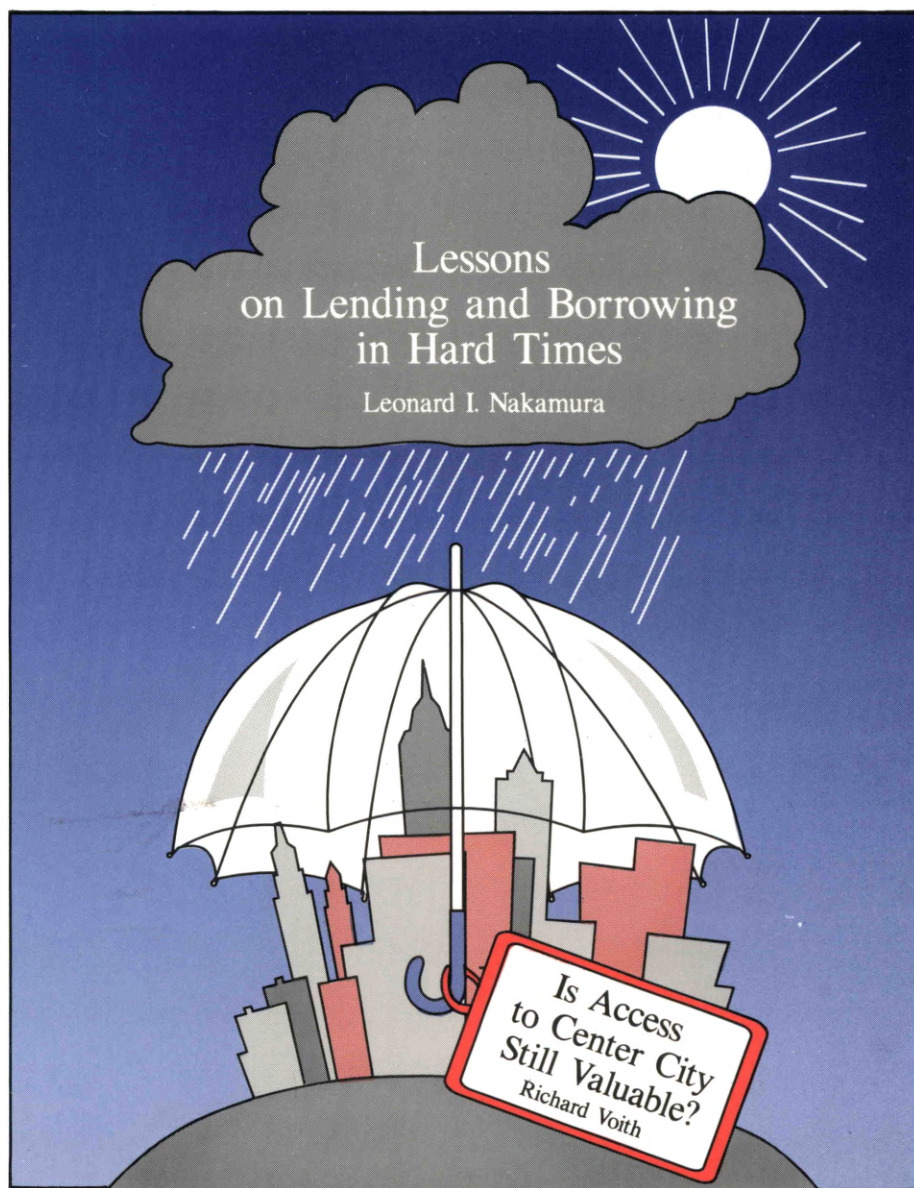


Business Review

Federal Reserve Bank of Philadelphia

July • August 1991

ISSN 0007-7011



Business Review

The BUSINESS REVIEW is published by the Department of Research six times a year. It is edited by Patricia Egner. Artwork is designed and produced by Dianne Hallowell under the direction of Ronald B. Williams. The views expressed here are not necessarily those of this Reserve Bank or of the Federal Reserve System.

SUBSCRIPTIONS. *Single-copy subscriptions for individuals are available without charge. Institutional subscribers may order up to 5 copies.*

BACK ISSUES. *Back issues are available free of charge, but quantities are limited: educators may order up to 50 copies by submitting requests on institutional letterhead; other orders are limited to 1 copy per request. Microform copies are available for purchase from University Microfilms, 300 N. Zeeb Road, Ann Arbor, MI 48106.*

REPRODUCTION. *Permission must be obtained to reprint portions of articles or whole articles. Permission to photocopy is unrestricted.*

Please send subscription orders, back orders, changes of address, and requests to reprint to Publications, Federal Reserve Bank of Philadelphia, Department of Research, Ten Independence Mall, Philadelphia, PA 19106-1574, or telephone (215) 574-6428. Please direct editorial communications to the same address, or telephone (215) 574-3805.

JULY/AUGUST 1991

IS ACCESS TO CENTER CITY STILL VALUABLE?

Richard Voith

If "location, location, location" is really all that important to house values, then what makes one residential location more attractive than another? One answer is accessibility to jobs, shopping, and recreation—amenities usually found in the downtown of a city. But with suburban employment and shopping centers proliferating, is access to center city still as valuable as it used to be?

LESSONS ON LENDING AND BORROWING IN HARD TIMES

Leonard I. Nakamura

Problem loans and highly leveraged transactions have brought home a truth about lending that is easily forgotten in good times: loans sometimes fail, with sad consequences for both borrower and lender. In truth, seizing the collateral of insolvent debtors often harms the lender as much as the borrower. How can lenders ensure repayment by borrowers and yet avoid being too conservative in hard times?

Is Access to Center City Still Valuable?

*Richard Voith**

The old real estate adage—that the three most important factors in house value are “location, location, and location”—may be an exaggeration. Nevertheless, prices for similar houses vary greatly *within* metropolitan areas and even more so *across* metropolitan areas. What makes one location more attractive than another?

Some studies have emphasized amenities and the efficiency of local government as important determinants of where people choose

to live and how much their houses are worth. Another major factor, however, is accessibility to employment, shopping, and recreation. And because people prefer to live in neighborhoods convenient to employment and everyday activities, houses in these areas command higher prices.

Although we often hear about “accessible” neighborhoods, accessibility is not an easy thing to measure. Before the rapid growth of the suburbs, a city’s central business district (CBD) was the focal point of a region’s economic activity. Accordingly, economists’ early models of residential location tended to define accessibility in terms of distance from the CBD.

*Richard Voith is a Senior Economist in the Urban and Regional Section of the Philadelphia Fed’s Research Department.

But suburbanization changed all that, requiring us to reconsider what makes one location more accessible than another.

Since people can work, shop, and find entertainment in any number of employment centers, a neighborhood's accessibility depends not just on how close it is to those various centers, but on the quality of transportation to and from them. Even if close to an employment center, a residential area may not be perceived as accessible if transportation to that center is poor. Another complicating factor is that different neighborhoods may be convenient to employment and recreation centers that are not equally attractive. A house within easy commute to a center with a large number of high-wage jobs is likely to be more valuable than a house nearby a center with relatively low wages. And since a locale's accessibility and nearby attractions may be greatly affected by economic development and transportation policies, it is important to know how much accessibility affects people's location choices.

