Firm location and the method of payment in mergers and acquisitions

Dimitrios Koutmos, Wei Song and Si Zhou

Abstract

This paper examines the impact of a bidding firm's geographical location on the choice of method of payment in mergers and acquisitions. We find that rural bidders are more likely to offer pure stock deals and have lower propensity to use cash as the method of payment compared to their non-rural counterparts. Such findings are possibly attributable to recent empirical evidence which finds that rural firms face higher costs of debt and have limited access to soft information that can help in determining the true value of target firms.

JEL Classification: G14, G30, G34

Keywords: Firm location, Payment method, Mergers and acquisitions

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1. Introduction

Recent research examines the effect of firms' geographical location on corporate financial decisions such as corporate debt characteristics, payout policy and mergers and acquisitions. Arena and Dewally (2012) provides evidence that the cost of debt is higher for remotely located firms because of the informational weakness and limited relationships with better financial intermediations in the corporate debt market. In the same vein, John, Knyazeva and Knyazeva (2011) find that rural firms adopt paying higher regular dividends as an instrument to alleviate the agency conflicts between firm managers and shareholders as farther distances usually lead to the difficulty of regulating and higher monitoring costs for shareholders. For studies on mergers and acquisitions, Cai and Tian (2013) investigate the impact of a target firm's location on its corporate takeover exposure. They suggest that urban target firms are more likely to receive a takeover deal and with higher transaction completions than non-urban target firms. From the bidder side, Uysal, Kedia and Panchapagesan (2008) examine the location effect and bidder returns and find that closer distances between target and acquiring firms bring higher overall returns, especially for bidder returns in local deals which are almost double when compared with non-local deals.

The spirit of this paper is to provide the first empirical investigation of the impact of bidding firms' geographic location on influencing merger characteristics such as the choice of payment methods. As discussed above, although the relationship between firm location and terms of mergers has received growing attention in recent literature, there is no clear evidence to show whether bidding firms' own geographic location may affect merger characteristics. In fact, the choice of payment method is strongly determined by a bidder's debt capacity, cash financed deals could be a signal of new debt issuance whereas the objective of an equity financed deal is to mitigate the information asymmetry problem from the bidder side (e.g. Hansen, 1987; Huang and Walkling, 1987; Faccio and Masulis, 2005; Matos and Mergulhao, 2012).

Our study sheds light on the growing literature on investigating factors that may influence the decision of payment method in mergers and acquisitions. That is, building upon the information hypothesis that rural firms have limited access to soft information, are not as well-recognized by professional investors, and bear higher costs of debt (e.g. Coval and Moskowitz, 1999; Loughran and Schultz, 2005; Loughran, 2008), they are less likely to use cash financing in a merger deal compared to their non-rural counterparts.

2. Data and methodology

We establish our initial sample of US corporate acquisitions over the period 1998-2010 from the Thomson One Banker Mergers and Acquisitions database. We exclude firms in both financial (SIC code 6000-6999) and utility industries (SIC code 4000-4999). We require bidding firms are publicly listed whereas target firms are either private or public companies. The original sample consists of 20,333 deals. We further remove (i) unsuccessful deals over the sample period 1998-2010, (ii) deal values less than $1 million, (iii) deals where bidding firms own more than 10% of a target's shares prior to transaction and the seeking percentage of holding target shares after the transaction is less than 50%, (iv) deals described as bankruptcy acquisitions, divestitures, going private, leveraged buyouts, repurchases, restructurings and reverse takeovers, (v) deals without detailed information on the payment method composition from Thomson One Banker, and (vi) deals where information pertaining to firms' fundamentals and their headquarters could not be found in the CRSP/COMPUSTAT merged database. Overall, after removing the aforementioned deals, we are left with 5,334 deals involving 2,520 public bidding firms.

Following John, Knyazeva and Knyazeva (2011) and Arena and Dewally (2012), we retrieve location information for each firm's headquarters from the CRSP/COMPUSTAT merged database. We then gather the longitude and latitude for each bidding firm and calculate the physical distance between bidding firms' headquarters and every metropolitan area based on the 2000 US census:

$$Distance_{a,b} = arcos(deg) \times \frac{2\pi r}{360} \tag{1}$$

$$\begin{aligned} deg =& cos(lat_a) \times cos(lon_a) \times cos(lat_b) \times cos(lon_b) + cos(lat_a) \\ & \times sin(lon_a) \times cos(lat_b) \times sin(lon_b) + sin(lat_a) \times sin(lat_b) \end{aligned} \tag{2}$$

where *lat* and *lon* are latitudes and longitudes, respectively, and *r* is the radius of the earth, which is 6378 km.

