Outsourcing, firm size, and product complexity: Evidence from credit unions

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Introduction and summary

Outsourcing involves firms' choosing to procure goods or services from other firms rather than producing them internally. For example, firms can outsource accounting and other business services to service providers or maintain internal departments to meet these needs. An automobile manufacturer can design and produce parts internally or outsource by relying on suppliers for production, design, manufacturing, or some combination of these activities. The choices that firms make regarding outsourcing have increasingly attracted the attention of the media, policymakers, and researchers. This attention stems in part from the fact that outsourcing has become increasingly global in scope, meaning that firms that outsource are often moving production and jobs across international borders. In addition, a growing number of researchers in recent years have identified outsourcing as a key determinant of firm profitability and, therefore, a key component of business strategy. Competitive pressure continually drives firms toward more efficient production. Because outsourcing helps firms to achieve this goal, understanding the drivers of outsourcing improves our understanding of business strategy.

Like any critical business decision, the decision to outsource production or services has benefits and costs. By outsourcing, small firms use more efficient suppliers that can supply goods or services at lower cost. These suppliers are often larger than their clients and have economies of scale that smaller firms could not achieve with in-house production. Lower costs may also result from competition among suppliers in their product markets, providing firms that outsource with multiple options. At the same time, outsourcing imposes transaction costs of writing and enforcing contracts with suppliers. Such benefits and costs of outsourcing would depend on firm characteristics, the suppliers' industry structure, and the nature of the outsourced function.

In this article, we shed some light on the determinants of outsourcing by studying outsourcing practices of credit unions (CUs). Using data from the National Credit Union Administration (NCUA), we examine the outsourcing practices of CUs in their data processing (DP). Data processing is a critical information management function throughout the financial services industry, as it is in many other industries. Our data are unique in that they contain rich information both on CUs' DP choices and a number of other firm-level characteristics. This allows us to explore questions that have received relatively little attention from researchers. In particular, we focus on examining how CUs' decisions to outsource are associated with firm size and the diversity of their product offerings.

Firm size may be important because it affects the scale at which a firm can produce internally if it chooses not to outsource. Scale economies are widely held to influence firms' outsourcing decisions, particularly for functions that have relatively high fixed costs. Many technology-based functions, such as data processing, fall into this category because they impose significant fixed hardware, software development, and training costs. This suggests that smaller firms should outsource more to take advantage of scale provided by specialized DP vendors. On the other hand, larger firms may have more bargaining power with vendors, rendering them more likely to enter relationships with suppliers. This will be particularly true if large customers make up a significant fraction of a given supplier's business (Besanko, Dranove, and Shanley, 1996).

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We also investigate the relationship between outsourcing and the product offerings of CUs. CUs offer a wide array of financial services, with specific offerings varying across and within firms. Offering a greater number of products may have two effects on the decision to outsource. First, if there are fixed costs associated with offering an individual product, greater product diversity may change the fixed costs of internal production. This may change the scale economies of internal versus external production. A second effect of product diversity may be an increase in the complexity of the firms' DP requirements. In the literature on transaction cost economics, which we discuss in more detail below, product complexity is considered a primary influence on firms' decisions to outsource (Masten, 1984). The relationship between complexity and outsourcing is that more diverse product offerings create a greater number of contingencies regarding future vendor–firm interactions. This makes contracting costly and discourages outsourcing.

Using the data from NCUA, we try to estimate the relationship between firm size, product diversity, and outsourcing. Our empirical results show that our two measures of interest—CU size and product diversity—both affect the propensity to outsource. Moreover, they also interact in interesting ways; the relationship between diversity and outsourcing is not simple. Up to a point, greater diversity is associated with more outsourcing, but firms with the greatest product variety are less likely to outsource. This suggests that the countervailing factors affecting outsourcing change in importance with firm size and product diversity.

Beyond these relationships, CU size and product diversity are also linked, with larger CUs offering more products. Holding the number of products constant, we find that for small/medium size CUs, diversity is associated with more outsourcing. For large CUs, diversity is associated with less outsourcing.