EARLY MODELS OF RESIDENTIAL LOCATION

Urban economists first addressed how accessibility influences residential locations and land values by making some simplifying assumptions. The most important was that businesses concentrated in the CBD because being close to one another increased productivity.¹ These productivity increases associated with a CBD location were termed "agglomeration economies."² The only concentration of em-

ployment was in the CBD, giving rise to the term "monocentric region." Other common assumptions were that transportation costs per mile to the CBD were equal from anywhere within the metropolitan area, and that only transportation costs for work trips were important. These assumptions implied that the travel costs associated with any location were determined solely by its distance to the CBD.

Given these assumptions, economists analyzed how people trade off commuting costs with what they are willing to pay for housing. They drew three conclusions: 1) the value of land should fall as distance from the CBD increases; 2) population density should fall as distance from the CBD increases; and 3) people choose residential locations that minimize total commute time in the region.

Not surprisingly, the monocentric model predicts higher prices for land close to the CBD, which in turn leads to higher house prices for otherwise identical houses. Consumers can avoid some of the costs of commuting by living closer to the CBD, but in doing so, they bid up the prices of houses such that the higher house price just offsets the commuting savings. A direct consequence is higher land costs for locales closer to the CBD and lower land costs for more distant locations. Accordingly, people living closer to the CBD own smaller houses than residents of more distant, less expensive areas. This leads to the second major conclusion of the monocentric model—that population density declines with distance from the CBD. Finally, the predicted pattern of declining house prices and less density with distance from the CBD results in the optimal amount of

¹For a detailed discussion of the monocentric model, see Edwin S. Mills, "An Aggregative Model of Resource Allocation in a Metropolitan Area," *American Economic Review* 47 (1967) pp. 197-210, or Richard F. Muth, *Cities and Housing: The Spatial Pattern of Urban Residential Land Use* (University of Chicago Press, 1969).

²See Gerald Carlino, "Productivity in Cities: Does City Size Matter?" this *Business Review* (November/December

1987). This assumption did not preclude employment scattered in the suburban areas. Of course, the downside of agglomeration is congestion, and if a locale becomes too congested, productivity may decline. Firms locating outside the CBD forfeit the agglomeration economies, but could realize a benefit by lowering their workers' commuting costs, allowing the suburban firms to offer a lower wage.

commuting. That is, given house prices and commuting costs, no two households could exchange locations and both be better off.

How do these predictions correspond to the real world? Although there is evidence that residential density declines with distance from the CBD, there is little consistent evidence that house values fall as well.³ Also, residential distances from the CBD and the associated level of commuting predicted by the monocentric model are much lower than that actually observed. In other words, people tend to live farther away from the CBD than would be expected given the trade-off between house prices and commuting costs to the CBD. Some authors argue there is a great deal of “wasteful” commuting, suggesting that the underlying notion that people make residential-location decisions based on a trade-off between commuting and housing costs is fundamentally flawed.⁴ After all, people may want to be near amenities not available in the CBD and thus may be willing to pay more to locate farther from the CBD. Others suggest that the concept is correct, but that the assumptions about the metropolitan areas are wrong.⁵

³The density predictions are consistent with the monocentric model, since much of the housing stock in older cities was constructed when the model’s assumptions were more consistent with the actual metropolitan structure. House prices can adjust much faster than the stock of housing, so the failure of the monocentric model should be observed first in its predictions regarding prices. Examples of recent studies finding either a positive relationship or no relationship between distance from the CBD and house value include D.M. Blackley and J.R. Follain, “Tests of Locational Equilibrium in the Standard Urban Model,” *Land Economics* 63 (1987) pp. 46-61; M.L. Cropper and P.L. Gordon, “Wasteful Commuting: A Re-examination,” *Journal of Urban Economics* 29 (1991) pp. 2-13; and E.J. Heikkilä et al., “What Happened to the CBD-Distance Gradient? Values in a Poly-centric City,” *Environment and Planning* 21 (1989) pp. 221-32.

⁴Bruce W. Hamilton, “Wasteful Commuting,” *Journal of Political Economy* 90 (1982) pp. 1035-53.

IMPROVING THE SIMPLIFIED MODEL

Though the monocentric model is a useful starting point for examining residential-location choices, its basic assumptions are less realistic today than when the model was first proposed. Most metropolitan areas have not just a CBD but many suburban employment centers, and these centers can differ from the CBD in several ways. High-quality automobile transportation to suburban centers is almost universally available, while public transportation to these centers is poor at best. Generally dependent on the automobile for access, these centers are less dense in their development, which lowers their potential for agglomeration economies. On the other hand, most CBDs are accessible by public transportation and by automobile, though usually at a higher cost than are the suburban sites. Public transportation allows higher-density development in the CBD than in most suburban centers, increasing the potential for agglomeration economies. Though most suburban neighborhoods have high-quality auto access to suburban employment centers, not all have high-quality public transportation to the CBD.

More complicated models that consider suburban employment centers and differences in public transportation services do not lead to simple conclusions about the relationship between distance from the CBD and house value and residential density. These models predict that people “sort” themselves into residential communities that are convenient to specific employment locations. Communities convenient to an employment center—the CBD, for example—should have a disproportionately high percentage of their residents working in that center. Over time, this sorting process should result in people choosing employment

⁵See, for example, Michelle J. White, “Urban Commuting Journeys Are Not ‘Wasteful,’” *Journal of Political Economy* 96 (1988a) pp. 1097-110.

and residential locations that minimize the region's total commuting burden. Recent studies provide strong evidence for this sorting behavior. In fact, if differences in the quality of the transportation system and the multicentered nature of regions are taken into account, there is little evidence of "wasteful" commuting.⁶

But what are the implications for house values? Certainly house prices are no longer strictly linked to their distance from the CBD. Since there are many smaller, similar suburban employment centers, all with relatively good highways and parking, a suburban residential location is likely to be convenient to at least one employment center. A house far from the CBD may not be highly valuable to a CBD worker, but it might be highly attractive to a suburban worker. Though one might expect some differences in house prices based on distances from suburban centers, these differences are likely to be small and difficult to observe, requiring detailed geographic and transportation data that are seldom available.

Still likely, though, is that higher house values would be observed for locations having commuting advantages to high-wage employment centers not duplicated elsewhere.⁷ One such advantage is the availability of high-quality public transportation to the CBD. If the CBD has higher-wage employment, differences in the availability and quality of public transportation across suburban neighborhoods could cause differences in suburban house values. In communities with good public transportation, higher house values should go hand in hand with a greater fraction of the labor force em-

ployed in the CBD and with lower auto ownership, as people substitute public transportation for cars.

The extent of residential sorting is important to consider when evaluating policy changes that affect accessibility. Policymakers should take into account not only how a policy change would affect the existing population, but also what changes in population the policy would induce. A policy that dramatically affects the accessibility of a residential area or the productivity of a commercial area could have much larger impacts than expected.

For example, suppose a public transit authority alters its prices or service quality. This will immediately change the demand for its services and ultimately affect accessibility as well. Over time, people will decide to relocate, which magnifies the initial impact of the policy. These sorting impacts may be larger than the direct impacts, eventually affecting a community's size and house values.⁸

THE PHILADELPHIA EXAMPLE

The Philadelphia metropolitan area is an excellent case study for examining the issues raised by urban models. The Philadelphia region, having multiple employment centers, is fairly decentralized, yet it has a large CBD that has grown along with the suburban subcenters in the 1980s.⁹ The location and commuting

⁶See White (1988a).

⁷Note that higher wages can be sustained only if the employment center is more productive. Frequently, this higher productivity depends on the employment center's accessibility to a large, high-quality labor force and agglomeration economies associated with concentrations of businesses.