A rural firm is classified as such if its distance is larger than 100 miles from any of the 49 metropolitan areas shown in 2000 US census. The remaining bidding firms are categorized as non-rural firms. On average, rural firms included in our merger sample are 524.18 miles away from the closet top 10 largest metropolitan cities such as New York, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia, Boston, Detroit, Dallas and Houston.

Figure 1 presents the deal distribution according to the geographical category of our sample. The map shows the rural and non-rural areas based on the population distribution as most metropolitan cities are located in the west and east coasts and upper Midwest of the US, whereas most rural deals occurred in California, Nebraska, Missouri, North Carolina, Virginia, Tennessee, Louisiana, Iowa and Arkansas.

[PLEASE INSERT FIGURE 1 HERE]

Our first empirical model is to estimate the percentage of cash or stock used in merger deals on the rural measurements and other control variables that may affect the choice of payment method. As shown by its definition, the distribution of our dependent variable is positively skewed, which is located within the interval [0,100]. We then adopt the Tobit regression in investigating the general relationship between rural acquiring firms and cash payment fraction:

$$y_{i,t} = \begin{cases} 0 & \text{if } y^*_{i,t} \leq 0 \\ y^*_{i,t} & \text{if } 0 < y^*_{i,t} < 100 \\ 100 & \text{if } 100 \leq y^*_{i,t} \end{cases} \tag{3}$$

$$y^*_{i,t} = \alpha_i + b_i Rural_{i,t} + \sum_{k=1}^{K} \beta_i^{(k)} CONTROLS_{i,t}^{(k)} + u_{i,t} \tag{4}$$

where $Rural_{i,t}$ is the variable that indicates firm's location. $CONTROLS_{i,t}^{(k)}$ stands for the k^{th} control variable which is expected to affect the percentage of cash payment $y_{i,t}$, and K is the total number of control variables. We also perform the same model for detecting the relationship between rural bidding firms and percentage of stock used in acquiring target firms. Figure 2 shows the distribution of percentages of methods of payment in our sample.

[PLEASE INSERT FIGURE 2 HERE]

Our second regression model analyzes the choice of payment as measured by dummy variables (cash or stock dominating) and we use a Probit model to examine a particular likelihood of rural bidding firms in selecting one of the specific payment method in the merger process:

$$y_{i,t} = \alpha_i + b_i Rural_{i,t} + \sum_{k=1}^{K} \beta_i^{(k)} CONTROLS_{i,t}^{(k)} + u_{i,t} \quad (5)$$

where $Rural_{i,t}$ is the variable that indicates firm's location. $CONTROLS_{i,t}^{(k)}$ stands for the k^{th} control variable, and $y_{i,t}$ is now the indicator variable that equals 1 if the composition of payment method is structured by more than 50% cash and 0 otherwise. Besides the cash dominating variable, we also examine the impact of firm location on the choice of paying pure cash as the medium of exchange in merger deals. Same models are also applied in testing the rural effects on the method of payment such as stock dominating and pure stock.

3. Empirical results

Estimation results in Table 1 show rural bidders pay fewer proportions of cash in buying target firms. This finding could be explained through the research by Arena and Dewally (2012) as they report rural firms face higher costs of debt and thus the percentage of cash as the composition of payment method of rural bidders is lower than that of non-rural bidders. In contrast, according to the information asymmetry hypothesis of equity financing deals (e.g. Fishman, 1989; Eckbo, Giammarino and Heinkel, 1990), the significant positive relationship between the rural proxy and the percentage of stock suggests rural bidders behave cautiously since equity offers provide better protection because now bidders share the post-merger risk with the shareholders. This is now advantageous to the bidder since, as mentioned earlier, rural bidders have less access to soft information pertaining to the target.