The economics of outsourcing

In its simplest form, the decision to outsource depends on the relative costs of *internal* versus *external* production for a given input. The firm chooses internal production if its net benefits exceed those associated with external production.

Theories of outsourcing attempt to explain firms' decisions by modeling the factors that affect costs of internal and external production. If production involves significant scale economies, both internal and external production should become cheaper in average cost terms as the size of the producer increases. In general, however, the scale of internal production is limited by other constraints on firm size. This implies that smaller firms are more likely to outsource, because they can rely on scale economies provided by external producers.

Competition in suppliers' markets also encourages outsourcing. Internal production may not be subject to market discipline because internally produced inputs are not sold in competitive markets. Thus, internal production may be inefficient. A related problem would arise if managers and workers associated with internal production were not compensated in a manner aligned with profit maximization at the firm level or were difficult to monitor and could shirk. In such cases, outsourcing might result in lower input prices. This competitive effect may even make the costs of internal production substantially higher than the costs of using inputs purchased through outsourcing.

Transaction cost economics and outsourcing

The *theory of the firm* literature (Coase, 1937; Williamson, 1975; and others) suggests that while outsourcing is beneficial to many firms because markets have advantages over internal production, it may also be undesirable because market transactions impose costs in some cases. The problem arises when the transaction involves *relationship-specific investment*: sunk (unrecoverable) costs of entering an outsourcing relationship with a specific vendor.[1] When a transaction involves relationship-specific investment, once the two parties have committed to the relationship, it is possible that one or both parties may try to demand more out of the transaction than was originally agreed upon, taking advantage of the fact that the other party has already made an investment specific to the transactional relationship and so is unlikely to withdraw. This is often referred to as a *hold-up* problem. As Williamson (1975) notes, each party may use the threat of not trading to appropriate rents from the other; these rents will be directly related to the sunk costs each side has committed to the business relationship. While these sunk costs encourage parties to remain in business relationships once they have begun, the hold-up problem represents a deterrent to outsourcing. If relation-specific costs are large, internal production may be preferable.

In principle, firms in an outsourcing relationship can write contracts to mitigate the risks of such hold-ups. These contracts specify the relationship between market events and payments made from one party to the other. Contracts also specify how contingencies are handled when information about future events is imperfect. Contracts also may define patterns of asset ownership in the business relationship in order to align firms' incentives in particular ways.

However, entering contracts may prove costly for two reasons. First, contracts carry transaction costs. These are the costs associated with writing, negotiating, and enforcing contracts.[2] Because these costs are often high, contracts in the real world are often incomplete: They do not effectively cover every possible contingency of the transaction. Thus, there will still be incentives for opportunistic behavior even after the contract is written. Given the risks of such opportunistic behavior, firms may forego market transactions (outsourcing) and handle production internally, even if they can not do so efficiently relative to the market.

Within this transaction cost economics framework, the factors that make contracting more difficult will deter outsourcing. These include the level of sunk costs associated with the transaction; higher sunk costs create greater scope for hold-up. Greater complexity deters outsourcing, because it increases the cost of writing the optimal contract. This could occur because complex products are associated with a wider number of contingencies for future outcomes. These contingencies could pertain to costs for either party to the contract, demand for the final good, or some other aspect of the business environment. Complexity may also make monitoring of the outside production effort difficult.

Related literature

There are not many empirical studies on the relationship between firm size and outsourcing.[3] The most recent and very relevant study is Borzekowski (2004), which also uses the data we use in this article. Borzekowski shows the positive association between CU size and its likelihood of outsourcing the DP system. However, as we show later on, CU size and the diversity of its products are also positively correlated. In this article, we examine whether the positive relationship between CU size and the likelihood of outsourcing persists after we control for the diversity of CU products, as well as how size and product diversity interact.

There are only a few empirical papers that examine the relationship between complexity and outsourcing. Masten (1984) studies input procurement in the aerospace industry, showing that more complex inputs are less likely to be outsourced. Among more recent efforts, Baker and Hubbard (2003) study the choice of shippers to use private (in-house) or for-hire (outsourced) drivers as their carriers and find that market segments where drivers perform complex tasks are more likely to be served by in-house drivers and trucks.

