Board of Governors of the Federal Reserve System

International Finance Discussion Papers

Number 394

April 1991

MARKET SEGMENTATION AND 1992:
TOWARD A THEORY OF TRADE IN FINANCIAL SERVICES

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ABSTRACT

The effect of the unification of the European banking market on the efficiency of the allocation of capital across Europe depends on the economic forces behind banking structure. Such forces are not well understood. The paper discusses a conceptual framework for analyzing financial services (especially bank loans and deposits), in which a key distinction is between services offered across borders and those services where location of the intermediary matters. Empirical evidence from Italy is examined that suggests that banking markets are geographically fragmented, possibly because of natural, as opposed to regulatory, barriers to capital mobility. In the light of this conceptual framework and the empirical results, the likely effect of European integration on real capital mobility and efficiency of banking markets is discussed.

Market Segmentation and 1992: Toward a Theory of Trade in Financial Services

John D. Montgomery[1]

1. INTRODUCTION

The effect of the creation of a single European market for the services of banks and other financial intermediaries depends on the economic role that these intermediaries play. Standard theorems of gains from international trade may not apply to financial services. This paper concentrates on banks and similar lending institutions[2] and argues that the structure of banking markets are quite different from the markets for goods which standard trade theory treats. In particular, markets for some banking services appear to be fragmented geographically, and it is in these services that the value-added of banks may be the highest. This fragmentation implies that the market for financial services may never approximate the geographically integrated market assumed by trade theory.

In order to consider the effect of regulatory changes such as the EC's Second Banking Directive, it is necessary to have a framework consistent with recent literature. A number of recent papers have argued that financial intermediaries are an efficient response to asymmetric information between borrowers and lenders (see Diamond (1984), Williamson (1986) and Boyd and Prescott (1986)). Another strand of the literature, starting with Bernanke (1983), argues that bank failures, by damaging credit relationships, may have real

[2] Through most of this paper, I will use the term bank to refer to an institution that performs the lending services that banks perform; the term should be understood to include various similar institutions that perform similar functions.

economic effects. Both areas of literature are surveyed by Gertler (1988). More recently, a series of empirical studies, starting with Fazzari, Hubbard and Petersen (1988), have found that investment is sensitive to the cash-flow of a firm and that this sensitivity tends to increase for smaller and newer firms, as well as for those without strong ties to financial intermediaries.

The theoretical portion of the literature cited above tends to be quite abstract and, as it stands now, not well suited to considering the issues in the structure of banking markets. This paper represents a first step toward developing a framework that is consistent with recent theoretical and empirical literature and that can also explain the forms that banking markets take. I argue that to do so it is necessary to take into account the fact that the markets for some banking services may be geographically segmented. I also present some evidence on the segmentation across regions of the Italian banking market. Italy is chosen because data are available both on regional bank interest rates and on regional capital flows.

Montgomery (1990) argues that banks with local market power may cause reduced capital mobility between regions. This decreased capital mobility results from two factors: first, banks have market power in local deposit markets, which gives them access to a supply of cheap funds; second, lending in a locality is more efficiently done by locally based intermediaries. Lending between regions will therefore tend to take place between intermediaries, which is costly because of agency problems.[3] It follows from this argument that the extent to which the liberalization of the European capital market equalizes the cost of capital across countries may depend on the structure of financial intermediation in Europe.

Section 2 of this paper discusses the economic basis for financial intermediation and the effect this has on analyzing trade in financial services. A distinction is drawn between services that can be efficiently offered across international borders (except possibly for regulatory reasons) and services where local presence gives an intermediary a substantial cost advantage. I argue that the second pattern may be applicable for the services where

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[3] If these capital flows occur through debt placements, then they will take the form of standard interbank flows. With contracts restricted to debt, Montgomery's theory becomes a formalization of the credit limits and tiering of risks that are common in the interbank market.

intermediaries' economic role is the greatest. When such local advantages exist, imperfect competition is likely, which makes the case for cross-border expansion of intermediaries unclear.

Section 3 presents an empirical analysis of market segmentation in the Italian market. Data on regional interest rates and interregional capital flows is examined for the 1981-1984 period. The analysis provides evidence of the presence of either imperfect mobility of capital between regions or local market power of intermediaries -- the two elements of the environment postulated in Montgomery (1990). The sensitivity of this analysis to econometric issues and idiosyncrasies of the Italian system is discussed.

Section 4 discusses the effects of cross-border expansion of banks and thus the effects of the Second Banking Directive when there is market segmentation. The consolidation of banks from different local markets into multi-regional and multi-national banks may contribute to increased mobility of capital between regions. It may also reduce the likelihood of bank failure and therefore reduce the need for authorities to monitor bank behavior as part of the supervisory process. On the other hand, such a consolidation, by reducing the number of participants in the market, is likely to decrease competition for the banking services that can be provided across borders. Its effect on competition within local markets is uncertain. This section also discusses the possible effects of changing technology of information processing.

Section 5 concludes with a brief discussion of the policy implications of this work. A central message of this paper is that a model of a unified geographical capital market may be unsatisfactory for both positive and normative analysis, since markets for loans and possible other services of financial intermediaries appear to be geographically fragmented, at least for some classes of borrowers. I also suggest avenues for further research.

2. THE ECONOMICS OF TRADE IN FINANCIAL SERVICES

The economic effect of a liberalization in the cross-border activities of financial intermediaries depends both on the nature of the liberalization and on the economic basis for financial intermediation. A fundamental distinction is between banking services that can

readily be offered at a distance and those that require a presence near the user of the service.[4]

For those services that can be offered at a distance, a framework similar to that used to analyze trade in goods can be used. Absent market power or externalities, the standard theorems of trade theory are applicable, and free trade is likely to be optimal. Comparative advantage will depend either on relative factor endowments or on differences in production technologies.

As long as perfect competition holds in the market for international banking services, the case for government intervention will be rather weak, although an exception may be made because of safety and soundness issues. Authorities may wish to prevent some international banking transactions because of the risk of bank failure posed by such transactions. Banks in most wealthy countries have implicit or explicit deposit insurance, usually provided by the government. This insurance may, through the familiar moral hazard channel, induce bankers to take on more risk than is socially optimal, because the cost of deposit insurance is insensitive to additional risk.

Absent such an externality, however, the presumption must be that international banking transactions can only increase welfare and should therefore be permitted. This conclusion need not carry through if banks are imperfectly competitive. Then, depending on the exact circumstances, a host of policies may enhance national or even international welfare, although as has been shown by the literature on trade under imperfect competition, the case for government intervention is still far from straightforward.

One case where imperfect competition might be economically justified is if there are significant increasing returns to scale in banking. Then, banking services will be concentrated in large firms which deal with many customers, both domestic and foreign. The problem with this justification, however, is that such increasing returns to scale have been very difficult to identify in banking. For example, Benston, Hanweck, and Humphrey (1982) find

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[4] This distinction in the general context of trade in services is discussed in McCulloch (1987) and in some of the references therein.

in U.S. banking data for 1978 that no significant economies of scale are obtained for banks past the small threshold of $25 million in deposits.[5]

Although the foregoing has considered trade in financial services across international borders, it may be more important to focus on the cross-border expansion of banks. Many banking services are offered by banks (or bank branches) located in the same country, and often in the same region and town, as the banks' customers. Thus borrowers obtain loans through their local loan officer and savers deposit their money at their local teller window (or ATM). Most international capital transactions take place between two banks rather than between banks and non-bank customers.

