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COMMERCIAL BANK CONSUMER LENDING AND RETAIL SALES IN RURAL HIERARCHIES

*David Henderson and George Wallace**

Introduction

An emerging dualism between rural communities has been identified as one of the current important issues facing rural areas (Alter, 1990). The dualism issue in the rural economy focuses on the interdependence between growing communities and adjacent stagnating or declining communities. Much of the interdependency between the prospering larger communities and the deteriorating smaller communities within the same rural area results from interaction of the retail sector in the different communities (Aronson, Pulver, and Buse, 1987; Deller and Chicoine, 1989; Henderson, Tweeten, and Schriener, 1988).

Economic research suggests rural shopping patterns between different size communities perpetuate the commercial growth of larger communities and the commercial deterioration of smaller communities within rural hierarchies (Henderson, 1990). The hierarchy approach provides a framework in which to estimate more accurately the retail linkage between regional growth centers and the decline of small towns within rural areas (Henderson, Tweeten, and Woods, 1992). Understanding the connection between the retail and financial sectors within rural hierarchies is fundamental to a complete conception of the relative growth and decline of rural communities (Henderson and Wallace, 1992).

Consumer lending by a local commercial bank affects the level of retail sales in a community by altering the temporal purchasing power of local borrowers. When a bank makes a consumer loan, the ability of a local consumer to purchase consumer goods increases and the level of retail sales within the communities where the consumer loan is spent increases. Consumption and retail sales both increase in the current period when the loan is spent, but may decrease in a future period when the loan is repaid.

Within the hierarchy spatial approach, an important question is whether rural borrowers spend the loan in the community where the loan originates or whether they spend the income from the loan in a different community within the local hierarchy? The results presented in this

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paper indicate that part of the income from loans originating in small communities is spent at businesses in larger communities. The hierarchy approach delineated in this paper illustrates a procedure that can be used to obtain more reliable estimates of the flow of consumer loans between communities in rural hierarchies.

Consumer Spending Patterns in Rural Hierarchies

Central place theory provides a behavioral framework for explaining consumer spending patterns in a rural area that encompasses different ordered communities. Within the central place framework, families located in or near a lower ordered community purchase retail goods in both the lower and higher ordered communities of the rural hierarchy. The theory explains how noncompetitive retail purchases by residents in smaller communities from businesses in larger communities establish consumer spending patterns in rural hierarchies and how competitive purchases of retail goods by residents in smaller communities from businesses in larger communities change the level of consumer spending in different ordered communities over time.

Senenger (1978) outlines how noncompetitive consumer spending patterns develop between different size communities in a hierarchy. Retail businesses in the lower ordered communities sell less of a variety of goods and their local customers import the remainder of their consumer items from businesses in the higher ordered communities. Shopping for goods in a larger community that are not offered in a smaller community does not affect retail sales in a smaller community adversely because the goods purchased are not sold in the smaller community and are therefore not directly competitive.

Competitive imports occur when a small town consumer engages in a multipurpose shopping trip to a larger community to purchase goods not sold in the lower ordered community and while there also purchases goods that are for sale in the smaller community. This shopping behavior represents competitive retail imports into the smaller community because the shopper could have bought some of the goods purchased in the larger community from businesses in the smaller community. Purchasing as many goods as possible while shopping in the larger community enables the rural consumer to minimize shopping time and transportation costs during the one shopping trip (Fotheringham, 1983).

The theory implies that within rural hierarchies smaller communities import retail goods from the higher ordered communities and the larger communities export retail goods to the lower ordered communities. The level of imports is related inversely to the number of goods provided in a community, suggesting that the smallest communities which contain the

narrowest variety of stores have the highest level of retail imports. Conversely, the larger communities which contain the widest variety of stores have the highest level of retail exports within a rural hierarchy.

When competitive imports of lower ordered goods from a larger community are substituted directly for consumer purchases of lower ordered goods in a smaller community, the relative market shares of the different ordered communities changes. Consumer spending decreases in the smaller communities and increases in the larger communities as rural consumers spend an increasing proportion of their consumer dollar in the larger community (Henderson, 1990). Figure 1 shows how this process has affected consumer spending in a southwest Minnesota hierarchy from 1981 to 1986. Spending at retail businesses in the largest communities increased from 29 cents of every dollar spent in 1981 to 36 cents of every dollar spent in the area in 1986, while per dollar spending decreased 3 cents per dollar in the mid-sized communities and 4 cents per dollar in the smallest communities over the same period.

