

# **Subprime Mortgage Segmentation in the American Urban System<sup>1</sup>**

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*Abstract:* Research and policy debates in the United States have focused on the dramatic growth of mortgage lending in the risky subprime sector, which serves consumers with weaker credit histories, and its concentration in racially and ethnically marginalized communities. Evidence linking the subprime boom to the proliferation of predatory abuses, however, is often dismissed as anecdotal or isolated in a few unique places. In this paper, we undertake a geographical analysis of the central justifications for deregulated risk-based pricing: the proposition that subprime credit serves those who would otherwise be excluded, and reduces exclusionary credit denials. Multivariate analyses of metropolitan- and individual-level processes across the U.S. urban system provide evidence suggesting that subprime mortgage segmentation exacerbates rather than reduces traditional inequalities of denial-based exclusion.

**Key words:** mortgages, United States, logistic regression, racial discrimination, housing, subprime

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## **FROM RISK-BASED PRICING TO “SUBPRIME SLIME”**

The bills are coming due on America’s subprime lending boom. For years, the growth rates seemed only to increase in the subprime or “B-and-C” market, which involves high-cost lending to consumers with credit histories that disqualify them from the better terms of prime, A-rated loans. B-and-C home mortgage originations ballooned from \$65 billion in 1995 to \$332 billion in 2003 (Chomsisengphet and Pennington-Cross, 2006, p. 37), as the industry became more flexible and aggressive. As long as home values continued to rise, the fallout from risky practices could be hidden behind quick distress resales that avoided foreclosure, providing a steady stream of profits for brokers and lenders as well as investment banks involved in Wall Street mortgage-backed securities. And as long as the market seemed to be working, who could challenge its underlying logic? To be sure, community activists, attorneys, and critical researchers had been warning since the 1990s that subprime lending encouraged a syndrome of “predatory” lending -- using aggressive tactics and sophisticated legal abuses to push borrowers into credit they do not need, extracting lucrative fees and draining home equity even when the loan was destined for quick default. But regulators could easily ignore these criticisms when rising home values pushed lending volumes higher while foreclosure rates stayed under control; in this climate, it was difficult to challenge the dominant conservative justification of subprime lending as a case of benevolent risk-based pricing -- lenders charging more to provide services to risky borrowers who would otherwise be denied and excluded.

For years, the subprime policy debate has involved especially intense controversy over the question of racial discrimination. Everyone agrees that racial and ethnic minorities are much more likely than non-Hispanic Whites to end up with subprime credit. Those on the Right applaud this disparity as evidence that subprime credit serves those who are disqualified from mainstream loans because of their lower incomes, weaker credit records, and more unstable employment. Minorities are more likely to choose subprime, conservatives claim, and after controlling for choice and applicant credit history, racial disparities disappear. Conservatives attack the term “predatory” as undefined and inflammatory, and argue that any attempt to regulate the subprime sector will cut off the supply of credit to those who need it most. Analysts on the Left cite evidence that racial disparities persist after accounting for many borrower characteristics, note that studies supporting the claims of risk-based pricing are based on closely-

guarded industry data, and charge that the subprime industry is based on securitization innovations that allow lenders, brokers, and investors to profit from exploitation and discrimination. Struggles between these two interpretations have created a battlefield of trench warfare, and non-specialists are easily confused by the stalemate of sophisticated yet contradictory research (Ambrose and Pennington-Cross, 2000; Calem et al., 2004; Chomsisengphet and Pennington-Cross, 2006; Collins et al., 2005; Durkin and Staten, 2002; Dymski, 1999; Engel and McCoy, 2002; Howell, 2006; Immergluck, 2004; Li et al., 2006; Renuart, 2004; Squires, 2004). Since the late 1990s the industry's defenders, backed by ideological conservatives and laissez-faire federal regulators, have deftly capitalized on the stalemate to fight off a long line of bills proposed to crack down on abusive loans.

But things are changing. The Wall Street innovations that propelled the subprime boom reached their limits. Now it is conservative investors, bankers, and bond traders (not just left-leaning activists and scholars) who are horrified when they read the Enronesque revelations of what many subprime brokers and lenders have actually been doing; the proliferation of vivid, shocking stories makes it hard to defend the virtues of risk-based pricing or the neoliberal mantra that deregulated markets always know best (Engel and McCoy, 2007).<sup>2</sup> Subprime volume first soared even as house prices sagged beginning in late 2005, demonstrating that lenders were less responsive to consumer demand than to the imperative to meet Wall Street earnings expectations. The subprime share of all originations shot up to 20 percent in 2005 and 2006 (from 8 percent in 2003), while total subprime notes outstanding reached \$1.3 trillion in 2006, almost four times the figure from 2003 (Rushton, 2007). Completed foreclosures jumped 42 percent in a single year,

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<sup>2</sup> A few of the more sensational examples included the stories about the flamboyant red Ferrari convertible driven by an executive at New Century, an aggressive lender focused on low-income homeowners (Creswell and Bajaj, 2007b); the proliferation of sophisticated (and deceptive) loan products with 'teaser' introductory rates, like the hybrid adjustable-rate mortgage (quickly dubbed by critics as the HARM) and one creative firm's NINJA: the no income, no job, no assets loan (Pearlstein, 2007, p. D1); lavish celebrity coverage of an asset-backed bond trader pictured in front of his yacht named the "Forward Carry," who reaped millions betting on a subprime bond collapse in late 2006 (Bajaj, 2007b); and the disclosure that even as the crisis was throwing millions of families into distress in mid-2007, troubled subprime lenders were being snapped up by deep-pocket investors like Cerberus Capital Management, which found time amidst its \$7.4 billion takeover of Chrysler to pick up Option One and several other familiar subprime nameplates (Bajaj and Creswell, 2007).

reaching 1.2 million, and the share of mortgages entering the foreclosure process reached the highest figure ever recorded in the 37-year history of the statistic (Timmons and Werdigier, 2007, p. C1). One federal agency estimated that more than a million of the (mostly subprime) mortgages with low introductory “teaser” rates would reset to higher rates in 2007 alone, just as falling house prices would make it impossible for cash-strapped borrowers to sell or renegotiate to avoid default (Joint Economic Committee, 2007). A number of subprime lenders declared bankruptcy and investors pummeled the stocks of mainstream banks with subprime subsidiaries (Creswell and Bajaj, 2007b; Sorkin, 2002; Tam, 2007). The editorial page editors of the *Wall Street Journal* tried to spin this news as a sign that the industry was not charging *enough* from its consumers (*Wall Street Journal*, 2007), but on the other side of the journalistic firewall, the *Journal* published an intimate account of a Black middle-class neighborhood in Detroit flooded with subprime credit and foreclosures (Whitehouse, 2007). The reporter’s detailed account of subprime capital “injected” into Detroit neighborhoods, pushed aggressively on borrowers regardless of their desires or ability to repay, presented a direct challenge to the industry party line -- and since it appeared on the pages of the most conservative major newspaper in America, the story could not be dismissed as just another left-wing attack on the free market. Indeed, “the market” itself began to run away from the subprime market. The headlines from London, New York, Hong Kong, and other global stock exchanges began to take on an air of panic when the Dow Jones average slid 415 points on the last day of February, and fear began to spread to other parts of the bond and equity markets. Several hedge funds with positions in subprime securities teetered on the verge of collapse, investors punished funds and banks from Britain to Germany to Australia for their exposure to the U.S. subprime market, bond-rating agencies scrambled to downgrade subprime deals, and a wave of earnings warnings by large banks bled the Dow by 4.2 percent for the last week of July, capping the worst performance in nearly five years (Bajaj, 2007a). One frustrated investment strategist told the *Washington Post* that “investors were treating some of the big Wall Street firms as if they were ‘subprime slime.’” (Henderson, 2007, p. F1).