Credit unions and data processing

With these ideas in mind, we examine firms' decision to outsource by using the data from call reports that CUs submit to the National Credit Union Administration (NCUA). The data include information on how CUs procure the automated DP systems to manage the records of their share and loan transactions.

CUs are financial institutions that provide banking services to their members. In principle, they are nonprofit organizations, owned by their members. In many cases, the CU is affiliated with an organization from which it draws members; for example, large companies like Boeing, state agencies, the Navy, and the Pentagon all have CUs offering services to their members. Based on the NCUA call reports, the total number of CU members grew from 65.1 million to 83.6 million between June 1994 and December 2003.

CUs earn income from interest on loans and investments, as well as fees charged for their services (such as overdraft fees, ATM fees, and credit card fees). Such income is spent on interest expenses, such as dividends on shares, interest on deposits, as well as non-interest expenses, including employee compensation, benefits, travel and conference expenses, rent, operations, member insurance (that is, borrower's protection and share insurance), and outside professional services. Often CUs use net proceeds (income minus expense) to maintain or improve the financial services they offer to members or to expand their operations. In many ways, the structure of the CU industry mirrors that of the commercial banking sector, which represents the CUs' primary competition.[4] Beyond managing checking and saving accounts, CUs offer a wide array of financial services, including more sophisticated saving and investment options, as well as personal loans and mortgages. Because of their status as nonprofit organization, CUs are entitled to preferential tax treatment.

Data processing

Like all financial services providers, CUs need to maintain detailed records of their clients' transactions. The core data for each customer usually include transaction records associated with checking or savings accounts. Managing other financial products, such as credit cards, personal loans, mortgages, as well as share certificates, increases the complexity of DP requirements. Such data may come into the CU through teller transactions, mail, phone, deposit boxes, and ATMs (automated teller machine), or online. While in principle CUs may track customer data manually (on paper), the vast majority of CUs use some form of computer system to handle their DP.

Internal versus outsourced DP services

The efficient way to source DP systems is a key concern for CUs; trade publications (for example, the

periodical *Credit Union Tech-Talk*) and industry conferences reflect this emphasis by devoting considerable attention to information technology (IT) issues and outsourcing in particular. We focus our analysis on CUs that use some form of automated (computerized) data processing system.[5] Our sample comprises approximately 10,000 CUs, with the overall number declining over the sample period 1994–2003 as CUs merge and exit (see table 1).

Among CUs using automated DP systems, some develop their own in-house and others choose various degrees of outsourcing. In the data, CUs are given three options to specify the type of their procurement of the data-processing system. The first is "credit union developed in-house system," which is the system developed and operated completely internally. The second is "vendor-supplied in-house system," which refers to a system in which the CU purchases software from a vendor, but operates hardware and software within the CU. And the third is the vendor-supplied online (VOL) system, which is the most complete form of outsourcing. In this article, we focus on the choice between this most complete form of outsourcing and the alternatives, so the term "outsourcing" from here on indicates the use of VOL.

In the VOL arrangement, the hardware and software used for DP are located off-site at the vendor's service bureau, which handles DP for many or all of its customers. The connection is made through a telecommunications link connected to terminals in the CU and these terminals may be proprietary terminals supplied by the vendor or Windows-based PCs already owned by the CU (or purchased by the CU). As shown in table 1, about 26 percent to 30 percent of the CUs in our sample choose VOL, with the percentage falling slightly over time.

TABLE 1

Credit unions using vendor online DP system

Year	Sample with automated DP system	% with vendor online system
1994	10,542	30.7
1995	10,481	29.2
1996	10,355	27.2
1997	10,245	26.4
1998	10,150	26.4
1999	9,859	26.4
2000	9,546	26.6
2001	9,323	26.4
2002	9,105	26.0
2003	8,843	26.2

Source: Authors' calculations based on NCUA call reports.