⁸For example, Richard Voith, in "The Long-Run Elasticity of Demand for Commuter Rail Transportation," *Journal of Urban Economics* (1991), has estimated that the long-term effects on transportation demand of changing price and quality can be more than twice as large as the short-term effects. A highly readable discussion of these issues is provided by Voith in "Commuter Rail Ridership: The Long and the Short Haul," this *Business Review* (November/December 1987).

⁹The Philadelphia CBD is defined as the area bounded by the Schuylkill and Delaware rivers and Vine and South streets.

patterns were examined for evidence of sorting and its effects on residential location, car ownership, and house values.¹⁰ Though general evidence is provided on the importance of sorting throughout the metropolitan area, the focus is on where CBD workers live, the role of the suburban commuter rail system in their choice of neighborhood, and the system's effects on car ownership and house values.¹¹

Geography and Transportation. According to the 1980 Census, about 55 percent of the 2.2 million people in the Philadelphia metropolitan area labor force lived in the suburban Pennsylvania counties of Bucks, Chester, Delaware, and Montgomery and in Camden County, New Jersey.¹² The extent of employment decentralization in the region is evident. Only 4.6 percent of the suburban labor force works in the CBD, and fully 17 percent of the suburban census tracts have no residents working in the CBD. Still, the CBD has maintained its importance in the regional economy. Some suburban census tracts have as many as 22 percent of their labor force working in the CBD. The CBD's share of the region's total employment has been almost constant at 10 percent in the years from 1976 to 1986. However, while suburban employment grew tremendously over the period, the rest of the city did not prosper.¹³

¹⁰See Richard Voith, "Transportation, Sorting, and House Values in the Philadelphia Metropolitan Area," *Journal of the American Real Estate and Urban Economics Association* (forthcoming), for a detailed description of the analysis.

¹¹The analysis is based on 1980 Census data. These data are still useful because the issues examined reflect long-run location choices. The factors affecting these choices, especially the transportation system and the CBD's relative importance to the region, have changed little in the last 10 years.

¹²The Philadelphia metropolitan area also includes Burlington and Gloucester counties in New Jersey. We did not examine these counties because they do not have commuter rail service.

The transportation system in the Philadelphia area has not changed dramatically in the last 20 years, though the highway system has improved progressively. But these improvements have barely kept pace with the increase in auto travel due to the region's decentralization.

The commuter rail system, now operated by the Southeastern Pennsylvania Transportation Authority (SEPTA), has been a fixture on the Pennsylvania side of the Philadelphia region for most of the century. The Port Authority of Pennsylvania and New Jersey (PATCO) has provided commuter rail service in Camden County, New Jersey, since 1968. The primary function of both systems is to bring suburban commuters to downtown Philadelphia. Despite recent interest in "reverse commuting," these systems are generally not competitive with the automobile for commuting to suburban employment. With 137 stations combined, they provide service to a large number of suburban communities. Over 42 percent of the suburban census tracts have access to commuter rail transportation (Figure 1), but the quality of commuter rail service differs considerably across communities.

How Long Do Philadelphians Commute to Work? A powerful piece of evidence for sorting in the Philadelphia region is that average reported commuting times differ very little across residential locations.¹⁴ People have the opportunity to work at an employment center

¹³See Anita Summers and Peter D. Linneman, "Patterns and Processes of Urban Employment Decentralization in the U.S., 1976-1986," Wharton Real Estate Center Working Paper 75, University of Pennsylvania (1990). CBD employment grew about 10.5 percent, but overall employment in the city of Philadelphia fell over 6 percent. Suburban employment rose 33 percent.

¹⁴The commuting data are based on the 1980 U.S. Census.

FIGURE 1
Commuter Rail Transportation in the Delaware Valley



Note: Dashed lines indicate services discontinued since 1980.

that is relatively close, regardless of how far their house is from the CBD, and they choose to do so. People in tracts far from the CBD tend to commute the same amount of time as those close to the CBD. Average commute time in the region is about 23 minutes; this figure is remarkably consistent across counties, ranging from a low of 22 minutes in Chester and Montgomery counties to a high of 25 minutes in Delaware County (Figure 2). This contrasts with the dramatic differences in highway commute times to the CBD across counties, which vary from a low of 36 minutes in Camden County to a high of 77 minutes in Chester County. Even though the average highway commute time from Chester County to the CBD

is more than twice that of Camden County, residents of Chester and Camden counties spend nearly the same average time commuting. It appears that people choose to live in locations relatively close to their work places, and that virtually all suburban residential locations are convenient to at least some form of employment.

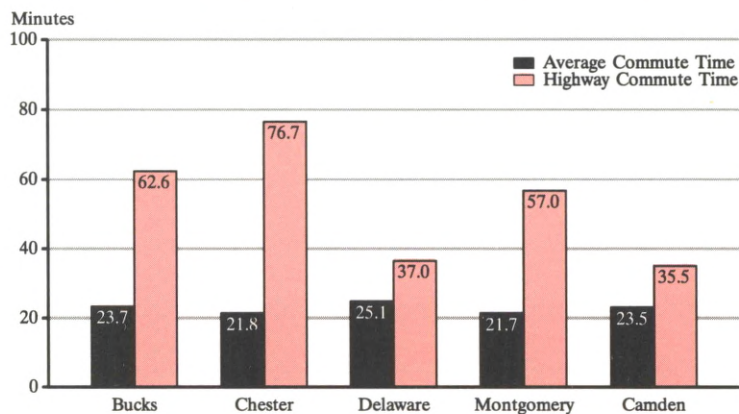
Where CBD Workers Live. Since people choose to live close to their jobs or to seek jobs close to their homes, those having jobs in the CBD should be concentrated in areas from which CBD commuting is relatively less costly. For any location, the greater its accessibility to the CBD, the higher the fraction of its residents that should work in the CBD. And more resi-

dents will work in the CBD if the community's accessibility to other work sites is poor.

Highway commute time to the CBD is one important factor affecting a neighborhood's convenience to the CBD and hence its attraction for CBD workers. A look at where suburbanites work shows how strongly highway commuting time influences their neighborhood choice (Figure 3). The fraction of people working in the CBD declines dramatically with highway commute time. For example, the percentage of Merion residents working in the CBD declines dramatically with highway commute time. For example, the percentage of Merion residents working in the CBD declines dramatically with highway commute time. For example, the percentage of Merion residents working in the CBD declines dramatically with highway commute time.

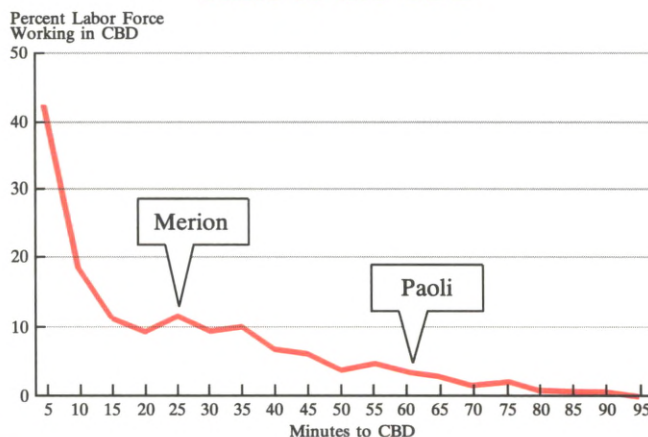
Some differences in the percentage of workers employed in the CBD may result from differences in accessibility to other work sites rather than in travel time to the CBD. Consider two communities, both with equal commute times to the CBD; if one has higher average commute times for all commutes, including those

FIGURE 2
Average Commute Times by County and Highway Commute Time to the CBD



Source: Average commute time is published by the U.S. Commerce Department's Bureau of the Census. Highway commute time is compiled by the Delaware Valley Planning Commission.