Wall Street. Washington, DC. London, New York, Hong Kong. Remarkably, the public discourse of subprime has gone prime-time, breaking out of the cloistered debate amongst specialized researchers to generate front-page coverage of the fears and anxieties of investors

and regulators in cities at the peak of the global-city hierarchy. But also: Detroit. In this paper, we map the geographies created by the subprime mortgage boom, and we evaluate how theories of risk-based pricing seem increasingly at odds with systemic market outcomes that are indisputably bad (whether or not we call them predatory). We focus on the geography of racial-ethnic disparities in subprime lending, distinguishing a) places where subprime credit appears to serve those who would otherwise be excluded from credit, from b) places where subprime credit exacerbates exclusion and inequality. Our geographical approach is closely aligned with Massey and Meegan's (1985) conceptualization of *extensive* research -- examining a few phenomena quantitatively across many places, as opposed to *intensive*, qualitative case studies of many different phenomena in a single locality. We seek to map some of the dynamics of subprime lending across the entire U.S. urban system, with more than three hundred local housing markets. Our approach responds to the common criticism of vivid portraits of family and neighborhood distress: skeptics commonly use geography to dismiss accounts like the *Wall Street Journal's* diagnosis of the unfolding crisis in Detroit. Detroit, the skeptics will say, is a unique (basket)case. Perhaps it is, but Detroit and hundreds of other unique cases are tightly woven into an entire urban system of homeownership, racial-ethnic inequalities, and mortgage market segmentation (Sugrue, 2005; cf. Dymski, 1999; Immergluck, 2004). When viewed from Wall Street or Washington, many of these cities are mundane, ordinary places that are easily overlooked, like the "black holes" ignored by the top-of-the-hierarchy bias of globalization and world-cities research (Short, 2004; cf. Knox and Taylor, 1995; Sassen, 2002; Taylor, 2003). What would the landscape of subprime mortgage lending look like if we understood it as one aspect of cities as systems within systems of cities (Berry, 1964)? What would the map look like if we produced something like Berry's (1972) *City Classification Handbook* for subprime credit flows?

Our story proceeds in five parts. First, we review the debate over how to define and identify predatory lending. Since conservatives have fought efforts to create public data that can measure the problem with precision, we propose an alternative approach based on the simple idea of the burden of proof: racial-geographic disparities cannot be taken as *prima facie* evidence of discrimination or predatory behavior, but the *burden of proof shifts where these disparities persist after accounting for demand-side, borrower characteristics*. Second, we describe the

extent of subprime lending in the U.S. urban system, and its relation to urban and regional inequalities of race and ethnicity. Third, we analyze the relation between subprime availability and traditional, denial-based exclusion. Fourth, we refine the analysis with models that control for the qualifications of individual homeowners and homebuyers. Finally, we summarize our findings and the implications for analysis and action.

## **SUBPRIME, PREDATORY, AND POLITICS**

Ever since the term “predatory” was applied to mortgage lending practices (Zuckoff, 1992), the label has been both polarizing and popular. It conveys the simple essence of processes that are often quite complex (we may not understand precisely how the predator catches his prey, but we know that blood is spilled when he does) and so journalists, organizers, and researchers sympathetic to the community reinvestment movement deploy the term frequently (Joint Economic Committee, 2007; Lee, 2007; Relman et al., 2004; Renuart, 2004; Squires, 2004). Yet not all subprime lending is predatory. Subprime refers to a specific niche that can be defined by the industry’s own criteria (Chomsisengphet and Pennington-Cross, 2006; Li et al., 2006; Quercia et al., 2004; Scheeselle, 2006). Predatory, by contrast, is often used in press accounts and advocacy campaigns in ways that mix causes, consequences, intentions, and judgments -- such that the term becomes a pliable, chaotic concept.<sup>3</sup> To address this problem, Engel and McCoy (2002) developed a clear set of criteria defining predatory lending as a syndrome involving at least one of five distinct processes: 1) lending designed “to result in seriously disproportionate net harm to borrowers,” 2) harmful “rent-seeking,” i.e., using market power to charge rates and fees well beyond those justified by competitive market conditions, 3) using deception and illegal fraud to consummate loan transactions, 4) engaging in other forms of deception that are not explicitly prohibited by law, and 5) forcing or tricking borrowers into giving up meaningful legal protections, e.g., mandatory arbitration clauses. Engel and McCoy’s (2002) definition distills the wide range of dozens of different abuses of borrowers down to their fundamental economic and legal essence -- so that attorneys, regulators, and legislators can identify appropriate strategies for litigation or regulation. But applying this definition requires close-range, in-depth analysis of individual loan documents or internal company practices; and every single time anyone invests in this kind of intensive research, conservatives respond by

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<sup>3</sup> We are grateful to one of the anonymous referees for this turn of phrase.

dismissing the resulting evidence of predatory behavior as anecdotal -- a single bad broker, a few bad people in one lender, or the understandable quirks of a few basket-case housing markets like Detroit. When confronted with evidence from intensive research, in other words, conservatives demand that predatory lending be measured with extensive research methods across the entire market, in a standardized quantitative way across many different institutions, borrowers, and places.

For those with vested interests in arguing that predatory lending does not exist, it is a convenient fact that systematic, extensive data cannot be used to measure the phenomenon. Industry lobbyists have fought hard to make sure the data are never made public. The most extensive public data source on home loans comes from the Home Mortgage Disclosure Act (HMDA), which every year requires most lenders doing business in any of the metropolitan areas of the U.S. to report a few pieces of information on every loan application they receive (including whether they approve or deny the request) (FFIEC, annual). HMDA is uniquely rooted in civil rights legislation of the 1970s, and so it also includes individuals' responses to questions asking them to identify their race, ethnicity and gender. But the financial information in HMDA is very limited in comparison to the detailed databases that lenders compile, and which they occasionally share with pro-industry researchers. In particular, HMDA provides no direct measure of applicant creditworthiness. When the regulatory provisions of HMDA were revised a few years ago to identify certain high-cost loans -- to help improve the empirical definition of "subprime" - - many academic researchers and community reinvestment advocates submitted formal comments asking not only for new data fields that would help identify abusive loan terms, but also for a key variable that would exonerate lenders from charges of discriminatory predation if indeed they were innocent: applicant credit history. But the industry's written comments argued against any new disclosures. Immergluck (2004, p. 219) was absolutely correct when he predicted the terms of public debate when the newly released data exposed severe racial and ethnic disparities: "...lenders will dismiss disparities as due primarily to differentials in credit history, without having to offer any evidence in this regard. ... banks argued against including such data in HMDA, but later they will almost certainly argue that, without such data, the pricing data cannot be interpreted."

If we cannot identify predatory loans in HMDA, but if we must use HMDA because it is the only source of extensive, quantitative data with information on race/ethnicity that can rebut the dismissive notion of isolated bad apples, what can we do? We approach this dilemma in two ways. First, we avoid the impossible task of using public data to classify loans as predatory. Instead, we shift the focus to the central claims of risk-based pricing; the legitimacy of the subprime sector hinges on this economic and regulatory doctrine (Chomsisengphet and Pennington-Cross, 2006; Collins et al., 2005; Durkin and Staten, 2002; Engel and McCoy, 2002, 2007; Stiglitz and Weiss, 1981). Risk-based pricing begins from the simple idea that credit markets operate most efficiently when lenders are able to set equilibrium risk-adjusted prices for all of the credit they extend. Yet when lenders have insufficient or imperfect information about the true repayment intentions of borrowers, a problem of adverse selection plagues the market: raising the cost of credit deters low-risk borrowers with good intentions, but has no deterrent effect for risky, irresponsible consumers. This problem of ‘asymmetric’ information -- a lender can never really know as much as a borrower about the person’s true intentions to honor the debt -- renders the most important tool of economics (the price mechanism) impotent, or worse, dangerous. As long as lenders cannot accurately separate good and bad applicants, they will protect themselves by setting qualification standards too high and rationing credit on supply rather than price -- such that credit demand persistently exceeds supply (Stiglitz and Weiss, 1981).

