less constrained by bank loan. An investigation of transaction motive is thus conducted on large firms that are characterized by relatively low financial constraint. In order to better assess the effect of financial constraint, a comparison then is made on small firms who are more likely to be constrained.

Model and Data

Model Setup for the Transaction Motive

The first model tests the transaction motive where most (but not all) of trade credit is widely used for the purpose of business transactions, as opposed to financing. The extent,

¹¹ Petersen and Rajan(1997) point out that the transaction motive is prevalent in large-wealth firms. However, they do not verify their hypothesis on large-wealth firms due to the limitation of their dataset.

however, varies in different sized firms. Model 1 is proposed with a focus on in-stream credit flows and investigates the smoothness of the credit flows by controlling the presence of financing constraint¹². The smoothness is defined by the extent to which the firms can offer credit to their clients.

$$AR_{it} = \alpha + \mu_i + \beta_1 E_{nit} + \beta_2 I_{nit} + \beta_3 T_{nit} + \beta_4 O_{nit} + \beta_5 AP_{it} * Crisis + \varepsilon_{it} \quad (1)$$

where i and t index firms and time periods respectively, and the n subscript refers to the n th variable of each group; α is an intercept term; μ controls for firm-specific and time-invariant effect controlling for heterogeneity; ε is an i.i.d error term. Designate the vector of grouped independent variables for i th firm at time t as I'_{it} , E'_{it} , T'_{it} and O'_{it} , where $I'_{it} = (I_{1it}, I_{2it}, I_{3it}, \dots, I_{nit})$, $E'_{it} = (E_{1it}, E_{2it}, E_{3it}, \dots, E_{nit})$, $T'_{it} = (T_{1it}, T_{2it}, T_{3it}, \dots, T_{nit})$ and $O'_{it} = (O_{1it}, O_{2it}, O_{3it}, \dots, O_{nit})$. The vector I'_{it} incorporates a set of variables related to internal financing—income (INC), cash flow (CF), and liquidation (LIQ). The vector E'_{it} is established to capture the sources of external financing, including bank loans (BL), and stock and bonds (SB). The vector T'_{it} is simply the amount of trade credit inflow—accounts payable (AP). As the last vector O'_{it} , it reflects the establishment and development of up to 9 industries, measured by industry growth rate from 2002 to 2008 (IndGR). The circulation mechanism in Equation 1 is proposed against the diversion mechanism shown in Model 2.

Model Setup for the Financing Motive

Model 2 tests the hypothesis 2 that borrowing constraint directly results in a diversion of trade credit flows.

$$NetTC_{it} = \alpha + \mu_i + \beta_1 E_{it} + \beta_2 I_{it} + \beta_3 O_{it} + \beta_4 BL_{it} * Crisis + \varepsilon_{it} \quad (2)$$

Where NetTC is the surplus of trade credit by subtracting receivables (AR) from payables

¹² To control the presence of financial pressure, the tests in this paper are conducted on large and small firms separately. The smaller firms are assumed to receive more financing pressure.

(AP). The definitions of the other variables are analogous to those of Equation 1.

In order to test the aforementioned hypotheses, this paper differs from Meltzer (1960)¹³ in two respects. Firstly, some changes are needed due to a new framework of this paper where both financing and transaction variables are examined. Secondly, in the present paper, a closer look is taken at the diversion of trade credit that is supposed to be associated with self-financing. The descriptions for the variables are listed in Table 2 where the independent variables are categorized by external financing, internal financing, transaction, and operation.

It is necessary to give justifications for the independent variable selections. First, the cash flow statement, refers to a cash basis report on financial activities¹⁴. This cash statement includes only inflow and outflow of cash activity during a time period. Thus, in this respect it is believed to measure the current financial status of a firm more efficiently in terms of liquidity¹⁵ than other financial statements (Helfert, 2001). Moreover, Almeida, Campello, and Weisbach (2004) adopt the cash flow sensitivity (A firm's propensity to save cash out of cash flow) to capture the financial constraint that a firm is enduring. They find that firms with positive cash flow sensitivities (have a propensity) desire to expand, but the availability of funds constrains a firm's investment demand. Negative cash flow sensitivities (no propensity) cause firms to become defensive. Positive cash flow sensitivities suggest profitability and, therefore, desire to expand, but the opposite is a sign of weakness or overgrown expansion. It is, therefore, proposed that a profitable firm with positive cash flow might offer more credit for their clients in an attempt to expand their size.

¹³ Meltzer (1960) examined the determinants of net trade credit and its response to monetary policy.

¹⁴ These financing activities include operating activities, investing activities, and financing activities.

¹⁵ See Matolcsy, Z., Booth, P. and Wider, B., 2005.

Table 2.2

The Descriptions for the Dependent Variables and Independent Variables

Variables:		Measurements:
Dependent Variables:		
Net Trade Credit	(NetTC)	The diversion of trade credit: AP-AR
Accounts Receivable	(AR)	The amount of AR
Independent Variables:		
(1) Financing Variables (I+E)		
Internal Financing (I)	Income	Subtracting expenses from gross earnings
	Net Cash Flow	Cash receipts minus cash payments given a year
	Liquidation:	Subtracting cash and short-term investment from current liability.
External Financing (E)	Bank Loans	Long term debt from bank and financial institutions
	Bonds and Stocks	<u>Shares</u> that have been purchased by investors outside of the firm.
(2) Transaction Variable (T)		
	Accounts Payable	The amount of AP
(3) Operating Variable (O)		
	Industrial Growth rate	The Sales growth rate in certain industries

Second, LIQ measures the risk of liquidation by subtracting cash and short-term investment from the current liability. Slightly different from Meltzer (1960), instead I take the difference between term “cash” and “current liability”, rather than the ratio. The reason for this change is that this model is designed to be scaled by volume, and this modification allows me to evaluate the effect of certain measures in the same level. Third, INC is the net income to sensor the operating performance. Fourth, BL is the long-term debt provided by banks or other financial institutions. Fifth, SB is the stock and bonds issued by firm.

Sixth, the recent attention is paid to the importance of trade credit on economic development. Fisman and Love (2003) find that less developed industries or countries

highly depend on trade credit, signaled by a higher ratio of accounts payable to total assets. It is indicated that the industrial development is associated with the trade credit usage. A similar finding provided by Herbst (1974) states that industry factors, such as trend, and seasonal issues, are contributing factors for the availability of trade credit lending. After reviewing literature above, industry growth rate as a good indicator should be able to measure the industrial development. The next thing that happens is that I have to make a choice from two sets of data regarding industrial growth rate: the overall industrial growth rate and growth rate within industry. It is noticed from Smith and Smith (1999), who conducted a study on trade credit usage in inter-firm trade, that the variance across industries is much bigger than that within industries in the panel data regression. A similar result from the data of this paper is shown in Table 3, where the ratio of accounts payable (or accounts receivable) to total assets varies across industries. The three highest ratios are observed in agriculture, wholesale trade and manufacturing while the two lowest are in finance, insurance and real estate, and services. It is apparent that the cross-sectional variation of this ratio is high in this sample. Among the ratios, the highest (0.15) is 15 times as high as the lowest (0.01).