Credit union size and DP outsourcing

The VOL system is likely to differ from in-house production in its scale requirements. It involves lower fixed costs, both in terms of software development and hardware. For these reasons, we might expect smaller firms to employ VOL more often than larger firms.

CUs vary widely in terms of size. In December 2003, 14.2 percent of the CUs in our sample had less than $2 million in assets, 14.9 percent had between $2 million and $5 million, 16.2 percent had between $5 million and $10 million, 32 percent had between $10 million and $50 million, and 21 percent had $50 million or more. Table 2 shows the size distribution of CUs employing both in-house and outsourced DP services for December 2003. An interesting pattern emerges. The mean firm size for CUs that outsource is smaller than for those that do not outsource, while median firm size for CUs that outsource is larger than for those that do not outsource. Among the CUs that do not use VOL, there are some that are very big, while many others (about 67 percent) are smaller than the median CU that uses VOL. Size distribution is much tighter for those that use VOL, which also suggests that both very small and very large CUs are more likely to retain in-house DP services.[6]

Many small CUs offer less complex products than bigger CUs, thus requiring a lower-tech DP system (such as Microsoft Excel). If lower-tech DP systems have lower fixed costs, it may be worthwhile for smaller firms to handle DP internally. Of course, small firms could outsource these activities as well. However, if search and transaction costs are lumpy or fixed, it may not make sense to outsource such simple activities for which a supplier may not provide large cost advantages. It also might be easier for firms to monitor internal production given the simplicity of their DP requirements.

TABLE 2

In-house data processing versus outsourcing, year-end 2003

	In-house	Outsourcing
Number of credit unions	6,523	2,320
	Assets ($mil.)	
Mean	78.3	46.1
Median	9.0	21.6
Standard deviation	377	154
10th percentile	10.8	49.3
90th percentile	164	88.5

Source: Authors' calculations based on NCUA call reports for December 2003.

On the other hand, medium and large firms offer more sophisticated products, which require complex DP systems. While performing DP in-house allows flexibility in dealing with complex DP tasks, it could be that only the largest CUs achieve efficient scale for internal DP functions. Transaction costs may also account for this discrepancy. In the context of DP, the relationship-specific investment arises from the necessity to train employees to use the systems specific to a vendor. Vendors may also have specific hardware and data organization requirements that are not easily transferable to competitors' systems. These sunk costs make it difficult for CUs to switch vendors. In such circumstances, CUs would be vulnerable to the opportunistic behavior of vendors. This requires contracting. If the costs of contracting for DP are relatively fixed, smaller firms will be deterred from outsourcing while medium firms will find it worthwhile. Larger firms may find it worthwhile to outsource but may also be able to achieve efficient scale internally.

Product offerings and outsourcing

Here, we discuss the relationship between outsourcing and product offerings. Most CUs' data processing requirements involve handling data on share (deposit) information. This includes both share (savings) and share draft (checking) data. Beyond these basic saving and checking accounts, many CUs offer more sophisticated vehicles for saving and investing, as well as various types of loan options. Included among these are saving instruments such as share certificates, IRA accounts, money market accounts, auto loans, credit cards, fixed rate mortgages, variable rate mortgages, and home equity loans. We count how many of these eight products are offered by each CU and use this as a measure for the diversity of product offerings.[7]

Table 3 shows data covering our entire sample period, 1994–2003. On average, for about 21 percent of our sample, the data-processing systems deal with only one additional type of financial transaction beyond the basic savings and checking account data, while for about 16 percent of CUs, the DP systems process seven or eight additional types of transactions.

The degree of product diversity might affect outsourcing decisions in two ways. First, diversity might increase the minimum scale necessary to adequately produce DP services in-house. Diverse products require more sophisticated software, requiring a larger on-site IT staff to maintain the system. This would make multiproduct firms more likely to outsource than single-product firms of similar size.

A second factor affecting the relationship between product diversity and outsourcing is transaction costs.

TABLE 3

Credit unions using vendor online DP system

Number of products	% of credit unions	% using vendor online
1	20.64	12.0
2	14.73	17.4
3	12.51	25.2
4	12.96	36.5
5	12.23	40.8
6	11.12	41.3
7	10.19	33.2
8	5.62	23.7
Total	100	

Source: Authors' calculations based on NCUA call reports.