FIGURE 3
Percent of the Suburban Labor Force Working in the CBD and Highway Commute Time to the CBD



Source: Based on data from the U.S. Census (1980) and the Delaware Valley Planning Commission.

outside the CBD, then that locale must have relatively worse accessibility to the non-CBD employment centers. The data suggest that for two communities with equal access to the CBD, increasing travel time to non-CBD employment centers by five minutes increases the percentage working in the CBD by 46 percent.

For Philadelphia-area commuters, the rail system is an important alternative to the automobile. A major difference between the rail system and the highway system, however, is that only some communities have access to the rail system, and it essentially serves only one employment destination—the CBD. Not surprisingly, for suburban communities with train service,¹⁵ the fraction of the labor force working in the CBD (5.3 percent) is 29 percent higher than for census tracts without service (4.1 percent). Part of this difference results from the fact that tracts with service tend to be closer to the city. But even with other factors held constant, the fraction of CBD workers living in census tracts with service is 15 percent higher.

The availability of the commuter train also results in fewer purchases of automobiles, even for households of equal income. Households in census tracts with train service own 4.5 percent fewer cars, on average. While this figure appears small, it actually is quite significant considering that only 5.3 percent of the labor force in these tracts commutes to the CBD. Assuming that train service is irrelevant for 90 percent of the people in a given census tract (and hence should not affect car ownership), the 4.5 percent reduction overall implies a household car-ownership rate for the remaining 10 percent of only 0.97 cars per household, about 60 percent of the average car-ownership rate.

Housing Prices and the Commuter Rail System. Does sorting into residential locations

convenient to work result in higher house prices in neighborhoods with greater accessibility? In particular, are people willing to pay a premium to live in residential neighborhoods that have commuter rail service to the CBD?

Median house values in each of the 678 census tracts in the Philadelphia metropolitan area were compared using statistical techniques to adjust for differences in housing quality.¹⁶ There was some evidence that houses tend to be more expensive the farther they are from the CBD, contrary to the prediction of the monocentric urban model.¹⁷ But consistent with the idea that most suburban communities are convenient to at least one suburban employment center was the finding that average commute times are unrelated to house value. This is not surprising, since sorting has resulted in similar commuting times throughout the region.

Even though house prices tend to increase with distance from the CBD and most residential locations are equally convenient to some suburban employment, the accessibility to the CBD provided by the commuter rail systems generates significant house value premiums for residents in neighborhoods with service. In fact, if we hold constant other factors, such as highway accessibility and house quality, houses in areas with train service enjoy premiums of 6.4 percent over those without service. This

¹⁶A linear regression model was used in which median house value was the dependent variable. House value was a function of its accessibility to the CBD by auto and by train, as well as to other employment centers. Since the theory is developed in terms of a standard unit of housing, characteristics of the housing and neighborhood are included in the regression to control for differences in attractiveness that are unrelated to accessibility across tracts.

¹⁵The designations “with service” and “without service” refer not to the communities themselves, but to residences having rail stations in or nearby their census tracts.

¹⁷House prices may be higher for more distant houses partly because of larger lots. Unfortunately, data on lot sizes are not available.

implies a premium of \$5,594 for train service.¹⁸

The house-value premium associated with train service can be used to calculate a net increase in real estate values associated with the commuter rail system. A total of 258,437 owner-occupied houses are in census tracts with train service. This implies that the increase in suburban value associated with the train service is about \$1.45 billion.¹⁹

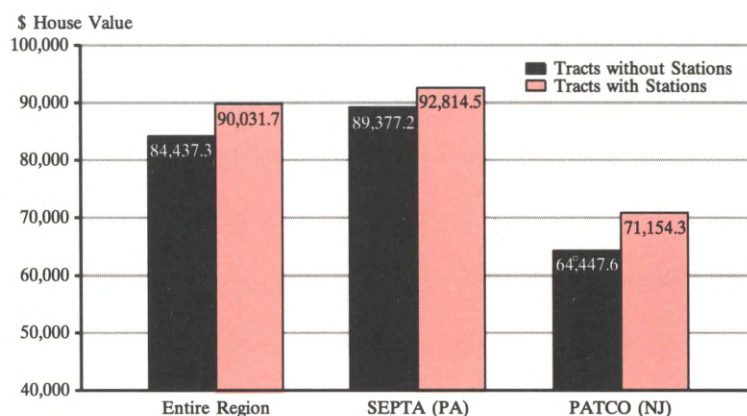
Service Quality and House Values.

If people are willing to pay a premium to live in an area with train service, they would likely be willing to pay even more for higher-quality train service. Once again, Philadelphia provides a natural test for this hypothesis. The two commuter rail systems serving the CBD—SEPTA and PATCO—are very different. PATCO service is, on average, five times as frequent as SEPTA's. Furthermore, PATCO enjoys a greater time advantage, relative to the automobile, than SEPTA. Thus, PATCO generally provides higher-quality service.

¹⁸The figures, in 1990 dollars, are based on prices in 1980, inflated by the U.S. Consumer Price Index.

¹⁹This assumes that increases in value near stations are not offset by decreases in areas far from stations. Also, about one-third of all riders on the system reside within the city limits; any premiums associated with housing within the city are not included in the figures.

FIGURE 4
House-Value Premiums
for Commuter Rail Service



Source: Based on data from the U.S. Census (1980) and the Delaware Valley Planning Commission.

The higher-quality PATCO service has a much larger positive effect on house values than the SEPTA service (Figure 4). The premium of \$6,706 in New Jersey is 10.1 percent of the average house price in Camden County. The \$3,437 premium for the Pennsylvania counties, where the average price of a home is higher than in New Jersey, is 3.8 percent of the average house price. Because these two systems serve the same destination, the difference in premiums very likely reflects consumers' willingness to pay for higher-quality transportation.²⁰

CONCLUSION

Even in a region with multiple employment

²⁰The difference in premiums could also reflect price differences between the two services. Additionally, the PATCO impacts may be magnified by the lack of alternative employment centers in Camden County.

centers, access to the CBD remains valuable to suburban residents. A high-quality, CBD-oriented public transportation system can affect suburban residents' choice of neighborhood, the number of cars they buy, and the value of their houses. The house-value premiums associated with the transportation service can be sustained, however, only if service quality is maintained or enhanced, and if the CBD retains a productive advantage over other employment centers.

The productivity of the CBD is not independent of the transportation system, as an attraction of the CBD is its accessibility to a wide labor pool. However, if other factors—such as local taxes, poor services, or crime—reduce the CBD's attractiveness, the real estate premiums associated with the commuter rail system are

likely to diminish. Additionally, increases in train-service quality are likely to increase house-value premiums, while eroding service quality will likely have the opposite effect over time.

In the Philadelphia area, these effects can be large, as indicated by the estimated \$1.45 billion premium on suburban real estate values associated with commuter train service. At a discount rate of 10 percent, suburban residents with train service would enjoy positive financial benefits even if they paid up to \$145 million a year to support the two rail systems that serve Philadelphia's CBD. This estimate suggests that, despite the region's increasing decentralization, over 40 percent of the metropolitan area's suburban residents have a direct interest in the quality of public transportation and the economic health of the CBD.