Table 2.3

The Level of Accounts Payable(AP) and Accounts Receivable (AR) over Total Assets across Industries

Industry	AP/total assets	AR/total assets
(1) Agriculture, forestry, and fishing	0.09	0.15
(2) Mining	0.09	0.07
(3) Construction	0.01	0.03
(4) Manufacturing	0.11	0.12
(5) Transportation, communications, electric, gas, and sanitary service	0.03	0.03
(6) Wholesale trade	0.09	0.09
(7) Retail trade	0.15	0.08
(8) Finance, insurance and real estate	0.02	0.02
(9) Services	0.02	0.03

Note: the calculation was made from the data of this paper.

To minimize the cross-sectional variation, the model will incorporate the industrial growth rate (IndGR) within industry, categorized by U.S. SIC industry codes.

Data

With the exception of the dummy, all of the variables above are measured in one million U.S. dollars. Firm-level data is taken from Worldscope and Onesource database for Hong Kong firms, which provide the data from a set of financial statements, and general information. Hong Kong, as a great financial and trade center of Asia, thrives on its advanced financial industry, as well as an exported-oriented economy. These features of Hong Kong match this paper's emphasis on transaction and financing motives. Also, much attention recently falls on the rise of Asia. The paper serves as a new look at Asian economy.

The sample period ranges from 2002 to 2008, which contains the recent financial crisis starting 2008. A dummy variable is therefore needed to detect a structural change in each model during the crisis. In this context, I generated dummy variables and interactions to support the hypotheses in this paper. I scored one to the dummy if it is the year of 2008—the onset of the global financial crisis, otherwise, I scored zero. It is interesting to compare the financing and transaction motives during the pre-onset and onset of the crisis. The interaction terms are therefore interacted with bank loans and accounts payable in Equations 1 and 2, respectively. The terms are obtained by multiplying the dummy and bank loans, or by the dummy and accounts payable.

There is no standard to define the firms' sizes. For example, an automobile company, with very large share of market sales, may be not profitable. In this case, the size of this company changes by the different definitions—profitability or sales. Thus, it is inappropriate to impose a unique criterion of measurement for overall industries or countries that are less or more developed. Also, the U.S. Census Bureau does not define

small or large business, but provides advices that allow users to define business categories in any of several ways: (1) employers and nonemployers, (2) employment size of firms, (3) employment size of establishments, or (4) profits of firms. An alternative method adopted in previous literature is to seek arbitrary assigned thresholds, such as a critical percentile¹⁶ of size in sample data.

According to the U.S. census bureau¹⁷, firms with less than 500 employees are relatively small, and with more than 2500 are relatively large. Four perspectives on this criteria selection are present: (1) Dataset in this paper provides the information on employment size of firms (Method 2). No information about either unemployment (Method 1) or establishments (Method 3) is covered by this dataset. (2) Method 4 is arranged in a robustness check. I repeat the tests using profitability as an alternative measure of firms' sizes. The results are substantially robust to the measures of firm size used¹⁸. (3) Seeking a critical percentile might be biased or skewed if the sample data is not large enough to represent the population or the data size changes with different specifications. (4) The thresholds in this paper are consistent with those in previous analyses of European and Canadian markets (Bednarzik, 2000; Baldwin, Jarmin, and Tang, 2004). These applications provide a way of dealing with the firms' sizes on foreign markets.

Estimation Results

An econometric approach selected in this paper should be efficient to evaluate the two equations. Seemingly unrelated regression (SUR) is thereby employed, since SUR is more efficient than OLS when the disturbance terms in different equations are correlated (Zellner, 1962). OLS ignores the possibility that two different dependent variables across equations may be correlated, and thus the residuals are correlated. It is that the disturbance

¹⁶ The criterion for definition of large firm varies in previous studies. It depends on the specifications I am interested in. For example, Blaso (2005) defines the low wealth firms below 55th percentile of profit in the sample data. On the contrary, Gertler and Gilchrist (1994) design 30th percentile of sales as cutoff for small and large firms. Moreover, Demirguc-Kunt and Maksimovic (1999) discuss firms' debt maturity by dividing the firms into quartiles by value of total assets.

¹⁷ The U.S. census bureau separates three tiers of the firms' size: the firms with employees less than 500, less than 2500 but more than 500, and greater than 2500.

¹⁸ A result on the robustness check is attached in Appendix B.

of in-stream flows and off-stream flows are correlated with each other. The correlations between the residuals of Equations 1 and 2 are shown in Tables 4 and 5. It can be seen that the disturbances between the residuals of Equations 1 and 2 are highly significant at 1 percent confidence level, for both small and large firms. The estimation of SURE is thereby necessary since the correlations of disturbances exhibit the violation of OLS.

Table 2.4

Correlation between Residuals of Equation 1 and 2 for Small Firms

	Equation1	Equation 2
Equation 1	1	-0.478***
Equation 2	-0.478***	1

The correlation is tested for significance using a standard T-test, where the null hypothesis is that the two disturbances are not correlated.

*** $p < 0.01$

Table 2.5

Correlation between Residuals of Equation 1 and 2 for Large Firms

	Equation 1	Equation 2
Equation 1	1	-0.672***
Equation 2	-0.672***	1

The correlation is tested for significance using a standard T-test, where the null hypothesis is that the two disturbances are not correlated.

*** $p < 0.01$

Table 6 shows the results of estimating the parameters of the Model 1 for both large and small firms using SURE. By checking the 1st column, the variables measuring profitability are significantly and positively related to trade credit lending, where a one-unit increase in income, cash flow, and liquidation, raises 0.101, 0.090, and 0.017 units of accounts receivable respectively.

Large firms increase 0.051 units (column 1) of trade credit availability to their clients in responding a one-unit increase of bank loan, whereas the small increase 0.203 (column 3).

The marginal effect of bank loans for small firms (0.203) is 4 times greater than for large firms (0.051), indicating that compared with large firms, small firms are more sensitive to the bank loans. Work is needed to extend the method to accommodate regressions with interaction term—bank loans and financial crisis. The inclusion of interaction term enters into Column 2 and 4 for large and small firms. During the onset of financial crisis, the marginal effect of bank loans reduces significantly from 0.051 to 0.019 in large firms whereas the effect falls significantly from 0.203 to -0.109. This reduction during the crisis is due to the fact that firms no matter their sizes in crisis period are unwilling to sacrifice their resource (bank loan) to make more trade credit available for their clients.