Outsourcing a DP system that manages diverse products would require more detailed contracts and greater contingency coverage. Tellers would also require more training to use a specific vendor system. Such factors increase the sunk costs of entering outsourcing relationships, making hold-up more likely. If CUs with more diverse products have greater scope for data analysis, transaction costs might be higher for those with many product offerings as well. In addition, because software is not located on-site and data are also managed remotely, CUs face the risk of unanticipated downtime for the online system. While disaster recovery is usually covered in the standard vendor contract (Klepper and Jones, 1998), the services may not always be satisfactory. These problems might also be more severe for CUs with complex products. Given that the system is not owned by the CU, the CU would not have full control over how the problems are resolved. All of these factors may encourage CUs with a wide range of products to perform data processing in-house.

Table 3 provides details of the interesting relationship between product offerings and outsourcing. A greater number of products is associated with a greater likelihood of outsourcing, but only to a point. CUs with six additional loan or share data-processing requirements are most likely to outsource their data processing. Those offering either fewer or more than six products are less likely to outsource. Again, this suggests that there are countervailing influences at work. As we mentioned before, as the number of products increases, DP needs become more complex, which might reduce the attractiveness of outsourcing if it increases transaction costs. On the other hand, product diversity might also incur greater fixed costs, which would increase the attractiveness of outsourcing.

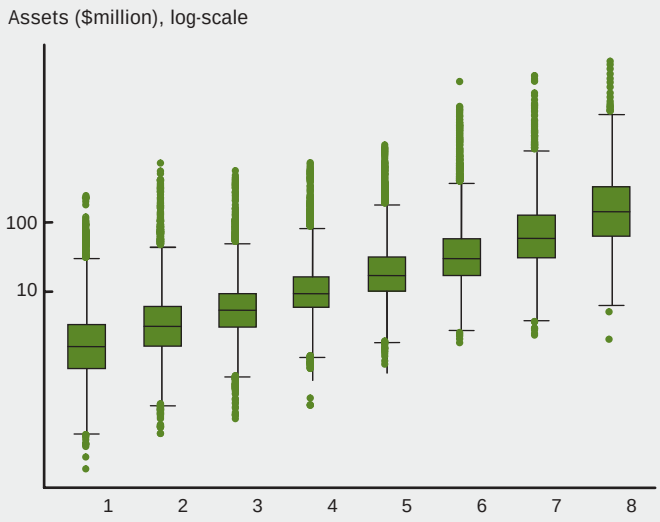
It is also possible that this relationship between the propensity to outsource and product diversity is simply picking up the relationship between the propensity to outsource and CU size. Figure 1 illustrates the positive relationship between CU size and product variety. CUs that offer more products are typically larger. Because they achieve internal scale economies, larger CUs may prefer not to outsource data processing when their product range is diverse, because the increased complexity in data processing reduces the benefit of outsourcing. However, outsourcing may still be preferred by smaller CUs offering more products, because smaller CUs do not have the same internal scale economies.

To distinguish the effects of size from the effects of complexity, in table 4 we stratify CUs by size and examine how the propensity to outsource changes with the number of products. While some cells in the table use a small number of CUs and are therefore *noisy*, the table suggests some fairly clear patterns. For smaller CUs, we see that outsourcing becomes more likely as the number of products increases. This is consistent with the notion that smaller CUs do not have scale economies in dealing with complex data processing, forcing them to use vendors if they offer complex products. The pattern also exists for medium-sized CUs, although the effect is not quite so dramatic. For large CUs, however, the relationship is reversed—a greater number of products seems to be associated with in-house DP. This relationship is more consistent with a transaction-cost-based explanation, whereby complex DP creates a difficult contracting environment and, therefore, encourages in-house production.