Lessons on Lending and Borrowing in Hard Times

*Leonard I. Nakamura**

Problem loans and highly leveraged transactions have brought home a truth about lending that is easily forgotten in good times: loans sometimes fail, with sad consequences for both borrower and lender. Many existing loans have soured, causing lenders to tighten credit terms on new lending. Meanwhile, borrowers have complained—and policymakers have openly worried—that lenders are refusing sound loans.

New theories about lending and about loan contracts emphasize the difficulties lenders face in ensuring repayment of their loans. According to these theories, the collateral for a loan is not just a back-up source of repayment if the borrower defaults; collateral is also crucial for inducing payments from borrowers who can make them.

Cash-strapped borrowers, when their businesses sour, will often try to put off lenders and keep paying their employees, suppliers, and landlords. In response, lenders will threaten to seize collateral and declare loans in default to ensure they get their fair share of a distressed borrower's cash flows.

*Leonard I. Nakamura is a Senior Economist in the Banking and Financial Markets Section of the Research Department, Federal Reserve Bank of Philadelphia.

This threat is a blunt instrument that often harms the lender as much as the borrower. After all, the value of the borrower's collateral, particularly during a recession, may be insufficient to repay the loan. But there are other considerations, as well. A foreclosure causes valuable resources to be lost that would not be lost otherwise. Management may lose partial control over the firm because of bankruptcy rules, or spend too much time in court, struggling against creditors and other claimants, and too little time running the business. Customer relationships inevitably worsen as customers begin looking for alternative suppliers. And ultimately, if an otherwise viable borrower is liquidated, valuable relationships between management, employees, and customers are lost.

If a borrower's business is fundamentally sound, its longer-term profitability ought to be the best source to repay the loan. But if the lender forces the borrower out of business, this source of funds is lost.

THE DILEMMA OF FORECLOSURE

In the tale of the goose that laid the golden eggs, the owner foolishly tried to get the goose's prized eggs more quickly by killing it. Lenders are not so unwise; still, they might have to threaten foreclosure as a way to force borrowers to repay. When lenders must carry out their threats, they kill the golden goose—and this is the dilemma of foreclosure.

Unfortunately, standard economic theory had assumed away this dilemma, maintaining that the interests of borrowers and lenders could always be aligned through loan agreements. Consequently, economists believed that inefficiencies associated with loan default were small and that liquidation decisions were always sound. After all, wasn't it true that only firms having no value as going concerns were liquidated?

More recent theories offer less optimistic conclusions about lending. They show that

firms having value as going concerns may well be liquidated and that inefficiencies associated with loan default can have important consequences for aggregate economic activity. In particular, the implication is that some loans that would ordinarily be made in good times would not be made in uncertain times. These newer theories are more realistic about the potential for conflicts between borrower and lender; accordingly, they are useful guides—to all parties—for anticipating, and thereby lessening, the pain associated with hard economic times.

Two theories in particular have emphasized the importance, and difficulty, of maintaining the borrower's incentive to repay. The idea is disarmingly simple: if given a choice of how much to repay, a borrower who wishes to maximize profits will always choose to repay the smallest amount. One theory, originated by Robert Townsend,¹ underscores the lender's ignorance, relative to the borrower, of the borrower's net worth. The other theory, originated by Oliver Hart and John Moore,² emphasizes the borrower's control over cash flows (the revenues that flow to the borrower from sales of products and services).

TOWNSEND: LOAN CONTRACTS REDUCE INFORMATION COSTS

Townsend's model stresses the cost to investors of obtaining financial information about borrowers. Before granting a loan, outside financial investors must first obtain detailed information about the firms seeking finance. This information extends to the firm's products and services, the customer base, marketing

¹Robert M. Townsend, "Optimal Contracts and Competitive Markets With Costly State Verification," *Journal of Economic Theory* 21 (1979) pp. 265-93.

²Oliver Hart and John Moore, "Default and Renegotiation: A Dynamic Model of Debt," MIT Working Paper (August 1989).

data, advertising plans, management, alternative financial resources, plant and equipment, labor resources and costs—in short, a detailed financial analysis and forecast. And until the financing is actually in hand, the firm has a strong incentive to provide investors with satisfactory information.

But once the investment is made, the investors may not be well positioned to keep informed about a firm's net worth. Information gathering is a costly procedure, requiring, at a minimum, an audit of current assets and liabilities, an explanation of variances between planned income and expenses and the results achieved, and an evaluation of future profit prospects.

The loan contract, according to Townsend, minimizes this informational cost by specifying a fixed dollar amount that the borrower agrees to pay; as long as repayment is made, no further financial investigation is required. If the borrower fails to repay, however, the lender investigates the borrowing firm, learns of its net worth, and seizes its assets up to the value of the debt plus the cost of the investigation. A solvent borrower will have a strong incentive to repay, as long as the costly investigation following default makes a solvent borrower worse off. The loan contract thus minimizes the cost of post-investment financial investigation while preserving the incentive to repay.³

The Defaulting Borrower Pays a Penalty.

³Townsend's model can best be understood by comparing the loan contract with a venture-capital contract, whereby the investor expects to receive a share of the venture's net worth. This financing contract repays the investor an amount depending on the firm's net worth; if the investor is ignorant of the firm's position, the owner, in an effort to minimize the repayment, will likely claim that the firm has low net worth. As a result, this type of contract requires the investor to always know the firm's net worth—which is costly information to obtain—and is likely only when the investor takes a large stake in the firm and the venture shows potential for substantial returns. Venture capitalists invest relatively large stakes in small start-ups and follow them closely.

In practice, a borrower who fails to make timely repayments faces the threat of loan foreclosure and seizure of collateral. (See the box on p. 16 for a discussion of collateral.) Although the borrowing firm can partially protect itself by seeking bankruptcy protection, its business and plans become subject to legal restrictions and scrutiny by the lender. Such constraints, not to mention the loss of reputation and goodwill that bankruptcy may entail, can hurt the firm. The key consequence of default, as required by Townsend's theory, is that the borrower pays a penalty:⁴ a loss of asset value. The penalty can be imposed on borrowers through various methods—loan workouts, liquidation, takeover of the firm by an outside administrator acting on behalf of creditors, or seizure and selling of collateral. (The practical steps on the road to liquidation are briefly defined in the box on p. 17.)

Let's take, as an example, an investment in a fictitious computer chip manufacturer, Custom Chip. Custom Chip's value is only partially its factory and inventory of materials and chips; much of its value is its new *ideas* for chips. Only an expert in the computer chip business can know how much Custom Chip's value increased—or decreased—in a given period. One way to find out might be to auction off Custom Chip's patents, its chip-design department, and its manufacturing plant (as would happen in a liquidation). But doing that would destroy the firm.

If Custom Chip owes its lender \$2 million, then as long as the firm's true value is greater than \$2 million, the owners will have a strong incentive to repay the debt rather than risk having the firm thrust into bankruptcy. The

⁴For a precise specification of how the losses of collateral associated with liquidation relate to the optimal debt contract, see Jeffrey M. Lacker, "Collateralized Debt as the Optimal Contract," Federal Reserve Bank of Richmond Working Paper 90-3 (March 1990).

threat of foreclosure enforces the loan repayment and means that the lender need not pay computer consultants to analyze Custom Chip's value. However, if Custom Chip cannot or will not repay the \$2 million, the lender may have to declare a default and thrust Custom Chip into

bankruptcy.