Interestingly, for those large firms, one-unit increase in trade credit inflow (payables) stimulates the outflow (receivables) by 0.654 units. But for those small firms, one-unit increase in inflow drives the outflow only by 0.187 units, which is about 4 times smaller than that of large firms. Small firm's transit less trade credit from suppliers to customer clients, indicating a proportion of vendor credit is used for other purpose. A force, so-called self-financing, appears in small firms and resists the movement of credit flows from the suppliers to clients. This finding supports the hypothesis 2 mentioned concerning a partial diversion of trade credit inflow.

A test for an interaction term between payables and financial crisis is also undertaken. The regressions with the interaction terms are located in column 2 and 4 for small and large firms respectively. In small firms, the interaction term—payables*dummy—are statistically significant and positive at a 5 percent confident level. It is worth noting that a one-unit increase in payables only raises the credit outflow by 0.113 units in crisis period—which is much less than that in rest of year where the marginal effect is 0.213. For large firms, credit acceptance (payables) during the financial crisis has no significant effect to advance trade credit to clients. This contradiction is explained as the result of financing constraint during the financial crisis. Financial crisis has a stronger influence on small firms due to a fact that small firms are more likely be debt-rationed. The industrial growth rate shows a positive

relation with the trade credit outflows, but no statistical significance is shown in neither of groups.

Table 2.6

Determinants of Trade Credit in-Stream Flows (AR) of Model 1: Seemingly Unrelated Regression

	Large (1)	Large (2)	Small (3)	Small (4)
Net Income	0.101*** (0.015)	0.089*** (0.015)	0.076*** (0.024)	0.047** (0.023)
Cash Lag	0.090*** (0.012)	0.093*** (0.012)	0.055* (0.032)	0.071** (0.030)
Liquidation	0.017** (0.007)	0.018*** (0.007)	0.021 (0.018)	0.026 (0.018)
Bank Loans	0.051*** (0.007)	0.057*** (0.007)	0.203*** (0.020)	0.294*** (0.021)
Shares and Stocks	0.005*** (0.001)	0.005*** (0.001)		
Payables	0.654*** (0.016)	0.661*** (0.019)	0.187*** (0.022)	0.213*** (0.025)
Industrial Growth Rate	24.317 (35.557)	23.095 (35.431)	10.089 (10.154)	8.254 (9.492)
Payables*Dummy		-0.029 (0.032)		-0.100** (0.044)
Bank loans*Dummy		-0.038** (0.016)		-0.403*** (0.044)
Constant	-1.186 (3.996)	0.723 (4.046)	0.203 (1.287)	1.300 (1.211)
Observations	826	826	651	651
No. of I.d.	118	118	93	93
System Weighted R-Square	0.744	0.744	0.249	0.312

Dummy: score 1 in the year of 2008--the onset of global financial crisis, otherwise, score 0.
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

To summarize, the main effect of the transaction factor (AP) in large firms is 4 times greater than that in small firms. Especially at the year of 2008, with a one-unit increase in

credit acceptance (AP) in small firms, credit lending (AR) decreases by -0.100 units. These findings in this paper suggest that transaction motive serves as a major driving force in large firms, but not in small firms.

Table 7 presents the estimation result for Model 2. By examining the first column of Table 7, it is apparent that the liquidation are significantly correlated with the trade credit diversion, indicating that a one-unit increase in the liquidation is associated with a 0.025 and 0.185 increase in units of diversion for both large and small firms. The diversion for self-financing flows out as the liquidation pressure¹⁹ becomes more pronounced in small firms. But for the first column, large firms are less sensitive to the liquidation pressure and there is only 0.025 units increase in the diversion, 8 times smaller than that of small firms. In addition, the diversion in either group is inversely related to income and cash flow, indicating that a slow money turnover is associated with the needs of self-financing. It is that a one-unit decrease in cash flow is associated with 0.090 or 0.106 units increase in diversion for large and small firms.

Bank loans have a significantly negative coefficient -0.021 (column 1) and -0.241 (column 3) for large and small firms. The statistics imply that a reduced bank debt makes more trade credit flowing out for self-financing no matter the firms' size. It is that diversion of trade credit increases by 0.021 (0.241) for every unit drop in bank debt for large firms (small firms). The amount of diversion in small firms is 12 times greater than that in large firms. In addition, this finding for Model 2 supports the assumption of Model 1 in which small firms offers less trade credit lending to clients in the presence of bank lending constraints. This result provides a vision of financing motive that reduces the ability of small firms to offer trade credit to their client during the financial crisis.

¹⁹ Dichev (1998) uses the liquidation as a proxy for bankruptcy.

Table 2.7

Determinants of Trade Credit Diversion (NetTC) of Model 2: Seemingly Unrelated Regression

	Large (1)	Large (2)	Small (3)	Small (4)
Net Income	-0.108*** (0.021)	-0.096*** (0.022)	-0.045 (0.051)	0.000 (0.050)
Cash Lag	-0.090*** (0.018)	-0.092*** (0.018)	-0.106* (0.067)	-0.127** (0.065)
Liquidation	0.025** (0.010)	0.023** (0.010)	0.185*** (0.037)	0.171*** (0.036)
Bank Loans	-0.021** (0.010)	-0.029*** (0.010)	-0.241*** (0.042)	-0.361*** (0.046)
Shares and Stocks	-0.009*** (0.002)	-0.009*** (0.002)		
Industrial Growth Rate	18.557 (52.077)	19.339 (51.990)	-4.715 (21.207)	-2.022 (20.589)
Bank loans*Dummy		0.044* (0.024)		0.554*** (0.094)
Constant	0.708 (5.861)	-1.084 (5.930)	-1.196 (2.688)	-2.837 (2.624)
Observations	826	826	651	651
No. of I.d.	118	118	93	93
System Weighted R-Square	0.744	0.744	0.249	0.312

Dummy: score 1 in the year of 2008--the onset of global financial crisis, otherwise, score 0.
Standard errors in parentheses

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

Conclusion

This paper presents the studies of financing motives and transaction motives conducted on large and small firms separately. An initial attempt was made to incorporate two models measuring two components of trade credit outflow—trade credit acceptance and lending. Estimation of linearly SURE are developed under two processes with a comparison of different sized groups. The empirical results give evidence on the hypotheses of this paper and assess other factors such as industrial growth rate, and financial crisis.

This paper performs an empirical study on the existence of different motives in usage of trade credit. Two models are formulated to predict the diversion and in-stream flows.