FIGURE 1

Credit union size by number of products

log of assets (deflated, base year = 2003), whole sample period



Notes: The center line in the shaded box indicates the median. The upper line of the box is the 75th percentile, and the bottom line is the 25th percentile. The upper adjacent line indicates the value that is approximately 1.5 times the gap between the 25th and 75th percentiles above the 75th percentile. The lower adjacent line indicates the value that is approximately 1.5 times the gap between the 25th and 75th percentiles below the 25th percentile.

Sources: Authors' calculations based on NCUA call reports.

Probit analysis

To further explore these relationships, we perform a probit analysis, specifying cross-sectional variation in outsourcing as a function of size and product diversity. The general empirical framework we employ is a discrete choice model in which a CU outsources when

$$Y_{it}^{*} = \alpha + \beta_1 Size_{it} + \beta_2 N_{it} + \beta_3 (Size_{it} \times N_{it}) + year\ dummies + other\ control\ variables + \varepsilon_{it} > 0,$$

where Y_{it}^{*} represents the net benefit of outsourcing for CU *i* in year *t*. CU size is measured by the logarithm of assets that is deflated by GDP deflator (base year is set at 2003) and *N* stands for the number of products that a CU offers. As we mentioned, based on table 4, it appears that product mix has different effects based on CU size, so we include the interaction term $Size_{it} \times N_{it}$. We assume that the error ε_{it} is normally distributed and estimate the above equation by performing probit analyses,[8] where a CU outsources when $Y_{it}^{*} > 0$ based on our whole sample of 98,449 observations. We also include a dummy variable indicating whether the CU is located in an urban area. Existing studies (Hubbard, 2001; Ono, 2001) suggest that local market size affects the propensity to outsource.[9] In our data, while CUs in urban and rural markets offer roughly the same number of products, urban CUs are on average larger. Thus, not controlling for location may cloud our interpretation of the size coefficient.[10] We also include dummies indicating the CU's field of membership, or group that it serves. Such groups are defined by community, association, educational institution, military group, government entity, as well as companies (Borzekowski, 2004). Specific types of membership groups are likely to be associated with other characteristics of CUs as well as their outsourcing propensity; by controlling for the field of membership, we can net out the

TABLE 4

Percentage of CUs outsourcing by size and number of products, 1994–2003

	Number of products							
Assets (deflated)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Less than $10 million	10.5 (19,393)	15.1 (12,841)	20.8 (9,552)	29.0 (6,846)	33.8 (2,954)	39.5 (948)	45.3 (192)	34.2 (38)
$10 million–$50 million	40.3 (821)	34.8 (1,526)	40.6 (2,571)	45.9 (5,377)	45.8 (7,468)	47.6 (6,761)	45.6 (4,192)	44.8 (1,014)
$50 million or more	66.3 (101)	34.8 (135)	38.0 (184)	37.5 (539)	30.7 (1,623)	28.7 (3,243)	23.6 (5,648)	18.8 (4,482)
All	12.00	17.40	25.20	36.50	40.80	41.30	33.20	23.70

Note: Number of observations in parentheses.
Source: Authors' calculations based on NCUA call reports.

effect of the group that the CU services from that of CU size and the diversity of their services. Table 5 shows the summary statistics of the variables included in the analysis.

Table 6 shows our results. The coefficients for CU size, the number of products (*N*), and the interaction terms between them are all significant. The coefficients for CU size and *N* are both positive, and that for the interaction term is negative.[11]

This suggests that both size and product diversity (*N*) increase the propensity to outsource, but that at higher levels of *N*, the relationship reverses. Based on the results in table 6, for CUs with average characteristics, the relationship between the probability of outsourcing and the number of products is:

$$d(\textit{Prob of Outsourcing}) / dN = 0.581 - .0340\ \textit{Size}.$$

$d(\textit{Prob of Outsourcing}) / dN$ is positive for a CU with log(assets) below 17.09.[12] For CUs larger than this, offering additional products is associated with a lower probability of outsourcing. Again, this is consistent with the idea that when DP requirements are more complex, larger CUs may prefer to perform the services in-house in order to avoid the costs of specifying many details on the contract. It is also possible that larger CUs experience greater benefits from retaining the flexibility that in-house DP allows, or that DP complexity makes monitoring the outsourced relationship more difficult.[13]

For small CUs, on the other hand, the probability of outsourcing is greater for those that offer a wider range of products. It is possible that for small CUs, the benefit of relying on scale economies in a vendor may outweigh the benefits of performing DP in-house.