The historical consensus among economists is that credit rationing was a pervasive feature of the U.S. housing finance system through the 1980s, and that the calculus of risk and asymmetric information -- and not racial-ethnic discrimination -- explained the problem of “redlining” that starved minorities of credit. The contemporary corollary is that credit rationing has been dramatically eased by advances in consumer credit reporting, credit scoring algorithms, and increasingly sophisticated models of delinquency, default, and prepayment (see Collins et al., 2005; Durkin and Staten, 2002; Pennington-Cross et al., 2000). All of these innovations have helped to reduce the problems of asymmetric information, the consensus holds, resulting in a more efficient and more equitable market. Lenders who specialized in higher-cost, risk-adjusted credit are able to serve borrowers who would otherwise be unable to obtain credit. Mainstream lenders who avoid the specialized marketing and underwriting innovations of the subprime

sector, the argument goes, remain trapped in the old credit-rationing regime: they loan to clearly low-risk A-rated borrowers, but they cannot distinguish good B-and-C prospects from the truly risky ones. So they reject them all, regardless of the profits to be made. Subprime specialists, meanwhile, are able to separate good from bad, and therefore they serve precisely those kinds of B-and-C borrowers turned away by mainstream banks. Since there is no public information that mirrors the internal risk-modeling systems used by subprime specialists, then we should be unable to distinguish between these different pools of borrowers when we use the limited public data on income, loan amount, and the like. Borrowers who receive high-cost credit from subprime specialists should be indistinguishable from those denied by mainstream, prime lenders. We test this hypothesis by a) analyzing whether subprime lending reduces mortgage exclusion and denial in different cities across the U.S., and b) testing for differences between individual borrowers rejected by prime lenders and those served by subprime specialists.

The second element of our approach is based on the simple ideas of circumstantial evidence and the burden of proof. We make no presumption that subprime credit is inherently predatory, but we also reject the *laissez-faire* assumption that all subprime transactions are inherently Pareto-optimal expressions of fully informed consumer choice. We use a simple multivariate regression approach to model the segmentation of racially and ethnically marginalized borrowers into subprime credit in different cities across the U.S. urban system. If racial-ethnic and geographic disparities persist after accounting for borrower characteristics, then we contend that the burden of proof shifts, and requires subprime advocates to provide further justification -- backed up by publicly disclosed data -- for credit market inequalities. In this sense, our approach is similar to then-New York Attorney General Eliot Spitzer's attempt to get internal underwriting data from several large lenders under his jurisdiction that had alarmingly high racial disparities in their HMDA records (Parker, 2005; Stein, 2005). Our approach is also similar to the statistical analyses of HMDA routinely performed by staff at the Federal Reserve Board, who found sufficient statistical significance in the racial disparities of 200 institutions to refer them for further regulatory examination based on the 2004 HMDA, and 270 lenders based on the 2005 data (*Origination News*, 2006, p. 81).

## **MEASURING THE U.S. SUBPRIME URBAN SYSTEM**

To evaluate the claim that risk-based pricing explains the geography of subprime lending, we assembled a database that includes information on many different *places* as well as *individuals* applying for home loans. At the heart of the database are the loan application records from the 2004 HMDA files,<sup>4</sup> which for the first time included indicators for high-cost, “rate-spread” loans. These are loans where the annual percentage rate is more than three percentage points higher than the reported yield on Treasury securities of comparable maturity for first-lien obligations, and five percent for subordinate liens.<sup>5</sup> The database includes all applications filed across several hundred metropolitan areas, and excludes multifamily records, applications submitted before the new 2004 requirements took effect,<sup>6</sup> and records without valid geographical identifiers. We use various subsets of this database to analyze the geography of lending flows, and the effects of borrower characteristics on lending outcomes.<sup>7</sup> Finally, to analyze the relations between lending trends and the characteristics of metropolitan regions, we created a different subset that matches records to metropolitan area characteristics from the 2000 U.S. Census of Population and Housing.<sup>8</sup>

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<sup>4</sup> HMDA records are released annually, and so the 2004 records are not the most recent available. We focus on 2004 because it is the first year of the crescendo of the subprime boom that ran into trouble during 2006 and 2007; moreover, the 2004 records capture the last full year of credit activity prior to the devastation of a number of Gulf Coast housing markets in Hurricane Katrina in September, 2005. Analysis of 2004 subprime activity offers a conservative, best-case scenario, and under-estimates the risky practices that spread through the market in 2006 (Joint Economic Committee, 2007).

<sup>5</sup> The APR used to identify rate-spread loans “captures not just the contract-based interest rate on a loan, but also points and fees that a consumer pays up-front reflected as an interest rate. The APR is generally accepted as a good measure of loan price.” (FDIC, 2005, p. 4).

<sup>6</sup> Applications received late in the year often wait until early the next year for a final decision. For the new reporting requirements that took effect January 1, 2004, these prior-year applications are identified with a specific flag indicating that, for example, rate-spread information was not required.

<sup>7</sup> The main database includes approximately 21.3 million applications. Because of the prohibitive time required to perform iterative procedures such as maximum likelihood estimation, our loan-level models (Tables 3 through 6) are estimated on random samples of all applications. This approach has negligible effects on the practical significance of the model parameters, although increasing the number of records used for model estimation does make it easier for parameters to pass tests of statistical significance.

<sup>8</sup> This step required excluding 57 metropolitan areas that can be identified in new metropolitan area definitions implemented in 2003 and used for the 2004 HMDA, but impossible to match to metropolitan summaries of the 2000 Census data.

*The Subprime Urban Hierarchy* - For a first glance at the U.S. subprime urban system, consider three simple analyses of the database. The first is a simple tabulation of the proportion of all approved, conventional single-family loans that exceed the rate-spread threshold (Table 1). The highest subprime market shares do highlight a few familiar icons of urban distress -- Detroit does indeed make the list -- but most of the entries are places that are almost completely ignored by the housing and lending literatures. In the home purchase market, the nation's capital for subprime lending is McAllen, Texas, where 42.1 percent of all homebuyers received rate-spread loans. "Many areas of the United States look for distinctiveness in ways that portray them as 'Number One,'" begins a report from researchers at the University of Texas - Pan American, but this region earns first-class status on a suite of troubling benchmarks such as highest unemployment, lowest per capita income, highest volume of border drug seizures, greatest concentration of poor, informal enclaves (*colonias*) housing the nation's largest population of migrant farm workers (Richardson and Pagan, 2002, p. 2). In the home improvement market, the peak of the subprime hierarchy is Dothan, Alabama, once cited in passing by Reynolds Farley as a place so poor, with such a low cost of living, that anyone there lucky enough to have an income at the federal poverty level could actually expect a reasonable standard of living (cited in Jennings, 1994, p. 12). In the refinance market, the subprime global city is Hinesville-Fort Stewart, Georgia, a town half an hour southwest of Savannah that is home to the Army's largest installation east of the Mississippi. Service members and their families account for about two-thirds of Hinesville's population (Surran, 2007).

**Table 1.** Metropolitan Areas with Greatest Share of Rate-Spread Mortgage Loans, 2004.

*Home Purchase*

McAllen-Edinburg-Pharr, Texas	42.1
Odessa, Texas	40.9
Hinesville-Fort Stewart, Georgia	39.9
Laredo, Texas	39.4
Alexandria, Louisiana	37.4
Detroit-Livonia-Dearborn, Michigan	37.1
Pine Bluff, Arkansas	36.5
Jackson, Mississippi	34.8
Brownsville-Harlingen, Texas	33.6
Sumter, South Carolina	32.0

*Home Improvement*

Dothan, Alabama	46.6
Greenville, North Carolina	44.8
Tuscaloosa, Alabama	44.1
Odessa, Texas	40.5
Valdosta, Georgia	39.8
Kennewick-Richland-Pasco, Washington	38.2
Macon, Georgia	38.1
Athens-Clarke County, Georgia	38.1
Rocky Mount, North Carolina	37.8
Albany, Georgia	37.8

*Refinance*

Hinesville-Fort Stewart, Georgia	45.6
McAllen-Edinburg-Pharr, Texas	41.8
Brownsville-Harlingen, Texas	41.2
Odessa, Texas	40.9
Pine Bluff, Arkansas	39.4
Laredo, Texas	37.9
Lawton, Oklahoma	35.8
Fort Smith, Arkansas-Oklahoma	35.0
San Angelo, Texas	34.7
El Paso, Texas	34.3

*Data Source* : FFIEC (2005).