Recent economics and finance literature suggests that the way in which these banking services are offered is of great importance to a national economy. Relationships between banks and borrowers are part of the productive capital of an economy, because they are the result of a long-term process of information acquisition. For example, Bernanke (1983) finds that disruptions in bank credit worsened the Great Depression in the United States. Fazzari et al. (1988) provide evidence that small firms are more prone to the informational constraints that lead to a role for financial intermediaries. These firms tend to use bank financing more than larger firms, and they also tend to retain more of their earnings.

Whited (1990) finds that the borrowings of U.S. firms whose debt is rated by a bond rating agency appear to be less constrained than those firms without bond ratings. This suggests that firms about which information is widely and cheaply available (those followed by bond-rating agencies) face lower financing costs than those on which information is not easily obtained. This second type of firm is likely to have to borrow through a financial intermediary; the wedge in costs suggests both that financial intermediation plays an important economic role and that it is imperfect.

Hoshi, Kashyap and Scharfstein (1991) find that investment in Japan is more sensitive to liquidity for firms that are not members of industrial groups than for those firms that are

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[5] This study did not, however, consider the possibility suggested by the theoretical banking literature that larger banks should have a lower cost of funds because they are more diversified.

members of these groups and that therefore have close ties to large banks. They argue that this evidence is consistent with the hypothesis that monitoring by banks overcomes asymmetric information problems that would otherwise require companies to finance investment internally.

This literature suggests that transactions between banks and customers may be the result of costly and irreversible investment in information acquisition by the parties involved in the transaction. If these transactions also are significantly less costly when done at short range, then not only will markets be segmented, but it may be difficult for new bank entrants to gain access to these markets. Evidence that such barriers are high can be seen by the fact that multinational banks wishing to enter into a new market frequently buy existing banks in that market rather than set up their own branches from scratch. Since the availability of credit and the return on savings are crucial economic variables, the nature of the geographically segmented financial markets may have a significant impact on economic welfare in different regions or countries.

Trade in financial services in this context is a different issue than in the world of cross-border transactions described above. It is likely that the market for financial services, at least for those purchased by smaller agents without good access to liquid securities markets, will be segmented into geographically separated markets. These individual markets are likely to be characterized by imperfect competition between a small number of firms. In fact, existing theoretical studies of financial intermediation as a response to informational costs (especially Diamond, 1984 and Williamson, 1986) predict unlimited increasing returns to scale for financial intermediation, due to gains from diversification. Given the fact that most geographical markets have more than one bank, it seems clear that some cost must increase with bank size. The optimal scale of a bank is uncertain, but if it is large relative to a particular geographical market, this fact, along with the barriers to entry posed by long-term relationships, means that geographical markets will be characterized by small numbers of imperfectly competing banks.

A foreign bank can enter such a domestic market in one of two ways: first, it can lend to or borrow from local intermediaries; second, it can open a branch or subsidiary in the local market, which can then build relationships and enter into the set of transactions best done

locally. The first of these options is open to a bank as long as there are no legal restrictions on international capital transactions; analytically, this case is similar to the case of dealing with cross-border transactions between banks and non-banks. By adopting principles of regulatory harmonization and mutual recognition, the EC Second Banking Directive facilitates the second option; see Key (1989) for a discussion. A bank may expand into a foreign country either by opening new operations or by purchasing an existing intermediary. The implications of this expansion are discussed in Section 4.

3. EVIDENCE FROM ITALY

The gains and losses to opening a country's financial markets to outside financial intermediaries depends on the degree to which the market is localized, as discussed in the previous section, versus the degree to which the location of the intermediary providing the service is irrelevant. In this section, I provide evidence from Italian banking data that the market for bank lending is localized. The concept of local will be taken to be the region of the country; our data for Italy distinguishes twenty such regions. This section provides evidence that one of two types of localization exists: either some local borrowers prefer to borrow from local intermediaries, who in turn exercise a significant degree of market power over those borrowers, or else the flow of funds between regions is imperfect, perhaps due to agency costs in interbank transactions, as discussed in Montgomery (1990).[6]

Previous work in this field is scarce, but includes the study by Neumark and Sharpe (1989), who use data from U.S. metropolitan areas. They concentrate on the deposit side of the market and find that deposit interest rates are more sensitive to money market interest rates in banking markets that are less concentrated. This is evidence in favor of the view that financial services are to a significant extent localized markets and that the competitive

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[6] This phenomenon was probably accentuated for the data considered in this paper, since during this period, Italy had no centralized interbank market, but rather a system of negotiated, bilateral deals.

structure of banks in local markets affects the effective interest rates faced by individuals in these markets.

Both the U.S. market examined by Neumark and Sharpe and the Italian market examined in this section are markets in which legal restrictions exist (or did exist during the period from which the data are taken) on the ability of banks to expand geographically. As discussed in Montgomery (1990), multi-regional banks, by increasing interregional capital movements, may reduce some of the inefficiencies associated with the localization of banking. However, it is not evident that inefficiencies connected with interregional capital flows should disappear nor is it evident that local market power should be eliminated. It would therefore be useful to run tests similar to Neumark and Sharpe or to the one conducted in this section on data from countries where banking is dominated by nationwide banks with branches in many localities.

3.1. A Theoretical Framework

This sub-section discusses a simple theoretical framework with which to analyze local market power of banks and the degree of capital flows between regions. The case where banks have local market power will be treated as if a region has only a single monopolist bank. On the other hand, the case in which there exists perfect competition will require only that banks act as price-takers; I do not impose a zero-profit condition on banks, because there may exist fixed entry costs that render ex post profits positive. The price-taking condition allows for such fixed entry costs as long as profits are zero for entrants.

The following two simple assumptions will be maintained throughout this analysis: First, the demand for bank loans in a particular region is a decreasing and linear function of the interest rate charged on loans. Second, the supply of deposits from a particular region is an increasing and linear function of the interest rate paid. The assumption on the direction of these relationships is innocuous, but the linear nature of these relationships is a simplification. These relationships can be written in inverse form:

$$R_L = a - bL, \tag{1}$$

and

$$R_D = c + dD.$$ (2)

Equation 1 is the inverse demand curve for bank loans in a region, where a and b are positive parameters, R_L is the interest rate charged on bank loans, and L is the real volume of loans made. Equation 2 is the inverse supply curve for bank deposits in a region, where c and d are positive parameters, R_D is the interest rate paid on deposits, and D is the volume of deposits. In the analysis to follow, a and c will be assumed to vary across regions, while b and d will be assumed fixed, which simplifies the analysis.

A regional bank may also borrow from other banks. On a regional basis, borrowing by banks from other banks in the same region will net out, meaning that net interbank borrowing must be from outside the region. Denote funds borrowed this way by B, which can also be negative if a bank takes in more local deposits than it makes local loans. The bank's budget constraint requires that $B = L - D$; bank equity capital is lumped in with borrowed funds.

If funds are perfectly mobile between banks in different regions, the bank should be able to borrow as much as it wishes at a fixed interest rate. There are two exceptions to this, but neither exception will affect the analysis of this section. The first exception is if the region were a large portion of total capital markets, in which case the cost of funds would increase with the amount borrowed. But in this case, under perfect capital mobility, the cost of funds would still be the same in all regions in a given time period, which is sufficient for the analysis carried out here.

