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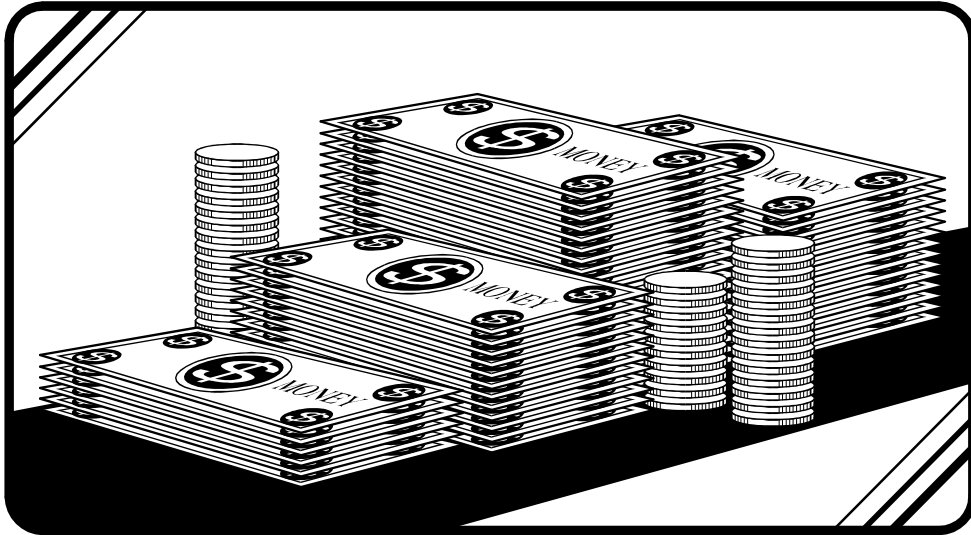
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Agribusiness Trade Credit - A Paradox

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Abstract

This article utilizes the Survey of Small Business Finances to compare and contrast trade credit practices of rural small business firms. The results show that these firms borrow money and then re-lend it to others in the form of trade credit. There is a strong direct relationship between various forms of debt held by these firms and their level of accounts receivable (e.g., trade credit extended to customers). The actual level of re-lending varied among firms depending on their adoption level of computers that are used for cash management and credit services. Accounts receivable balances were also dependent on sales levels, costs of doing business, and other income.

The most important source of funds for re-lending was obtained from mortgages and stockholder loans. These fund sources provide continuity in trade credit availability. The results also identify key factors affecting demand for trade credit extended to agribusinesses by other firms' accounts payable. A strong inverse relationship exists between accounts payable and other credit sources, indicating they are substitutes. Greater availability of credit from mortgages, other loans, and credit lines, reduces demand for accounts payable. However, they are not perfect substitutes. Demand for accounts payable varies with level of sales, cost of doing business, other income, and adoption of technology.

Key Words: agribusiness, trade, credit, finance

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Cole R. Gustafson *

Introduction

Credit granted by a selling firm to finance another firm's purchase of the seller's goods, commonly referred to as trade credit, remains the single largest source of short-term business credit (Petersen and Rajan, 1997). Recent studies of small food manufacturing firms (Gustafson, 2003) and rural small businesses (Gustafson, 2004), many of which are agribusiness related, show that trade credit comprises nearly one-fourth of total financing for these firms as well.

Persistent high levels of trade credit appear to be a paradox in the face of highly developed U.S. financial markets. Why do agribusiness firms continue to act as financial intermediaries – a role usually reserved for financial institutions? Moreover, despite its importance, trade credit receives far less attention than developments in commercial lending or corporate debt markets. Yet, when a firm's suppliers begin to demand cash on delivery, it is often a key signal the firm faces impending financial difficulty and bankruptcy.

This report utilizes Federal Reserve Bank small business survey information to compare and contrast trade credit practices of rural small business firms. The goal is to identify firm characteristics relating to their decision to either receive or extend trade credit. The survey provides robust information on the financing of small businesses including an overview of the firm's organization, financial characteristics, and credit use (Bitler, Robb, and Wolken, 2001). An appealing feature of this survey is the delineation of metro and rural (non-metro) respondents. Rural firms included in this survey are presumed to be directly or indirectly related to agriculture, thus broadly referred to as agribusinesses.