The high cost of default is most obvious when the lender seizes collateral. The collateral is then no longer available to the borrower, who was actively using it, and it goes to a lender, for whom it has no direct use. The borrower loses

by not having use of the collateral, which is often necessary to doing business. In addition, the lender incurs costs in seizing, storing, and selling the collateral. And as the lender has no special expertise with the collateral, its value may deteriorate further while in the lender's possession.

Lender Must Carry Out the Threat. In Townsend's model, the story ends there. Once default occurs, the lender must carry through the threat of foreclosure and seize the collateral. Thus, Townsend's theory predicts that costly bankruptcies will arise from the existence of debt contracts—and that firms having more value as going concerns than in liquidation may be liquidated solely because they cannot pay their debts. If lenders chose instead to renegotiate the terms of the loan, then borrowers would lose their incentive to repay. Unfortunately, by foreclosing on borrowers who are potentially viable, the lenders may lose their best

Are You Sure It's Collateral?

Collateral may be any asset of the borrower. Physical assets would be land, plant, equipment, and inventory. Financial assets would include receivables (customers' promises to pay) and financial securities (stocks and bonds).

However, collateral is of value only to the extent that the lender can actually claim, seize, and dispose of it in the event of default. For most borrowers, collateral is property that is a functional part of the business, and its value varies with the business's ups and down. Then there are other important assets—customer goodwill and other future profit opportunities, for example—that are intangible and cannot be used as collateral because the lender cannot seize and sell them.

Establishing a clear claim to collateral is not always easy. Lenders must follow procedures, set forth in the Uniform Commercial Code, to ensure that their claim is valid. In essence, this requires clearly identifying the collateral, making sure that no one else has a prior claim to it, and making public the lender's claim. This process is called securing and perfecting collateral. If not crucial to the borrower's business, the collateral may actually be held by the lender. However, very often the collateral is integral to the borrower's business and cannot conveniently be held by the lender.

Numerous anecdotes attest to the problems that can arise with collateral. In one instance, the collateral was salad oil, held in vats. When default occurred, the vats turned out to contain water with a thin film of oil on top. In another instance, collateral was mineral rights and a car. But the borrower, it turned out, had never bought the mineral rights, and when the lender came to collect the car, he found that it had already been sold.

A cattle rancher pledged five steers as collateral for a loan, but none of the steers was specifically identified as such. Just before the rancher defaulted, five steers left the herd and, caught in a lightning storm, sought shelter under a tree. The tree was struck by lightning and the five steers died. The rancher was able to argue successfully that the bank's claim was to the five dead steers.

Collateral often deteriorates in value when the firm's lines of business deteriorate. When oil prices slumped in 1986, drilling rigs fell in value. When retail sales slumped in 1990, the value of unsold merchandise declined along with them. If a firm's sales falter because its customers are in financial straits, the firm's receivables will turn out to have little value.

source of repayment: the borrower's value as an ongoing business.

A partial parallel for the lender's dilemma can be found in the famous Bible story about King Solomon. The wise king was able to discern which of two women claiming to be a baby's mother was telling the truth when he threatened to cut the child in two. Similarly, the lender must threaten to destroy the firm in order to learn the owners' true assessment of its worth. In both cases, the threat must be made in order to learn information. King Solomon, at least, had the advantage of knowing that his threat was only a threat. But in Townsend's model, the lender may discover that the firm cannot repay and that the threat will have to be carried out. And so, a temporary cash shortage can result in business failure when the lender cannot verify that the borrower's problems are indeed temporary.

HART AND MOORE: COLLATERAL MAKES RENEGOTIATION POSSIBLE

A more recent model, by Hart and Moore, explores loan renegotiation as an alternative to liquidating the firm. But unlike Townsend's model, this one assumes that investors have no difficulty maintaining good information about borrowers—only trouble controlling them contractually.

Hart and Moore assume that investors and entrepreneurs begin with the same information and that they always learn new information simultaneously. However, entrepreneurs control

cash flows and can always divert them from investors by, say, using cash to pay workers and suppliers instead.

The only commitment entrepreneurs can make is collateral—and lenders can seize collateral if fixed payments are not made. This

The Road to Liquidation: Some Terminology

Bankruptcy - A debtor is afforded relief from its debt under the provisions of the Bankruptcy Code either through a liquidation (Chapter 7 of the Code) or rehabilitation (Chapter 11 for commercial enterprises and Chapter 13 for individuals). In a liquidation proceeding, the assets are collected and distributed by a trustee. In a bankruptcy, lenders cannot seize assets or attempt to collect payments; secured lenders are entitled, eventually, to payments equal in value to their collateral, but unsecured lenders often receive little. Rehabilitation and emergence from bankruptcy proceedings typically involve the consent of creditors and equity holders.

Collateral - Any property of the borrower that secures the debt to a lender. In the event of default, a lender may seize the borrower's collateral; in bankruptcy proceedings, a secured lender has first claim to proceeds from collateral.

Default - A borrower's violation of the loan's terms. Failure to make timely payments or to fulfill other terms, such as providing timely and accurate financial data, constitutes a default. The lender's response—foreclosure of the loan—typically includes the right to demand full loan repayment and the right to seize any collateral specified in the loan contract.

Loan workout - A business plan by which a borrower tries to resolve a problem loan. The business plan is typically an agreement arrived at by the lender and the borrower in an effort to avoid bankruptcy proceedings. Renegotiation of loan payments is often a part of a loan workout.

Liquidation - The collection and disposal of a borrower's assets.

Renegotiation - Resetting the terms of a loan contract, typically involving a delay of payments and often a reduction in interest or principal.

collateral, however, is worth more when left in the hands of the entrepreneur. And if collateral falls in value, as often happens in recessions, the lenders' ability to collect payment decreases.

This theory rests on the idea that the variety of possible events that can affect a business is simply too large and complex to be captured in a contract. Moreover, as contract provisions become more complicated, both writing and interpreting the contract become increasingly expensive. Lenders thus keep financial contracts in a form as simple as possible in order to enforce them at low cost. This allows them control over specific types of collateral, but not over details about cash flows.

By Hart and Moore's reasoning, the owner of Custom Chip will repay the loan as long as the manufacturing plant and inventory of computer chips (as distinct from anticipated future profits) remain valuable. However, if the plant and inventory fall in value, the owner can divert cash and ideas to start up a new firm, defaulting on the original loan, even if current cash flows would suffice to repay it.

Threat of Loss Enforces Repayment. Another example of the role collateral plays in enforcing payment can be found in the mortgage market. Consider Robin House, who is buying a \$200,000 house with a 10 percent down payment of \$20,000; her debt is therefore \$180,000. Initially, the value of the collateral—the house—exceeds the value of the debt by \$20,000. The threatened loss of home easily enforces Robin's mortgage payments. But suppose the housing market deteriorates and the home falls in value to \$150,000. If Robin values her credit reputation (including assets the mortgage lender might be able to seize) at only \$20,000, she has an economic incentive to default on the mortgage: her debt exceeds the value of the collateral plus bankruptcy cost. She may refuse to make mortgage payments even though she can afford them.

Borrowers who lose their incentive to repay when their collateral falls in value frequently

do default. It is also true that when borrowers are unable to repay, their collateral is often low in value—and both situations occur for the same reason: a weak economic environment. Consider inventory as collateral. When a firm fails, its inventory will consist of those goods it could not sell at close to the original price. Loans that are overcollateralized when made may be severely undercollateralized when foreclosed on. Yet, this does not mean that the collateral serves no purpose; indeed, it helps ensure repayment during periods in which the borrower *can* repay.