The second exception is that the riskiness of the bank may vary with the quantity it borrows. It is important in this context to distinguish between the riskiness of an individual bank and the riskiness of the entire banking sector in a particular region. There is no reason to expect the riskiness of a bank to increase as it borrows more. Models such as Diamond (1984) and Williamson (1986) predict that as banks become larger, they become more diversified and their risk of failure decreases. Alternatively, it could be argued that less

responsible or less risk-averse bankers both borrow more and make riskier lending decisions, possibly because they expend less effort on evaluating loan applicants. Some individual banks would be quite likely to have a reputation for being riskier or more irresponsible than others, but for this fact to affect the results of this paper, these characteristic would have to vary systematically across regions. It also requires that these banks can obtain more funds despite a reputation for not carefully evaluating potential borrowers. Bankruptcy risk is also unlikely to rise with the amount borrowed, since I am allowing B to consist of both debt and equity,[7] so that the debt-equity ratio and therefore bankruptcy risk should be unrelated to B.

Even if the riskiness of a particular bank might increase with the amount it borrows, lenders to the region where that bank is located need not lend through that particular bank, unless the bank had some particular advantage in the region that could not be duplicated by other banks. If that were the case, then capital would in fact be imperfectly mobile between regions, for reasons of financial structure similar to those discussed in Montgomery (1990).

If funds are imperfectly mobile across regions, then the bank faces an upwardly sloping supply curve for funds. The reasons for such a slope may be agency costs (as discussed in Montgomery (1990)), transactions costs, or non-diversifiable, region-specific risk. Of these, transactions costs seem the least plausible; it seems unlikely that transactions costs could be high enough to account for a significantly upwardly sloping supply schedule. Non-diversifiable risk could account for such an upward slope, especially if Italian capital markets were effectively cut off from foreign capital markets during the period of this study (1981-1984), which would have reduced diversification opportunities. The inverse supply curve for funds borrowed is

$$R_B = e + fB \tag{3}$$

where e and f are positive parameters, B is the quantity of funds borrowed interregionally, and R_B is the interest rate at which the funds are borrowed.

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[7] This is contrary to the assumptions of Diamond (1984) and Williamson (1986).

In all cases discussed below, it is assumed that the representative regional bank is a price-taker on the interregional market. Although a bank may be large in its own local market, it is always assumed to be small in the interregional market.

In the derivations that follow, b, d, and f are assumed fixed, while a, c, and e vary. Since this paper focuses on cross-sectional variation, variation in e will not be of interest, since e will be the same for every region. In one of two sets of regressions run in this paper, I will use time dummies to control for the effect of e, which can vary over time; the other set of regressions uses the spread between the regional bank lending interest rate and the national treasury bill rate instead of the level of the bank lending interest rate as the left-hand side variable, as a more parsimonious way to control for e. Denote the variance of a as σ_a^2, the variance of c by σ_c^2, and the covariance of a and c as σ_{ac}. I will derive the cov(R_L, B) for the four separate cases: the different possible combinations of perfect local competition vs. local market power and of perfect interregional capital mobility vs. imperfect regional capital mobility.

It is assumed throughout that banks are on their respective supply and demand curves. This assumption precludes the type of credit rationing discussed by Stiglitz and Weiss (1981). In their model, the interest rate charged by banks might not vary with the amount lent, because of asymmetric information between borrowers and banks, when banks have a limited supply of funds available. Such a partial equilibrium model, with the supply of funds to the bank not modeled, is not directly reconcilable with the analysis of this paper, but is unlikely to change the main results.[8]

This analysis also excludes other possible heterogeneity in borrowers, for example the fact that different regions have borrowers of differing riskiness, who will therefore borrow at different nominal rates even if there is perfect interregional capital mobility and perfect

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[8] An exception would be if the following situation occurred: lenders were tiered into different risk categories, the optimal interest rates charged to different categories varied, and the total expected return on loans decreased as the interest rate increased (which would be possible if the bank had some market power over its borrowers). In this case, the demand for loans could appear to be upward sloping, since the loans with the highest expected return, which the bank would lend to first, would also have the lowest stated interest rate. In this case, the parameter b in the inverse loan demand schedule (1) would be negative.

competition among banks within a region. This heterogeneity presumably accounts for some of the variation of R_L across regions, but there is no reason to expect that this variation will be systematically related to B.

In the rudimentary model sketched above, the structure of financial intermediation along two dimensions. First, either competition within regions is perfect or banks wield market power within the region. Second, funds are either perfectly or imperfectly mobile between regions. In what follows, I will sketch out the implications of the four possible combinations of these hypotheses for the correlation of regional interest rates R_L and regional borrowings B from other areas.

Case 1: Perfect regional competition and perfect interregional capital mobility.

A regional bank acts as a price taker on all markets. R_B is fixed, and the same for all regions. Bank profits are given by

$$\pi = LR_L - DR_D - BR_B \tag{4}$$

and are maximized subject to the constraint

$$B + D = L. \tag{5}$$

Price-taking behavior implies $R_B = R_L = R_D$,[9] and loans L and deposits D are determined by the demand and supply schedules (1) and (2). B is given by $L - D$ and will be affected by interregional variations in a and c. Since R_L is constant across regions (because R_B is fixed), R_L will not depend on a or c and will therefore be uncorrelated with all region-specific variables.

Case 2: Perfect regional competition, but imperfect interregional capital mobility. Regional banks solve the same constrained optimization problem (4) and (5), but in equilibrium B is

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[9] This abstracts away from other variable costs, an abstraction that will not effect the correlations derived in this sub-section.

determined by the inverse supply schedule (3). When these equations are solved for B and R_L, they yield

$$R_L = \frac{adf+bcf+bde}{bf+df+bd} \, ,$$

and

$$B = \frac{ad+cb-e(b+d)}{bf+df+bd} \, .$$

Case 3: Regional market power, but perfect interregional capital mobility.

I confine my attention to the case of a regional monopolist. In this case, the regional bank no longer takes R_L and R_D as given when maximizing profit (4), but instead considers the interaction of interest rates and quantities given by the demand and supply curves (1) and (2). In this case, the solution for R_L is

$$R_L = \frac{a}{2} + \frac{1}{2} R_B \, ,$$

where R_B is constant across all regions, and the solution for B is

$$B = \frac{ad+bc-(b+d)R_B}{2bd} \, .$$

Case 4: Regional market power and imperfect interregional capital mobility.

In this case, the regional bank acts as a monopolist toward local depositors and borrowers, and although the bank is still a price taker on the interregional market, now the supply of interregional funds is upward sloping. The solution for R_L is

$$R_L = \frac{a(2bd+bf+2df)+cbf+2ebd}{2(2bd+bf+df)},$$

and the solution for B is

$$B = \frac{ad+bc-e(b+d)}{2bd+bf+df}.$$

These four cases give the expected correlations between interregional borrowings B and the interest rate of bank loans R_L. In the null hypothesis of perfect regional competition and perfect interregional capital mobility, there should be no correlation between these two variables. In the other three cases, which comprise different alternative hypotheses with varying combinations of imperfectly mobile capital between regions and banks with local market power, there should be a non-zero correlation between B and R_L. Furthermore, if innovations (c) in the supply of deposits are controlled for, it can be shown that this correlation should be positive.

The intuition for this positive correlation is straightforward. A change in a represents a shock to the demand curve for loans facing the bank. This has two effects. The first effect stems from the imperfect immobility of capital, which implies that the supply of funds to the bank is upward sloping (the supply of local funds is always upward sloping), so that the marginal cost of funds is increasing with the quantity borrowed. If, for example, a increases, meaning the demand for loans increases, then bank lending will tend to increase. But this increases the funds banks use and therefore the marginal cost of those funds, so that the bank's new optimum implies a higher marginal revenue than before. For the competitive bank, this marginal revenue is simply R_L, while for the monopolistic bank, the marginal revenue is $2R_L - a$; in either case, a higher marginal cost, brought on by greater borrowing (both locally and interregionally) requires a higher R_L.