We further introduce the alternative rural measurements in testing the robustness of our estimating results. That is, we adopt the physical distance between a bidding firm's headquarter and the nearest top 10 and top 49 ranked US metropolitan areas based on 2000 US census, respectively. Similar findings have been emerged as farther the distance of bidding firms from either the top 10 or top 49 metropolitan areas, the higher the proportion of securities used as the payment method component.

[PLEASE INSERT TABLE 1 HERE]

Table 2 shows additional regression results for the likelihood of adopting cash or stock as the payment option when bidders are remotely located. Models (1) to (6) in Table 2 provide similar evidence as shown in Table 1, suggesting that a rural bidder is more likely to offer a

merger deal with stock dominating the payment method. An interesting finding that emerges is that rural bidders are more likely to acquire target firms by means of providing pure stock-financed offers. This can be explained as follows. Firstly, rural firms are strongly reluctant to endure the cost of overpayment based on pure cash-financed deals. Secondly, regarding the narrow channel in obtaining the essential soft information to better understand the target, rural bidders with pure stock payment could enjoy a state-contingent benefit when comparing with the fact that cash payment is irrelevant with the profitability of the merger. Again, results from the ordered Probit regression in models (13) to (15) show additional evidence that remotely located firms are less likely to use cash as the means of payment in merger deals.

[PLEASE INSERT TABLE 2 HERE]

4. Conclusion

Using a merger sample consisting of 5,334 deals over the period 1998-2010, we find that firm geographic location does affect the choice of method of payment in acquisitions. In particular, rural bidders are more likely to purchase target firms through stock offers and they distribute a higher proportion of stock to finance the merger. Two reasonable interpretations that support our research findings are that remotely located firms have limited access to soft information in estimating the true value of targets and with lower debt capacity given their relatively high debt yield spreads (e.g. Fishman, 1989; Martin, 1996; Arena and Dewally, 2012). Through providing further evidence on how firm location could affect corporate investment and financial decisions, our findings suggest that future research studies should consider firm location as an important factor that will affect the decision of payment method in mergers and acquisitions.

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Appendix: Variable Definitions

Variable	Definitions
	Panel A: Payment Method Variables
Percent of cash	Percentage of cash as adopted by the bidder in acquiring the target firm from Thomson One Banker.
Percent of stock	Percentage of stock as adopted by the bidder in acquiring the target firms from Thomson One Banker.
Cash dominating	A dummy variable equal to 1 if the weight of cash usage is more than 50% of the total payment composition and 0 otherwise.
Stock dominating	A dummy variable equal to 1 if the weight of stock usage is more than 50% of the total payment composition and 0 otherwise.
Pure cash	A dummy variable equal to 1 if the deal is 100% paid by cash and 0 otherwise.
Pure stock	A dummy variable equal to 1 if the deal is 100% paid by stock and 0 otherwise.
	Panel B: Main Variables of Interest
Rural	Indicator equal to 1 when the bidder is located in a rural area and 0 otherwise.
Top 10 distance	The geographic distance between a bidder's headquarters and the nearest top 10 ranked US metropolitan areas based on 2000 US census.
Top 49 distance	The geographic distance between a bidder's headquarters and the nearest top 49 ranked US metropolitan areas based on 2000 US census.
	Panel C: Deal Characteristics
Deal Size	The value of deals (in $millions) as reported by Thomson One Banker.
Diversification	A dummy variable equal to 1 if bidders and targets are located in the same industry and 0 for intra-industry deals. The definition of inter- and intra-industry is based on the 2-digit SIC code from Thomson One Banker.
Private deal	A dummy variable equal to 1 for private target firms and 0 for public target firms from Thomson One Banker.
Tender offer	A dummy variable equal to 1 if deals are described as tender offers by Thomson One Banker and 0 otherwise.
	Panel D: Bidder Characteristics
Size	The logarithm of book value of total assets (COMPUSTAT item 6).
ROA	The ratio of the operating income before depreciation (COMPUSTAT item 13) to the total assets (COMPUSTAT item 6).
Tobin's Q	The logarithm of the ratio of market value of assets over book value of assets: (COMPUSTAT item 6-COMPUSTAT item 60+COMPUSTAT item 25*COMPUSTAT item 199)/(COMPUSTAT item 6).
Leverage	Book value of debts (COMPUSTAT item 34+ COMPUSTAT item 9) over book value of total assets (COMPUSTAT item 6).
Cash	The ratio of cash and short-term investments (COMPUSTAT item 1) to book value of total assets (COMPUSTAT item 6).
Rating missing	A dummy variable equal to 1 if there is no specific credit rating for bidders and 0 for bidders with a credit rating.

