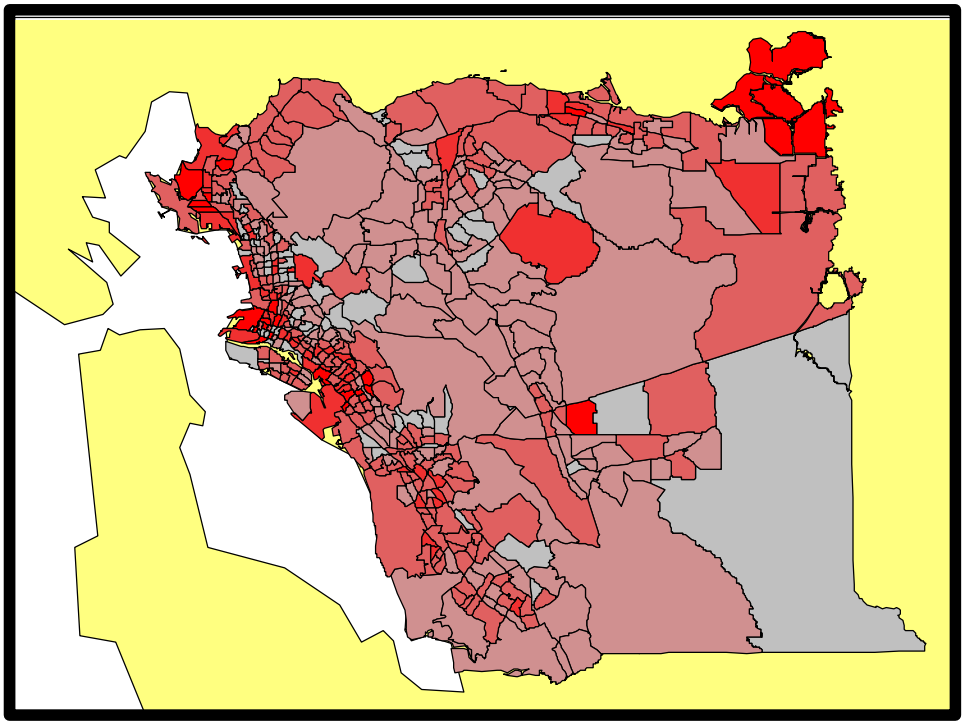
Beyond Lender Bias: Low-Income Communities and the Struggle for Capital in a Networked Economy



Mortgage Loan Denial Rates

Rick Jacobus
www.rjacobus.com
rick@rjacobus.com

Introduction

There is no doubt that information technology has brought about huge changes in world financial markets. Markets which used to be largely isolated are now inextricably interconnected by a real time network of transactions in which, generally, capital flows instantly to the highest bidder regardless of the location of that bidder on the globe. We might expect this trend, which Richard O'Brian calls this "the end of geography," to be good news for low-income communities. One could conclude that the development of an integrated and standardized financial network, by reducing the role of potentially biased individual lenders, could reduce racial and income discrimination and move the economy toward a situation where capital is allocated based entirely on the real value which various sectors contribute. And yet low-income urban communities in America and elsewhere appear to be experiencing increasing capital shortages.

This paper identifies an emerging structural logic of the financial system under which investment decisions are made by a network that relies on previous transactions as the main source for information about credit quality. The home mortgage market in the United States is examined as a specific case of this more general global financial market transformation. Data relating to the secondary market for single family home mortgages in the Oakland, CA metropolitan area is employed to provide empirical support for the argument that the emerging financial network has distinct geographic preferences which place low-income and minority neighborhoods at a systematic disadvantage in the competition for capital.

The New Logic of Capital Allocation:

What is the logic by which capital is allocated? How do investors decide where to invest their limited capital? Since the dawn of capitalism the basic answer to these questions has involved investors preferring investments which offer higher, risk adjusted, returns. Recent changes, resulting from the introduction of advanced information technology, have not altered this most basic logic. Technology has brought about a significant change

in the scale and geographic range over which this profit seeking occurs but the same technology has brought another, possibly more fundamental, change in the way investors, as a whole, evaluate the risks that different projects pose. In America over the past 25 years, the traditional system of financial intermediation with banks and thrifts at the center has been gradually eroded and replaced by what Tom Schlescinger calls a "transactions-oriented" system in which allocation decisions are increasingly made by electronically integrated capital markets rather than by individual institutions.

Investment Decisions Involve Information Costs

The basic problem which investors face is how to distinguish the best borrowers from the worst. This is the problem which economists call **asymmetric information**. Ackerlof's classic example of information asymmetry involves buyers and sellers of used cars. Sellers know the true quality of their cars but buyers are unable to easily tell the best quality cars from the "lemons." Without reliable information, a car will sell at a price that represents the value of an average quality car. The best cars will be undervalued and the worst cars will be overvalued. A buyer may choose to collect more information by having a car inspected but even a very thorough inspection will not uncover every defect. The buyer will have to weigh the cost of the inspection against the potential value of the information.

The same dynamic exists in financial markets; lenders cannot easily tell the best borrowers from the lemons. Here again the lender can, and surly will, invest in the production of information by researching the borrower's financial condition, etc. If a borrower is undervalued (i.e. they are being charged too high an interest rate for the level of risk that they actually pose) a lender can make money by offering them a better deal. If the best borrowers are undervalued by a large amount then an investor might be willing to spend a lot of money finding these borrowers. However the volume of potential data which might be relevant to any given investment is nearly infinite and, at a certain point,

the cost of producing the information exceeds the maximum gain that the information offers.

Markets Lower Information Costs

Economists are fond of theorizing about perfect markets and many have pointed out that perfect markets solve this type of information problem. Imagine a firm that, rather than going to a bank for a $500 million loan, issues 1 million $500 bonds. If these bonds are actively traded every day, the price of the bonds will rise or fall as new information about the company comes out. No single investor will need to invest significant resources researching the firms credit quality. In fact if you invested in research, discovered that a firm were undervalued and began to buy its debt, by bidding up the price you would effectively signal the market of the result of your research. You cannot simultaneously maintain monopoly control of your information and participate in the market. Thus, as Stigletz points out, in the theoretical perfect market all information available to any market participant is summarized and incorporated into the price. A market serves as a feedback mechanism through which all information is captured in transactions and becomes a public good available instantaneously to everyone.