Following sections of this report provide a background on trade credit, describe the 1998 Federal Reserve's Survey of Small Business Finances including the survey's history, content, sampling procedure utilized, and procedures for access. An overview of rural small business trade credit is then presented with comparisons made between firms that receive and extend credit.

Role of Trade Credit in Agribusiness Finance

Trade credit is the primary source of finance in undeveloped countries where limited financial intermediation exists. However, it is an important component source of financial capital in developed countries as well. Rajan and Zingales (1995) find that accounts payable (AP) as a percent of total credit ranged from Germany (11.5 percent) to France (17 percent), with Canada (13.3 percent), United Kingdom (13.7 percent), Italy (14.7 percent), United States (15 percent), and Japan (15.4 percent) falling in between. Accounts receivable as a percentage of

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total assets in these countries ranged from 13 percent in Canada to 29 percent in France and Italy. Usage of trade credit would likely be higher among small and rural businesses where credit access is more difficult.

The importance of trade credit to commercial firms has been noted by several authors including Jaffe (1971) and Meltzer (1960). However, Petersen and Rajan (1997) were among the first to quantitatively investigate the importance of trade credit to both large and small businesses. Data for their analysis were obtained from both the Federal Reserve Bank's Survey of Small Business Finances and Compustat. In general, they found that firms strongly prefer to borrow from a bank, if bank credit is available. Firms with unused bank credit had significantly lower AP (i.e., they use less trade credit). Also, firms with long-term relationships with a bank use less trade credit. Interestingly, they found accounts receivable (AR) balances were positively correlated with firm age and size, that is, they were suppliers of credit. In fact, larger firms were found to have easier access to external finance and in turn acted as financial intermediaries by extending trade credit to other smaller firms. Although they studied small businesses, they did not differentiate between metro and rural firms.

Nilsen (2002) and Lang and Nakamura (1995) found that bank credit availability varies depending on macroeconomic conditions. Riskier firms often seek additional trade credit during periods of economic tightness in an effort to maintain operations. Nilsen demonstrates that in tight conditions, trade credit increases for small firms, but not for large firms – those that have greatest access to bank loans and outside sources of finance. Agribusiness firms are likely to be viewed as riskier and thereby require additional trade credit because of their concentration in a single sector (agriculture) and rural location.

These prior studies have failed though to explain the anomaly of why trade credit exists. If markets are efficient, financial institutions would be expected to use their competitive advantages of lower source fund costs and specialized credit risk assessment to lend directly, even in tight macroeconomic conditions. Recent explanations have focused on principle/agent issues and monitoring. Burkhart and Ellingsen (2002) suggest that trade credit is tied more closely to tangible assets, which can be tracked and monitored. Monies obtained from a financial institution are fungible and more easily diverted. Extension of trade credit is related to a physical quantity of goods, and repayment is expected when they are sold. Thus, tracking is easier. In risky times, trade credit may be viewed as a credible commitment not to divert funds to unprofitable purposes. Even though financial institutions have lower cost funds, total costs are higher because they cannot monitor fund usage as efficiently.

Firms receiving trade credit provide early warning signals to suppliers that are unobservable to financial institutions. Suppliers that offer two-part trade credit view payments beyond the discount period as a sign of financial difficulty (Ng, Smith, and Smith, 1999). Petersen and Rajan (1994) find that 90 percent of firms take advantage of early payment discounts.

Financial institutions may delegate monitoring risky firms to trade credit suppliers. When conditions improve, close monitoring is less important, and financial institutions can

increase their share of financing working capital for riskier firms. Moreover, firms and trade credit suppliers have incentives to collude against financial institutions. Suppliers benefit from the sale, and risk of default is shifted to the financial institution (Biais and Gollier, 1997).