The second effect arises if the bank exercises market power. Then as the demand curve for loans shifts, the profit-maximizing bank will tend to take some of that shift in a quantity shift and some in a price change. The quantity change affects borrowing (from both

sources if capital is imperfectly mobile and interregionally if capital is perfectly mobile), and the price shift refers to a change in R_L.

The empirical analysis in this section will use total interregional borrowings as a proxy for interregional bank borrowings. In a world where financial intermediaries are the most efficient means for channeling funds from savers to investors and where financial transactions are more costly with distance, most interregional transactions will take place between financial intermediaries (or between branches of the same intermediaries). The fact that some transactions do not take place through intermediaries should not bias the results of this analysis, which depends on there being no correlation between borrowings and regional interest rates under the null hypothesis. The reason for this is that there is no *a priori* reason to expect the volume of transactions that do not take place through an intermediary to behave systematically so as to cause total borrowings to be spuriously correlated with interest rates on bank loans, when there is no correlation between bank borrowings and interest rates. I consider the effects of this and other possible sources of measurement error in the appendix.

The analysis uses several different controls for deposit supply. Supply of deposits should be correlated with income of residents in a region. One control used is therefore per capita income of a region; income is scaled by population in order to approximate deposit supply relative to lending opportunities, which will generally also increase with population and other measures of size of the region. Income suffers from the drawback, however, that it may endogenously depend on local interest rates; another control used is spending of governments (at all levels) in the region, with investment spending excluded. This measure, also expressed in per capita terms, has a better claim on exogeneity than income does. Both of these measures, however, may also be imperfect controls because they may also cause shifts in the demand for banks loans (a) as well as shifts in the availability of funds to banks (c). In the appendix, I also carry out a thorough analysis of the consequences using different controls.

3.2. Data and Implementation

The data are in a panel of annual observations over 4 years (1981-1984) and 20 regions. All data used in this study come from Italian government sources. Annual interest rates on bank lending is the average of quarterly regional observations from a table "Distribuzione per Regione ed Area Geografica dei Tassi d'Interesse sui Prestiti in Lire" in the Banca d'Italia (1985).[10] These interest rates are on short-term loans to households and non-financial enterprises, including non-profit institutions. Data on regional net imports, regional GDP, and regional government spending come from Istituto Centrale di Statistica (1986); the data are in 1970 prices (billions of lira). Regional net imports are the net inflow of goods from all other areas, including other regions of Italy. Regional population figures, used to compute per capita income, come from the 1981 Census, as reported in Istituto Centrale di Statistica (1988). Consumer price indices are published by the Banca d'Italia in its 1985 annual report; the base year is 1980 = 100. Interest rates are converted to ex post real interest rates using consumer price inflation over the following year.[11]

The interest rate spread is calculated by subtracting the interest rate of Italian Treasury bills from the interest rate on regional bank loans. The Treasury bill rate is an average of monthly observations on three-month bills at primary market auctions. This data also comes from the Banca d'Italia.

In the theoretical discussion above, no distinction was made between stocks and flows. Banks in Italy are prohibited from making all but a small number of long-term loans (see Price Waterhouse (1988, p. 108)). All other lending must not exceed a term of 18 months; the data used in this paper is on the short-term loans. Thus most but not all of a bank's loans

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[10] Interest rate data for the first quarter of 1981 was not available, so that the 1981 interest rate observation is an average of the second through the fourth quarter.

[11] The purpose of this is to provide a more consistent scaling of interest rates from year to year. Nominal interest rates would give identical significance levels for the flow regressions, which employ time dummies as well, but not for the stock regressions. The possibility that inflation rates vary across regions introduces a possible source of measurement error for interest rates, which is analyzed in the appendix.

will be turned over each year, so that the data I am using comes close to being the interest rate on the entire stock of loans, but with new loans weighted somewhat more heavily.

The analysis will be done for both flow and stock measures of borrowings. For the flow measure, I will use regional net imports. This is related to net borrowings by the following identity:

$$NM = B + FI + T,$$

where NM are net imports, B new borrowings from other areas, FI net factor income received from other areas, and T unilateral transfers from other areas. The presence of factor income and transfers means that net imports measure new borrowings with error, a fact that may bias the coefficient of NM. Another problem with this measure is that factor income and transfers may affect the volume of deposits in a region. Both of these points are discussed in more detail in the appendix, but they suggest that the results using flows must be interpreted with some caution, since they may be tainted by measurement error.

The stock measure is less subject to measurement error, in that it is possible to take into account those factor payments that represent interest payments on previous borrowings. The stock of borrowings is the region's net debt to the outside world and is equal to the sum of previous flow borrowings plus the accumulated interest on these flows. This measure can be derived as follows. First, decompose factor income in period t into non-capital factor income Y_t^F less interest on the region's net debt position D_{t-1}:

$$FI_t = Y_t^F - rD_{t-1}.$$

Net debt evolves according to

$$D_t = D_{t-1} + \left(NM_t + rD_{t-1} - Y_t^F - T_t\right).$$

Backwards substitution yields

$$D_t = D_0 (1+r)^t + \sum_{i=1}^{t} \left((1+r)^{t-i} \, NM_i \right) - \sum_{i=1}^{t} \left((1+r)^{t-i} \left(Y_i^F + T_i \right) \right).$$

In this expression, net debt in period t is represented as the sum of the initial net debt in some period 0 (grossed up by subsequent interest payments on this debt) and subsequent borrowings (also grossed up by subsequent interest). The subsequent borrowings are separated into a weighted sum of net imports, which we observe, and a weighted sum of transfers and non-capital factor income, which will be subsumed into the error term. In this paper, $t = 0$ represents 1980 and $t = 1$ through $t = 4$ represents 1981 through 1984, the sample periods. Since a stock measure for D_0 does not exist, this component will be approximated by a region-specific fixed-effect that is constrained to grow by the real interest rate each year. This term will enter the regression the regression separately from the $(\Sigma (1+r)^{t-i} NM_i)$ term. The interest rate will be approximated as a real interest rate of either 0 or 5 % per year. This is an approximation in that only under the null hypothesis of perfect capital mobility should the interest rate be the same across regions. Since I have allowed for interest payments, the error term in the stock regressions will include only factor payments on non-capital factors, particularly labor, and unilateral transfers. Thus we have substantially reduced the measurement error inherent in the flow measure and can expect more accurate results with this stock measurement.

The data are scaled to prevent differences in size of region from having an effect. The income and government spending measures used to control for deposit supply are regional per-capita income (regional GDP divided by regional population) and regional per-capita government spending (regional government spending divided by regional population). Regional borrowings, both in the stock and in the flow cases, are scaled by dividing by regional GDP. Units for the data are as follows. Borrowings are expressed as a percentage of income. Interest rates and interest rate spreads are expressed as annual percentage rates. Per capita income and per capita government spending are both in terms of thousands of 1970 lira.

3.3. Empirical Results

The data decisively reject the null hypothesis. The regressions using the flow measure of borrowings are reported in Tables 1 and 2. All regressions employ ordinary least squares. Table 1 uses the lending interest rate as the left-hand side variable, while Table 2 uses the spread between the lending interest rate and the interest rate on Italian Treasury bills.