*An American Subprime Dilemma* - When we consider the entire list, however, some familiar elements of American regional geography appear. For our second simple analysis, we summed

the loan records to create about a dozen simple indicators of each metropolitan mortgage market. We then used a simple principal components analysis and cluster analysis to classify all of the nation's metropolitan areas in the spirit of the classical social ecology literature (Berry and Kasarda, 1977).<sup>9</sup>

The results distill the nation's 387 metropolitan areas into ten distinct types, revealing many fascinating urban and regional dimensions of housing and credit circumstances. Here we focus on just one of the distinct groups identified by the cluster analysis (see Figure 1). This cluster is a group of thirty metropolitan areas where three of ten loan requests are denied, and the population of those who do receive loans is split mostly along the traditional American division between Non-Hispanic Whites and Non-Hispanic African Americans. This group of metropolitan areas has the nation's highest prevalence of subprime lending -- 25 percent of purchase loans, 31 percent for renovation loans, and 30 percent for refinance loans. Moreover, despite the fact that our analysis is based solely on simple credit indicators -- and includes no variables for regional location or context -- the result maps out the deep, sedimented histories identified sixty years ago as the *American Dilemma* (Myrdal, 1944, especially Volume II, pp. 605-638). The pattern is inescapably American, geographical, historical, and contemporary. This is today's home-financing legacy of the Black Belt that was created across the U.S. South in the Reconstruction era. On the periphery, of course, we find exceptions and curiosities. To the west, Lawton Oklahoma gets much of its racial and ethnic diversity from the enlistees at Fort Sill, home of the Army's Field Artillery units, on a base that is the last of the forts built across the southern plains to fight the 'Indian Wars' a century ago. To the north, Detroit is among the

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<sup>9</sup> We tabulated thirteen indicators: 1) the FHA-insured share of all mortgage applications, 2) denial rate for conventional applications, separate shares of applications for 3) home improvement, 4) refinance, 5) mobile home loans, separate measures for the share of applications filed by people identifying themselves as 6) Non Hispanic Black, 7) Hispanic, 8) Non Hispanic White, 9) Non Hispanic Asian, and 10) Native American, and finally the proportion of conventional originations that exceed the rate-spread trigger for 11) home purchase, 12) home improvement, and 13) refinance loans. The principal components analysis yielded four eigenvectors accounting for 73 percent of total variance, which we used (in unrotated form) as input to a non-hierarchical, nearest-centroid sorting algorithm. The result captured about seven-tenths of the variance in the four components by grouping the nation's 387 metropolitan areas into ten clusters.

largest of the industrial destinations for the Great Migration of southern rural African Americans forced off their land by agricultural mechanization after the First World War.



**Figure 1.** The Subprime Mortgage Black Belt.

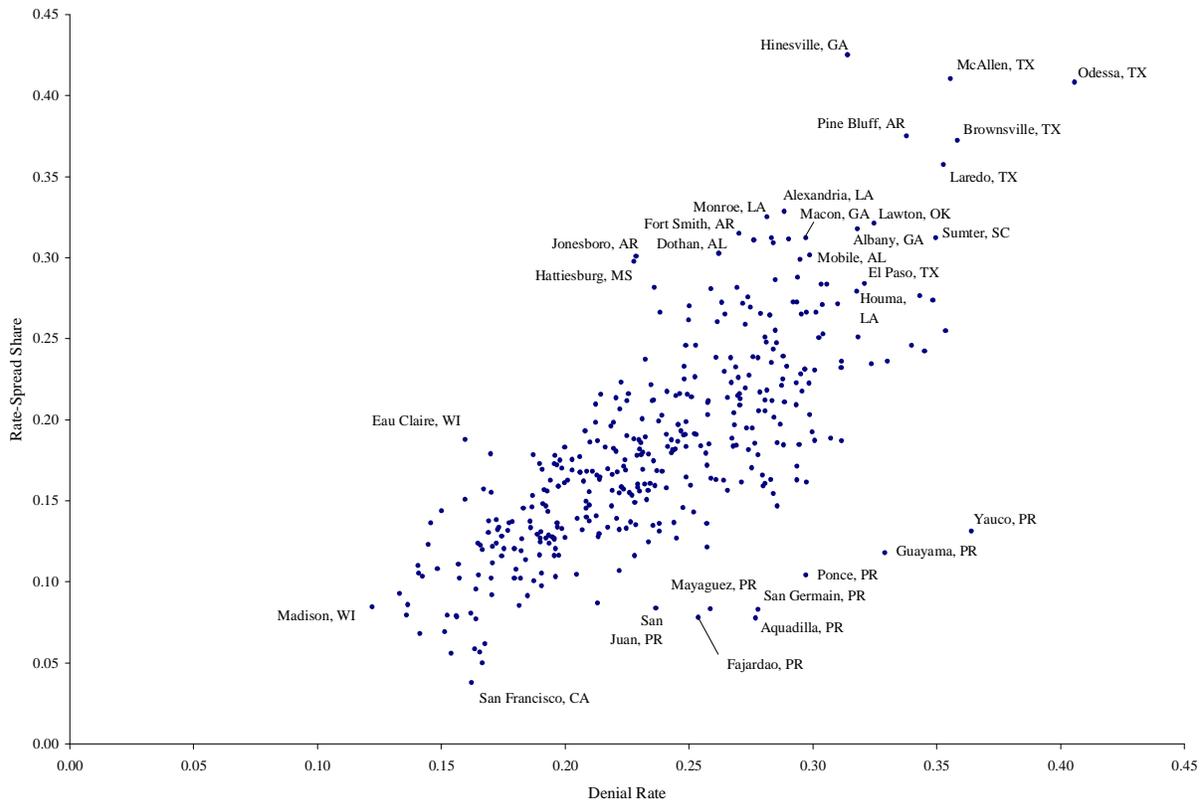
But at the center of the Black Belt, just beyond the southern reach of the Appalachian piedmont, equidistant from the Virginia and Carolina upland towns and the Mississippi floodplain settlements to the west, is Albany, Georgia. Today, 32 percent of conventional mortgage applications here are rejected. Among those who do get loans, one quarter receive rate-spread credit for home purchases, and the high-cost share rises to 34 percent in the refinance market and 38 percent for home improvement loans. If one reads the headlines describing controversies over payday lending and the battles over lending regulations in the Georgia legislature (Schanze, 2003, Unger, 2003), one sees the present-day version of the antebellum residue described by W.E.B. Dubois when he did part of the fieldwork for *The Souls of Black Folk* near Albany. Describing a precarious sharecropping system that would soon be plowed under in the Cotton Kingdom, the Egypt of the Confederacy, Du Bois (2003 [1903], p. 92) observed, “It is a beautiful land, this Dougherty County ... but a pall of debt hangs over the beautiful land; the

merchants are in debt to the wholesalers, the planters are in debt to the merchants, the tenants owe the planters, and laborers bow and bend beneath the burden of it all.”

We could sketch this kind of geographical vignette for any of the hundreds of metropolitan areas across the U.S., or for any of the more than 52 thousand urban and suburban neighborhoods that it is possible to identify in the database. Instead a third simple analysis reveals that most of these vignettes would probably reveal different pieces of the same puzzle: those places with the highest loan denial rates have the highest shares of high-cost subprime lending (Figure 2). 55.7 percent of the variation in subprime lending across all metropolitan areas can be explained by variations in denial rates -- and *vice versa*. The figure rises to 63.9 percent if we set aside the unique case of metropolitan areas in Puerto Rico, where even with deep poverty and a high homeownership rate, few households have mortgages. Subprime credit is not as competitive here in the face of generous government subsidies for down payments as well as (for low-income owners) ongoing monthly payment assistance (Hibernia Southcoast Capital, 2004, pp. 18-19).<sup>10</sup> Overall, the pattern attests to a tight correlation, and it underscores the fundamental analytical dilemma that if subprime lending is the optimal risk-based pricing solution to the old problems of credit rationing and exclusion of a generation ago, then why don't we see lower denial rates in places with a lot of subprime activity? Is the segmentation of areas with higher African American populations the result of legitimate risk factors in the local market, including borrower characteristics that disqualify many from prime, mainstream credit? Does the risk-based pricing of subprime lending expand opportunity, reducing the problems of exclusionary denial after accounting for local market conditions and risk factors?