The outsourcing options might have influenced the number of products that CUs offer. Among CUs that do not use vendor online systems, however, the majority purchase the software from vendors, which usually can accommodate as wide a range of products as the VOL. We also ran the probit analysis excluding the CUs that reported they develop the software by themselves, and our results remained qualitatively the same.

Another way of interpreting our empirical results is to focus on size. From table 6,

$$d(\textit{Prob of Outsourcing}) / d\textit{Size} = 0.1679 - .0340\ N.$$

The effect of *Size* is zero when *N* is about five. For CUs offering more than five products, the relationship between the likelihood of outsourcing and CU size is negative. Again, when the product offered is complex, larger CUs may be more likely to perform DP in-house, in order to avoid high transaction costs. For CUs offering fewer than five products, the relationship between size and propensity to outsource is positive. When the degree of product diversity is low, small CUs may find in-house DP less costly, considering

TABLE 5

Summary statistics: Sample size 98,271 1994–2003

Variable	**Mean**	**Standard deviation**
Log assets (deflated)[a]	16.05	1.69
Number of products	3.84	2.22
FOM: Community	0.070	0.26
FOM: Association	0.058	0.23
FOM: Education	0.082	0.27
FOM: Military	0.014	0.12
FOM: Government	0.118	0.32
Located in urban areas[b]	0.79	0.41

[a]Base year is 2003.
[b]Areas within PMSA under 1994 definition.
Source: Authors' calculations based on NCUA call reports.

the search costs and contract costs associated with outsourcing. In contrast, large firms have more negotiating power and may receive favorable treatment from vendors; thus for them, the benefits of outsourcing may outweigh the contracting costs as long as the DP requirements are not too complicated. Therefore, when a big CU offers a relatively small range of products—and, consequently, when the contract it has to negotiate if it chooses to outsource is less complicated—the CU might see more benefit from outsourcing compared with performing DP in-house.

TABLE 6

Results of probit analysis

	dF/dx	Robust standard error
CU size: log assets (deflated)	0.1679***	0.0061
Number of products	0.5812***	0.0189
Number of products × CU size	–0.0340***	0.0011
FOM: Community[a]	0.0243**	0.0127
FOM: Association[a]	–0.0558***	0.0143
FOM: Education[a]	–0.0576***	0.0116
FOM: Military[a]	–0.0446	0.0266
FOM: Government[a]	–0.0179*	0.0103
Dummy: located in urban areas[a]	0.0094	0.0096
Dummy: y95[a]	–0.0079***	0.0028
Dummy: y96[a]	–0.0291***	0.0041
Dummy: y97[a]	–0.0400***	0.0042
Dummy: y98[a]	–0.0407***	0.0044
Dummy: y99[a]	–0.0442***	0.0045
Dummy: y00[a]	–0.0446***	0.0047
Dummy: y01[a]	–0.0503***	0.0048
Dummy: y02[a]	–0.0598***	0.0043
Dummy: y03[a]	–0.0593***	0.0045
Predicted probability at mean		0.2730
Number of observations		98,271

[a] *dF/dx* is for discrete change of dummy variable from 0 to 1; assets are deflated by GDP deflator (base year = 2003).

Notes: Base year is 1994; White-correlated standard errors with clustering over credit unions were calculated; *** indicates significant at 1 percent level; ** indicates significant at 5 percent level; and * indicates significant at 10 percent level.

Source: Authors' calculations based on NCUA call reports.

Conclusion

Outsourcing has become a much examined and debated issue. Researchers are increasingly recognizing that, in addition to the economic issues associated with outsourcing across national borders, outsourcing decisions are a key component of business strategy. Little is known, however, about the factors that affect firms' outsourcing decisions. We have addressed one aspect of this issue by examining CUs' outsourcing decisions. We find that both CU size and product diversity are important factors influencing a CU's decision to outsource DP. While it appears that CU size and product diversity may have independent effects, they also interact; the relationship between outsourcing and CU size depends on the number of products that the CU offers and vice versa.