Data and Study Area

The Minnesota Department of Revenue provided data on retail businesses in a ten county area of southwest Minnesota. The data include the annual number of retail businesses and sales by community from 1981 to 1986. This study uses retail sales data from 24 of the communities in the area, two of which averaged 229 retail businesses per year over the period, while ten averaged 91, and the remaining 12 averaged 21 retail businesses per year.

The retail sales data include annual retail sales by two digit Standard Industrial Classification code (SIC). The data include retail sales for SIC codes 52 through 58. Data for all retail sectors are available for the mid-sized and largest communities, but not available for SIC 53 or SIC 56 for businesses in the smallest communities.

Data on bank consumer loans by community are collected from the "Report of Condition and Income" of the Board of Governors of the Federal Reserve System. The bank data are reported by individual banks and contain annual information on outstanding consumer loans. The individual bank data are aggregated to the community level to match the retail data at the community level when more than one bank is located in a community.¹

¹The Minnesota Department of Revenue supplied data for 79 communities. The "Report of Condition and Income" from the Federal Reserve System contained bank data for 49 communities. The final combined sample consisted of the 24 communities contained in both data sets.

Model Specification

Classical loanable funds theory provides a useful framework for analyzing the relationship between community retail sales and consumer loans by banks. Commercial banks represent a local financial intermediary that transfers funds from savers in a community to consumer borrowers in the local market. The supply and demand for retail consumptions funds adjusts to a community market equilibrium as the real interest rate paid to savers by borrowers in the community adjusts.

Borrowers demand money for present consumption because they are willing to exchange a current dollar's worth of real goods and services now for less than a current dollar's worth of real goods and services in the future. Savers, on the other hand, are willing to supply funds because they are willing to exchange a current dollar's worth of real goods and services now for more than a current dollar's worth of real goods and services in the future. The borrowers achieve a higher level of utility in the current period by consuming future consumption in the present period, and savers achieve a higher level of utility in a later period by deferring present consumption into the future.

Present consumption for those who borrow is a function of current income and borrowing. Borrowing for consumption increases present purchasing power and generates higher levels of retail sales to the consumer in the current period. Conversely, repayment of the loan in the future may decrease the future income and purchasing power of the consumer when the loan is repaid.

Figure 3 shows that consumer loans average about 4.9 percent of total annual retail sales in the sample communities between 1980 and 1986. Consumer loans average 1.4 percent of total annual retail sales in the largest communities and 1.3 percent of total annual retail sales in the mid-sized communities. The smallest communities had the largest ratio of consumer loans to retail sales with an average of 2.2 percent over the period.

The empirical community retail sales function should have a variable that accounts for the larger variety of retail businesses located in the higher ordered communities. The community hierarchy variable should be included because the larger set of different retail enterprises in the higher ordered communities affects local shopping patterns. A community retail sales function, with a community hierarchy variable, is identified as follows:

$$(1) S_i = f(Y_i L_i P_i D)_i$$

where:

- S = Retail sales in community i ;
- Y = Personal income for community i ;
- L = Outstanding consumer loans in community i ;
- P = Population for community i ; and
- D = Variable that accounts for the relative effect of different sets of retail consumption opportunities in the different ordered communities.

The model employs a short-run income determination model where current consumption is a function of current income plus current consumer borrowing. The economic relationship between retail sales and local income is based on the proposition that the amount of disposable income spent by consumers at businesses in a community equals the amount of retail sales in a community (Henderson, 1990). Consumer loans by banks are assumed to increase the purchasing power of consumers in the current period by the amount of the loan.

The marginal propensity to consume from current income theoretically is less than one because the marginal propensity to save is assumed to be greater than zero. The marginal propensity to consume from consumer loans is assumed to equal one because the marginal propensity to save from consumer loans is assumed to be zero. It follows that the marginal propensity to consume from consumer borrowing is larger than the marginal propensity to consume from other current incomes.