Terminating shipments, and thus trade credit when nonpayment occurs, is a strong means of enforcing repayment and monitoring – especially if a supplier provides the business with a product that has no close substitutes. But, businesses provide continued and growing demand for suppliers’ goods. Thus, mutual long-term relationships are important to trade credit. So important, that Ng, Smith, and Smith (1999) find suppliers are willing to extend discount periods for long-term customers, thus refuting two-part trade credit as a signal of financial risk.

Several other theories have been advanced to explain use of trade credit over financial institution credit. Frank and Maksimovic (1998) argue that trade credit suppliers may have a comparative advantage in liquidating inventory in cases of default, thereby lowering transaction costs. Ferris (1981) shows that transaction costs are reduced in the presence of uncertainty about delivery times and production needs because trade credit reduces a firm’s need to hold precautionary balances. Finally, Brennan, Maksimovic, and Zechner (1998) find trade credit allows firms to engage in price discrimination by combining sales with credit.

The Survey of Small Business Finances

The Survey of Small Business Finances (SSBF) is used in this study to empirically test the relationships outlined above. The SSBF is conducted by the Federal Reserve Bank and collects demographic and financial information from 3,561 for-profit, nonfinancial, nonfarm small businesses (less than 500 employees) who were in business in the United States at the end of 1998. Similar surveys have been conducted in 1987 and 1993. Working papers, methodological documentation, codebooks, and full public datasets (SAS or PDF) are available online:

<http://www.federalreserve.gov/pubs/oss/oss3/nssbftoc.htm>

Information collected in the survey includes:

- Demographic information on the owners and characteristics of the firm including SIC, MSA, and Dun & Bradstreet industry classifications;
- Inventory of firm’s deposit and savings accounts, leases, credit lines, mortgages, loans, and other financial services (for each financial service, the supplier is identified);
- Characteristics of financial service suppliers including type (e.g., bank, individual), method of conducting business, patronage, and reasons for choosing source;
- Experience in applying for credit in the past 3 years;
- Experience with trade credit and equity injections;

- Firm's income and balance sheet; and
- Credit history, credit scores for both firm and owners, and Herfindahl index of concentration.

The sample for the survey was drawn from the Dun & Bradstreet Market Identifier file which represents approximately 93 percent of full-time business activity. Sampling was done according to a two-stage stratified random sample. In the second stage, small businesses with more than 20 employees and minority-owned firms were oversampled to ensure their numbers would be sufficient for statistical testing. An overall response rate of 33 percent was obtained. Appropriate sample weights are included in the public dataset.

Bitler, Robb, and Wolken (2001) summarize key survey findings. Over 83 percent of the small businesses had less than 10 employees and over one-half were organized as sole-proprietorships. The primary activity for 43 percent of the firms was business or professional services. Commercial banks were the primary supplier of financial services and 55 percent reported having loans, capital leases, or lines of credit at year end. Trade credit was used by 60 percent of small businesses in 1998, but interest rates were quite high; 2 percent a month was not uncommon. Three-fourths of the firms used computers, primarily for accessing the internet, inventory management, and bookkeeping. Data from this survey have also been used to explore lending practices of rural banks involved in mergers (Walraven, 1999) and portfolio decisions of small agribusinesses (Holmes and Park, 2000).

Regression Analysis

Ordinary least squares regression techniques are employed to explore the influence of key financial variables and measures of technology on rural small business utilization of trade credit. Again, since these firms are located primarily in rural areas and are either directly or indirectly affected by economic prosperity in agriculture, it is assumed that they are representative of agribusiness firms.

Two separate equations are estimated, one in which the firm's AR level is the dependent variable and the other where the firm's level of AP is the dependent variable. The first equation represents the degree to which agribusinesses extend trade credit to other firms and farmers, whereas the second equation delineates important factors affecting an agribusiness firm's demand for trade credit.