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<sup>10</sup> Ironically, the Island's largest bank, Banco Popular ran into severe financial troubles not because of local conditions in Puerto Rico, but because of a poorly-timed acquisition of a subprime lender on the U.S. mainland (Reuters, 2007; Cervantes and Shimkus, 2007). In a further irony, Banco Popular has extensive anti-predatory lending education programs.



**Figure 2.** Metropolitan Subprime Segmentation and Denial Rates.

## MODELING METROPOLITAN CREDIT FLOWS

One way to answer these questions is to model the relations between denial and subprime market share portrayed in Figure 2 while controlling for economic and demographic variations across different metropolitan housing markets. We matched the HMDA aggregations to 2000 Census data on a standard suite of measures of mortgage demand and market risk, along with other variables that might help to disentangle interrelated socioeconomic processes (e.g., racial and income inequalities).<sup>11</sup> We also created a unique risk measure: HMDA provides no direct information on applicant credit risk, but certain lenders are required to report at least one reason when they reject applications. ‘Credit history’ is one of the nine options that underwriters can choose, and so we created a variable measuring the proportion of all denied applications where

<sup>11</sup> For this stage of the analysis, we excluded metropolitan areas in Puerto Rico, and metropolitan areas that could not be identified in 2000 Census summaries.

credit history was cited as a factor. This index captures the collective verdict of the many underwriters scrutinizing the qualifications of applicants in each metropolitan market.<sup>12</sup>

Risk-based pricing implies that subprime lending should be greatest in underserved areas with lower incomes and worse credit, and that after controlling for these factors, subprime share will reduce market exclusion. OLS regression models provide only tepid support for these propositions. The results shown on the left side of Table 2 indicate that we can account for 80 percent of the variance in subprime share across metropolitan areas, with fairly robust tolerance diagnostics.<sup>13</sup> Consistent with the risk-based pricing thesis, subprime shares rise in areas with lower per capita incomes and higher denial rates. Yet even after accounting for credit risk and housing market conditions, subprime credit is not racially neutral. For Latinas and Latinos, subprime disparities can be explained in terms of demand-side factors: the Latino share of applications is not a statistically significant predictor of metropolitan subprime share once we account for the bad-credit denial measure and other controls. Non-Hispanic Black share, however, remains significant even after accounting for credit and other factors. Moreover, there is no evidence that subprime activity helps to reduce exclusionary denial. The results on the right side of Table 2 indicate that it is possible to account for 80 percent of the variance in denial rates across metropolitan areas. Credit risk performs as expected in this denial model: metropolitan areas where greater shares of files are marked by underwriters as “bad credit” have significantly higher overall denial rates. Yet even after accounting for this credit proxy and all other controls, the rate-spread measure remains the single most important factor explaining variations in metropolitan mortgage rejection rates. And even after controlling for all of these conditions, rejection rates are still significantly higher wherever more African Americans and Latinos live. The only encouraging hint is that after we account for the higher rejection rates of

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<sup>12</sup> Denial reasons are required for lenders supervised by the Office of the Comptroller of the Currency, the Office of Thrift Supervision, and the National Credit Union Administration; our variable measures bad-credit denials at these lenders, as a share of all denials regardless of reason by these lenders, in each market. Denial reasons are optional for all other lenders (see OCC, 2004, p.4).

<sup>13</sup> With only one exception, the tolerance values are all above the 0.20 threshold where multicollinearity begins to undermine the biased estimates for individual parameters. Even so, all of the tolerances indicate sufficient multicollinearity to reduce the squared semi-partial correlations, because so much of the 0.80 r-squared value for both models is accounted for by joint, overlapping variances of several predictors.

areas with more African Americans, we find that places with greater White-Black income inequality have slightly lower rejection rates. In sum, though, none of the results support the hypothesis that subprime lending represents a racially neutral solution to the problem of mortgage exclusion.

**Table 2.** Metropolitan Subprime Segmentation and Mortgage Denial.

Label	Subprime Segmentation				Denial			
	Standardized Coefficient	Squared	Squared	Tolerance	Standardized Coefficient	Squared	Squared	Tolerance
		Semi-partial	Partial			Semi-partial	Partial	
	Corr Type II	Corr Type II		Corr Type II	Corr Type II			
Total population (log)	-0.0016	0.000	0.000	0.475	0.1094 **	0.006	0.031	0.490
Non-Hispanic Black share	0.2851 ***	0.026	0.119	0.317	0.1859 ***	0.010	0.052	0.295
Non-Hispanic Native American share	-0.0094	0.000	0.000	0.838	-0.0030	0.000	0.000	0.838
Hispanic share	0.0561	0.001	0.005	0.283	0.1795 ***	0.010	0.049	0.296
Share of foreign-born population arrived 1995-2000	0.0541	0.002	0.009	0.585	-0.0251	0.000	0.002	0.581
Share of labor force in armed forces	-0.0310	0.000	0.002	0.385	-0.0032	0.000	0.000	0.384
Per capita income, 1999	-0.3539 ***	0.037	0.162	0.295	-0.0450	0.001	0.003	0.248
Ratio, White to Black per capita income	0.0580	0.002	0.010	0.595	-0.1277 ***	0.010	0.052	0.621
Ratio, White to Hispanic per capita income	-0.0016	0.000	0.000	0.434	0.0315	0.000	0.002	0.435
Homeownership rate	0.1309 ***	0.007	0.034	0.396	0.0870 *	0.003	0.016	0.389
Percentage of owner occupied housing units built before 1950	-0.1000	0.000	0.000	0.254	0.1111 *	0.003	0.017	0.258
Median gross rent as share of household income	-0.1558 ***	0.013	0.063	0.527	0.0753 *	0.003	0.015	0.501
Share of owner occupied housing units with no mortgage	-0.0808	0.001	0.007	0.198	0.1719 **	0.006	0.032	0.203
Share of mortgaged units with a second mortgage	-0.3183 ***	0.032	0.142	0.312	0.0565	0.001	0.005	0.269
FHA share of conventional single family loans	-0.0423	0.001	0.003	0.285	0.2140 ***	0.014	0.071	0.305
Home improvement loans as share of conventional single family loans	-0.0918 *	0.003	0.015	0.352	0.0432	0.001	0.004	0.348
Refinance loans as share of conventional single family loans	0.0728 *	0.003	0.014	0.500	0.0703 *	0.002	0.013	0.500
Mobile home loans as share of all mortgages	-0.0540	0.001	0.005	0.347	0.2007 ***	0.015	0.076	0.374
Bad-credit denials as share of all denials at required reporters	0.0408	0.000	0.002	0.251	0.1790 ***	0.008	0.044	0.262
Conventional denial rate	0.3657 ***	0.028	0.129	0.212				
Rate-spread share					0.3530 ***	0.027	0.129	0.219
Number of observations	322				322			
Adjusted R-squared	0.80				0.80			

\*Coefficient significant at P<0.05; \*\*P<0.01; P<0.001.