The marginal propensity to consume from personal income also is affected by the consumer debt incurred from the act of repaying a consumer loan. The consumer loan in the current period must be repaid from personal income in some future period. The repayment of the consumer loan from future personal income decreases future consumption and future retail sales to those who borrowed in the past.²

To approximate consumer spending from bank consumer loans, a cross-sectional (24 communities) time series (1980-1986) regression equation is employed. Retail sales equals consumer expenditures for retail goods, of which the principal components at the community level are total income (personal income plus loans) and population

²The positive effect on retail sales from spending the loan in the current period is captured by the consumer loan (L) variable. The negative effect on retail sales from repaying the loan in the future is captured in the income (Y) variable during the repayment period. The expected sign on the consumer loan (L) variable is positive in time period t and the expected sign on the income (Y) variable is negative because personal income (Y) in time period t decreases by the amount of repayment on a loan made in time period $t-1$.

(Henderson, Tweeten, and Woods, 1992). The ordinary least squares (OLS) method yields empirically unbiased estimates, but the estimates may be less efficient than other more restrictive generalized least squares (GLS) procedures.

The following equation is specified to estimate the contribution of consumer loans to retail sales by business type (SIC 52 ... 58) and community size:

$$(2) S_{jit} = \alpha + \beta L_{it} + \beta D_k L_{it} + \beta Y_t + \beta P_t + e_t$$

where:

S = Deflated gross retail sales by business classification (j = 1 ... 7) by community (i = 1 ... 24) in year t (1980-1986);

α = Intercept term;

β = Coefficients to be estimated;

L = Real outstanding consumer loans by community (i = 1 ... 24);

Y = Real personal income;

P = Population;

D = A 0,1 dummy variable used to stratify the communities by size (k = 3); and

e = Random error term.³

County level income (Y) and population (P) are used as control variables for community income and population.

Following central place theory, the 24 communities are stratified into three size groups based on community population and the number of businesses per community. The dummy variable (D) enables the estimation of a coefficient on consumer loans for each of the three sizes of community. The interaction term between the dummy variable and the consumer loan variable is rotated to estimate a standard error for each loan coefficient by community size. The standard errors are used in hypothesis tests to investigate for differences in the retail sales-consumer loan relationship by size of community.

The sign on the interaction terms (DL) will depend on the shopping patterns associated with the income from consumer loans by business type and size of community. The consumer shopping theory predicts

³Each business type time series equation for each community is tested for first order autocorrelation. The hypothesis of no serial correlation is accepted or inconclusive for all equations. Each annual equation across all communities is tested for heteroskedasticity using the criteria developed by White. Heteroskedasticity is detected, which suggests that although the estimated coefficients are unbiased and valid for hypothesis testing, they may not be the most efficient estimators.

than an increase in consumer loans in the smallest communities may cause an increase in competitive retail imports into the smaller communities. If the consumer loan is spent on a competitive import, the estimated coefficient is expected to be related negatively to retail sales in the smaller communities.

The expected sign for the largest communities is positive. Borrowers in the highest ordered communities are assumed not to import from the smaller communities. Also, an increase in competitive imports into the smaller communities from the larger communities is expected to increase retail sales in the higher ordered communities (Henderson, Tweeten, and Schriener, 1988; Henderson, Tweeten, and Woods, 1992).

A regional regression without the community dummy variable by SIC code is calculated to illustrate the improved accuracy of the community estimates. The regional consumer loan coefficient represents an average of the three community coefficients (Henderson and Wallace, 1992). The sign on the regional consumer loan coefficient is expected to be positive and have a value of near one.⁴

Estimates and Hierarchical Hypothesis Tests

The coefficients and other statistical information for the estimated hierarchy equations are in Table 1. The F statistic is significant for each equation, indicating the equation fits all seven retail sectors well. The high adjusted R^2 for all equations indicates that consumer loans, personal income, and population explain most of the variation in retail sales within all seven retail sectors.

Twelve of the estimated 19 consumer loan coefficients are not significantly different from zero. This result indicates that consumer loans may not be spent in all retail sectors. Consumer loans do not affect the retail sales of general merchandise store (SIC 53), grocery stores (SIC 54), or apparel stores (SIC 56) significantly in any size community. Bank consumer loans do not appear to be related statistically to consumer purchases of these nondurable goods.

Five of the significant consumer loan coefficients are within the durable goods retail sectors. The estimated coefficient for automotive dealers (SIC 55) is significant for all three sizes of community.⁵ The

⁴Theoretically, consumer loans are contemporaneously and positively related to retail sales in the region, but the propensity to spend from consumer loans should be one because the propensity to save is assumed to be zero.