In both tables, Column 1 reports the basic regression of the interest rate variable on regional net borrowings and regional per capita income. Annual dummy variables are added in Table 1 to control for the fact that the overall level of interest rates may vary from year to year due to factors not specific to any particular region. The interest rate spread provides the same correction, so that dummies are not used in the regressions reported in Table 2. The spread regression therefore has more degrees of freedom. Standard errors of the coefficient estimated coefficients are in parenthesis. All coefficients are significantly different from 0 at the 1% significance level, except for the coefficient on income in Table 2, which is only marginally significant. In both cases, the coefficient on borrowings is significantly positive, which rejects the hypothesis outline in Case 1 above, that of perfect interregional capital mobility combined with perfectly competitive behavior within regional banking markets.

This regression was redone in Table 1 after omitting an apparent outlier, the 1983 observation for Lazio, for which net imports differed radically from other years. The results with this omission, reported in Column 2, are almost identical to those above. The results obtained above do not, therefore, appear to be the work of an outlier.

Productivity shocks may affect interest rates and borrowings. Since productivity shocks may affect different industries to different degrees, regional average interest rates may differ for reasons of aggregation across industries at the same time that borrowings differ across regions. Such productivity shocks are difficult to observe, at least without disaggregated, industry-level data. In the context of the appendix, this implies a non-zero $\sigma_{\epsilon\eta}$. In the event this induced a positive $\sigma_{\epsilon\eta}$, R3 would be violated and the coefficient on B might be positive even under the null hypothesis. One way to control for this problem is to observe that productivity shocks that increase borrowings are likely to be correlated with income growth. I have therefore added income growth to the regressions on the lending interest rate reported in Table 1, in an attempt to control for the effects of productivity

shocks. The growth rate used is $ln(Y_t/Y_{t-1})$, where Y_t is current year's income. This regression is reported in Column 3 of Table 1. The coefficient on income growth is significant, but it does not affect the coefficient on borrowings much. The results in this paper therefore do

TABLE 1: FLOW VERSION
Regressions on lending interest rate

	(1)	(2)	(3)	(4)	(5)
Borrowings	0.0174	0.0173	0.0175	0.0331	0.0335
	(0.0056)	(0.0056)	(0.0057)	(0.0040)	(0.0040)
Income	-0.7744	-0.7725	-0.7708	- -	- -
	(0.2108)	(0.2110)	(0.2117)		
Government Expenditure	- -	- -	- -	- -	-0.3553
					(0.3025)
Constant	7.6256	7.6235	7.6235	6.4041	6.4951
	(0.3519)	(0.3521)	(0.3532)	(0.1241)	(0.1461)
1982 Dummy	1.2787	1.2788	1.2916	1.2744	1.2764
	(0.1602)	(0.1603)	(0.1619)	(0.1730)	(0.1726)
1983 Dummy	3.6793	3.7042	3.6748	3.6892	3.6940
	(0.1602)	(0.1624)	(0.1609)	(0.1730)	(0.1726)
1984 Dummy	3.4228	3.4228	3.3729	3.3947	3.4018
	(0.1604)	(0.1605)	(0.1771)	(0.1730)	(0.1727)
Income Growth	- -	- -	0.0210	- -	- -
			(0.0068)		
R^2	0.917	0.918	0.918	0.902	0.904

(Standard errors in parentheses. Columns 1, 3, 4 and 5 for full sample (80 observations); Column 2 omits Lazio, 1983.)

not appear to be a spurious consequence of productivity shocks, although if better measures of productivity shocks became available, it would be important to retest this conclusion.

Results using government expenditure instead of total income as a control for deposit supply are reported in Column 5 of Table 1 and Column 3 of Table 2. In both of these regressions the coefficient on borrowings is positive and highly significant. Government spending, however, is significant in neither regression.

Finally, regressions without controls (Column 4 of Table 1 and Column 2 of Table 2) have a highly significant and positive coefficient on borrowings. All of the results reported in Tables 1 and 2 reject the null hypothesis of perfect regional competition and perfect interregional capital mobility.

TABLE 2: FLOW VERSION
Regressions on interest rate spread

	(1)	(2)	(3)
Borrowings	0.0248 (0.0075)	0.0366 (0.0050)	0.0369 (0.0051)
Income	-0.5856 (0.2804)	- -	- -
Government Expenditure	- -	- -	-0.2881 (0.3831)
Constant	5.0608 (0.4516)	4.1329 (0.0823)	4.2095 (0.1312)
R^2	0.436	0.405	0.409

Interest rate spread is bank lending rate minus Italian treasury bill rate.

The results using the stock measure of borrowings are reported in Table 3, 4, 5, and 6. To conserve space, the coefficients on the regional dummies (corrected for accumulated interest payments) are not reported. In almost all of the stock regressions, the coefficient on borrowings is positive and significant at the 1% level. The exceptions to this are the two

TABLE 3: STOCK VERSION
Regressions on lending interest rate
Assumed real return: 0%

	(1)	(2)	(3)
Debt Stock	0.0089	0.0092	0.0119
	(0.0024)	(0.0023)	(0.0024)
Income	1.6226	- -	- -
	(2.4723)		
Government Expenditure	- -	- -	-26.8471
			(9.0742)
Constant	2.9019	5.9078	11.7832
	(4.5849)	(0.2098)	(1.9956)
1982 Dummy	1.2620	1.2436	1.4055
	(0.1169)	(0.1129)	(0.1191)
1983 Dummy	3.6205	3.5915	3.9233
	(0.1237)	(0.1149)	(0.1555)
1984 Dummy	3.2345	3.2638	3.7811
	(0.1274)	(0.1187)	(0.2072)
R^2	0.970	0.969	0.974

(These regressions also include 19 regional dummies, corrected for accumulated interest payments. The coefficients on these variables are not reported.)

regressions that use income as a control and assume a 5% real rate of return, reported in Column 1 of Tables 4 and 6; although the estimated coefficient is positive in both cases, it is insignificant in Table 6 (with the spread as the left-hand side variable) and only significant at the 5% level in Table 4 (with the lending interest rate as the left-hand side variable). In

TABLE 4: STOCK VERSION
Regressions on lending interest rate
Assumed real return: 5%

	(1)	(2)	(3)
Debt Stock	0.0066 (0.0032)	0.0078 (0.0024)	0.0072 (0.0023)
Income	1.0438 (1.7628)	- -	- -
Government Expenditure	- -	- -	12.7298 (5.3501)
Constant	3.9809 (3.2897)	5.9250 (0.2041)	3.1206 (1.1949)
1982 Dummy	1.2175 (0.1155)	1.2196 (0.1147)	1.1655 (0.1126)
1983 Dummy	3.5270 (0.1188)	3.5381 (0.1166)	3.4284 (0.1212)
1984 Dummy	3.1139 (0.1625)	3.1781 (0.1203)	3.0065 (0.1362)
R^2	0.969	0.968	0.971

(These regressions also include 19 regional dummies, corrected for accumulated interest payments. The coefficients on these variables are not reported.)

all but one case, therefore, we can reject the case of perfect interregional capital mobility and perfect regional competition using the stock version as well.

The empirical results presented here show that external regional borrowings are significantly and positively correlated with the loan rate in a region, which demonstrates either that banks must have market power within regions or that interregional capital mobility is imperfect. This therefore shows that at least for the country and time period studied, the structure of the banking industry plays an important role in the allocation of funds within a region and across regions, and by extension across countries.