## MODELING INDIVIDUAL SEGMENTATION

Our evidence suggests that at the metropolitan scale, exclusionary denial and inclusionary segmentation into subprime credit are two sides of the same coin. This evidence is consistent with the seeming paradox of a great deal of lending research, which continues to document the old redlining of minority rejection (implying that the financial services industry provides too little credit to some people and places) as well as the new racial disparities in the cost of credit (implying that some lenders aggressively push too much credit on bad terms) (Calem et al., 2004; Dymski, 1999; Holloway, 1998; Howell, 2006; Williams et al., 2005). Industry partisans maintain that subprime lenders have higher denial rates because they have brought new potential borrowers into the marketplace, and that even if market-wide disparities appear, risk-based pricing provides needed service to consumers who would otherwise be unable to qualify for traditional, prime loans. Testing this claim requires a) shifting from the aggregate scale to the

level of individual borrowers, and b) measuring individual creditworthiness. Many years ago Abariotes et al. (1993) devised a technique to identify the distinctive profile of applicants in HMDA who are seen as too risky by underwriters (see also Holloway, 1998; Holloway and Wyly, 2001; Myers and Chan, 1995). The approach involves estimating a logistic regression on a random sample of applications, predicting the likelihood of an applicant being rejected specifically for reasons of bad credit, as a function of the (unfortunately limited) financial information in the HMDA files. The parameters of the bad-credit model are then used to calculate, for each applicant in the database, a probability estimate measuring each individual's similarity to those who are viewed by underwriters as too risky. In addition to income, and estimated debt burden, we also include gender and race/ethnicity. The latter factors are illegal considerations in underwriting, but for thirty years lending industry partisans have always claimed that racial differences in lending outcomes are the product of omitted variable bias (i.e., that legitimate but unmeasured risk factors correlated with race explain the disparities). Including gender and race/ethnicity captures as much of this bias as possible; and it gives the benefit of the doubt to underwriters. If women and/or minorities have weaker credit profiles even after adjusting for income, then our approach will distill the effect into the credit instrument and create a conservative bias *against* finding racial discrimination when the credit measure is used in any other model. Our bad-credit model fits reasonably well, with tolerance values indicating no multicollinearity problems, and a good match between predicted and observed outcomes for the largest number of applications in the lower probability ranges (Table 3). Bad-credit denials are more likely for low-income applicants, and for those seeking renovation or refinance loans, subordinate liens, or unsecured loans. All else constant, Hispanics are 2.6 times more likely than Non-Hispanic Whites to be rejected on the basis of bad credit, and this ratio jumps to 3.4 for African Americans.

**Table 3. Bad-Credit Denial Model.**

Parameter	Parameter Estimate	Odds Ratio	Tolerance
Intercept	2.8283 *		
Applicant income (ln)	-0.648 ***	0.640	0.79
Ratio of income to loan amount (ln)	0.068	1.065	0.44
Owner-occupied	0.3746	1.454	0.87
Second lien	0.7055 **	2.025	0.53
No lien	1.2908 **	3.636	0.67
Pre-approval requested	-1.2935	0.274	0.92
OTS-regulated lender	0.1283	1.137	0.94
NCUA-regulated lender	-1.6482 ***	0.192	0.90
Home improvement	1.5578 ***	4.749	0.58
Refinance	0.8303 ***	2.294	0.78
Demographic information missing	0.2281	1.256	0.94
Female primary applicant	0.2228	1.250	0.93
Hispanic	0.9605 ***	2.613	0.96
Native American or Alaskan Native	1.0673	2.908	0.99
Asian or Pacific Islander	-0.0424	0.958	0.95
African American	1.2276 ***	3.413	0.94
Number of observations	3,872		
Nagelkerke max-R <sup>2</sup>	0.19		
Percent concordant	77.2		

*Detailed Model Fit Diagnostics*

Probability range	Number of applications	Average model-implied probability	Actual share denied for bad credit
0.1 - 4.9%	1,949	0.027	0.028
5.0 - 9.9%	1,015	0.069	0.071
10.0 - 14.9%	377	0.122	0.101
15.0 - 19.9%	204	0.172	0.196
20.0 - 24.9%	116	0.225	0.207
25.0 - 29.9%	60	0.272	0.283
30.0 - 34.9%	36	0.326	0.167
35.0 - 39.9%	35	0.374	0.400
40.0 - 44.9%	26	0.420	0.423
45.0 - 49.9%	15	0.477	0.467
50.0 - 54.9%	10	0.528	0.900
55.0 - 59.9%	15	0.572	0.733
60.0 - 64.9%	7	0.620	0.571
65.0 - 69.9%	2	0.693	0.500
70.0 - 74.9%	2	0.719	0.500
75.0 - 79.9%	2	0.787	1.000
80.0 - 84.9%	1	0.832	1.000
85.0 - 89.9%	-	-	-
90.0 - 94.9%	-	-	-
95.0 - 99.9%	-	-	-

Notes: The dependent variable is: application rejected by lending institution, with at least one of the stated reasons cited as "credit history."

Models estimated on a random sample of all loan applications. Odds ratios for income, and loan ratio report the change in odds with an increase of one standard deviation in the respective predictor.

\*Coefficient significant at P<0.05; \*\*P<0.01; \*\*\*P<0.001.

Controlling for the estimate of applicant credit risk helps us provide rigorous tests for the interrelated claims of risk-based pricing: a) subprime lenders serve borrowers who would otherwise be excluded, and b) the geography of segmentation, with its pronounced racial and ethnic disparities, is simply the result of demand-side factors.

*Segmentation and Exclusion* - If subprime lenders serve those who would otherwise face exclusion, then we should observe no systematic differences between two groups of applicants. Those who applied and were rejected by mainstream lenders should be similar to those who succeeded in getting high-cost loans from specialized subprime firms (Scheeselle, 2006). From the perspective of the lending market as a whole, these two groups should be perfect substitutes with the main (unobservable) difference being the mistake of some consumers who did not realize they would not qualify at a prime lender. Empirical results do not support this expectation (Table 4, Model 1). A logistic model predicting differences between prime rejections and subprime approvals reveals stark, systematic differences in these populations. True, credit risk does matter, consistent with industry claims. Increasing the value of the bad-credit measure by one standard deviation boosts the likelihood that a borrower will be doing business with a subprime lender by a factor of 1.3. However, even after accounting for income, loan purpose, and a measure of credit risk that may itself capture the effects of racial discrimination, individual racial disparities persist. All else constant, African Americans are 1.5 times more likely than Non-Hispanic Whites to wind up with a high-cost loan at a subprime lender. Another way to interpret the results is to say that subprime lenders' clientele includes 1.5 times as many African Americans as we would expect if these companies simply served those excluded from mainstream credit. The inequalities remain unchanged if we consider that subprime lending approvals are slightly more likely than prime denials to be in metropolitan areas with elevated denial rates (Table 4, Model 2). While consumer decisions may explain some of this disparity, choice is *not* a magical, exogenous explanation. There is considerable qualitative and quantitative evidence that African Americans' greater 'choice' for subprime lenders stems in part from aggressive marketing schemes focused on minority neighborhoods (Engel and McCoy, 2002; Calem et al., 2004; Howell, 2006; Renuart, 2004; Squires, 2004).

**Table 4.** Modeling Differences between Subprime Approvals and Prime Rejections.

Parameter	Model 1		Model 2	
	Parameter	Odds	Parameter	Odds
	Estimate	Ratio	Estimate	Ratio
Intercept	-3.5073 ***		-4.0383 ***	
Applicant income (ln)	0.2542 ***	1.170	0.2876 ***	1.197
Ratio of income to loan amount (ln)	-0.1322 *	0.880	-0.1657 **	0.852
Owner-occupied	-0.1005	0.904	-0.1065	0.899
Second lien	0.9645 ***	2.623	1.0148 ***	2.759
No lien	-13.1117	0.000	-13.0443	0.000
Pre-approval requested	-0.5809 **	0.559	-0.5778 **	0.561
OCC-regulated lender	-3.9423 ***	0.019	-3.9498 ***	0.019
OTS-regulated lender	-2.7502 ***	0.064	-2.7447 ***	0.064
FDIC-regulated lender	-1.1516 ***	0.316	-1.146 ***	0.318
HUD-regulated lender	1.6152 ***	5.029	1.6167 ***	5.036
Home improvement	-1.4125 ***	0.244	-1.4134 ***	0.243
Refinance	0.2658 ***	1.304	0.2644 ***	1.303
Demographic information missing	-0.6558 ***	0.519	-0.654 ***	0.520
Female primary applicant	0.2534 ***	1.288	0.255 ***	1.290
Hispanic	0.392 **	1.480	0.3933 **	1.482
Native American or Alaskan Native	-0.5644	0.569	-0.5634	0.569
Asian or Pacific Islander	-0.2001	0.819	-0.1849	0.831
African American	0.4161 **	1.516	0.4091 **	1.505
Credit history instrument	2.3447 *	1.298	2.3784 *	1.303
Metropolitan conventional denial rate			1.3089	1.056
Number of observations	6,552		6,552	
Nagelkerke max-R <sup>2</sup>	0.52		0.52	
Percent concordant	87.1		87.1	

Notes: The dependent variable separates a) rate-spread originations by lending institutions specializing in subprime marketing (Scheeselle, 2006) from b) applications rejected by non-subprime specialists.