Figure 1. Geographical distribution of merger and acquisition deals

This figure presents a map of the deal distribution of rural and non-rural areas in the United States over the period 1998-2010. Following Loughran and Schulz (2005) and Arena and Dewally (2012), we define rural bidders as those bidding firms that are more than 100 miles from any of the top 49 US metropolitan areas as shown in the 2000 census. Each deal is shown as a plotted point within the location of a particular bidder. Areas with darker shadings are non-rural areas and the darkest shading is for the area with the highest population in the 2000 census.

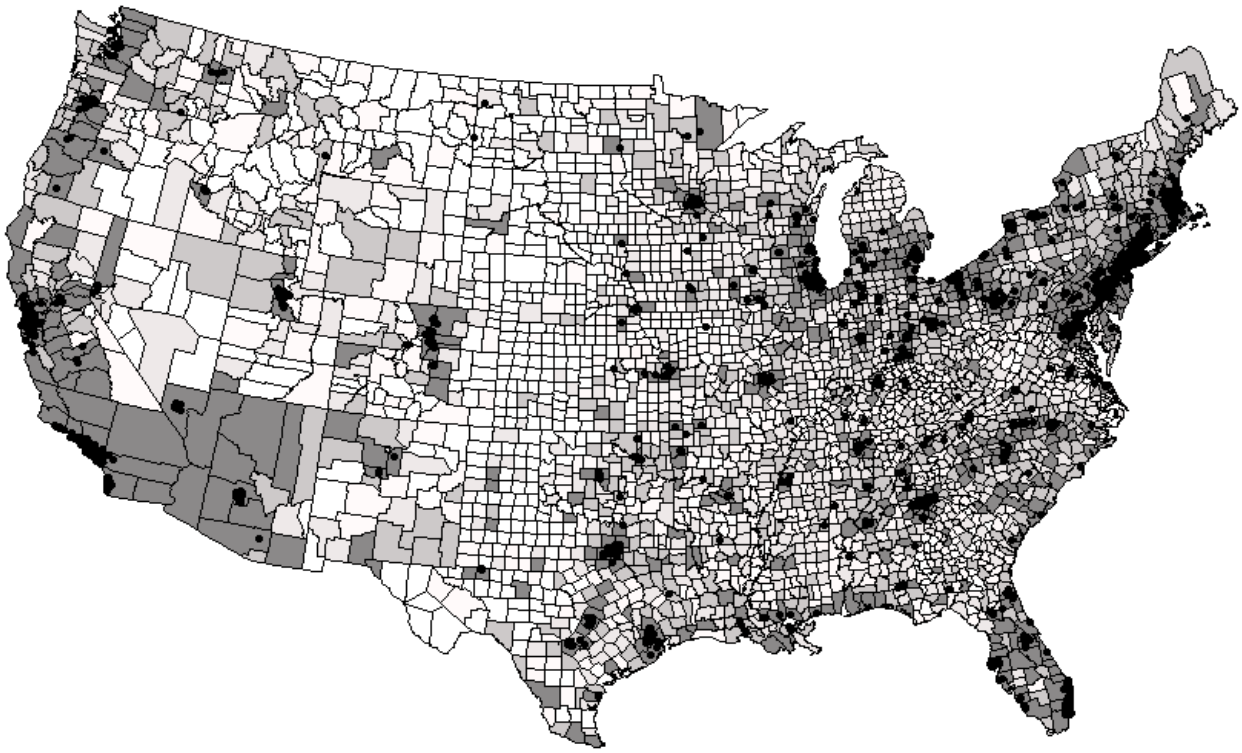
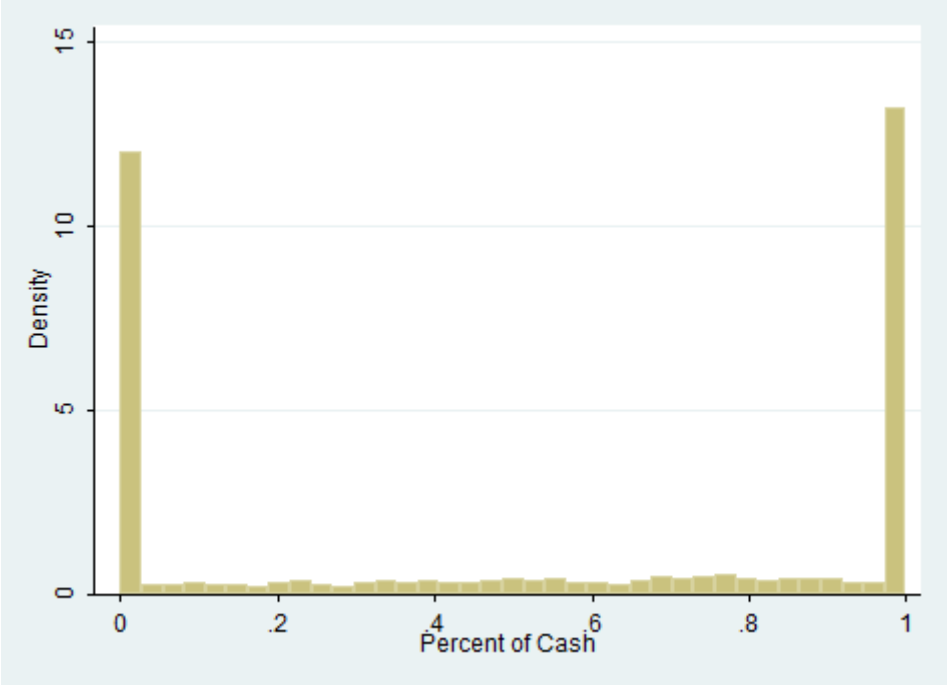