TABLE 5: STOCK VERSION
Regressions on interest rate spread
Assumed real return: 0%

	(1)	(2)	(3)
Debt Stock	0.0148	0.0160	0.0113
	(0.0034)	(0.0033)	(0.0036)
Income	4.5293	- -	- -
	(2.8473)		
Government Expenditure	- -	- -	19.9022
			(7.2987)
Constant	-4.7832	3.6084	-1.0152
	(5.2830)	(0.2886)	(1.7176)
R^2	0.734	0.722	0.754

Interest rate spread is bank lending rate minus Italian treasury bill rate.

(These regressions also include 19 regional dummies, corrected for accumulated interest payments. The coefficients on these variables are not reported.)

The foregoing analysis has assumed that interest rates are set by the interaction of profit-maximizing banks with markets. Banking markets are rarely that perfect, in that they are subject to widespread government restrictions and regulation. Italy is no exception to this, and financial markets there are affected by a number of government programs designed, for example, to channel funds to poorer areas. However, I have been unable to find any information which would lead to the belief that the results found in this paper are a spurious correlation due to some government program. In particular, there do not appear to be any

TABLE 6: STOCK VERSION
Regressions on interest rate spread
Assumed real return: 5%

	(1)	(2)	(3)
Borrowings	0.0040	0.0126	0.0095
	(0.0039)	(0.0034)	(0.0031)
Income	5.7486	- -	- -
	(1.6039)		
Government Expenditure	- -	- -	25.4136
			(5.9593)
Constant	-7.4291	3.3258	-2.3809
	(3.0117)	(0.2840)	(1.3613)
R^2	0.787	0.740	0.802

Interest rate spread is bank lending rate minus Italian treasury bill rate.

(These regressions also include 19 regional dummies, corrected for accumulated interest payments. The coefficients on these variables are not reported.)

restrictions that require a borrower to borrow from a local bank rather than a bank in a different locality.[12]

Italy does have a rather fragmented banking system. During the sample period, banks in large Italian cities were prohibited from opening branches in smaller localities. This paper therefore cannot directly answer the question of whether extensive branch banking, including multinational banking, is a more efficient way to organize capital markets. What I have shown is that in examining this issue, it is necessary to take into account the fact that banking tends to be localized, at least for some borrowers, and that local banking markets tend to be characterized by a significant degree of imperfect competition. Any theory of multi-regional banking must explain how the moving of market transactions into a corporate structure can affect the economic forces identified in this section.

4. FINANCIAL SERVICES WITH GEOGRAPHICALLY SEGMENTED MARKETS

4.1. The Applicability of the Empirical Evidence to Other Markets

The preceding section presented strong evidence for the segmentation of banking markets at the regional level for Italy. I also referred to evidence on geographical segmentation of the banking market in the United States (Neumark and Sharpe, 1989). Both of these studies demonstrate that location is economically significant in these two countries. In the United States, banks were shown to have market power in local markets for deposits.

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[12] The fact that net regional capital flows in Italy contain substantial government transfers may lead to a moral hazard problem. If such funds passed through regional banks and if the central government did not control the use of the funds, banks might have an incentive to make riskier lending decisions than if it had more risk-sensitive private funding. (During the period examined by this paper, there was no formal deposit insurance system in Italy.) Riskier loans would have a higher probability of default and therefore a higher stated interest rate. This could make $\sigma_{\epsilon\eta}$ positive and induce a positive correlation between interest rates and borrowings. However, these transfers should primarily go to poorer regions, leading to a (negative) correlation between per capita income and interest rates. I have included per capita income in some of the regressions as a way to control for this effect. With this control, the coefficient on borrowings remains significantly positive.

In Italy, banks either have local market power in loan markets or funds are imperfectly mobile between regions. In all of these instances, the structure of local banking markets matters economically, because local markets are at least partially shielded from outside competition.

Both of these studies examined rather idiosyncratic banking markets, and the question remains as to whether the results can be generalized. In both Italy and the United States, there have existed substantial restrictions on the geographical expansion of financial intermediaries. In both of these markets, banks are both more numerous and less diversified geographically than in many other industrialized countries. Italy has also had many special credit programs targeted to less prosperous regions. (Some of the restrictions on banking in Italy are discussed in Price Waterhouse (1988, pp. 67-68)). Neither of these tests therefore supply a perfect laboratory for examining the outcome of natural economic forces on the structure of financial intermediation. It is theoretically possible that countries with more diversified financial intermediaries, both geographically and in product lines, have a much more efficient system of moving capital from saver to borrower; this proposition remains untested. Regional data for other countries is difficult to obtain. Even if such data were available, it would in fact be difficult to test the effect of regionally diversified intermediaries on capital market efficiency. The equality across regions of interest rates charged by multi-regional banks, if such an equality were indeed found, cannot prove that those interest rates are efficient.

These two studies do demonstrate, however, that the structure of local financial markets matters for the efficient allocation of capital. It suggests that locally-based financial intermediaries, or locally-based branches or agents of larger intermediaries, serve important economic functions. One such function is the ability to monitor and evaluate borrowers more efficiently, especially small and medium-sized commercial borrowers, where information is not easily standardized. These functions are discussed Montgomery (1990), which suggests that long-term relationships between borrowers and lenders help to segment capital markets. Clearly, local intermediaries affect prices faced by their customers and the quantities available to them. If locally-based intermediaries did not contribute to economic efficiency, depositors

and borrowers would deal with intermediaries outside their locales when local prices got out of line with prices in other locales.

I have concentrated on informational advantages possessed by local intermediaries in evaluating and monitoring local customers. This function provides a technological basis for examining the structure of markets for the services of financial services that is the same technological advantage used by Diamond (1984) and Williamson (1986) to demonstrate when financial intermediation is more efficient than direct dealings between saver and final borrower. I have not mentioned other advantages possessed by locally-based intermediaries that may account for some of the geographical segmentation found empirically. One of these is high search costs on the part of customers, which prevent their searching for better interest rates outside their locales when the number of intermediaries in that locale is restricted either by law or by economic forces. One problem with this story is that ways to ameliorate search costs, such as advertising, must be precluded.

4.2. The Advantages of Multi-Regional and Multi-National Banks

If financial markets are geographically segmented for technological (as opposed to regulatory) reasons, then multi-regional intermediaries can ease the movement of capital from one region to another, thus increasing capital market efficiency, but their effect on the competitiveness of regional capital markets is uncertain. Here I use "region" to denote the relevant geographically segmented market, which may vary greatly in size, depending on the type of transaction. Multi-national banks are clearly a variety of multi-regional bank.

Montgomery (1990) suggests that multi-regionals can move capital more efficiently between regions than can separate locally-based intermediaries. In that paper, capital that moves between regions does so at least partially through financial intermediaries, which are the most efficient way at least for smaller borrowers and lenders to deal with the world capital market. By taking what would have been an arms-length transaction into a corporate setting, contracting problems can at least partially be overcome. While separate intermediaries may find it necessary to deal via debt contracts (perhaps because of legal restrictions), a multi-regional offers implicit contracts to its employees that permit a richer structure of rewards, which in turn better induce local agents of these intermediaries to

expend effort on monitoring and evaluating local borrowers. Thus multi-regional banks can, at least in theory, help increase the flow of capital from region to region and therefore reduce differences in cost of capital between regions.

The entry of a multi-regional might also enhance efficiency of intermediation within a regional market. For example, the new entrant may possess proprietary technology or techniques that enable it to perform banking functions more efficiently. It may also be better positioned to help residents of a region perform transactions with other regions, especially in the context of inter-regional trade. To the extent that customers with whom the multi-regional deals in other regions also have operations in the newly entered region, the multi-regional will have credit information on this customer that need no longer be duplicated by it and a regional intermediary.