Models estimated on a random sample of all loan applications. Odds ratios for income, loan ratio, credit history instrument, and denial rate report the change in odds with an increase of one standard deviation in the respective predictor.

\*Coefficient significant at  $P < 0.10$ ; \*\* $P < 0.05$ ; \*\*\* $P < 0.01$ .

### *Segmentation, Race, and Ethnicity*

To test the claim of subprime neutrality, we narrow our focus to conventional loan applications approved and originated by all lenders. We then use a series of logit models to predict subprime selection as a function of borrower characteristics, and to determine whether racial and ethnic inequalities disappear when we account for the geography of credit rationing that risk-based

pricing is believed to cure. Consider first the simple model with applicant profiles (Table 5, Model 1). The standardized odds ratio for the credit instrument is 1.42, indicating that among all applicants who succeeded in getting loans, those who end up with rate-spread loans tend to be lower-income consumers with weaker credit. This finding is no surprise. More importantly the differences between purchase, home improvement, and refinance loans disappear when we control for credit, income, and other factors; and the income to loan amount ratio is positive, providing circumstantial evidence that the subprime sector is focused on borrowers with greater home equity. After adjusting for all other factors, African Americans and Native Americans are almost two times as likely as otherwise identical Non Hispanic Whites to end up with subprime credit. The disparity falls to 1.3 for Latinos and Latinas.

**Table 5.** Subprime Segmentation Models.

Parameter	Model 1		Model 2	
	Parameter	Odds	Parameter	Odds
	Estimate	Ratio	Estimate	Ratio
Intercept	2.9328 ***		0.9834	
Applicant income (ln)	-0.6951 ***	0.647	-0.5771 ***	0.696
Ratio of income to loan amount (ln)	0.6208 ***	1.663	0.48 ***	1.482
Owner-occupied	-0.1322	0.876	-0.1665 *	0.847
Second lien	0.2342 **	1.264	0.4587 ***	1.582
No lien	-17.32	0.000	-16.963	0.000
Pre-approval requested	-0.5613 ***	0.570	-0.5768 ***	0.562
OCC-regulated lender	-1.4981 ***	0.224	-1.5096 ***	0.221
OTS-regulated lender	-1.3065 ***	0.271	-1.2675 ***	0.282
FDIC-regulated lender	-0.7392 ***	0.477	-0.6938 ***	0.500
HUD-regulated lender	0.958 ***	2.606	0.9698 ***	2.638
Home improvement	-0.8937 ***	0.409	-0.8052 ***	0.447
Refinance	-0.0092	0.991	0.0251	1.025
Demographic information missing	0.1274 *	1.136	0.1437 **	1.155
Female primary applicant	0.165 ***	1.179	0.1783 ***	1.195
Hispanic	0.2967 ***	1.345	0.3265 ***	1.386
Native American or Alaskan Native	0.6711 *	1.956	0.7179 *	2.050
Asian or Pacific Islander	-0.1718	0.842	-0.1041	0.901
African American	0.5621 ***	1.754	0.5435 ***	1.722
Credit history instrument	5.4335 ***	1.421	5.3298 ***	1.411
Metropolitan conventional denial rate			5.3652 ***	1.237
Number of observations	22,154		22,154	
Nagelkerke max-rescaled R <sup>2</sup>	0.28		0.28	
Percent concordant	80.5		80.8	

Note: odds ratios for income, loan ratio, and credit history instrument report the change in odds with a one standard deviation change in the predictor. Models estimated with a random sample of all applications approved and originated as conventional loans.

\*Parameter significant at P<0.05; \*\*P<0.01; \*\*\*P<0.001.

Racial disparities persist when we consider the role of subprime lending in serving those excluded from credit (Table 5, Model 2). In metropolitan areas with higher conventional denial rates, all else constant, individuals who are approved have a greater chance of ending up with subprime credit. Yet including this factor has negligible effects on racial and ethnic gaps since the odds ratio for African Americans dips from 1.75 to 1.72, while for Native Americans it edges up from 1.96 to 2.05. The evidence does not support the idea that subprime credit reduces exclusion. Quite contrary, the findings suggest that unequal subprime segmentation goes hand in hand with rejection and exclusion.

Yet if the evidence indicates that race and ethnicity matter, there are reminders of the importance of contextual, regional dimensions of America's racial geographies. Recall the cluster of cities and suburbs across the Black Belt (Figure 1), which stood out as statistically unique on a few key mortgage variables including the racial composition of homeowners and homebuyers. Measuring segmentation effects for these distinctive places reveals compelling evidence of localized, urban and regional financial regimes (Ashton, 2005; Dymski, 1999; Immergluck, 2004). These localized financial environments are clearly not separate from the regional geography of race in America, but they cannot be reduced to the race of the individual applicant (Table 6). Even after accounting for income, credit risk, and the individual racialization of subprime selection, the Black Belt stands out. Of the cluster's thirty metropolitan areas, not one shows segmentation effects that are significantly less than the nationwide comparison for similarly-qualified borrowers. All but four effects are significant and positive. In Jackson, Mississippi and Pine Bluff, Arkansas, a homeowner or homebuyer is more than twice as likely to get subprime credit compared with otherwise identical borrowers in the rest of the nation. Disparities are slightly lower in Hinesville-Fort Stewart, Georgia, Decatur, Alabama, and across four separate metropolitan areas in Louisiana.

**Table 6.** Subprime Segmentation in the Black Belt.

	Parameter Estimate	Odds Ratio
Intercept	4.6835 ***	108.2
Applicant income (ln)	-0.8992 ***	0.570
Ratio of income to loan amount (ln)	0.7706 ***	1.840
Owner-occupied	-0.1425 ***	0.867
Second lien	-0.4738 ***	0.623
No lien	-18.4976	0.000
Pre-approval requested	-0.4004 ***	0.670
OCC-regulated lender	-1.3722 ***	0.254
OTS-regulated lender	-0.9456 ***	0.388
FDIC-regulated lender	-0.283 ***	0.753
HUD-regulated lender	0.93 ***	2.534
Home improvement	-0.2408 ***	0.786
Refinance	0.0304 *	1.031
Demographic information missing	0.2964 ***	1.345
Female primary applicant	0.0997 ***	1.105
Hispanic	0.2501 ***	1.284
Native American or Alaskan Native	0.0238	1.024
Asian or Pacific Islander	-0.3797 ***	0.684
African American	0.7483 ***	2.113
Credit history instrument	4.1957 ***	1.408
Montgomery, Alabama	0.0594	1.061
Shreveport-Bossier City, Louisiana	0.4509 ***	1.570
Monroe, Louisiana	0.5273 ***	1.694
Alexandria, Louisiana	0.6273 ***	1.873
Rocky Mount, North Carolina	0.1941 ***	1.214
Augusta, Georgia-South Carolina	0.1591 ***	1.172
Sumter, South Carolina	0.3975 ***	1.488
Danville, Virginia	-0.1021	0.903
Florence, South Carolina	0.3954 ***	1.485
Warner Robbins, Georgia	-0.0326	0.968
Columbus, Georgia-Alabama	0.1874 ***	1.206
Columbia, South Carolina	0.0996 **	1.105
Jackson, Mississippi	0.7047 ***	2.023
Birmingham, Alabama	0.2934 ***	1.341
Tuscaloosa, Alabama	0.0346	1.035
Albany, Georgia	0.3403 ***	1.405
Burlington, North Carolina	0.2983 ***	1.348
Baton Rouge, Louisiana	0.4241 ***	1.528
Mobile, Alabama	0.3522 ***	1.422
Jackson, Tennessee	0.1751 **	1.191
Dothan, Alabama	0.3609 ***	1.435
Decatur, Alabama	0.4141 ***	1.513
Macon, Georgia	0.1726 ***	1.188
Lawton, Oklahoma	0.3837 ***	1.468
Fayetteville, North Carolina	0.1853 ***	1.204
Goldsboro, North Carolina	0.2352 ***	1.265
Pine Bluff, Arkansas	0.7971 ***	2.219
Memphis, Tennessee-Mississippi-Arkansas	0.3988 ***	1.490
Hinesville - Fort Stewart, Georgia	0.5949 ***	1.813
Detroit, Michigan	0.3882 ***	1.474
Number of observations	291,606	
Nagelkerke max-rescaled R <sup>2</sup>	0.33	
Percent concordant	80.8	

Note: odds ratios for income, loan ratio, and credit history instrument report the change in odds with a one standard deviation change in the predictor. Models estimated with all observations for Black-Belt metros and a random sample of applications in all other metropolitan areas.