Steiglitz insight may seem to require a leap of faith, but the process is far from magical. The new global financial markets are frequently compared to casinos but, in terms of the flow of information, racetracks provide a better analogy. In a casino everyone has perfect information. We all know how many faces are on each die; the odds of the roulette wheel landing on any given number never change. At a racetrack the odds are far more difficult to calculate. The volume of information that is relevant to any race is nearly infinite. And yet the track must post odds and be prepared to pay based on those odds. Rather than attempting to collect all the relevant data, analyze it and set appropriate odds, the track will rely on the bets themselves to set the odds. The track establishes a transaction-oriented feedback mechanism in which odds are adjusted based on the betting that has already taken place. In this way no individual has to process all the relevant data. One

person may have a great deal of information about the health of the horses while someone else may know about the track condition and each, by acting on that information at the betting window, will influence the odds that the track offers. Ultimately the odds reflect a much broader spectrum of information than the track could have collected on its own.

The market is like a racetrack, then, in that as investors make decisions they signal others by influencing the price. This is not to say that the market is right. Bad information will be incorporated as well as good. The market is summarizing expectations and beliefs not facts. Just like at the racetrack where the favorite does not always win, a market can summarize false expectations. Other information may not be incorporated at all. Data that is not used in someone's decision to bet does not become information in this closed transaction-based system. If someone knows that one horse is sick but does not bet, then the odds are not effected by that information. The system only summarizes information which results in a transaction. Nonetheless the system efficiently collects enormous amounts of information without most of the cost that would normally accompany information collection.

Theory of Financial Intermediation

Leeland and Pyle theorize that banks arise precisely because capital markets are not perfect. Their theory of financial intermediation says that banks specialize in the production of information. They charge borrowers a premium over the rate that they would have to pay in a perfect market and apply some of this surplus to the cost of producing information. The bank can capture the value of its information production (by charging a higher rate) because it faces little competition in financing a specific firm. If the firm had many lenders, instead of just one or two, the bank's decision would signal the others and they might offer the firm debt at a slightly lower cost because they would not have to cover all of the information costs. However as long as the firm has to choose one lender, it will have to pay an information premium. Banks may compete on the cost of information production but in an imperfect market someone will have to bear a large cost for producing the information.

Technology and the Rise of Markets

With the rise of information technology, banks have been having a difficult time maintaining the monopoly control necessary to effectively collect their information production premium. Information Technology has had two main effects.

1. The integration of local or regional capital markets into a global communications network has brought an enormous volume of capital into one system, a precondition for an effective credit market.
2. Information processing technology has simplified the process of advanced statistical analysis of market transactions which is at the center of the transaction-oriented system.

An efficient market requires a high volume of active trading. The information cost savings that markets offer are only available where there is sufficient volume to insure that trades occur frequently. If each transaction relies on preceding transactions to accurately price the risks involved, than less frequent transactions make the information less reliable and cause investors to spend more on information production. Innovations in communications technology have made large scale, real time, financial transactions between geographically dispersed parties possible and even routine. This essentially brings all investors into one big market with an enormous volume of transactions.

At the same time, in order to take full advantage of the benefits of the market, investors have to be able to analyze the various risks that they face. Information technology gives investors access to up to the minute historical data on financial transactions and the ability to use this information to engineer portfolios which minimize their risk. Portfolio theory generally practiced by institutional investors involves managing the statistical correlations between different investments with the expectation that if one investment does poorly others will make up for any loss. This type of thinking requires an understanding not only of the historical performance of each type of asset but of the interrelationships between assets. While this analysis is not impossible to perform on paper is undoubtedly no

coincidence that its growing popularity has closely followed the growth of computer technology.

Information technology has allowed the market logic, which has always been an important element in capital flows, to grow in importance and increasingly to dominate other capital allocation mechanisms. Like many other impacts of information technology, it is not that these transactions could not have occurred without information technology but that the technology lends itself to this type of structure. Thus, as the rise of the secondary mortgage market described below demonstrates, the development of information technology and the growth of global credit markets have preceded hand in hand.

Why Study Home Mortgage Lending?

This increasing transaction orientation clearly makes credit easier for certain borrowers and harder for others. Small businesses are finding it harder to obtain financing while large corporations are finding it easier and easier. At the same time, the effect can be differentiated geographically at least with regard to certain types of lending. Dymski and Vietch (1995) define the term "geographic assets" to refer physical goods with long expected lives which cannot, cost effectively, be moved. Examples would be all types of real estate investment as well as certain industrial equipment. I would expand this definition to include the non-physical assets of businesses which are primarily locally serving and certain financial assets backed by real geographic assets. In all cases a geographic asset is one whose value is significantly tied to a specific geographic location and which therefore faces risks which are unique or specific to that place.

Geographic assets compete with each other and with all other assets on the global credit market. But no geographic asset competes alone. One type of investment in an area leads to other investments. Credit difficulties in a neighborhood lead to negative externalities which spillover and effect the creditworthiness of all geographic assets located in the area.

Ultimately we cannot understand the workings of the credit market for any geographic asset in isolation from those which supply credit for other assets in the neighborhood. However there is great diversity in the specifics involved in financing for each type of geographic asset. To understand the general impact of information technology and the resulting integration of financial markets on low income neighborhoods with any specificity we have to focus on one particular type of asset while looking for patterns which might be more broadly applicable.

Home mortgages are an interesting case for the study of the impact of the global market restructuring on credit availability in low-income and minority neighborhoods. In one sense home mortgage lending is the best area to study because this market has been transformed more dramatically than the market for other types of credit and because comprehensive geographically specific data is available as a result of the Home Mortgage Disclosure Act. On the other hand, one drawback to studying home mortgage lending is that single family homes are already fairly homogenous relative to other assets and, home mortgage lending has been fairly standardized for most of this century. We might expect to see more dramatic geographic differences if we were to study an asset which was less homogeneous than single family homes. Lending for apartment buildings, retail facilities, and small neighborhood businesses might be more geographically sensitive because of the greater heterogeneity of these assets. Nonetheless we can see that information technology has not had the same impact on all neighborhoods and even with a relatively standardized product, some people are finding that they do not fit the criteria for inclusion in the new global credit market.

Transformation of the Housing Finance System

Beginning in the depression, America developed a housing finance system based around savings and loan associations. S&Ls provided a segregated channel for credit exclusively for home mortgages. From the 1930s until the 1970s, federal regulation limited the interest rate that most financial institutions could offer to depositors. S&Ls were allowed

a to offer a slightly higher rate than banks and were expected to use these deposits to offer cheap credit to home buyers. Local savings and loans took local deposits and made local home mortgage loans. The entire system was isolated from other financial markets; rising or falling rates for corporate debt generally had little effect on home mortgage rates. Rising interest rates in the 1970s and increasing capital market integration brought this system to its knees. Money market mutual funds began offering savers rates which were much higher than the S&Ls were allowed to pay and many people pulled their money out of their local thrift and placed it on the growing global capital market. Many S&Ls went under and those that survived are no longer operating in an isolated market. The result of the S&L crisis has been the near total integration of American housing finance with other global credit markets.