Model 1 is to examine the in-stream flows behavior that is characterized by a transaction motive. In this study of transaction motive, the main effect of the transaction variable (AP) in large firms is 4 times greater than that observed in small firms. This result supports one of hypotheses in this paper that as can easily be seen, the transaction motive enables large firms to screen out inferior material from their suppliers, signal product quality to their clients, as well as save transaction costs for themselves. On the other side, small firms are more likely to be credit rationed and as a result divert a substantial proportion of vendor credit for self-financing. In Model 2 serving as a probe of flow diversion, it is found that the amount of diversion in small firms is 12 times greater than that in large firms. This result indicates that credit rationing as the major driving force result in a diversion toward self-financing in small firms, but has little effect in large firms.

As a matter of fact, firms may apply trade credit to stimulate sales through the creation of trade credit lending. However, for most loan-restricted firms, vendor credit can smooth out the impact of tightening monetary policy. It is necessary to ensure the flow of trade credit through suppliers, firms, to custom firms. Ways are suggested in which trade credit can be beneficial to both seller and buyer: (1) To better serve down-stream firms, firms should offer vendor credit on a selective basis. Firms should reduce the unexpected trade credit outflows as means of self-financing in costumer firms. (2) To make the trade credit chain smooth, down-stream firms collect cash from buyers quickly to pay off upstream firms.

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CHAPTER 3

RISK PERCEPTION AND RISKY ASSET SHARE IN RETIREMENT ACCOUNT

Introduction

The primary objective of this paper is to discuss the little-known relationship between risk perception and risky asset allocation in pension plans. A variety of traditional pension plans, like the defined benefit plan, are devised to protect employees with a predictable monthly benefit at retirement. With the increasing of participants, a shift has taken place to meet the shifting demands on a higher pension accompanied by a relatively higher risk. In this context, a majority of employees are therefore covered by a defined contribution plan as opposed to a defined benefit plan mentioned earlier. Different from the traditional pension plans, the defined contribution plan is no longer insured by Pension Benefit Guaranty Corporation (PBGC). We know, as a matter of fact, that benefit in a defined contribution plan when retired might be lower than that in a defined benefit plan, especially when the market remains depressed for prolonged periods. Recent studies (Samwick and Skinner, 2004; Poterba, Rauh, Venti, and Wise, 2006) also voiced the same concern about the massive capital inflows from risk-vulnerable participants who are less experienced. The trend of pension plans is requiring a combination of defined benefit plan and defined contribution plan. Most employers currently offer only defined contribution plan. Participants in this plan decide the share of risk asset and adjust the proportion of risk factor at will. Defined contribution plan is a lifecycle saving associated with an expected value on returns and unpredicted risk. It is hypothesized that investors may adjust the proportion of risky assets in their portfolio (increase or decrease) as they perceive a market boom or bust, or the potential risks surrounding investors' health situation.

Hudson-Wilson (2000) once generalized three types of investors who are return maximizers, portfolio risk reducers, and inflation hedgers. Different from earlier studies on this topic with an emphasis on speculation, this paper sheds lights on risky investment choice made by risk reducers and inflation hedgers. These groups of investors carry a substantial amount of capital, with less optimistic expectations or risk neutral preferences, primarily hedges against depreciation while buying stocks and bonds. The so-called hedger intends to select relatively lower risky assets and as a result make less significant gains. However, the motive of these investors has received less attention, even though recent studies suggest that it may play an important role in explaining the risk decision-making behavior. This paper is confined to these retirement account holders who are characterized by being less speculative. The idea of this paper is explored based on the Capital Asset Pricing Model (CAPM) beta, a parameter measuring the correlation between market return and asset return. Investors know the estimated CAPM beta²⁰ and therefore keep less risky assets once they are exposed to potential risks disproportionately. Investors have to take into consideration a wide range of risk factors when they make choice on portfolio allocation. This paper explores the risk factors surrounding investors and then analyzes the corresponding investors' reaction when individual are exposed to risk factors. Risk perception is related to some recognition on a matter of health, inflation pressure, and economy. Investors who anticipate a high likelihood of risks or crisis will as a result shift the portfolio composition and relevant risky components to undertake in stock market.

The paper is organized as follows. Section 2 briefly introduces recent workers participation in a defined contribution plan. In Section 3, I review literature relevant to risk factors that may impact on an investor's portfolio choice. Section 4 builds model and gains further insights into the structure and function of this model. The data source and statistics are provided in section 5. Section 6 contains an empirical application to a binary logistic model. The final section concludes.

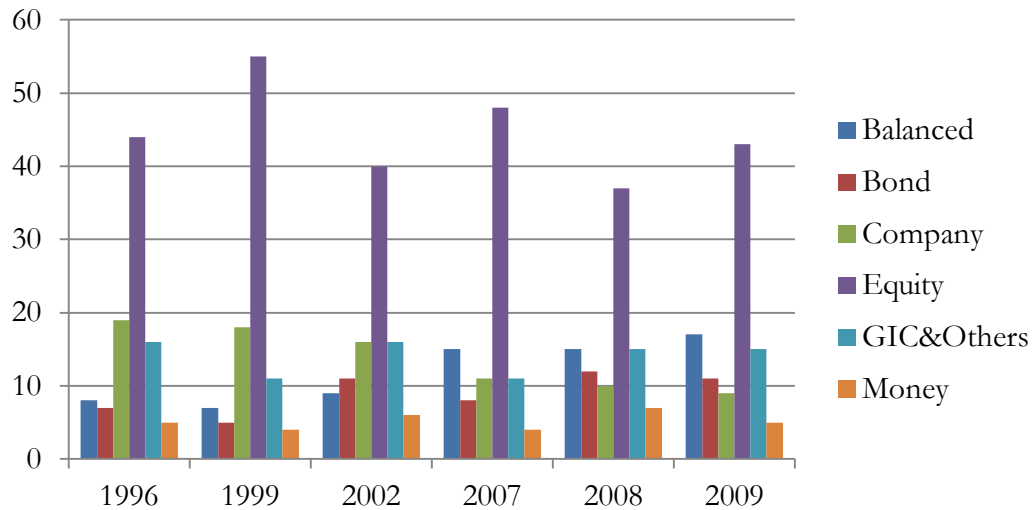
²⁰ The estimated CAPM beta is resolved by regressing an asset return on a market return.