Figure 2. The distribution of payment method

This figure shows the distribution of the percentage of cash and stock used in the merger sample of 5334 deals over the period 1998-2010. All the detail information is gathered from the Thomson One Banker Mergers and Acquisitions database.



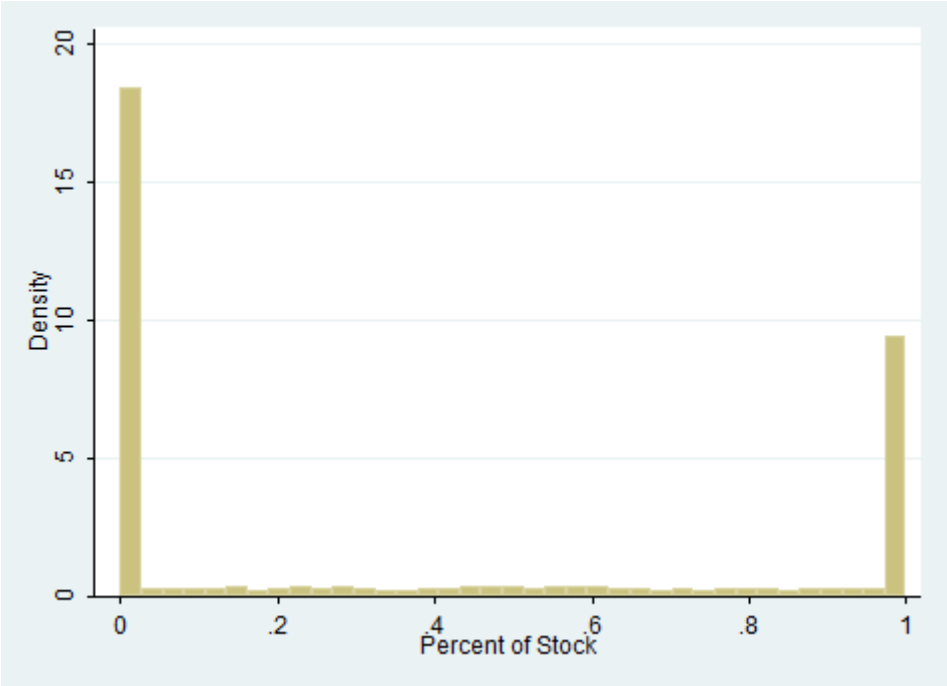


Table 1. Tobit regressions of payment methods on firm geographical location

This table presents estimation results through Tobit regressions of payment method on corporate geographical location. The merger sample consists of 5334 deals in the United States over the period 1998-2010. Models (1) to (3) refer to Tobit regressions with percent of cash as the dependent variable. Models (4) to (6) are Tobit regressions with percent of stock as the dependent variable. T-statistics based on standard errors which are robust to heteroskedasticity and provided in parentheses. Definitions of variables are discussed in the Appendix. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