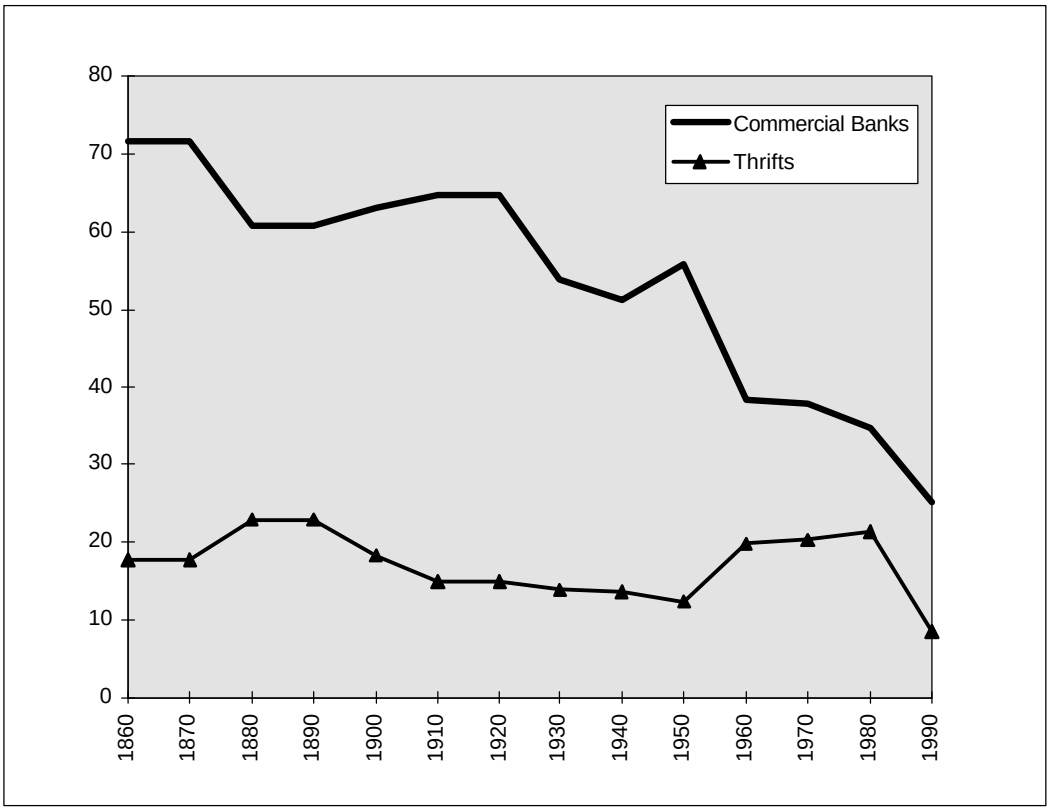
Into the vacuum created by the collapse of the savings and loan industry has stepped the Government Sponsored Enterprises (GSEs). Fannie Mae and Freddie Mac were created in the 1930s to act as a sort of grease in the gears of a housing finance system based mostly on local S&Ls and banks. They would sell bonds on the capital markets to raise money to purchase mortgages form financial institutions. This added fluidity to the mortgage finance system and smoothed out some regional differences between supply and demand for credit. From the inception of Fanny Mae in 1938 until the early 1980s the GSEs bought between 1 and 6% of residential mortgages. (Williams P. 34) Since the mid 1980s, the GSEs have been expanding their business very rapidly. In 1980 the GSEs purchased 17% of all single family, conventional, conforming mortgages originated in that year. By 1993 the number had risen to 71%. (HUD P. 9209)

This dramatic transformation of the housing finance system parallels a broader shift of capital away from intermediary institutions and onto global markets. Two interrelated phenomena, the institutionalization of savings and the securitization of financial assets explain this transformation.

Institutionalization of Savings

Over the past few decades savers have been leaving the safety of banks and investing instead in marketable securities or entities that hold those securities. In 1860 Commercial banks held 71% of US financial sector assets and thrifts held an additional 18%. Today banks hold 25% and thrifts 8.5%. Figure 1 illustrates the escalation of this change in the last three decades.

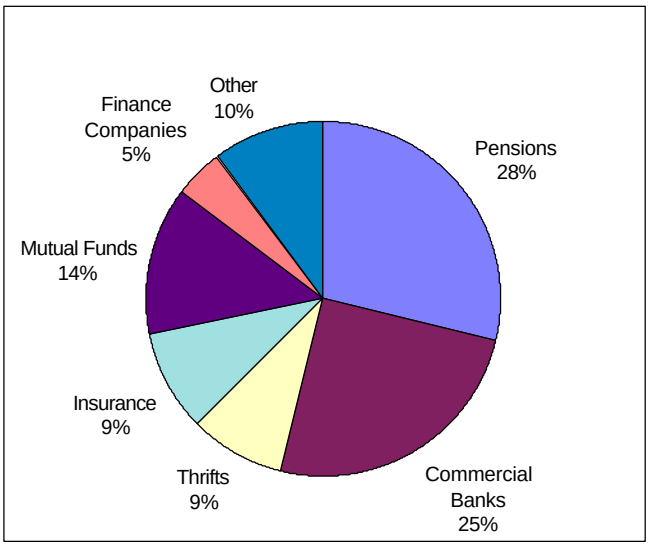
Figure 1: Financial intermediaries percentage of US financial sector assets.



Source: Federal Reserve Board as compiled in Southern Finance Project, 1995. Table 3.

Americans, like others around the world, have been turning to a growing diversity of financial services institutions to manage their savings. Pension funds, mutual funds, brokers and dealers, have all seen their share of assets increase dramatically. Figure 2 illustrates the current distribution of financial sector assets.

Figure 2: 1993 Distribution of US financial sector assets.



Source: Federal Reserve Board, Flow of Funds Accounts.