The variables contained in each equation arise directly from the discussion of the SSBF survey above or have been suggested by others as being important to agribusiness credit decisions. The general form of each regression model is expressed as:

$$AR_t \text{ or } AP_t = B_0 + \sum_{k=1}^K B_k X_{k,t} + \varepsilon_t ,$$

where AR_t and AP_t are the dependent variables defined above, X1-X5 are general financial measures of performance and size, X6-X14 represent liquidity and other forms of credit available, X15 is the Herfindahl measure of bank concentration, X16 represents other income available to the firm, X17-X23 quantify the firm's use of computers for various financial services, X24-X28 measure the firm's use of other financial services, X29 is the firm's Dun and Bradstreet credit score, and X30-X34 measure the firm's historical financial stress. Plausible, anticipated relationships between AR or AP and the respective variables are discussed in the next section.

Model Relationships

The first set of explanatory variables, X1-X5, is derived from financial information elicited from each firm in the survey. A direct relationship between both AR and AP, and total assets, X1, is expected. As a measure of overall firm size and business activity, both AR and AP would be expected to increase as total assets increase. Direct relationships between AR and AP and total investment, X2, are also expected for the same reason as they are indicators of overall firm expansion and activity. Likewise, direct relationships with total sales, X3, are expected. Higher sales among firms of relatively similar size indicates greater turnover and efficiency.

The relationship between cost of doing business, X4, and AR is unknown, but a direct relationship with AP is expected. Inefficient firms with relatively higher costs would be expected to have difficulty paying bills, leading to higher AP. Other income, X5, is expected to increase a firm's ability to extend AR, a direct relationship, and reduce AP, an indirect relationship.

If firms acquire debt with the expectation of re-lending it to others in the form of trade credit, a positive relationship between total liabilities, X6, and AR would be expected. Total liabilities, X6, net of AP, would be expected to be directly related to AP also. If total firm liabilities are high, AP would be expected to increase correspondingly because it is a form of debt as well.

Checking, X7, and savings, X8, account balances represent sources of funds and are expected to be directly related to AR and indirectly related to AP. As available funds increase, firms have great capacity to extend AR and pay down AP.

Variables X9-X15 represent different types of firm debt, ranging from short-term credit card to long-term mortgages. As hypothesized above with total liabilities, all of these are expected to be directly related to AR and AP. With X9-X15 and total liabilities both in the estimated equation, there is a risk of multicollinearity. However, X9-X15 do not comprise all liabilities as several minor categories of debt are not delineated in the SSBF survey.

Use of computers for various financial and office functions is measured by binary variables X16-X21 (1=yes, 2=no). Use of computer technology is expected to enable the firm to improve AR and AP management. Both would be expected to directly increase as the firm

becomes able to manage and extend more trade credit to others (AR) and take advantage of more credit available to itself (AP).

Other financial services used by the firms are quantified by binary variables X22-X26 (1=yes, 2=no). Like use of computers, greater use of technology is expected to improve AR and AP management leading to direct increases in both.

The firm's financial position is summarized by variables X27-X31. DB credit score is the credit score determined by Dun and Bradstreet (1=best risk, 5=high risk). X28-X31 are binary variables (1=yes, 2=no) indicating if the firm has been denied trade credit, been bankrupt in the last seven years, is presently delinquent on payments, or has not applied for credit because it feared denial. Firms with greater financial strength are expected to offer greater AR. Firms in financial difficulty will likely have increased AP, an inverse relationship.

The final variable, X32, is the Herfindahl index, a measure of bank concentration that is derived by summing squared market shares x 10,000. Increased bank competition is expected to lead to a greater breadth of financial services, products, and intermediation. With more competition, banks have greater incentive to supply a range of financial products to risky small businesses. Thus, a direct relationship between concentration and both AR and AP is expected.

Econometric Results

The studies reviewed earlier predict that agribusinesses obtain credit from financial institutions and then re-lend it to their customers in the form of trade credit (e.g., accounts receivable). In this section, that theory is tested using the empirical methods described above and rural small business survey data.

Table 1 presents ordinary least squares (OLS) regression results for the AR model shown in Equation 1. The estimated model has an F-value of 24.93 and adjusted R^2 of .50 with 743 d.f., a good fit for firm-level, cross-sectional data.