However, the effect of the multi-regional on competition in a regional market is uncertain. As a larger corporation, the multi-regional is likely to be better able to withstand increased competition than regional banks. If these banks are forced to exit the market, the relationship capital built up by these exiting banks may be lost. Also, if the same set of multi-regionals operate in many different markets, opportunities for implicit price coordination may increase; if one bank deviates in a particular market, its rivals can punish it in other markets, which in turn can preserve an oligopolistic equilibrium.

Thus, while multi-regional intermediaries are likely to increase the mobility of capital between regions, they are not likely to eliminate the imperfect competition that appears to characterize regional financial markets.

4.3. The Effect of Changing Technology

It is a commonplace that computer and telecommunication are quickly causing vast changes in banking and other financial industries. Whether technological advantages will fully erode the market segmentation examined in this paper is unclear.

Such technology is certainly reducing the need for a local presence for a number of administrative tasks. It is less clear that electronic technology can remove the need for repeated human interaction for the core information-related tasks of evaluating and monitoring borrowers. This is most likely for easily standardized loans, such as consumer lending, or

lending with stable and predictable collateral, such as home-mortgage lending. In fact, such loans are increasingly being disintermediated in the United States and to a lesser extent in Europe, although intermediaries typically still perform origination services. The meaning of mortgage securitization in the United States is clouded by an array of government guarantees that make it unclear whether the disintermediation would occur for purely economic reasons.

However, I have argued that developing information on small and medium-sized enterprises is one of the core roles played by financial intermediaries. This does not seem easily standardized and, although technology can certainly reduce the costs of such information processing, it is unlikely to replace human interaction and therefore the role of locally-based agents acting as financial intermediaries.

By providing easier means of financial control, technology may well improve the efficiency of the operation of multi-regional banks. It holds the promise of providing more up-to-date information on branch operations and therefore tightening control over branch operations. This increase in the flow of information may then help alleviate some of the agency problems that could exist within such a firm and thus increase the flow of funds within the organization from region to region.

4.4. A Framework for the Analysis of Financial Services

The evidence examined in this paper suggests that an empirically consistent framework for examining trade in financial services will have to take into account the need for the presence of factors of production, especially skilled labor, in the same country as the customers purchasing the financial services, at least for some of those services. The need for this presence is likely to cause geographical market segmentation. A firm from a foreign country wishing to "export" financial services will actually have to set up operations in the home country. If the segmented markets are imperfectly competitive, then the welfare effects of this entry are uncertain, especially if there are fixed costs to setting up in a local market and if existing firms choose to exit.

When analyzing financial services, it is necessary to distinguish two kinds of markets. The first is a cross-border market, in which, absent regulatory restraint, a firm can compete regardless of its physical location. The second is a localized market, in which a firm must

locate factors of production, and in which services are not truly tradeable, although they can be sold by a multi-national firm. These are extremes, and the markets for most banking services fall somewhere in between. In some cases, a local presence may be needed, but that local presence may involve a fairly trivial expenditure, such as to satisfy legal requirements.

In both types of markets, the size of the fixed costs needed to enter may determine the degree of competition in the market. At the extreme, when fixed costs go to zero, the markets will, absent regulatory restraints, become contestable, and even in the presence of increasing returns to scale, pricing of services in those markets will be at the levels afforded by perfect competition. I have argued, however, that some important banking markets are characterized by high fixed entry costs, especially the costs of developing customer relationships.

Given these costs, a bank in one country wishing to enter the local market has three choices: (1) establish a presence in the market, but only as a way to compete more effectively in the market for cross-market services, such as transaction services provided to large multi-national services; (2) slowly build up the customer relationships needed to service smaller customers, where the value-added of financial intermediation is potentially high; (3) purchase an existing intermediary. In considering the effect of these actions, authorities should consider the effect of the new entrant on competition in the local market.

Given the nature of imperfect competition, sweeping conclusions about the costs and benefits of such competition should not be made. If the foreign bank enters by creating its own operations from scratch, then the concentration of the local market will over time be reduced, which should have beneficial welfare consequences, although this may eventually cause existing banks to exit the market. If such exit occurs because the foreign bank has a lower cost of funds, and thus was more able to withstand a period of intense competition, welfare in the local market may be impaired once other banks have exited, because the surviving banks will not need to pass on their lower cost of funds to their customers.

An entering bank may have lower cost of funds because it faces a different regulatory environment. The move to regulatory harmonization in the EC is likely to reduce such regulation-induced cost differentials within the EC, and in this sense has positive welfare consequences. However, the geographical fragmentation of capital markets documented in

this paper may have deeper roots than government regulation, so that even with regulatory harmonization, banks may not be on an even footing in a particular local market, if their home country differs or if the extent of their other operations differs.

The case for a foreign bank buying a domestic bank is substantially weaker than for a foreign bank that creates its own operations from scratch. If both the acquiring foreign bank and the acquired domestic bank compete in the market for cross-border services, competition in that market is likely to be reduced. And the merger will not increase competition in the local market, because the number of banks has not increased.

This sub-section has discussed a framework for analyzing trade in financial services, especially banking. To the extent that other services require a local presence, as many certainly do, such a framework may be useful for them too. To formalize the notions discussed here, it will be necessary to combine theories of trade under imperfect competition with theories of the multinational firm. Applications to financial intermediation should also take into account the key role intermediaries appear to play in overcoming problems of asymmetric information.

4.5. Safety and Soundness

One of the major reasons for regulation of banks is the fear of the economic effects of bank runs, especially if those runs became contagious. Although explicit deposit insurance is not universal in industrialized countries, the lender-of-last-resort function exists at least in principle in all countries, in order to provide liquidity to banks under the threat of a bank run. When such assistance is also extended to insolvent banks, a widely recognized moral hazard problem exists, in that banks may have an incentive to take on excessive risks. Bankers can be dissuaded from taking these risks if the value of the bank charter is high enough (in the case a deposit insurance system) or if lender-of-last-resort assistance is given only at a high enough penalty rate. If the value of the bank charter is insufficient to prevent the bank's management from taking more than the optimal amount of risk, then supervision of the bank by authorities will be necessary. The case for supervision under a system without deposit insurance is less clear, but it may be argued that the supervisory process gives the regulator

better knowledge of the bank assets that it may have to discount in an emergency, helping it distinguish insolvent banks from the merely illiquid.

A multi-regional bank may reduce both the risks of bank failures and the cost of such supervision by authorities. The multi-regional's presence in more than one market diversifies its income, so that a region-specific shock will be less likely to cause the bank to fail, since its revenue is diversified across different regions. Since the multi-regional bank (instead of the deposit insurer) now bears the cost of underperformance of a regional office, the multi-regional will have an incentive to replace with internal controls some of the tasks banks supervisors perform with more fragmented banks. The multi-regional will be induced to monitor its own locally-based employees, replacing some of the monitoring by government bank supervisors. The geographical integration of banks within a country is therefore a way of privatizing part of the government's task of bank supervision. When banks expand across international borders, however, the task of bank supervision becomes more difficult and must be coordinated between different countries.

5. CONCLUSION

This paper has argued that in analyzing the effects of EC integration on banking markets it is necessary to take into account the fact that banks and similar financial institutions play an important role in overcoming informational problems, especially in lending to borrowers other than governments and large corporate borrowers. It is also important to recognize that this function takes place at least partially in geographically segmented markets. Evidence was presented on geographical segmentation in Italy, which may accompany imperfectly competitive behavior within regional markets. This provides evidence for the environment assumed in Montgomery (1990) to motivate real barriers to capital mobility.