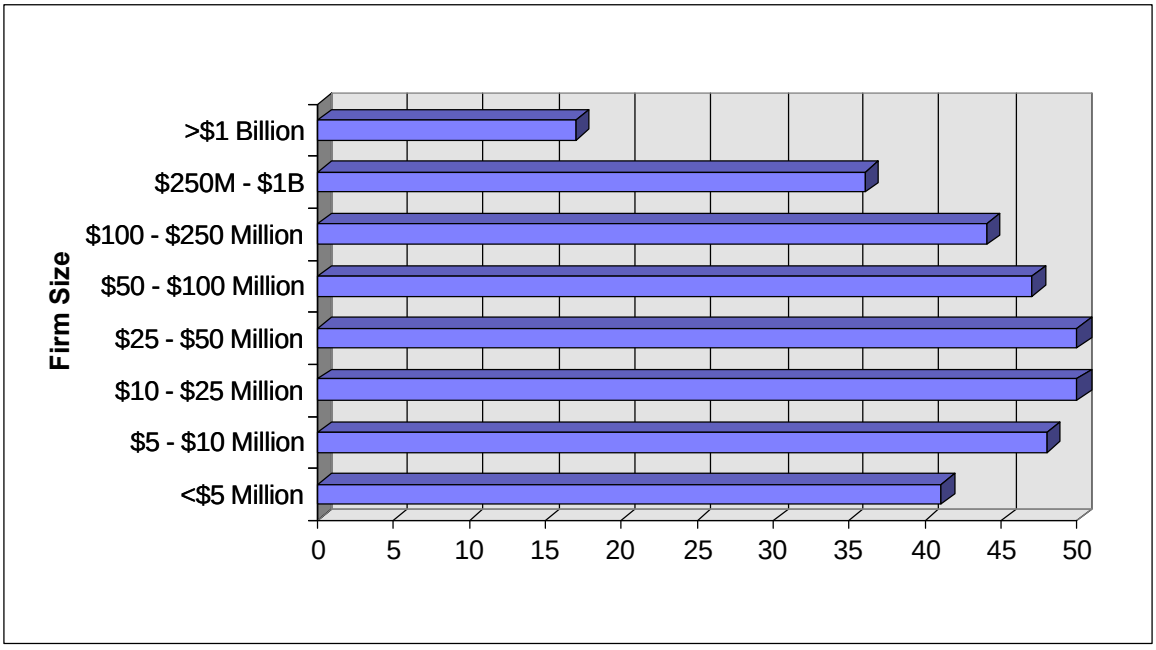
Banks have had difficulty competing for savings with these new sectors. Banks offer lower rates because what they do is very different. Bank lending is, by nature, information intensive and thus very expensive. These growing sectors have in common their emphasis on trading marketable securities rather than originating loans which means that they face lower costs. Costs alone would not put banks at a disadvantage. As long as the rate they charge borrowers is higher than what they pay to savers they can make a profit. However, at the same time that savers have been shifting to market oriented investments, borrowers have been turning to the capital markets as a source of lower interest rates.

Securitization of Financial Assets

Beginning in the 1950s banks began to loose their largest borrowers to credit markets. Large firms found that they could issue credit market instruments (bonds or commercial paper either exchange traded or privately placed) to raise credit at lower cost. Very high volume allowed these companies to take advantage of the market structure to avoid the underwriting and monitoring costs that banks passed on to them. Because they were able to issue large quantities of financially identical instruments which spread risks very broadly they were able to pay much lower rates.

Most bank borrowers, however, lack the volume to take advantage of credit markets. Institutional investors considering purchasing a market instrument issued by a smaller firm will expect a higher risk premium and/or will incur higher costs establishing the firms creditworthiness. Since banks specialize in this information intensive risk analysis and most market investors lack this capacity, banks have been able to offer better rates to smaller borrowers.

Figure 3: Percent of funds provided by banks to firms of varying sizes.



Source: Beshouri and Nigro, Table 3.

Securitization is a Substitute for Volume

In recent years credit markets have been replacing banks as sources for even very small loans thanks to securitization. Securitization refers to the process by which pools of relatively homogeneous smaller loans are assembled and securities (generally bonds) backed by these loan pools are issued. Loan payments from borrowers are then passed through to purchasers of these asset backed bonds as they are received. Thus, the bondholders face many of the same risks as lenders. However by investing in a pool rather than a single whole loan, they diversify much of that risk and by buying one of

thousands of identical bonds they feel some confidence that the bonds are priced appropriately relative to the remaining risk. The investor does not expend significant resources deciding what rate to charge, she buys at the market rate. In this sense, securitization is a substitute for volume; it allows the global credit market to finance small loans by turning them into standardized, high volume, tradable instruments.

To understand the advantage of securitization, consider a bank undertaking a mortgage decision. The bank will request certain basic financial information from the applicant. It will purchase information on the applicants credit history and will employ a trained appraiser to visit the property to be mortgaged, inspect and form an opinion about its value. Ultimately an experienced loan officer will review all of this information balancing each factor against the rest and make a recommendation regarding approval.

Contrast this to the decision facing the purchaser of a mortgage backed security. The investor is considering one (or several) of hundreds of thousands of identical claims on a very large pool of mortgages with certain known factors in common. Hundreds of other investors have paid the current price for these securities. This investor is unlikely to consider the individual credit histories of the mortgage holders and, similarly, will not request appraisals of the mortgaged properties. He will rely on the market itself to evaluate the risk of the investment by looking to previous transactions as the basis of his risk evaluation. He may invest a small amount of time trying to second guess the market, but for the most part he will not face significant information costs.

Securitization Requires Homogenization

In order to successfully securitize a pool of mortgages they must be relatively similar. The risk of investing in the pool can be specified more precisely the more the borrowers have in common. Investors are concerned with both the risk of default and the risk of prepayment. When interest rates fall, existing mortgages become more valuable because they still carry the old, higher, rate and thus they sell at a premium. However the same fall in rates will cause many homeowners to prepay their old mortgage and refinance.

Estimating the rates of default and prepayment is therefore essential to determining how much to pay for an interest in a pool of mortgages. Different borrowers have different rates of prepayment and default under different circumstances. For example, homeowners in California are more likely to prepay their mortgages because, on average, they move more often than, for example, Midwesterners. This is not a problem from the investor's point of view so long as they know about it before they invest in these mortgages.

Every pool has some average likelihood of default or prepayment but estimating that likelihood is difficult. If all of the mortgages in the pool share certain characteristics than investors will look at the performance of previous pools that shared those characteristics for evidence of these averages. The historical prepayment rate for loans of a certain type may not be a perfect indicator of the future likelihood of prepayment, but investors seem to feel that it is fairly reliable. Perhaps the ideal average prepayment rate changes over time but, relative to the variation within the pool, this change is likely to be quite small most of the time. As you increase the specificity of the pool you lower the variation and decrease the likelihood of results very far from the ideal, if not the historical, average. A pool of mortgages with more in common would have a lower standard deviation and we would expect to see less variation in the prepayment and default rates.

Issuers of mortgage backed securities, therefore have very specific standards to identify which loans they will buy. These criteria specify things like the maximum and minimum loan amount, the ratio of the loan amount to the appraised value of the property, the borrowers income or credit history, the ratio of the loan payments to the borrowers income, the size of the down payment, the term or other conditions of the loan, etc. Credit worthy loans which do not meet these criteria are not purchased. This is not because they are individually bad risks but because the risk is not as easily standardized.