While lenders would prefer collateral with an unshakable value, it is extremely hard to find. Indeed, it is not always easy to put the proper value on collateral in the first place. Collateral may not be as difficult to evaluate as the value of an ongoing concern, but it still may not be straightforward. (See the box at right for difficulties in determining how much the home underlying a mortgage is worth.)

Collateral Is Key to Renegotiation. In Hart and Moore's model, lenders can renegotiate a loan instead of seizing collateral. In a renegotiation, lenders may allow payments to be stretched out or even reduced so as to avoid the losses from seizing collateral. But since only collateral can enforce repayment, the lender will be willing to do this only if the borrower can offer immediate cash and future collateral that are at least as good as what the lender can gain through immediate seizure. If future collateral is inadequate, the lender will foreclose and a viable firm may be lost. Thus, renegotiation only partially solves the dilemma.

Suppose Custom Chip is unable to repay a loan during a period in which profit margins decline because of a recession in the computer industry. The lender has two options. One, it could seize the plant and its inventory of chips. Or two, it could renegotiate—permit Custom Chip to stay in business, accept an incomplete payment of the loan, accept the owner's beach condo, say, for additional collateral, and agree

Who Assumes the Risk in Offers to Pay Closing Costs?

Real estate ads sometimes include the come-on "Seller will pay closing costs." This practice creates the innocent appearance of a generous home seller helping the prospective buyer who otherwise would have trouble making the down payment on the house. But is this practice innocent from the perspective of the mortgage lender? No, because the seller is really being generous with the lender's money.

An offer to pay closing costs actually inflates the house's selling price. To see this, consider a house priced by its owner at \$100,000 but whose true market value has fallen to \$92,000. In method 1, the standard method, the owner straightforwardly lowers the price by \$8,000, to \$92,000. In method 2, the owner offers to pay the borrower \$8,000 up front by paying the buyer's closing costs.

	Method 1	Method 2
House price	\$92,000	\$100,000
Down payment	\$9,200	\$10,000
Mortgage loan	\$82,800	\$90,000
Closing costs	\$8,000	\$8,000
Buyer puts up	\$17,200	\$10,000
Seller gets	\$92,000	\$92,000

The only difference in the bottom line is that the lender has loaned \$7,200 more to the borrower; in both cases, the seller winds up with exactly the same amount of money. But suppose the house falls in value by 10 percent, to \$82,800. In the first case, the lender is fully protected, and the borrower has no incentive to default on the mortgage. But in the second case, the lender is likely to take a substantial loss if the borrower defaults on the mortgage—and now the borrower may have an incentive to default because the collateral that the borrower loses is less than the debt the borrower would otherwise have to pay.

And loans that make renegotiation more possible by preserving repayment incentives are attractive to borrowers as well as lenders. In renegotiation, loans in which borrowers have uncommitted resources to offer the lender are preferable to loans in which borrowers have no negotiating room. In the Custom Chip example, the fact that the owner's beach condo can be put up as collateral helps keep the firm alive. If the owner lacked this resource, renegotiation would be less attractive to the lender.

In 1989, Michael Jensen⁵ argued that highly leveraged transactions would not result in bankruptcies because lenders would always be better off renegotiating. In retrospect, Jensen's argument appears incorrect. One reason may be that, in many highly leveraged transactions, the borrowers had very little cash margin, or extra collateral, with which to renegotiate.

to a partial write-down of the remaining debt. However, if Custom Chip cannot come up with some combination of current cash and future collateral that is more valuable than existing collateral, the lender will go with the first option and seize the collateral. So, in this case, although Custom Chip might have a good chance of substantial future earnings, it is unable to realize them because it cannot promise the lender an adequate share of future earnings.

Renegotiations preserve the firm's value.

LENDING DURING A RECESSION

Lenders' most difficult decisions are made during recessions. For the prospective borrower, access to additional financing may be

⁵Michael Jensen, "Is Leverage an Invitation to Bankruptcy? On the Contrary—It Keeps Shaky Firms Out of Court," *Wall Street Journal*, February 1, 1989.

crucial to survival. But for the lender, recession financing is treacherous. In recessions, the probability of bad economic outcomes is higher than at other times, and inefficient, costly bankruptcies and liquidation are more likely.

Unless lenders have established procedures for commanding cash flows from troubled borrowers, they will be unable to lend profitably during recessions, when cash flows become more questionable. Collateral is crucial—both as an ultimate source of repayment and as a threat to command repayment. But in recessions, collateral—unfortunately—becomes less reliable.

Loan Contracts Are Less Efficient in Recessions. According to both of the models just discussed, firms with going-concern value may be shut down if loan repayments cannot be made. This is more likely to occur during recessions, when demand falls and cash flows dry up. As a consequence, loan contracts are more likely to lead to inefficiency during bad times than in good times, since bankruptcies and liquidations are more likely. Thus, the practice of making fewer loans in a weak economy is consistent with these theories.

Several other points about lending during a recession fall out of these models:

1. *More collateral will be required to further ensure repayment, although this makes borrowing more difficult.* During a recession, the increased risk that collateral will fall in value means that lenders will need larger amounts of it to maintain the borrower's incentive to repay. Inevitably, more potential borrowers will find that they lack the collateral necessary for the loan they're seeking.

2. *More documentation will be presented, and past lender-borrower relationships will be more important.* Lenders should attempt to know more about borrowers during recessions because default is more likely—and more expensive—when lenders are relatively ignorant. This makes it doubly hard on borrowers whose normal lenders themselves become cash

constrained; for borrowers to exchange a lender who knows them well for one who does not will be expensive, if not impossible. Detailed and accurate record-keeping may make the difference in whether new financing is obtained.

3. *Noncredit terms on loans will tighten.* Tightening noncredit terms for borrowers may make it harder for them to qualify for loans, but at least lenders will be able to continue making profitable loans in hard times. For example, in a weak real estate market, lenders should require higher down payments on mortgages and be particularly wary of techniques home sellers may use to foist greater risk on the lender.

In addition, lenders may demand more *covenants* to their loans. Loan covenants are legal conditions added to the loan contract that permit the lenders to declare loans in default. Some covenants constrain managerial discretion; others specify standards of continued creditworthiness. Covenants increase the lender's ability to seize collateral while it retains much of its value.

RENEGOTIATION IN RECESSION

Hart and Moore's model also has implications for what borrowers and lenders can expect from loan renegotiations during a recession. The lender's purpose in renegotiating a loan is to achieve new combinations of cash and collateral that leave the lender better off than under the previous agreement.⁶ For example, a lender will write down an unsecured loan,

⁶This article assumes that a firm's lenders are acting in concert. A natural tension between lenders often emerges in loan renegotiations, and the presence of many independent lenders may complicate renegotiation outside the framework of bankruptcy court. A lender acting independently should be cautious about infringing on the rights of other lenders; indeed, obtaining a preference over other lenders can be reversed if bankruptcy actually occurs. Worse yet, if the borrower is viewed as being in a lender's control, that lender may become liable to other lenders for the borrower's debts.

forgiving part of the debt to obtain collateral and immediate cash under a new agreement.

Conversely, borrowers should realize that in times of a weak economy, failure to repay a loan is likelier to have serious consequences—collateral may be seized, for example. In assessing their possibilities for a successful renegotiation, borrowers should review those assets that may be used for cash and collateral.