Background

Allocation of Risky Asset in 401(K) Retirement Account

In general, investors wish to avoid any adverse factors that would lower their expected return. To reduce the volatility of equity returns, a change in risky components is required to cope with the crisis. Official statistics from the Employee Benefit Research Institute (EBRI) and the Investment Company Institute (ICI) in Figure 1 show that from the selected years of 1996 to 2009, participants in 401K plan hold the share of stock market investment with a minimum of 47 percent in 2008 and a maximum of 71 percent in 1999.²¹ Needless to say, the share of risky assets is thought to be greater if it includes the balanced fund, which is a hybrid fund with a mix of bonds and stock. From this perspective, it is necessary for this study to move to a focus on risky asset share, since it is capable to capture most of bulk asset flow. It is worth noting that, as the economy worsens, the proportion of risky assets plummets. Figure 1 reviews evidence on the effect of recessions that occurred in 2001 and 2008 and consequently dramatic drops in risky assets, drawing on macro-economic evidence. It indicates that participants perceived crisis-awareness of exposures to an ongoing or forthcoming recession, and readiness to protect themselves from any unexpected volatility of markets.

²¹ Stock market investment is a direct sum of Equity Funds and Company Stock.



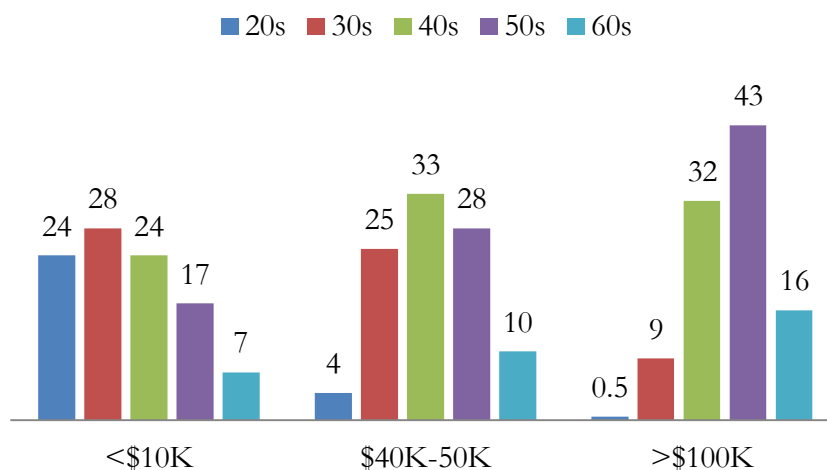
Source: A report on 401(K) retirement account is provided by the Employee Benefit Research Institute (EBRI) and the Investment Company Institute (ICI).

Figure 3.1 Variation in the share of different funds in fund-holder's account from 1996 to 2009

The Older Population Holds More Wealth than the Rest

The paper is restricted to employed people aged 40 years or older accumulating considerable pension wealth. The considerable pension wealth encourages its owner to be extremely cautious of potential risk, especially millions of people nearing retirement in fear of stock market crash. As seen from Figure 2, fund-holders aged between 40 and 60 years account for a high percent of wealth assets in each income interval—that is 71 percent, 48 percent, and 91 percent in low-, medium-, and high-income stratum. Let us turn to the rightmost group of Figure 2. It is interesting to note that the top wealth-holders with an account balance of 100,000 dollars or more, aggregated approximately 91 percent wealth lying in the age group of 40 years old or above in 2009. On the contrary, participants aged 40 or more possess less, but still a substantial amount of wealth (48 percent) in a low-wealth group of 10,000 dollars. As a matter of fact, the older has a clear advantage over the younger, no matter what quantile of wealth distribution they belong to. At this point, a life-cycle saving is somehow capable of explaining the age-wealth pattern presented in Figure 2. In the remainder of this paper, I intend to devote and focus

attention on the participants aged 40 or above. Meeting the needs of this paper, I use the Health and Retirement Survey (HRS) database to study the well-being of respondents with a focus on a group of people aged 40 years or above (mean and median ages of 49.4 and 48.4).



Compiled from the Employee Benefit Research Institute (EBRI) and the Investment Company Institute (ICI).

Figure 3.2 The share of participants' wealth of 401k account, grouped by age

Literature

CAPM Model

The CAPM provides important insights about risk-averse behavior in matters of uncertainty. The expected return in CAPM consists of two components: risk-free asset return, and risk asset return. A higher value of Beta, indicating the extent of correlation between risky assets and whole market, could determine a higher expected return of investment.

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \quad (1)$$

$$\beta_i = \frac{Cov(r_i, r_M)}{\delta_m^2} \quad (2)$$

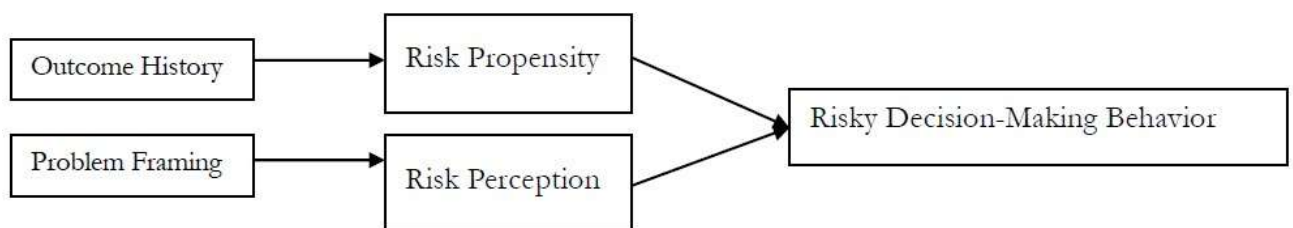
Where β_i is a measure of systematic risk, r_m is an expected return of market, r_i is an expected return of assets, and σ_m^2 is the variance of market returns. As a measure of volatility, beta coefficient indicates a correlation between market risk and asset risk. The CAPM model emphasizes the diversity of portfolio of assets so that systematic risk is more likely to represent the risk of portfolio. To minimize the unsystematic risk that is associated with individual's preference on asset selection, it is required to diversify the variety of asset so that risk exposure is limited to market only. By understanding of CAPM model, account holders may reduce the share of unsystematic risk when they perceive the level of risks to be high.

Risk-tolerant investors therefore accept a certain proportion of risky assets (such as stock and bonds), as opposed to the risk-free assets (treasury bills). Investors may lower their holdings of risk assets or the percentage of risky assets in a total when risk grows disproportionately faster than the expected returns.

Risk Attitude versus Risk Perception

A number of recent papers study the impact of risk factors on account holders. Instead of summarizing this literature, I refer the reader to Hariharan, Chapman, and Domian (2000) which shows that risk tolerant investors nearing retirement increase the proportion of risky asset, buying more stock. They estimated the response of risky asset shares as individuals change their risk attitudes. However they underestimate the importance of risk perception as a contributing factor in investment decisions. Risk perception, which stresses the risk awareness, is at least equally as important as risk attitude. Weber and Milliman (1997) stated that "the tendency to be attracted or repelled by alternatives that he or she perceives as more risky over alternatives perceived as less risky." Cognitive variables, such as risk perception, and a sense of control, may account for the willingness or participation in a financial investment. A strong argument proposed by Sitkin and Weingart (1995) states that "the direct impact of antecedent variables on risky decision-making actually takes

place only via the mediating function of risk propensity and risk perception.” As seen in Figure 3, Sitkin and Weingart introduce two exogenous variables affecting investors’ propensity and perception: outcome history and problem framing. In this context, an individual’s tendency to take or avoid risks is subject to outcome history which makes people feel confident or doubtful in a mental state. A person may behave actively and passively from the external environment. Problem framing, that is a relevance of previous experiences, would be supportive of individual involvement in risky activities. Needless to say, the expected utility (EU) framework has been theoretically challenged with the argument that risk attitude by its own is not sufficient enough to account for risk decision-making behavior.