	Percent of cash			Percent of stock		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Rural	-0.1566**			0.1734*		
	(-1.99)			(1.77)		
Top 10 distance		-0.0788**			0.0918**	
		(-2.05)			(1.96)	
Top 49 distance			-0.0737*			0.0909*
			(-1.79)			(1.78)
Firm size	0.0174	0.0136	0.0151	-0.0049	0.0074	0.0059
	(0.64)	(0.43)	(0.48)	(-0.14)	(0.18)	(0.14)
Return on assets	0.1526**	0.2484**	0.2469**	-0.1560*	-0.2571**	-0.2553**
	(2.15)	(2.51)	(2.50)	(-1.66)	(-1.98)	(-1.97)
Tobin's Q	0.0868	0.1072	0.1076	-0.0856	-0.1315	-0.1321
	(1.43)	(1.53)	(1.54)	(-1.12)	(-1.47)	(-1.47)
Leverage	0.0208	-0.0886	-0.0887	0.0031	0.1655	0.1657
	(0.24)	(-0.89)	(-0.89)	(0.03)	(1.31)	(1.31)
Cash	0.1409	0.1850*	0.1895*	-0.1329	-0.2009	-0.2060
	(1.56)	(1.73)	(1.77)	(-1.17)	(-1.46)	(-1.50)
Rating missing	-0.0572	-0.0728	-0.0714	0.0942	0.1205	0.1194
	(-1.08)	(-1.15)	(-1.13)	(1.41)	(1.48)	(1.46)
Diversification	0.0604*	0.0465	0.0460	-0.0637	-0.0401	-0.0395
	(1.65)	(1.07)	(1.06)	(-1.38)	(-0.72)	(-0.71)
Deal size	-0.0330***	-0.0282**	-0.0283**	0.0438***	0.0407**	0.0408**
	(-3.09)	(-2.19)	(-2.20)	(3.28)	(2.49)	(2.49)
Private deal	0.4566***	0.4746***	0.4745***	-0.6500***	-0.6816***	-0.6816***
	(8.79)	(7.71)	(7.71)	(-10.11)	(-8.74)	(-8.74)
Tender offer	1.4642***	1.4686***	1.4695***	-2.0554***	-2.1120***	-2.1128***
	(15.90)	(13.14)	(13.14)	(-15.58)	(-12.83)	(-12.83)
Constant	0.1663	0.1281	0.1202	0.4962***	0.5167***	0.5251***
	(1.30)	(0.84)	(0.79)	(3.09)	(2.65)	(2.70)
Pseudo R^2	0.0318	0.0308	0.0306	0.0370	0.0365	0.0365
Obs.	5334	5334	5334	5334	5334	5334

Table 2. Probit regressions of payment methods on firm geographical loca

This table presents estimation results through Probit regressions of payment method on corporate geographical location. The m
United States over the period 1998-2010. Models (1) to (6) refer to Probit regressions with cash dominating and stock domin
Models (7) to (12) are Probit regressions with pure cash and pure stock as dependent variables, respectively. The estimation resu
in Models (13) to (15), where the dependent variable is equal to 2 for all pure cash deals, 1 for mixed deals, and 0 for all pure
errors which are robust to heteroskedasticity are provided in parentheses. Definitions of variables are discussed in the Appendix
1%, 5% and 10% level, respectively.