There is a trade off between this need for standardization and the need for volume. A pool needs a large number of similar loans. The higher the number of loans in the pool

the closer the pool's results should come to the ideal or historical average. If a certain type of loan historically has a 1% default rate and we own one whole loan of this type, we will either have a 0% default rate or a 100% rate. As we buy more loans of this type we face less and less risk of a default rate much higher than 1%. In other words, the standard deviation diminishes as we increase the volume. In order to minimize the standard deviation we need a pool with both standardization and volume but, the more precise the standardization criteria, the smaller the number of eligible loans. As the volume of loans available on the secondary market has increased, so has the specificity with which they are pooled together and, as a result, the variety of different risk profiles available to investors has also expanded.

Ironically this pressure to decrease the standard deviations of loan pools serves as a mechanism to allow investors to *increase* the standard deviations of their portfolios. Investors frequently use mortgage backed securities as a hedge against other assets in their portfolios. A partial hedge exists anytime changes in the value of two assets are not perfectly correlated. Investors want to engineer portfolios with very low or negative correlations. A negative correlation would mean that, historically, as one asset's price dropped, the other's price tended to rise. In a perfect hedge the value of one asset will rise in direct proportion to any fall in the value of another asset. Hedging insulates an investor from some of the risk of market fluctuations.

While an S&L with nearly all of its money invested in mortgages would benefit from greater diversity within its mortgage portfolio, a portfolio investor purchasing mortgage backed securities will prefer more homogeneity. If the underlying loan pool is more homogeneous then the correlation to other investments will be more stable. For example if an investor is using MBS to hedge other interest rate sensitive investments she wants the MBS yield to move by a consistent amount every time interest rates change because her other investments will move in the opposite direction by that amount. The more homogeneous the pool, the more predictable it will be. Even investors who want to invest in pools with more diversification want a known level of diversification and will therefore

prefer a pool that combines several highly specific classes of loans with contrasting characteristics over a pool which achieves diversification by simply having broader criteria.

The Contribution of Information Technology

In order to manage complex portfolio investment strategies, investors need both real time (or close to it) data on market movements and the ability to analyze the complex interrelationships between various assets which those movements demonstrate. The global communications network provides investors with information on most market transactions in the instant that they occur. Increasingly powerful computers allow increasing sophistication in the level of statistical analysis.

An extreme example of this trend is the RiskMetrics data set published by JP Morgan daily over the Internet as well as on several proprietary financial industry computer networks. RiskMetrics provides data on historical yield volatility for thousands of market traded securities and a calculation of the correlation between changes in the yield of every security to that of every other instrument in the data set. Institutional investors use the massive RiskMetrics data set to perform extremely complex statistical analyses of the overall risk level of their portfolios. These "Value-at-risk" calculations require substantial computational power coupled with up to date data on market behavior.

Computerized underwriting:

At the same time that technology has transformed the preferences and behavior of investors it has made it possible for lending institutions to provide the level of statistical reliability that investor needs demand. Fannie Mae and Freddie Mac have used information technology to virtually remove human judgment, and its associated costs, from the process of underwriting many home mortgages. Fannie Mae offers networked institutions the option of underwriting loans through its "desktop underwriter" software. Fannie Mae says that the system's primary objectives are "to streamline the underwriting

process and, thereby, lower the cost of origination and to produce more objective and consistent underwriting decisions." (FNMA P. 1)

The software will insure that an application meets Fannie Mae's eligibility criteria. This kind of rule based underwriting offers lenders enormous savings over traditional methods of evaluating loan applications. It is important to recognize that, while banks have been using various credit scoring systems for years, it is the existence of an active secondary market that makes this totally rule based instant approval practical. As long as loans meet certain standard criteria they can be bundled together into enormous pools with statistically known loss rates. It does not really matter what the loss rate is. As long as it is consistent and the interest rate is set accordingly, a large enough pool can be sold or securitized. The uniqueness of each loan is effectively diversified away. A normal bank will not hold a large enough pool of loans of any one sub-type to take advantage of this diversification; they need the secondary market to really switch to rule based underwriting.

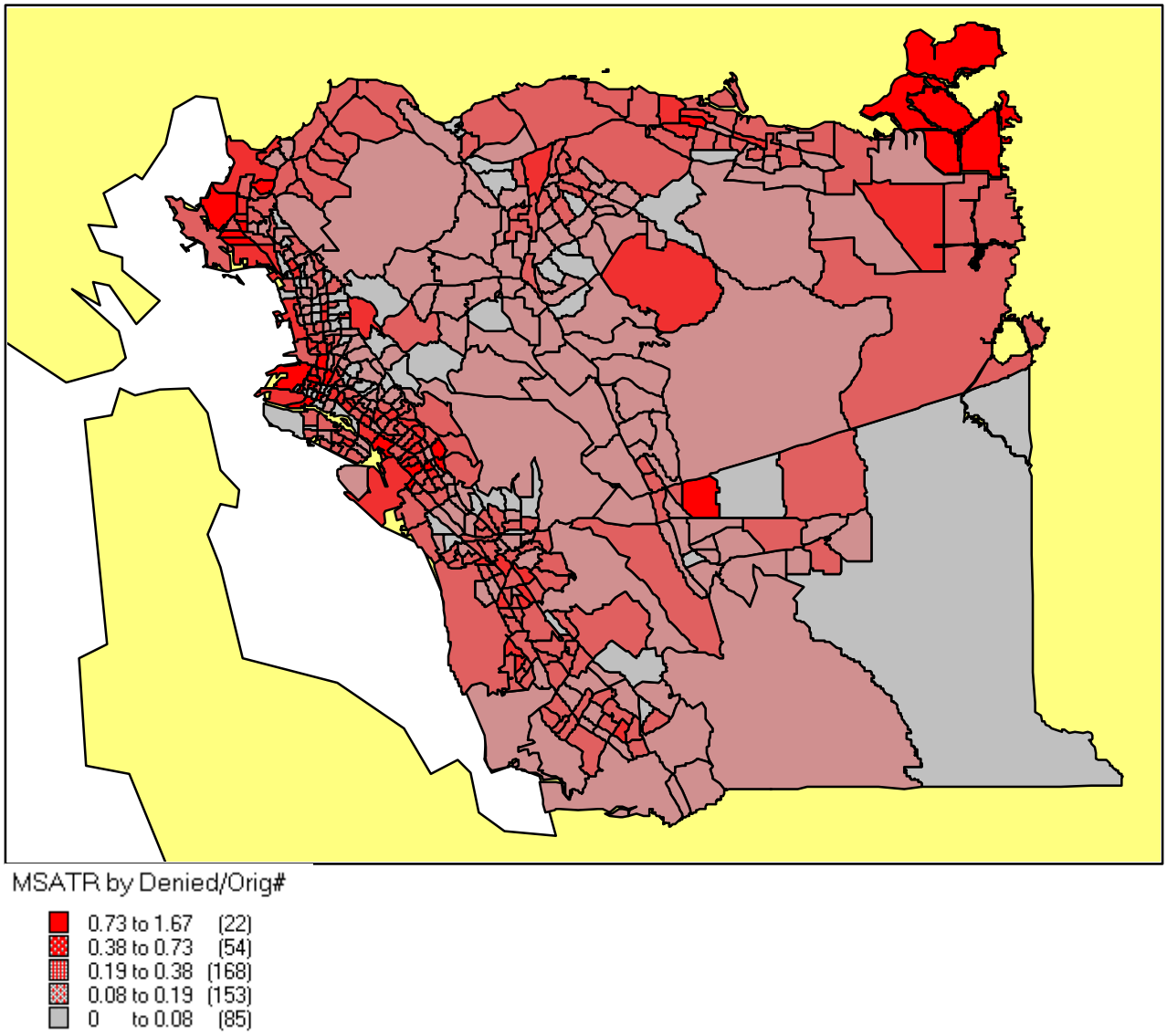
The American mortgage market has been totally transformed by the advent of technology which has allowed a move away from complex and costly bank underwriting. The new system relies on the market transactions themselves to develop a statistical analysis of risk which is increasingly replacing the judgments of individual lenders. This system lowers the cost of underwriting loans but it may not work equally well for all sectors of society. It requires considerable standardization and very high volume. Some borrowers who would be considered good risks by banks may find it difficult to meet the standards of the secondary market. An analysis of mortgage lending in the Oakland, CA area provides empirical evidence of this effect.