Source from Sitkin and Weingart (1995)

Figure 3.3 Mediated model of the determinants of risky decision-making behavior

This paper sheds light on the role and impact of risk perception on an individual’s investment choice. Retirement account is expected to provide smoothly long-run growing benefits while offsetting the environmental changes, such as inflation, inadequate funding, natural disasters, unexpected illness, or other obstructions. However, only a few papers in practice have dealt with the analysis of stock investment as a hedge against inflation when investors participate in pension plans. Even fewer of them discuss the risk perception that was of concern to hedger investors.

Financial Investment and Life-cycle Savings

Skinner (1988) argued that precautionary savings and uncertain income account for most aspects of life cycle savings. First, household saves for a rainy day against a bad state.

Investors are concerned primarily with well-being, which is subject to uncertain events, such as crisis, or health deterioration. (Kotlikoff, 2008; Starr-Mccluer, 1996; Chou, Liu, and Huang, 2004); Peek(1983) discusses two sources in saving plans: (1) Expected net capital gains on financial assets and (2) unexpected net capital gains on financial assets. In fact, Peek's insight is based on the CAMP model that expected income (or loss) is primarily contingent on systematic risk of market conditions. The deviation from balanced growth path may lead to the unexpected events, such as inflation, financial crisis, or job-loss. For instance, a worker who was previously employed and laid off from his last job is more likely to experience income loss during economic downturns. In fact, the unpredicted adverse events may affect stock market return and subsequently change individual's well-being and benefits. Following the classification proposed by Peek (1983), this study performs to examine the effect of risky perceptions on precautionary behavior when they re-allocate the share of risky asset in a portfolio.

A family's consumption level is subject to uncertain income over which the family has no control (Browning and Crossley, 2001; Mendelson and Amihud, 1982). Morduch (1995) emphasizes that the income levels and consumption levels are non-separable. Families usually tend to make consumption decisions by accumulating or depleting financial assets. Other researchers (Bayoumi and Macdonald, 1995) illustrate a phenomenon that families tend to use financial assets to smooth consumption no matter if the financial market is less or well developed. This view is reinforced by Morduch (1995) saying that income smoothing is contingent on different aspects of risks. In general, it consists of risk attitude, perception, and a variety of consumption controlling mechanisms. This argument strongly supports the hypothesis of this paper that workers may adjust allocation of retirement accounts against uncertain income and risks.

Model

In this paper, I apply a multivariable binary logistic model in which only two of the possible outcomes of change (more or less investment in stock market if investors changed their allocation since the last period) are discussed.

$$\Delta A' = \ln\left(\frac{\Delta A}{1 - \Delta A}\right) = \beta_0 + \sum \beta_m \text{Percp}_m + \sum \gamma_n X_n \quad (3)$$

Where ΔA is binary values measuring how have you changed allocation on stock? Score 1 if invest more on stock market, and -1 if invest less. Percp is a set of risky variables with an inclusion of health status, inflation perception, and crisis perception. The respondents were asked to rate the extent to which they feel worried or concerned regarding a prospective crisis, and inflation. X enters this model as control variables, such as education, age, and sex to increase the efficiency of estimation.

Risk perception is underestimated, or at least not explicitly considered in the classic Expected Utility framework that builds on risk attitude. An extension of the classic expected utility framework is proposed to emphasize the fact that investors may change the risky asset share as the market conditions changed.

Consider for instance the following case: You are offered to play a game of chance. A fair coin is tossed repeatedly until you get a first head, at which point the game ends and you get a prize. The prize “pot” starts at 1 dollar, and increases by m dollar (m is constant) in successive trials until you get a head. To enter the game, you must pay n dollars for a ticket. For example, if you toss a coin three times, and it comes up tails the first two times and ends up with a head. You have won a prize of $2+m$ dollars. Thus, the value of the losses or gains is associated with the net value of prize and ticket ($2+m-n$). Before entering the game, the player has to estimate the expected outcome of a game against uncertainty. If the prize goes up by 1 dollar for each consecutive head, the expected outcome for the game specified in Equation 4 is 2 dollars. If the prize goes up by 2

dollars, the expected outcome turns out to be 3 dollars. To simplify the description of recursive procedure, the expected outcome in this case is $m+1$, where m is the additional reward for each successful play.

$$1/2*(1)+1/4*(2)+1/8*(3)+\dots+\frac{n}{2^n}=2$$

(4)

$$1/2*(1)+1/4*(3)+1/8*(5)+\dots+\frac{2n-1}{2^n}=3$$

(5)

...

$$1/2*(1)+1/4*(1+m)+1/8*(1+2m)+\dots+\frac{n*m-m+1}{2^n}=m+1$$

(6)

Suppose players choose to enter two games with two different payoff structures. The rewards for each consecutive heads in game A and B increase by 1 dollar and 2 dollars respectively. Ticket price depends on the types of games with different payoffs. In this case, the price is set to be 2 dollars for A and 2.5 for B. The player is likely to perceive a higher risk in game A since the expected net gains (expected gains minus ticket price) for A is 0, while for B it is 0.5. Players will no doubt choose to enter game B with more expected gains. An investor decides whether to invest upon the expected gains with an appropriate level of risk to undertake. The purpose of constructing the mathematical model is twofold: (1) It is shown that risk perception enables investors to actively participate in financial activities; and, (2) Risk perception, at least in some circumstances, is more important than risk attitude.

The model mentioned above is successfully applied in practice to enlighten players to make a wise decision. However, in other practical cases, the actual behavior is more complex and difficult to estimate than a model which is simplified and subject to a few explicitly stated assumptions. The difference between the perception and reality for people who have different information precisions may vary significantly. Weber and

Milliman (1997) stated that it could be possible for a given individual to perceive risk differently from the same alternative or context at different times. So it is that the precisely or imprecisely current information perceived drives the people's decision and behavior. In this paper, a set of perception variables measures the investor's cognitive ability on accurate and inaccurate information. This paper performs an analysis of risky asset share in retirement saving plan with the inclusion of factors from a precautionary perspective. Distinguished from the previous works, this paper attempts to illustrate that the risk perception for a future event, such as inflation, financial crisis, even job promotion, may affect people's saving behavior.