There is no clear evidence that this geographical segmentation of banking markets is an artifact of outmoded regulation and outmoded technology. It is probable that this segmentation is instead the result of a combination of the cost advantages that location apparently confers on financial intermediaries and market power derived from long-term customer relationships. There is no reason to believe that the consolidation of the local

functions of banking into multi-regional and multi-national banks would eliminate this market power.

The primary policy message of this paper is that the gains from trade in financial services may not be well approximated by standard models of perfectly competitive trade in goods. Financial intermediaries operate in segmented, imperfectly competitive markets. While thus far we lack good models to address welfare questions in this framework, it is clear that governments should not presume that eliminating restrictions to cross-border expansion of financial intermediaries will lead to unambiguous welfare gains. Instead, authorities must pay close attention to competitive conditions in domestic markets for financial services. They should not assume that the elimination of barriers to capital movement and of restrictions on establishment of banks will lead to fully efficient capital markets.

In arguing that existing modes of analyzing financial intermediation may be inadequate, this paper may have raised more questions than it has answered. More research, empirical as well as theoretical, is clearly warranted on the structure of financial markets. One important area for research is on the role intermediaries play in moving capital from locale to locale. Another important goal for future research is to develop models of imperfect competition among financial intermediaries that incorporate a information-processing role for intermediaries.

APPENDIX: MEASUREMENT ERROR AND IMPERFECT DEPOSIT CONTROLS

The analysis of this paper consists of ordinary least squares estimation of the relationship

$$R_{it} = b_B B_{it} + b_G G_{it} + e_{it} \, ,$$

where R_{it} is either the lending interest rate or the interest rate spread, B_{it} is regional net imports, and G_{it} is either per capita regional income or per capita regional government spending.[13] This is not, however, a structural model, nor even a true reduced form in which

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[13] As described in Section 3, all variables are expressed in real terms.

the right-hand side variables are exogenous. Thus we must take some care in interpreting these regressions.

Suppose, without loss of generality, that we have the following three structural equations:

$$R = \alpha_1 a + \alpha_2 c + \varepsilon$$
$$B = \beta_1 a + \beta_2 c + \eta$$
$$G = \gamma_1 a + \gamma_2 c + \psi$$

The subscripts have been suppressed on R, B, and G. The shocks a and c are as defined above in Section 3. The coefficients α_1, α_2, β_1, and β_2 take on various signs depending on which of the four theoretical cases is true. The values of γ_1 and γ_2 determine how good a control G is. Finally, ε, η, and ψ are additional sources of noise that is orthogonal to a and c.

Under these circumstances and suitable regularity conditions, it is straightforward to derive the probability limit of the b^*_B, the estimate of b_B:

$$plim\ b^*_B = \frac{1}{\Delta}\left[\left(\alpha_2\beta_2\gamma_1^2 + \alpha_1\beta_1\gamma_2^2 - \alpha_1\beta_2\gamma_1\gamma_2 - \alpha_2\beta_1\gamma_1\gamma_2\right)\left(\sigma_a^2\sigma_b^2 - \sigma_{ac}^2\right) + \Theta\right],$$

where σ_x^2 denotes the variance of any variable x and σ_{xy} the covariance of any two variables x and y. Θ stands for a complicated expression that subsumes all the terms containing variances and covariances of the error terms ε, η, and ψ. Δ is given by

$$\Delta = (var\ B)(var\ G) - cov^2(B,G)$$

and can be shown to be positive. The sign of plim b^*_B therefore is the same as the sign of

$$\lambda = \left(\alpha_2\beta_2\gamma_1^2 + \alpha_1\beta_1\gamma_2^2 - \alpha_1\beta_2\gamma_1\gamma_2 - \alpha_2\beta_1\gamma_1\gamma_2\right)\left(\sigma_a^2\sigma_b^2 - \sigma_{ac}^2\right) + \Theta.$$

The null hypothesis in Case 1 above, that of perfect regional competition and perfect interregional capital mobility, implies that R is unrelated to the regional shocks a and c, so that the following restriction holds:

R1: $\alpha_1 = \alpha_2 = 0$.

In this case, λ reduces to

$$\lambda = \sigma_{\epsilon\eta}(var\ G) - \sigma_{\epsilon\psi}(cov\ (B,G)).$$

Under the null hypothesis, therefore, $plim\ b^*_B = 0$, except for the influence of the measurement error terms.

The assumption that one of these two terms, $\sigma_{\epsilon\psi}$, is zero is reasonable if G does not depend directly on the interest rate, which is more likely to hold when G is government spending than when G is income.[14] The restriction

R2: $\sigma_{\epsilon\psi} = 0$.

combined with R1 yields

$$\lambda = \sigma_{\epsilon\eta}(var\ G),$$

which has the same sign as $\sigma_{\epsilon\psi}$

A simple argument demonstrates that if $\sigma_{\epsilon\psi}$ is not zero, it is likely to be negative, and that therefore, under R1 and R2,

$$plim\ b^*_B \leq 0.$$

This argument runs as follows. The measure used in this paper for B, regional net borrowings, is regional net imports, which are related to true regional net borrowings (i.e. the current account deficit) by the following identity:

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[14] In some countries, expenditures of local and regional governments are often financed by borrowing and therefore regional government spending might depend on regional interest rates. This has not been the case in Italy since the 1970s, however; the deficits of local and regional governments are instead usually financed by transfers from the central government.

$$B = B_T + FI + T,$$

where B_T is true regional borrowings and FI and T represent two error terms, net factor income and unilateral transfers. Now consider a shock $\varepsilon > 0$ that drives up regional interest rates. Agents from other regions who lend money to the region receive a positive shock to the factor income they receive. Therefore net factor income FI received by the region drops. Since η is closely related to $FI + T$, this means that η and ε are likely to be negatively correlated.

This motivates the following restriction:

R3: $\sigma_{\varepsilon\eta} \leq 0$.

Under the null hypothesis, that of perfect regional competition and perfect interregional capital mobility (given by R1) and the error term restrictions R2 and R3, we have

$$plim\, b_B^* \leq 0.$$

Under the alternative hypotheses embodied by Cases 2, 3, and 4 in Section 3, $plim\, b_B^*$ conversely is likely to be positive. Consider, for example, the strong restriction

R4: $\gamma_1 = 0$.

This means that except for the error terms, G is a perfect control for c, the shock to deposit supply, since it does not depend on a, the shock to loan demand. Under R4 alone, λ reduces to

$$\lambda = \alpha_1\beta_1\gamma_2^2\left(\sigma_a^2\sigma_b^2 - \sigma_{ac}^2\right) + \Theta_{R4},$$

where Θ_{R4} contains a subset of the error moments in Θ. It is easy to see that in all of the alternative Cases 2, 3, and 4, both α_1 and β_1 are positive. This implies that, except possibly for the noise term Θ_{R4}, $plim\, b_B^*$ is positive.

An alternative strategy for dealing with the sources of error outlined above is to ignore controls altogether and to simply run the regression

$$R_{it} = bB_{it} + e_{it}.$$

Under R1 (the null hypothesis),

$$plim \; b^* = \frac{\sigma_{\epsilon\eta}}{var B}.$$

Combining R1 with R3, therefore implies

$$plim \, b^* \leq 0.$$

With no controls, b^* should be non-positive if the null hypothesis is true. In fact, however, in the empirical results presented, b^* is always significantly positive.

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