Oakland s Secondary Market

There are large geographic differences in the availability of home mortgage credit in the Oakland area. Residents of certain areas find it relatively easy to qualify for a home

mortgage while others face difficulties. Map 1 shows the denial rate for conventional, single family home mortgage applications for each census tract in the Oakland Metropolitan Statistical Area (MSA). The map shows a clear geographic component to the distribution of home mortgage approvals.

Map 1: Home Mortgage Denial Rates



What is less clear is what causes this map to look the way that it does. This has been the subject of considerable debate between government officials, bankers, community

activists and scholars over the past 25 years. Obviously economic factors such as income and employment which effect the demand for credit play a large role in this outcome. However, many studies have attempted to estimate the magnitude of the contribution of mortgage lending discrimination to this uneven outcome by comparing loan application denial rates and adjusting for credit factors.[1] A 1994 study by the Federal Reserve Bank of Cleveland concluded that even white applicants who apply for credit in minority tracts are 11.5% more likely to be denied than economically comparable applicants in all-white tracts. (Avery, Beeson and Sniderman)

It is clear from this research that this uneven outcome is the result of more than just income differences. The research seems to point to several independent processes including:

- overt discrimination
- covert discrimination
- unintended effects of lender bias
- differential treatment of applicants
- differences in marketing and outreach efforts

All of these factors are the result of bias internal to the lending institution. It is tempting to conclude that structural changes in the economy that reduce the importance of the judgments of individual institutions in favor of standardized criteria will be beneficial to those who are being discriminated against by biased lenders. A computer should be able to ignore an applicant's race while a loan officer might have difficulty ignoring deep prejudices. The global market seems unlikely to have prejudices against certain specific neighborhoods. We might expect that the global credit market would seek out the most credit worthy applications regardless of their location.

[1] See for Canner, Passmore, and Smith for one example or Carr and Megbolugbe for an overview of other studies.

It is very difficult to separate and quantify the effects of these different factors. There is no real way to tell whether applicants in certain areas are being denied because of their real credit risks, because of racial bias or because the institution does not feel that there is a secondary market for their loan. However, though we cannot document the exact contribution of secondary market structure on this uneven outcome, we can clearly demonstrate that there is a significant geographic component to secondary market activity and that that activity is influenced by neighborhood race and income composition.

Research Method:

By focusing on the rate at which originated loans are resold, it is possible to isolate the impact of the secondary market on this complex outcome. Some loans, it turns out, are sold onto the secondary market, more frequently than others. A key assumption of this research is that banks and other lending institutions only make economically viable loans[2]. If banks are only making safe and sound loans, why should some be sold while others are held? Nationally, in 1993 over 62% of originated conventional[3] mortgages were sold.[4] Table 1 shows the breakdown of these loans by purchaser.

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[2] The Community Reinvestment Act requires banks make credit available to all neighborhoods in their general market area and in some circumstances this might lead to banks making higher risk loans. However the law specifically requires banks to only make loans which are safe and sound and, because the consequences of failing to comply with CRA are generally insignificant, CRA does not provide much motive for banks to make bad loans. It does appear to encourage banks to incur information costs to find good loans in areas which might otherwise have been redlined.

[3] The term "Conventional" is used to refer to loans that are not insured by a government agency such as FHA or VA.

[4] Based on 1993 HMDA data compiled by John Lind (1995).

Table 1: Resale of Conventional Mortgages, 1993.

Purchaser	*Number*	*Percent Purchased*
FNMA	456945	26.3%
FHLMC	291014	16.8%
FmHA	234	0.0%
Bank	19473	1.1%
S&L	12848	0.7%
Insurance	5677	0.3%
Affiliate	110588	6.4%
Other	190081	11.0%
Total Sold		**62.6%**

Source: Lind Table 1A.

The originating institutions (banks, S&Ls, mortgage companies, etc.) can be expected to hold a certain percentage for their own portfolio. Geographically we would expect some fluctuation in the percentage sold just by random chance. Lenders will just happen to hold more loans in some places than others. However when we find significant differences in the rate sold, we can safely conclude that there is a geographically specific bias in favor or against a certain location. Since this analysis is only studying originated mortgages, all loan applications which were not economically sound have presumably been eliminated from consideration. Significant differences in the rate sold indicate geographic preferences in the structure of the secondary market and imply that these preferences are negatively impacting the ability of borrowers in these areas to compete for credit.

In a study of 1992 and 1993 HMDA data, John Lind found that bank and thrift portfolios included higher percentages of loans to low-income and minority borrowers than the subset of all loans which were resold on the secondary market. This paper extends this research by focusing on the geographic distribution on secondary market activity within one specific MSA. Rather than looking at the composition of the various portfolios, this analysis focuses on the percent sold by tract, which provides a more intuitive way of understanding the geographic aspects of the same data.