Data

The data from HRS provides longitudinal information on health and economic behavior. The most distinguishing feature of the survey is the biennially consecutive waves of responses, initially reported in 1992. There are great needs for a consecutive study that assesses individual behavior difference in every two years. For most participants, an event in the last period may have direct or indirect consequences for his or her current attitudes and behaviors toward an object. For example, suppose a participant moves to a new job since the last time he/she was interviewed in this survey. We have reason to believe that this respondent recently rearranged his/her account due to a new benefit plan or match rate a new employer offers.

During the last nine years, this survey followed up and examined the behavior of participants after being interviewed the first time. This survey is designed to provide information from the last period as well as the current period. Interviewer asked a series of questions concerning a comparison between the last and current period such as, "How do you change your allocation since the last time you were interviewed?" or "Do you change your job since the last time you were interviewed?" The answers to these comparative questions, rather than simply have the respondents report, allow us to obtain a more

accurate measure of information. What is more important is to raise a question concerning the causal relationship between two events that occurred separately. We have reason to believe that people who move into a new job are more likely to undertake a higher risk if the person is better off with a higher wage and benefits.

In the year of 2008, this survey interviewed roughly 17,217 household participants aged between 40 and 60 years. However, only 1380 valid observations were available for dependent variables. All respondents were asked general question such as age, sex, and marital status, however selective respondents were asked specific questions. The so-called further investigation was carried on selective respondents who were interviewed and asked a few of questions concerning specific aspects, such as work experience and expectations. It is worth noting that the group of selective respondents varies with the types of questions involved in this survey. It is the reason why a few control variables such as the number of children, and the expense of children, failed to enter my analysis.

The number of observations listed in Table 1 is thereby relatively smaller than the overall respondents investigated in 2008. I had to remove missing values on the dependent variable that are missed for the respondent who was not asked the question. The descriptive statistics for the truncated data is reported in Table 1.

Results

A logistic model estimates the odds ratio of risky assets versus safe assets in response to an exposure to risk and the relative factors such as age, sex, and education. As seen from Table 2, years of education and sex are significantly related to the recent change in retirement assets. The coefficient 0.522 shown in Table 3 indicates that the odds ratio of investing more on risky assets for women is 1.686 times greater than that for men. For the number of years of education as a continuous variable, the change in the odds ratios in response to some amount, rather than one unit of age, is of greater interest. In this way, it is interpreted

Table 3.1

Descriptive Statistics

Variable	Label	N	Min	Max	Mean	Median	Miss	Std Dev
Stock	Increase or decrease stock investigation in last year 1—increase, -1---decrease	1380	-1	1	-0.29	-1	0	0.96
Edu	Years of education completed	1359	6	17	14.30	14	21	2.12
Age	Years of age	1338	30.59	71.20	49.28	48.847	42	6.25
Sex	1—male, 2—female	1380	1	2	1.58	2	0	0.49
Income	Respondent's Annul Income measured in one thousand dollars.	1090	0	13000	93.15	60	290	557.73
Same job	Respondent's job title changed in last 2 years: 0—not changed, 1—changed.	1258	0	1	0.11	0	122	0.32
Health	Rate current health: 1—poor, 2—fair, 3—good, 4—very good, 5—excellent.	1380	1	5	2.56	3	0	0.90
Inflation	The expected chance of inflation rate greater than 5% in next 10 years.	1250	0	100	25.11	20	130	22.88
Economic Depression	Rate the chance us have economic depression in next 10 years.	1335	0	100	55.81	50	45	31.65

that the odds ratios are decreased by 31percent for each increase of 5 years in education.

With one year increase in age, the odds ratio is reduced by 3 percent.

Table 3.2

Raw Coefficients from Logistic Regression

Model Information					
Response Variable	stock				
Number of Response Levels	2				
Model	binary logit				
Optimization Technique	Fisher's scoring				
Number of Observations Read	1380				
Number of Observations Used	951				
Testing Global Null Hypothesis: BETA=0					
Test	Chi-Square	DF	Pr > ChiSq		
Likelihood Ratio	73.115	8	<.0001		
Score	52.585	8	<.0001		
Wald	60.907	8	<.0001		
Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	2.120	0.992	4.566	0.033 ***
Edu	1	-0.072	0.038	3.634	0.057 **
Sex	1	0.522	0.156	11.158	0.001 ***
Age	1	-0.027	0.013	4.534	0.033 ***
Annual Income	1	-0.009	0.002	16.611	<.0001***
Same job title	1	0.700	0.247	8.041	0.005 ***
Current health	1	0.096	0.093	1.082	0.298
Inflation	1	-0.012	0.003	12.448	0.000 ***
Economic Depression	1	-0.007	0.002	7.302	0.007 ***

For the remaining variables, the results are interpreted as follows. Workers who changed work title recently are more likely to increase the ratio of risky assets. The odds ratio for participants with different job titles is 2 times greater than that with the same job title. It is believed that the reason for this higher odds ratio is related to a promotion or better job, which brings a higher income or stronger occupational background.

Table 3.3

Exponentiated Coefficients from Logistic Regression Results

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Edu	0.930***	0.863	1.002
Sex	1.686**	1.241	2.290
Age	0.974***	0.950	0.998
Annual Income	0.991***	0.987	0.996
Same job title	2.013***	1.241	3.266
Current health	1.101	0.918	1.320
Inflation	0.988***	0.982	0.995
Economic Depression	0.993***	0.989	0.998

The inclusion of risk factors from a precautionary perspective is the primary concern of this paper. They are generated from three aspects: (1) health risk, (2) inflation pressure, and (3) economic depression. As shown in Table 2, worries or concerns about inflation and the economy are certain to be significantly associated with the odds ratio. However, the present evidence is not supportive of the hypothesis that health status is an important risk factor for the odds of investment on risky assets. In this paper, two other variables measuring risks are shown significant effects on odds ratios of investing more versus less.

The evidence shown in Table 3 suggests that the odds ratio of more risky assets versus safe assets drops by 1.2 percent²² for one percent increase in the probability of inflation greater than 5 percent. It is also interpreted that the odds ratio of investing more risky assets reduces by 11 percent while the predicted probability of inflation grows by 10 percent. A high inflation rate, in an economic sense, is a sign of macroeconomic instability. Investors tend to lower risky investment due to the concerns about the abnormal inflation rate (greater than 5 percent) as a consequence of “excessive” bank lending and speculative bubbles.

²² Odd ratio is measured by a distance from one unit.