Lenders are best off pushing for low-risk operation of the firm. A debt-burdened borrower has a strong incentive to divert funds at the lender's expense.⁷ To counter this, the lender will—in what is called a “loan workout”—actively negotiate the borrower's business plan to maximize the probability of receiving cash flows. In the loan workout, the lender should push to err on the side of safety and carefully monitor the borrower's expenses and receipts to see whether the borrower is adhering to plan. (A bank that handles a borrower's transactions is often well positioned to conduct a loan workout because it can best observe the borrower's behavior.) Cutting costs to conserve cash should almost always be part of a workout plan. A borrower who must give up something during renegotiation is less likely to default frivolously.

Both parties to the renegotiation should recognize the fundamental importance of good information. A strong relationship between lender and borrower and full, open communication are crucial to sound loan renegotiations. In a renegotiation, lenders often demand more information than in the initial loan process. Borrowers should recognize that, lacking good information, lenders ought not to make concessions in a renegotiation.

A final but crucial point following from the logic of Hart and Moore's model is one more pertinent to planning for the next recession than surviving the current one. When embarking on a relationship with a lender, borrowers too often care only about the short term, believing that all will be fine if only the lender grants the loan request. But borrowers ought to be forward-thinking, too, and ask themselves whether the lender will be helpful in hard times or force them to turn elsewhere when loan funds tighten generally. Just as lenders must look for sound borrowers, so should borrowers seek out sound lenders.

CONCLUSION

Recent theories on lending and the loan contract build on the idea that borrowers may lack adequate incentives to repay lenders. One conclusion they share is that loan defaults can have important economic consequences and lead to the failure of otherwise viable businesses. Another conclusion is that noncredit terms of loans can be expected to tighten in recessions.

In a downturn, credit terms to new borrowers normally tighten. The models attribute this tightening to the inherent conflicts that intensify between lender and borrower during recessions. Consequently, lending becomes less efficient and is more likely to lead to foreclosures and real economic losses. By tightening up lending practices, lenders may be able to increase their confidence in repayment and perhaps avoid being excessively conservative in hard times. And by anticipating potential credit problems, borrowers may be better able to minimize them.

Tighter credit terms are unpleasant for the borrower and may reduce the borrower's activity from the original plan. But they may be crucial for borrowing to continue in a tough economic environment.

⁷See Leonard I. Nakamura, “Loan Workouts and Commercial Bank Information: Why Banks Are Special,” Federal Reserve Bank of Philadelphia Working Paper 89-11 (February 1989).

Working Papers

Institutions and libraries may request copies of the following working papers, written by our staff economists and visiting scholars. Please send the number of the paper desired, along with your address, to WORKING PAPERS, Department of Research, Federal Reserve Bank of Philadelphia, 10 Independence Mall, Philadelphia, PA 19106. For overseas airmail requests only, a \$2.00 per copy prepayment is required; please make checks or money orders payable (in U.S. funds) to the Federal Reserve Bank of Philadelphia.

1990

- No. 90-1 Gerald Carlino and Richard Voith, "Accounting for Differences in Aggregate State Productivity."
- No. 90-2 Brian Cody and Leonard Mills, "The Role of Commodity Prices in Formulating Monetary Policy."
- No. 90-3 Loretta J. Mester, "Traditional and Nontraditional Banking: An Information-Theoretic Approach."
- No. 90-4 Sherrill Shaffer, "Investing in Conflict."
- No. 90-5/R Sherrill Shaffer, "Immunizing Options Against Changes in Volatility."
- No. 90-6 Gerald Carlino, Brian Cody, and Richard Voith, "Regional Impacts of Exchange Rate Movements."
- No. 90-7 Richard Voith, "Consumer Choice With State-Dependent Uncertainty About Product Quality: Late Trains and Commuter Rail Ridership."
- No. 90-8 Dean Croushore, "Ricardian Equivalence Under Income Uncertainty."
- No. 90-9 Shagil Ahmed and Dean Croushore, "The Welfare Effects of Distortionary Taxation and Government Spending: Some New Results."
- No. 90-10 Joseph Gyourko and Richard Voith, "Local Market and National Components in House Price Appreciation."
- No. 90-11 Theodore M. Crone and Leonard O. Mills, "Forecasting Trends in the Housing Stock Using Age-Specific Demographic Projections."
- No. 90-12 William W. Lang and Leonard I. Nakamura, "Optimal Bank Closure for Deposit Insurers."
- No. 90-13 Loretta J. Mester, "Perpetual Signaling With Imperfectly Correlated Costs." (Supersedes 89-22.)
- No. 90-14 Sherrill Shaffer, "Aggregate Deposit Insurance Funding and Taxpayer Bailouts."
- No. 90-15 Dean Croushore, "Taxation as Insurance Against Income Uncertainty."
- No. 90-16/R Loretta J. Mester and Anthony Saunders, "When Does the Prime Rate Change?"
- No. 90-17 James McAndrews and Richard Voith, "Regional Authorities, Public Services, and the Location of Economic Activity."

No. 90-18 Sherrill Shaffer, "A Test of Competition in Canadian Banking."

- No. 90-19 Brian J. Cody, "Seignorage and the European Community: Is European Economic and Monetary Union in Danger?"
- No. 90-20 John F. Boschen and Leonard O. Mills, "The Role of Monetary and Real Shocks in Near-Permanent Movements in GNP."
- No. 90-21/R Mitchell Berlin and Loretta J. Mester, "Debt Covenants and Renegotiation."
- No. 90-22 Richard Voith, "Transportation, Sorting, and House Values in the Philadelphia Metropolitan Area."
- No. 90-23 Gerald A. Carlino and Leonard O. Mills, "Persistence and Convergence in Relative Regional Incomes."
- No. 90-24 Sherrill Shaffer, "Stable Cartels With a Cournot Fringe."
- No. 90-25 Ahmed Mohamed, "The Impact of Domestic Market Structure on Exchange Rate Pass-through."
- No. 90-26 Loretta J. Mester and Anthony Saunders, "Who Changes the Prime Rate?"
- No. 90-27 Sherrill Shaffer, "The Lerner Index, Welfare, and the Structure-Conduct-Performance Linkage."
- No. 90-28 Sherrill Shaffer, "Regulation and Endogenous Contestability."
- No. 90-29 Brian J. Cody, "Monetary and Exchange Rate Policies in Anticipation of a European Central Bank."
- No. 90-30 Leonard I. Nakamura, "Reforming Deposit Insurance When Banks Conduct Loan Workouts and Runs Are Possible."

1991

- No. 91-1 Dean Croushore, "A Measure of Federal Reserve Credibility."
- No. 91-2 James J. McAndrews and Leonard I. Nakamura, "Worker Debt With Bankruptcy"
- No. 91-3 William Lang and Leonard I. Nakamura, "Housing Appraisals and Redlining."
- No. 91-4 Paul S. Calem and John A. Rizzo, "Financing Constraints and Investment: New Evidence from the U.S. Hospital Industry."
- No. 91-5 Paul S. Calem, "Reputation Acquisition, Collateral, and Moral Hazard in Debt Markets."
- No. 91-6 Loretta J. Mester, "Expense Preference and the Fed Revisited."
- No. 91-7 Choon-Geol Moon and Janet G. Stotsky, "The Effect of Rent Control on Housing Quality Change: A Longitudinal Analysis."
- No. 91-8 Dean Croushore, "The Short-Run Costs of Disinflation."

No. 91-9 Leonard I. Nakamura, "Delegated Monitoring With Diseconomies of Scale."



FEDERAL
RESERVE BANK OF
PHILADELPHIA

BUSINESS REVIEW Ten Independence Mall, Philadelphia, PA 19106-1574

Address Correction Requested