Table 1. Results, Accounts Receivable

Variable		Parameter Estimate	Standard Error
	Intercept	7393366**	165634
X1	Total assets	-0.00085751	0.00596
X2	Investments	0.02107*	0.01237
X3	Total sales for current FY	0.02193**	0.00649
X4	Total cost of doing business	0.01302*	0.00717
X5	Other income	0.22822**	0.03466
X6	Total liabilities	0.02757**	0.00711
X7	Checking balance year end	0.10190**	0.03956
X8	Savings balance year end	-0.07781	0.13592
X9	Personal credit card average monthly charge	-1.68351	2.70470
X10	Business credit card average monthly charge	3.19481	3.38013
X11	Amount owed on credit line	0.02268	0.04721
X12	Mortgage principal owed	0.07045**	0.02106
X13	Equipment principal owed	-0.03130	0.02762
X14	Stockholder loans principal owed	0.04336*	0.02268
X15	Principal owed other loan	0.01556	0.05417
X16	Computers used for PC banking	-74080	25777
X17	Computers used for e-mail	27204	18112
X18	Computers used for internet sales	15076	11319
X19	Computers used for credit applications online	73917**	28894
X20	Computers used for administration	-6232.63100	19195
X21	Computers used for accounting/bookkeeping	-13196	20278
X22	Use transaction services	13544	13395
X23	Use cash management services	-217528**	31784
X24	Use credit related services	-143223**	31459
X25	Use trust services	30359	23127
X26	Use brokerage services	-45574	37092
X27	db credit score rank	-9273.09154	6594.41474
X28	Suppliers ever denied trade credit	7009.18158	33969
X29	Bankruptcy past seven years	-10724	41289
X30	Delinquent on business obligations	-173.58628	8777.61369
X31	Didn't apply fearing denial	-56.60192	16857
X32	Herfindahl	5022.35010	17221

* Significant at $P < .05$.

**Significant of $P > .01$.

The dependent variable, each firm's AR, is found to be statistically related to several independent variables. The coefficients of total liabilities, mortgage principal owed, and stockholder loans are statistically significant. It is interesting to note that these are all longer term sources of credit, which may provide continuity to a firm's AR policy. Further, the magnitude of these coefficients suggests cautionary use of these credit forms for re-lending as the largest rate is 7 percent. All are direct relationships as expected.

As expected, AR were directly related to sales, investment, other income, and checking account balances. As firm activities and available funds expand, AR appears to increase as well. A firm's cost of doing business is directly related to AR, but this relationship was not hypothesized a priori.

Use of transaction and cash management services was directly related to AR, as expected. The ability to receive computerized online credit applications was indirectly related to increased AR, an unexpected result. Interestingly, levels of financial market competition, the firm's credit rating, and prior financial history were not statistically related to AR. Evidently, firms receiving AR are not concerned about the firm's health as long as they are able to receive trade credit.

Table 2 presents similar ordinary least squares (OLS) regression results for the model with AP as the dependent variable. The estimated model has an F-value of 35.51 and adjusted R² of .59 with 745 d.f., another good fit for firm-level, cross-sectional data.

The dependent variable, each firm's AP, was found to be statistically related to several independent variables, many of which were also important in the AR equation estimated above. AP was directly related to total sales and cost of doing business. As sales increase, AP increases by 3.3 percent. Moreover, as business costs increase, AP directly increases as a portion of additional costs are financed on trade credit extended by others.

Checking and savings account balances, as well as other income, represent fund sources that may mitigate the need for AP. Thus, an indirect relationship is found between these variables and AP. As hypothesized, when available funds increase, firms pay down AP in order to reduce the finance charges associated with trade credit.

Business credit cards, a credit line, a mortgage, and other loans appear to be substitutes for AP. Increases in any of these credit forms reduce AP, the inverse relationship that was hypothesized. If a firm had a difficult time obtaining financing from any of these types, it would be expected that their AP level would increase. Notice that the largest (absolute value) coefficient is attached to credit line, implying it is the closest substitute, but far from perfect.