⁵The largest proportion of consumer loans by banks is used to purchase products in the automotive sector.

calculated coefficient is positive for businesses in the largest and mid-sized communities but negative for the smallest communities.

The positive sign for automotive businesses in the largest and mid-sized communities indicates consumer loans originating in these communities are used to purchase goods from automotive businesses in the same communities. The negative sign for automotive businesses in the smallest communities indicates consumer loans originating in these communities are used to purchase goods from automotive businesses in the larger communities. This result indicates that rural consumers are receiving consumer loans for automotive goods from banks in the smallest communities, but that they are making the actual purchase of the good in a larger community.

In effect, rural consumers are using consumer loans from banks located in the smallest communities to import automotive goods from businesses located in the larger communities. The use of consumer loans to import automotive goods into the smaller communities stimulates the export of automotive goods from the larger communities. The increased level of exports is an extra stimulus to automotive sales in the larger communities of the hierarchy.

Consumer loans are significant and positive for building material stores (SIC 52) and furniture stores (SIC 57) in the largest communities, indicating consumer loans are spent at these businesses. The sign on consumer loans for building material (SIC 52) and furniture (SIC 57) is negative in the smaller communities, but statistically insignificant. The negative sign indicates that rural consumers from smaller towns also may be importing building material supplies and furniture from businesses in the larger communities, although the statistical insignificance of the estimates limits the inferences that can be drawn.

Two of the significant consumer loan coefficients are within the nondurable goods retail sectors. The positive sign for eating places (SIC 58) in the largest and mid-sized communities indicates consumer loans originating in these communities are used to purchase goods from eating places. This result implies a cash leakage from consumer loans, as perhaps rural consumers use part of the consumer loan to have a meal during the shopping trip to spend the loan.

Regional and Hierarchical Properties of the Estimates

Previous research in Minnesota has indicated regression results from homogeneous clusters of counties provide better estimates than the aggregation of counties for the state (Raab, 1984). Previous research also has shown regression results from the hierarchy approach to be more accurate than the homogeneous cluster of counties approach (Henderson and Wallace, 1992). The community

hierarchy approach provides improved estimates because county estimates represent a spatial average of the communities estimates within the county.

To illustrate this point, Table 2 contains the consumer loan coefficients all 24 communities as well as the consumer loan coefficients for the automotive sector by community size. The sum of the estimated automotive coefficients by community size weighted by the share of automotive sales by community size equals the regional coefficient. The spatially aggregated regional coefficient is less than the estimated coefficient for the largest and mid-sized communities, but greater than the estimated coefficient for the smallest communities.

The regional coefficient not only overestimates the consumer loan coefficient for the smaller communities, but it also has the wrong sign. The positive effect of the consumer loans in the largest and mid-sized communities conceals the negative effect of competitive imports of automotive products into the smallest communities in the regional equation. The constrained regional equation is improper for estimating the effect of competitive imports into the smaller community markets from the higher ordered communities and provides less accurate estimates than the hierarchical approach.

Summary and Conclusions

Many rural areas face the issue of growing communities located adjacent to declining communities. A rural hierarchy approach provides a framework in which to explain the situation. The vitality of the retail sector in a single community is tied to the vitality of the retail sector in other adjacent communities because consumers in smaller communities import goods from businesses in the higher ordered communities of rural hierarchies.

The increased purchasing power from consumer loans by banks appears to be more closely related to the consumption of durable retail goods than nondurable retail goods. The one exception is a positive relationship between eating places and consumer loans in the larger communities. This result may imply a cash leakage from consumer loans for durables during the shopping trip.

The strongest relationship between consumer loans and retail sales appears to be with automotive stores. The results imply consumer loans originating from banks in small communities are used to import automotive goods into the small communities from the larger communities. Automotive dealers in the larger communities probably are furnishing most of the new cars purchased by consumers in the smaller communities.

The hierarchy approach illustrates an important principle of spatial economics. Measurements derived from data within spatial units represent spatial averages, and estimates derived from them are average coefficients through space. The procedure outlined in this paper provides a method that can be used to derive more accurate community estimates.