It is important to point out that even small percentage differences in the percent sold may have large impacts on overall credit availability in an area. If lenders are originating loans with the intention of selling them on the secondary market then it is inevitable that those loans which do not meet the criteria are far less likely to be made. This research does not attempt to estimate the magnitude of this effect. We are in the middle of a transformation of the mortgage system from one where lenders originated primarily for their own portfolios to one where they are, increasingly, originating for sale on the secondary market. Banks are still holding some mortgages in portfolio and, as we will see, those mortgages are different from the ones that are sold. If the system were entirely focused on the secondary market we would not observe any difference between the held and the sold loans regardless of the amount of discrimination inherent in the secondary market. If all loans were sold or sellable, we should not be able to distinguish applications which were rejected for economic reasons from the good applications which were rejected because they did not fit the specific criteria of the secondary market. Thus, the incomplete transformation of the mortgage market may be offering a temporary opportunity to study the geographic preferences of the secondary market. If the transformation continues to progress we might expect the observable bias studied here to become less significant, even as the real problem grows.

Who's loans get resold?

Overall 46.8% of conventional home mortgages originated in the Oakland MSA in 1994 were resold during 1994. This rate is dramatically lower than the national average rate of 62%. Several factors such as higher average home prices in the bay area and the relative lack of new suburban construction in the Oakland area in 1994 may partially account for this large difference in resale rate.

Differences in resale rate by tract

In addition to this large regional difference, there are sub-regional differences in resale rate between different census tracts in the MSA. Map 2 shows the percent sold for each tract in the area. While there appears to be a geographic pattern, it is not simply a difference between central city and suburban locations. Much of the difference, in fact, can be

explained by tract race and income. Table 2 shows that loans for properties located in low-income tracts are far less likely to be resold than loans in middle income tracts. At the same time, high income tract loans are even less likely to be resold. This is the result of the fact that the Government Sponsored Enterprises (GSEs) Fannie Mae and Freddie Mac impose a maximum loan amount. Loans above this limit, called "jumbo" loans, are frequently purchased by insurance companies and other purely private secondary market actors but the lack of volume in this sub-market makes securitization of jumbo loans difficult.

Percent Sold on Secondary Market

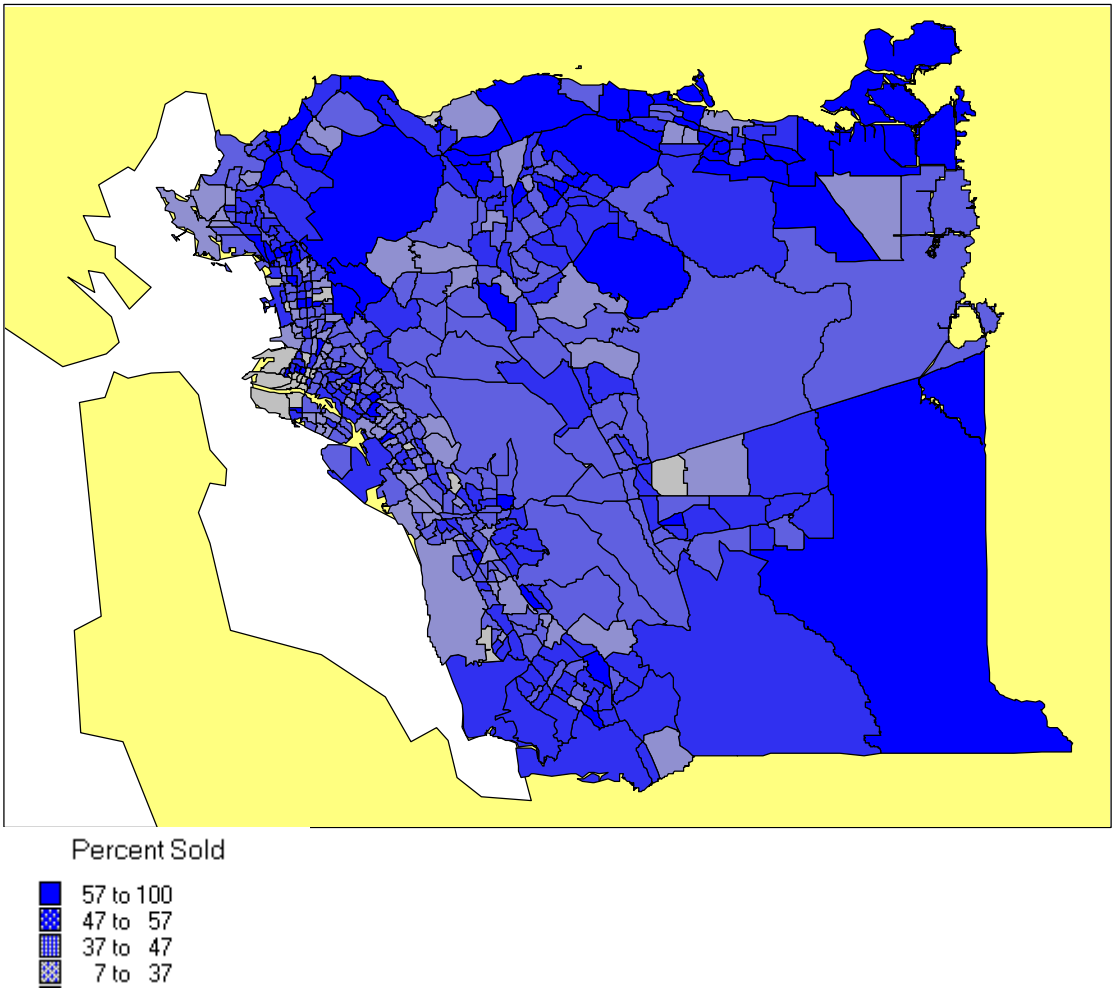

Table 2: Percent sold by tract income as a percent of MSA median

Tract % of MSA	*Held*	*Sold*	*%Sold*
25% - 60%	547	385	41.31%
60% - 80%	879	723	45.13%
80% - 100%	2257	1834	44.83%
100% - 125%	3111	3214	50.81%
125% - 150%	2402	2267	48.55%
150% - 200%	2011	1602	44.34%
>200%	680	420	38.18%
Grand Total	11900	10470	46.80%

Source: 1994 HMDA data, FFIEC

Similarly, as Table 3 shows, tracts with higher percentages of minority residents tend to have significantly lower rates of secondary market activity. Loans made in tracts with few minority residents have a greater chance of being resold on the secondary market than loans in higher minority tracts.