Table 2. Results, Accounts Payable

Variable		Parameter Estimate	Standard Error
	Intercept	-297746	268594
X1	Total assets	0.00240	0.00955
X2	Investments	-0.00442	0.02007
X3	Total sales for current FY	0.03309**	0.01056
X4	Total cost of doing business	0.06789**	0.01146
X5	Other income	-0.30940**	0.05689
X6	Total liabilities	0.43127	0.01742
X7	Checking balance year end	-0.14357*	0.06404
X8	Savings balance year end	-0.18737	0.21999
X9	Personal credit card average monthly charge	-2.31873	4.37959
X10	Business credit card average monthly charge	-9.15593*	5.47475
X11	Amount owed on credit line	-0.44298**	0.07718
X12	Mortgage principal owed	-0.32664**	0.03562
X13	Equipment principal owed	0.02031	0.04474
X14	Stockholder loans principal owed	-0.05111	0.03674
X15	Principal owed other loan	-0.26458**	0.08796
X16	Computers used for PC banking	-96698*	41806
X17	Computers used for e-mail	57833*	29305
X18	Computers used for internet sales	14410	29185
X19	Computers used for credit applications online	-9067.84934	46861
X20	Computers used for administration	43030	31079
X21	Computers used for accounting/bookkeeping	22952	32846
X22	Use transaction services	-8988.30907	21694
X23	Use cash management services	-842.26848	51573
X24	Use credit related services	-117347*	50981
X25	Use trust services	-16817	37453
X26	Use brokerage services	8471.93975	60078
X27	db credit score rank	-489.34287	10680
X28	Suppliers ever denied trade credit	13980	55016
X29	Bankruptcy past seven years	47693	66875
X30	Delinquent on business obligations	20470	14216
X31	Didn't apply fearing denial	-19107	27302
X32	Herfindahl	-2434.22222	27889

* Significant at $P < .05$.**Significant of $P > .01$.

Use of computers for PC banking and email has a mixed impact on AP. The coefficient for PC banking is as hypothesized, increased adoption of computers to PC banking leads to greater AP balances (recall, this is a binary, 1=yes, 2=no, variable). However, use of computer for email leads to an inverse relationship, one that is unexpected. Use of a credit service also leads to the hypothesized relationship that increased levels of financial services leads to greater AP.

None of the other measures of bank concentration, credit score, or financial stress were statistically related to AP. Again, it appears firms perform few credit checks of past financial history before providing trade credit.

Conclusion

Do agribusinesses obtain credit from financial institutions and then re-lend it to others in the form of trade credit? Empirical results from this analysis of rural small business finances suggests the answer is yes. As predicted by the theory developed in the first part of this paper, there is a strong direct relationship between various forms of debt held by these firms and their level of AR (e.g., trade credit extended to customers). The actual level of re-lending varied among firms depending on their adoption level of computers for cash management and credit services. Accounts receivable balances were also dependent on sale levels, costs of doing business, and other income. The most important source of funds for re-lending was obtained from mortgages and stockholder loans. These fund sources provide continuity in trade credit availability.

The results also identify key factors affecting demand of trade credit extended to agribusinesses by other firms (AP). A strong inverse relationship exists between AP and other credit sources, indicating they are substitutes. Greater availability of credit from mortgages, others loans, and credit lines reduces demand for AP. However, they are not perfect substitutes. Like AR, AP demand varies with level of sales, cost of doing business, other income, and adoption of technology.

Although the SSBF survey information is robust, the selection of rural small businesses employed in the study is an imperfect definition of agribusiness. Moreover, these national data do not capture the unique competitive environments, statutory regulations, and geographic idiosyncrasies that arise in local financial markets. A dedicated survey overcoming these limitations may provide greater insight and reliability.

This study has several implications. First, re-lending on the part of agribusinesses may alter the riskiness of these firms, depending on their ability to appraise creditworthiness and the level/distribution of net returns from the re-lending activity. Equity holders, profit-sharing employees, and communities that rely on the firm's economic activity may have interest in greater disclosure of re-lending activity. Second, lenders who supply funds to agribusinesses for re-lending may need to revise their credit assessment models if re-lending returns diverge from the agribusinesses' core business activity. Finally, evaluations of financial intermediation in rural areas need to consider the important role of firm-to-firm lending. Perceived capital rationing may not account for trade credit.

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