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Table 1
Estimated Retail Sales With Respect to Consumer Loans¹

	Building Materials (SIC 52)	General Merchandise (SIC 53)	Grocery Stores (SIC 54)	Standard Industrial Classification Code ² Automotive Stores (SIC 55)	Apparel Stores (SIC 56)	Furniture Stores (SIC 57)	Eating Places (SIC 58)
Intercept	1,349,492* (412,840)	1,744,826** (892,294)	-2,455,163 (2,256,540)	4,795,781* (937,969)	333,561 (589,569)	545,765** (279,174)	314,499 (243,650)
Consumer Loans (L)							
Largest Communities (DL)	.32676* (.0594)	.08831 (.1207)	.22367 (.3746)	.83755* (.1364)	.02090 (.0768)	.24465* (.0514)	.41612* (.0355)
Mid-Sized Communities (DL)	-.06675 (.07153)	-.30152** (.1583)	-.13229 (.4919)	.88543* (.1625)	-.15532 (.1010)	.05631 (.0609)	-.23487** (.0436)
Smallest Communities (DL)	-.26249 (.2899)	NA	-3.09502 (3.4214)	-1.11323* (.2803)	NA	-.23158 (.2345)	-.09899 (.1079)
Control Variables							
Personal Income (Y)	-.01992** (.00569)	-.00086 (.0103)	-.02335 (.0244)	-.07923* (.0128)	-.02027* (.0059)	-.00416 (.0045)	-.00603*** (.0033)
Population (P)	205.63* (66.87)	529.21* (120.22)	810.69** (365.92)	681.9* (149.5)	262.6 (75.7)	38.7 (52.1)	78.2** (39.1)
F	112.5*	125.3*	51.9*	192.8*	42.5*	65.1*	261*
Adjusted R ²	.8415	.9313	.8580	.8893	.7694	.8067	.9249
N	112	42	49	112	56	84	119

1. Standard errors are in parentheses

2. Refer to *Standard Industrial Classification (SIC) Manual, Office of the President, 1987* for a detailed description of retail activities included in the analysis

* Significant at the 1 percent level

** Significant at the 5 percent level

*** Significant at the 10 percent level

NA Not applicable

Table 2
Spatial Aggregation Property of Hierarchical Estimates¹

Equation/ Variables	Regional Equation	Hierarchy Equation	Percentage of Regional Automotive Sales ²	Weighted Coefficient ³
Coefficients Intercept	2,839,909* (970,377)	4,795,781* (937,969)		
Consumer Loans ⁴				
All Communities	.69180* (.16669)	NA	100%	.69180
Largest Communities	NA	.83755* (.1364)	28.49588%	.23866
Mid-Sized Communities	NA	.88543* (.1625)	62.99208%	.55775
Smallest Communities	NA	-1.11323* (.2803)	8.51204%	-.09476
Control Variables				
Personal Income	-.10338* (.0154)	-.07923* (.0128)		
Population	969.1* (179.3)	681.9* (149.5)		
F	194.71	192.8		
Adjusted R ²	.8230	.8893		
N	125	125		

1. Standard errors are in parentheses

2. Percentage of total sales in the automotive sector (SIC 55) by community size

3. Estimated coefficient multiplied by the percentage of sales by community size

4. The sum of the estimated community consumer loan coefficients weighted by the percentage of total automotive sales (SIC 55) equals the regional consumer loan coefficient with a rounding error at the second decimal point:

$$(.83755)(.28495) + (.88543)(.62992) + (-1.11323)(.08512) = .70165 \approx .69180$$