Our analysis reveals that, in general, larger CUs are more likely to outsource their DP function, although the relationship is reversed for the very largest CUs. This stands in contrast to a simple scale-based explanation for outsourcing. Product diversity in general has an intuitive impact. For smaller CUs without the capacity to handle sophisticated DP functions, having more products increases their propensity to outsource. Again, for larger CUs the relationship is reversed. Large CUs exhibit a positive relationship between the number of products and in-house data processing. This may reflect larger firms' desire to make their data processing part of their core competency, a strategy they can pursue because they have sufficient scale.

Our results imply that outsourcing is probably driven by a combination of factors rather than any one simple influence. While scale economies are an important determinant of firms' outsourcing decisions, the transaction costs associated with using vendors, which vary based on firms' characteristics, seem to affect their decisions.

NOTES

[1]Sunk costs are investment costs that can never be recouped. For example, when an investment made by a firm has no intrinsic value to other firms, cannot be sold in a secondary market, or cannot be allocated to another use within the firm, the investment represents sunk costs.

[2]Coase (1937) and Williamson (1975) identified four types of transaction costs. "First, some contingencies which the parties will face may not be foreseeable at the contracting date. Second, even if they could be foreseen, there may be too many contingencies to write into the contract. Third, monitoring the contract may be costly. Fourth, enforcing contracts may involve considerable legal costs." (Tirole, 1988)

[3]Some evidence on the relationship between outsourcing and firm size can be found in Abraham and Taylor (1996) and Ono (2001) although it was not the main focus of these papers. Examining the relationship between manufacturers' decision to contract out business services and manufacturers' characteristics, Abraham and Taylor (1996) found support for the scale-based story for outsourcing practices for business services, including janitorial, accounting, and computer services. In contrast, using the *Annual Survey of Manufactures* and examining manufacturing establishments' practices of outsourcing advertising, accounting and bookkeeping, legal services, as well as data processing, Ono (2003) finds evidence inconsistent with the scale-based story.

[4]See Emmons and Schmid (2000) for a discussion of the competitive interplay between CUs and commercial banks.

[5]We exclude CUs that use manual or paper-based systems. Because we examine the procurement of DP systems that manage share and loan information, we also exclude CUs whose loan or lease amount recorded is zero and those that do not indicate that they offer any typical loan products, including auto loan, credit card, and mortgage. We also limit our analysis to CUs of more than 100 members. None of these restrictions has a qualitative impact on our analysis.

[6]As shown in table 2, 90th percentile assets of CUs with in-house data processing are greater than those of outsourcing CUs.

[7]The banking literature draws a distinction between products that appear on the bank's balance sheet as assets (such as loans) and those that appear as liabilities (such as checking accounts). For our purposes, we assume that consumers view all financial services as "products" defined broadly.

[8]Our data are a panel, but for simplicity here we present results from a specification that does not fully exploit this dimension of the data, for example, by including firm fixed effects. We did estimate a fixed-effects model and obtained qualitatively similar results.

[9]It is possible that urban locations have a greater supply of IT personnel, allowing CUs to carry an internal IT department at lower cost. At the same time, a dense local IT labor market might be associated with greater turnover of IT personnel. In such a case, CUs may decide to outsource in order to avoid the costs associated with high IT personnel turnover.

[10]See Ono (2001) for an analysis of local market effects on outsourcing.

[11]We also ran the probit analysis, excluding military and governmental CUs as well as some very small and very large CUs whose log assets (deflated) are below and above 3 standard deviations from the mean. This left us with 85,156 observations. The results of the probit remained qualitatively the same. For this restricted sample, we also ran the probit for each year. The coefficients for size, product complexity, and their interaction terms were qualitatively the same across years.

[12]This corresponds to assets of roughly $26 million (deflated by the GDP deflator, base year = 2003).

[13]See Baker and Hubbard (2003).

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