In this study, the prediction of economic depression shows a significant effect, being associated with less risky investment. As expected, the odds ratio of investing more risky assets falls by 7 percent for a 10 percent increase in the probability of crisis occurring in the next 10 years. In general, these results support the hypothesis of this paper that risks perceived from surroundings account for the recent change of risky asset share in individual's retirement assets.

Conclusion

The paper presents empirical evidence showing risk perception significantly impacts on the portfolio composition. A shift is made in the portfolio composition from a risky asset toward a safe asset when the investor perceives uncertainties, from either inflation or the economy. The precautionary response individual-by-individual depends on the extent to which an individual can feel or perceive. An investigation in this context is carried out concerning a recent change in retirement saving account. The study is confined to participants aged 40 or above who carry substantial savings in their retirement account. The findings of this study show that the odds of investing more on risky assets vary significantly by gender, education, job, and risk perception from either the economy or inflation. Worries or concerns about a forthcoming risk and crisis significantly depress the current activities of risky investment in pension plans.

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Appendix A

Robustness Checks

Table 1.4

Robustness Check Using Employment Size as An Alternative Measure Of Firms' Size

VARIABLES	(1)	(2)	(3)
Accounts_Payable	0.359*** (0.022)	0.405*** (0.022)	0.308*** (0.036)
Liquidation	0.068*** (0.008)	0.028*** (0.008)	0.073*** (0.008)
Net_income	0.078*** (0.015)	0.113*** (0.016)	0.079*** (0.015)
Long_Term_Debt	0.092*** (0.007)		0.109*** (0.009)
Inventory	0.018 (0.016)	0.074*** (0.015)	0.018 (0.016)
Cashlag		0.142*** (0.012)	
Payables*Dummy			0.072* (0.043)
Long_Term_Debt*Dummy			-0.036*** (0.014)
Constant	-0.863 (4.240)	-0.330 (4.352)	-0.897 (4.229)
Observation	707	707	707
Number of Firms	101	101	101
R-squared	0.622	0.601	0.626

Dummy: Net Cash Flow—1: positive net cash flow; 0: zero or negative net cash flow

Standard errors in parentheses

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

Table 1.5

A Robustness Check Using Profitability as an Alternative Measure of Firms' Size

VARIABLES	(1)	(2)	(3)
Accounts_Payable	0.414*** (0.027)	0.463*** (0.027)	0.487*** (0.049)
Liquidation	0.069*** (0.008)	0.029*** (0.009)	0.068*** (0.009)
Net_income	0.081*** (0.017)	0.109*** (0.018)	0.081*** (0.017)
Long_Term_Debt	0.096*** (0.008)		0.101*** (0.011)
Inventory	0.007 (0.018)	0.065*** (0.017)	0.013 (0.018)
Cashlag		0.137*** (0.014)	
Payables*Dummy			0.105** (0.056)
Long_Term_Debt*Dummy			-0.020 (0.016)
Constant	0.928 (5.467)	1.840 (5.628)	2.490 (5.469)
Observation	546	546	546
Number of Firms	78	78	78
R-squared	0.636	0.614	0.641

Dummy: Net Cash Flow—1: positive net cash flow; 0: zero or negative net cash flow

Standard errors in parentheses

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

Appendix B

A Robustness Check Using Profitability as An Alternative Measure of Firms' Sizes

From Table 8, the main effect of the transaction variable (AP) in large firms (0.787) is about 6 times greater than that observed in small firms (0.129). This is robust with the primary findings of this paper that larger firms for a purpose of transaction, transit more credit in a conventional flow.

Table 2.8

Determinants of Trade Credit In-stream Flows (AR) of Model 1: Seemingly Unrelated Regression

	Large (1)	Large (2)	Small (3)	Small (4)
Net Income	0.090*** (0.015)	0.086*** (0.016)	0.028* (0.018)	0.032** (0.018)
Cash Lag	0.087*** (0.014)	0.086*** (0.014)	-0.031** (0.014)	-0.032*** (0.014)
Liquidation	0.014* (0.008)	0.015** (0.008)	0.076*** (0.010)	0.075*** (0.010)
Bank Loans	0.045*** (0.008)	0.050*** (0.009)	0.074*** (0.004)	0.073*** (0.004)
Shares and Stocks	0.014*** (0.002)	0.014*** (0.002)		
Payables	0.787*** (0.017)	0.773*** (0.018)	0.129*** (0.013)	0.153*** (0.016)
Industrial Growth Rate	28.651 (44.062)	29.258 (43.891)	-1.601 (5.083)	-1.173 (5.054)
Payables*Dummy		0.062* (0.038)		-0.064** (0.026)
Bank loans*Dummy		-0.023 (0.019)		0.013 (0.010)
Constant	-1.375 (4.998)	-1.028 (5.072)	0.161 (0.648)	0.046 (0.645)
Observations	826	826	651	651
No. of I.d.	118	118	93	93

System Weighted R-Square	0.827	0.826	0.583	0.588
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Dummy: score 1 in the year of 2008--the onset of global financial crisis, otherwise, score 0.

Standard errors in parentheses

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

The results from Table 9 are shown that small firms are much more sensitive to the borrowing constraint than large firms. The coefficient of bank loans for small firms is -0.112 whereas the coefficient of bank loans for large firms is -0.025. Small Firms keep more trade credit (4 times greater) for self-financing as one-unit increase in bank loans during the onset of financial crisis. This result is also robust with the primary findings of this paper that smaller firms have to self-financing as the availability of the options is scarce, and as a result offer less trade credit to their clients.

Table 2.9

Determinants of Trade Credit Diversion (NetTC) of Model 2—Seemingly Unrelated Regression

	Large (1)	Large (2)	Small (3)	Small (4)
Net Income	-0.087*** (0.020)	-0.083*** (0.021)	-0.007 (0.059)	-0.017 (0.059)
Cash Lag	-0.088*** (0.018)	-0.089*** (0.018)	0.097** (0.046)	0.099** (0.046)
Liquidation	0.011 (0.010)	0.010 (0.010)	-0.004 (0.033)	-0.003 (0.033)
Bank Loans	-0.025*** (0.010)	-0.028*** (0.011)	-0.112*** (0.013)	-0.107*** (0.013)
Shares and Stocks	-0.019*** (0.003)	-0.019*** (0.003)		
Industrial Growth Rate	7.662 (56.695)	8.257 (56.720)	1.099 (17.138)	0.910 (17.090)
Bank loans*Dummy		0.018 (0.024)		-0.062** (0.032)
Constant	1.318	0.442	-1.124	-0.943

	(6.442)	(6.547)	(2.183)	(2.179)
Observations	826	826	651	651
No. of I.d.	118	118	93	93
System Weighted R-Square	0.827	0.826	0.583	0.588

Dummy: score 1 in the year of 2008--the onset of global financial crisis, otherwise, score 0.

Standard errors in parentheses

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