NA Not applicable to the equation

* Significant at the 1 percent level

Figure 1
Percentage of Retail Sales by Community Size
1980-1986

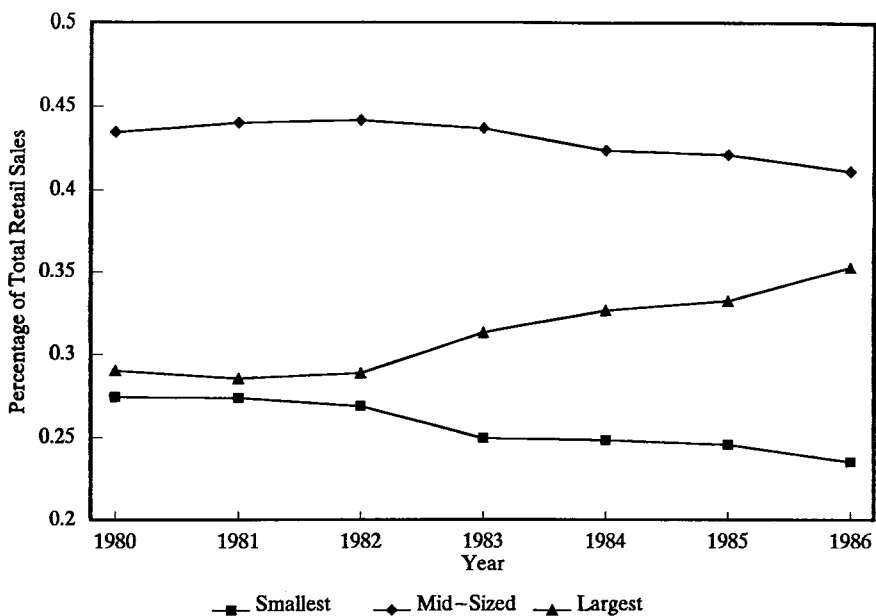


Figure 2
A Rural Minnesota Hierarchy

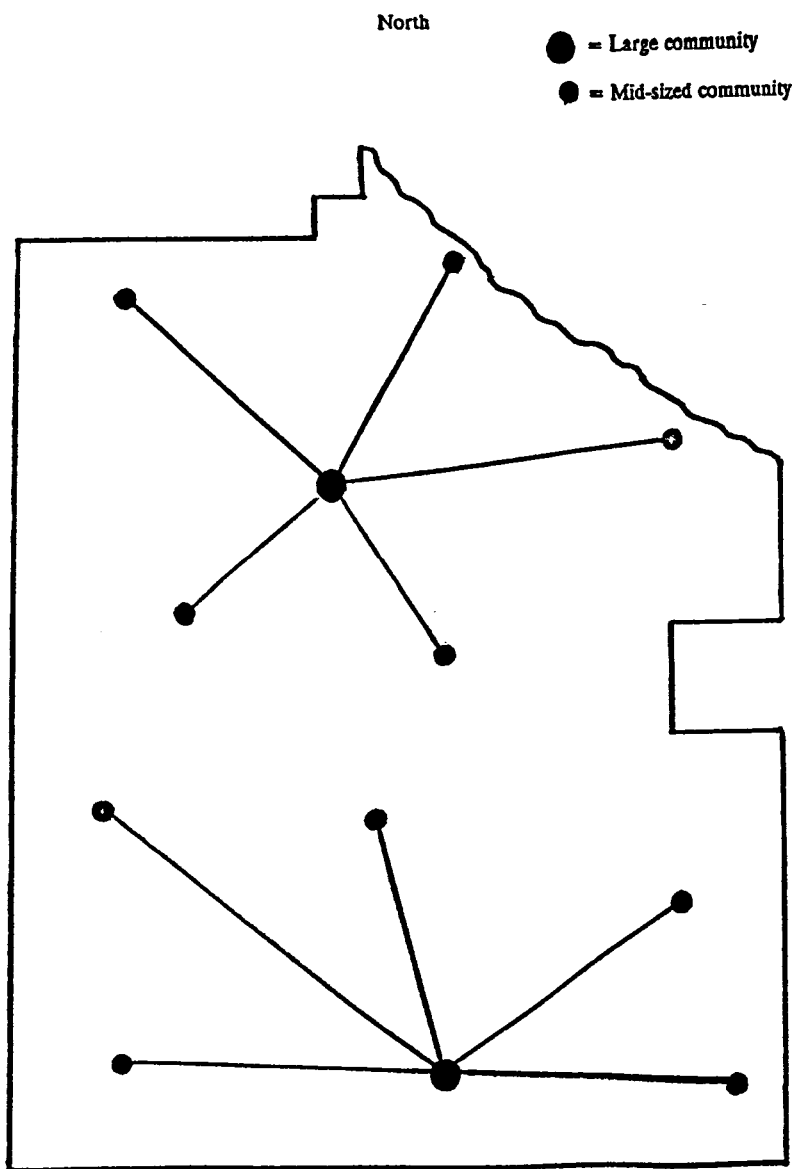


Figure 3
Consumer Borrowing as a Percent of Retail Sales
by Community Size
1980-1986