	Cash dominating			St
	Model (1)	Model (2)	Model (3)	Model (4)
Rural	-0.1435**			0.1726**
	(-1.99)			(2.36)
Top 10 distance		-0.0406		
		(-1.24)		
Top 49 distance			-0.1113**	
			(-2.05)	
Firm size	-0.0006	-0.0026	0.0002	-0.0031
	(-0.02)	(-0.11)	(0.01)	(-0.13)
Return on assets	0.0992	0.0946	0.0970	-0.1495*
	(1.27)	(0.90)	(0.93)	(-1.91)
Tobin's Q	0.0920**	0.0908*	0.0908*	-0.1142**
	(2.38)	(1.93)	(1.92)	(-2.15)
Leverage	-0.0428	-0.0410	-0.0426	0.0988*
	(-0.67)	(-0.48)	(-0.50)	(1.78)
Cash	0.1445	0.1487***	0.1558***	-0.0695
	(1.25)	(2.69)	(2.79)	(-0.68)
Rating missing	-0.1085***	-0.1102**	-0.1107**	0.1026***
	(-2.62)	(-2.18)	(-2.21)	(2.78)
Diversification	0.0523	0.0497*	0.0503*	-0.0445
	(1.35)	(1.79)	(1.84)	(-1.04)
Deal size	-0.0193	-0.0195**	-0.0193**	0.0374***
	(-1.35)	(-2.31)	(-2.30)	(2.93)
Private deal	0.4364***	0.4362***	0.4349***	-0.5225***
	(7.61)	(7.08)	(7.09)	(-10.05)
Tender offer	1.3788***	1.3817***	1.3803***	-1.5101***
	(11.62)	(14.02)	(14.06)	(-19.24)
Constant	-0.2422**	-0.2300*	-0.2434**	-0.0077
	(-2.09)	(-1.94)	(-1.97)	(-0.06)
Pseudo R^2	0.0392	0.0390	0.0396	0.0504
Obs.	5334	5334	5334	5334

Table 2. Probit regressions of payment methods on firm geographical location (

	Pure cash			Pure stock		
	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
Rural	-0.0916			0.1697**		
	(-0.95)			(2.19)		
Top 10 distance		0.0016			0.0074	
		(0.05)			(0.25)	
Top 49 distance			-0.0616			0.0638***
			(-1.41)			(2.79)
Firm size	0.0291	0.0306	0.0296	0.0047	0.0027	0.0031
	(1.03)	(1.05)	(1.07)	(0.16)	(0.09)	(0.10)
Return on assets	0.1567*	0.1539*	0.1550*	-0.1354*	-0.1293*	-0.1310*
	(1.77)	(1.79)	(1.80)	(-1.94)	(-1.90)	(-1.94)
Tobin's Q	0.0657	0.0665	0.0654	-0.0471	-0.0473	-0.0464
	(1.05)	(1.08)	(1.06)	(-0.68)	(-0.67)	(-0.66)
Leverage	0.0359	0.0336	0.0359	-0.0962	-0.0961	-0.0959
	(0.44)	(0.43)	(0.44)	(-0.98)	(-1.00)	(-0.99)
Cash	0.0659	0.0734	0.0728	-0.2190**	-0.2319**	-0.2330**
	(1.17)	(1.30)	(1.28)	(-2.17)	(-2.30)	(-2.35)
Rating missing	-0.0184	-0.0173	-0.0195	0.0455	0.0442	0.0467
	(-0.32)	(-0.30)	(-0.34)	(0.53)	(0.51)	(0.53)
Diversification	0.0996***	0.0990***	0.0983***	-0.0342	-0.0329	-0.0324
	(2.74)	(2.76)	(2.73)	(-1.00)	(-0.96)	(-0.95)
Deal size	-0.0380***	-0.0382***	-0.0380***	0.0277*	0.0280*	0.0278*
	(-5.61)	(-5.72)	(-5.69)	(1.87)	(1.89)	(1.89)
Private deal	0.1609***	0.1608***	0.1598***	-0.5310***	-0.5307***	-0.5302***
	(3.77)	(3.79)	(3.77)	(-8.60)	(-8.64)	(-8.63)
Tender offer	1.1028***	1.1053***	1.1039***	-1.2569***	-1.2606***	-1.2595***
	(11.02)	(11.09)	(11.14)	(-10.71)	(-10.72)	(-10.76)
Constant	-0.5737***	-0.5845***	-0.5751***	-0.2826	-0.2685	-0.2732
	(-4.06)	(-4.04)	(-4.01)	(-1.47)	(-1.40)	(-1.39)
Pseudo R^2	0.0301	0.0299	0.0301	0.0431	0.0424	0.0428
Obs.	5334	5334	5334	5334	5334	5334