Table 3: Percent sold by tract racial composition

Min Pop Percent	*Held*	*Sold*	*%Sold*
0-10	595	453	43.23%
10-20	4680	4144	46.96%
20-30	1812	1889	51.04%
30-40	1744	1585	47.61%
40-50	1113	938	45.73%
50-60	709	555	43.91%
60-70	364	251	40.81%
70-80	259	185	41.67%
80-90	338	249	42.42%
90-100	286	221	43.59%
All Tracts	11900	10470	46.80%

Source: 1994 HMDA data, FFIEC

Here again the resale rate tracks the loan volume fairly closely. The tracts with the highest resale rates also have the highest volume of originations.

Differences in resale rate by borrower

Certainly some of the difference in the resale rates for different tracts can be attributed to the race or income of the borrowers. The secondary market appears to have race and

income preferences which are not specifically geographic. Table 4 and Table 5 illustrate the bias in the secondary market based on applicant income and race respectively. It is clear from these tables that middle income white borrowers are far more likely to benefit from the presence of the secondary market. The geographic outcome observed above could be an indirect result of these factors. Low-income tracts face a disadvantage because, by definition, they have a high proportion of low-income borrowers; minority tracts, similarly, have more non-white borrowers.

Table 4: Percent sold by applicant income as a percent of MSA median

Applicant Income	*Held*	*Sold*	*%Sold*
25% - 60%	232	172	42.57%
60% - 80%	1201	926	43.54%
80% - 100%	1381	1025	42.60%
100% - 125%	1905	1674	46.77%
125% - 150%	1723	1585	47.91%
150% - 200%	2436	2373	49.34%
200% - 250%	1249	1228	49.58%
250% - 300%	717	596	45.39%
>300%	972	672	40.88%

Source: 1994 HMDA data, FFIEC

Table 5: Percent sold by applicant race

Applicant Race	*Held*	*Sold*	*%Sold*
Am. Indian	55	65	54.17%
API	2024	1782	46.82%
Black	810	562	40.96%
Latino	1055	814	43.55%
White	7451	6663	47.21%
Other	228	129	36.13%
N/A	277	455	62.16%
Grand Total	11900	10470	46.80%

Source: 1994 HMDA data, FFIEC

Tract seems more important than borrower

However when we look again at the geographic dimension controlling for race and income we find a persistent geographic component. Table 6 shows that in tracts with less than 50% minorities 47.5% of all originated loans are resold. Within these tracts there is very little difference between white and non-white applicants. However there is a dramatic difference between the resale rate for these tracts and that for tracts with greater than 50% minorities where only 42.7% of loans are resold. Here again the tract racial composition seems to be more important than the applicants race. Whites in minority tracts have a slight advantage over minorities in those same tracts (44% vs 42%) but compared with residents in majority white tracts they are at a great disadvantage.

Table 6: Percent sold by tract minority percentage and applicant race.

Tract Percent Minority	*Applicant Race*	*Held*	*Sold*	*%Sold*
0-50%	Non-white	3042	2779	47.74%
	White	6902	6230	47.44%
0-50 Total		9944	9009	47.53%
50-100	Non-white	1407	1028	42.22%
	White	549	433	44.09%
50-100 Total		1956	1461	42.76%
Grand Total		**11900**	**10470**	**46.80%**

Source: 1994 HMDA data, FFIEC

The same logic is apparent in Table 7 which presents the impact of tract and applicant income. Low-income applicants who live in middle income tracts are more likely to see their loans resold than middle income applicants in low-income tracts. The loans with the highest resale rates are those made to middle-income applicants who live in middle-income neighborhoods. These loans are represented by the cells located in the center of the table. In the corners of the table are the applicants whose loans are underrepresented in the secondary market: low-income residents of low-income areas and wealthy residents of wealthy neighborhoods. This table indicates clearly that both tract and applicant characteristics effect a loans chances of being resold.

Table 7: Percent sold by tract income and applicant income.

Applicant Income	Tract Income							All Tracts
	25% - 60%	*60% - 80%*	*80% - 100%*	*100% - 125%*	*125% - 150%*	*150% - 200%*	*>200%*	
25% - 60%	38.46%	35.00%	37.35%	45.24%	48.48%			42.57%
60% - 80%	39.78%	37.43%	41.52%	48.47%	46.97%	50.00%		43.54%
80% - 100%	43.51%	46.15%	39.25%	45.14%	40.63%	41.67%		42.60%
100% - 125%	36.30%	46.09%	45.49%	49.45%	48.22%	42.62%	36.96%	46.77%
125% - 150%	43.21%	47.85%	47.46%	49.19%	49.30%	42.37%	47.14%	47.91%
150% - 200%	45.36%	48.95%	49.33%	54.49%	50.04%	43.21%	35.90%	49.34%
200% - 250%	44.12%	58.21%	45.83%	55.04%	49.35%	47.55%	43.48%	49.58%
250% - 300%			48.39%	48.57%	50.80%	43.76%	33.33%	45.39%
>300%			39.60%	53.26%	39.02%	40.96%	34.81%	40.88%
All Incomes	41.31%	45.13%	44.83%	50.81%	48.55%	44.34%	38.18%	46.42%

Source: 1994 HMDA data, FFIEC

Conclusion:

The expansion of information technology has encouraged the development of a financial system which focuses almost exclusively on historical market transactions as a means of controlling risk. This change has lowered the cost of obtaining credit for many borrowers. However the very same logic leads to a feedback mechanism which appears to put some borrowers at an ever-increasing disadvantage. If transactions become the only means of measuring risk than areas which experience a lower volume of transactions will find it harder to obtain credit. The secondary market needs high volume to function and lenders will be increasingly hesitant to lend in areas where there is no secondary market. Neither process causes the other. Both processes cause the other. Banks will have a tendency to avoid areas where resale rates are low and resale will tend to be lower in areas that banks avoid.

This process of exclusion cannot be separated from the transactions oriented logic of the financial network. If we use the market to identify risk, we have to recognize that places which have not been properly served by the market in the past will appear more risky.

This system is exerting a strong pressure toward homogenization of people and places. But some people and some places will not be easily homogenized. These places will increasingly be left out of the global financial network. The more they are excluded the more pressure there will be to exclude them further. The network logic itself, by creating self reinforcing feedback loops, implies self reinforcing exclusion. Places that fall out of the network or fail to ever be incorporated will face increasing credit shortages. Fewer transactions lead to higher information costs for each future transaction and therefore to fewer future transactions and even higher costs, etc. etc. etc.

The structural logic which we see emerging in the financial markets may not be limited to this realm. The information technology encourages the development of certain types of logical structures. Self-reinforcing feedback loops are a familiar control structure to anyone with experience in computer programming. To the degree that information technology pervades other aspects of human experience and replaces human judgment with all of its inconsistencies, we can expect to find similar structures of self reinforcing exclusion.