\*Parameter significant at P<0.05; \*\*P<0.01; \*\*\*P<0.001.

## CONCLUSIONS

“Investment banks employ a variety of techniques ... to shield investors from virtually all of the credit and litigation risk associated with predatory loans. ... As a result, investors can safely invest in top-rated subprime mortgage-backed securities without worrying about losses, even when the underlying loan pools are replete with questionable loans. *The protections that securitization provides investors do not safeguard borrowers.* To the contrary, securitization inflicts negative externalities on subprime borrowers .... securitization dilutes incentives by lenders and brokers to avoid making loans with excessive default risk by allowing them to shift that risk to the secondary markets, which has other ways to protect itself.”

Engel and McCoy, 2007, p. 2041, emphasis added

For more than a decade, subprime/predatory lending analysts have fought to a stalemate over the possibilities of definition and measurement, and whether documented cases of lending abuse in particular places can ever be taken as symptomatic of broader credit market failures. The explosion of the Wall Street securitization market during these years intensified this debate, even as favorable market trends allowed conservatives to dismiss concerns over predatory lending and to emphasize the magic of structured finance and risk-based pricing. Now, as hedge funds collapse from their subprime exposure, and as a parade of institutions scramble to write down billions in subprime holdings (Cresswell and Bajaj, 2007a, 2007b), conservatives are trying to claim that subprime borrowers were *not being charged enough*. Wrong. There is a compelling, rigorous literature at the nexus of economics, sociology, and the law that analyzes how securitization allows many actors to extract short-term profits from even the most dangerous transactions (Ashton, 2005; Engel and McCoy, 2002, 2007; Howell, 2006; Immergluck, 2004; Joint Economic Committee, 2007; Squires, 2004; Williams et al., 2004). Billions of dollars of excessive fees and home equity have been extracted from subprime borrowers, propelling a long speculative run among investors seeking the lucrative returns offered through subprime mortgage-backed securities. Now the speculative run is ending, and investors are finally learning what community activists have known for more than a decade: there are many horrifying cases of predatory abuse of individual homeowners that are masked behind the obtuse,

seemingly harmless accounting language of structured finance, with its senior and subordinate tranches, conditional mortgage calls, collateralized debt obligations, interest- and principal-only strips, and “waterfall” repayment provisions (see Engel and McCoy, 2007, p. 2047). In turn, investor panic is shutting off the spigot of cheap capital for subprime lenders, undermining the effectiveness of the investor protections of securitization. Subprime borrowers, however, have almost none of the protections enjoyed by investors.

In this study, we used a geographical approach to move beyond the intractable dilemmas of uncontested classification and measurement. Regardless of whether we call it efficient risk-based pricing or invitation to predatory abuse, subprime mortgage lending is tightly bound up with the enduring racial-geographic inequalities of American housing. Our analysis of credit flows across all of the metropolitan areas of the U.S. urban system yields no evidence that subprime credit helps to reduce the traditional problems of unequal denial and exclusion. Contrary, the results suggest that subprime segmentation actually adds a new dimension to the old inequalities. Moreover, geographical and racial disparities in segmentation persist after accounting for borrower characteristics, including a measure of credit risk that itself captures certain aspects of disparate racial impact. The preponderance of evidence, across many different cities and suburbs throughout the nation, indicates that subprime segmentation cannot be dismissed as an isolated process, and that it exacerbates rather than eases old forms of credit rationing and exclusion. Moreover, all of our findings date to the best-case scenario of 2004, a period when the national economy was well into its post-recession expansion, and before the underwriting excesses that financial analysts, bankers, and regulators now all agree got out of hand during 2005 and 2006. Although the database used in our study has important limitations, its broad coverage of racial-ethnic variations in credit, and the consistent direction of the findings, merit a shift in the burden of proof: if the market for subprime lending reduces traditional inequalities of denial-based exclusion as advocates claim, then why are African Americans twice as likely as otherwise identically qualified Non Hispanic Whites to be slotted into the high-cost, high-risk subprime markets? And why does subprime credit continue to cast a pall of debt over the beautiful lands of America’s Black Belt? The burden of proof has shifted, and advocates of risk-based pricing who fight efforts to regulate predatory lending have a responsibility to justify, with publicly released data available for widespread scrutiny, the

pervasive statistical findings of disparate impact. And we must never forget that the coefficients of these statistical findings represent the cumulative impact of innumerable decisions by individual lenders, brokers, investors -- and homeowners, many of whom are now faced with the loss of their homes and life savings.

## REFERENCES

- ABARIOTES, Andrianna, Sarita Ahuja, Helen Feldman, Carol Johnson, Lekha Subaiya, Nathan Tiller, Julie Urban, and Samuel L. Myers, Jr. 1993. *Disparities in Mortgage Lending in the Upper Midwest: Summary Results Using 1992 Home Mortgage Disclosure Act Data*. Paper presented at the Fannie Mae University Colloquium on Race, Poverty, and Housing Policy. Minneapolis, MN, December 3.
- AMBROSE, Brent W., and Anthony Pennington-Cross. 2000. "Local Economic Risk Factors and the Primary and Secondary Mortgage Markets." *Regional Science and Urban Economics* 30, 683-701.
- ANDERSON, Jenny, and Vikas Bajaj. 2007. "Calm Returns to Market, but Worries Persist Over Subprime Loans." *New York Times*, March 1, p. C1, C4.
- ASHTON, Phil. 2005. *Advantage or Disadvantage? The Changing Institutional Landscape of Central City Mortgage Markets*. Ph.D. Thesis. New Brunswick, NJ: Edward J. Bloustein School of Planning and Public Policy, Rutgers University.
- BAJAJ, Vikas. 2007a. "More Lenders Feeling Pain from Defaults." *New York Times*, July 31, C1, C2.
- BAJAJ, Vikas. 2007b. "Prospering in an Implosion." *New York Times*, June 1, C1, C10.
- BAJAJ, Vikas, and Julie Creswell. 2007. "Big Investors Jumping Back into Shaky Home Loans." *New York Times*, June 1, C1.
- BERRY, Brian J.L., ed. 1972. *City Classification Handbook: Methods and Applications*. New York: Wiley-Interscience.
- BERRY, Brian J.L. 1964. "Cities as Systems within Systems of Cities." *Papers of the Regional Science Association* 13, 147-163.
- BERRY, Brian J.L., and John D. Kasarda. 1977. *Contemporary Urban Ecology*. New York: Macmillan.
- CALEM, Paul S., Jonathan E. Hershaff, and Susan M. Wachter. 2004. "Neighborhood Patterns of Subprime Lending: Evidence from Disparate Cities." *Housing Policy Debate* 15(3), 603-622.
- CBC NEWS. 2007. "HSBC Warning Focuses Attention on U.S. Mortgage Sector." *CBC News Transcript*, February 9.
- CERVANTES, Ileana, and Peter J. Shimkus. 2004. *USA Credit Analysis: Popular, Inc.* Chicago: Fitch Ratings.
- CHOMSISENGPHET, Souphala, and Anthony Pennington-Cross. 2006. "The Evolution of the Subprime Mortgage Market." *Federal Reserve Bank of St. Louis Review* 88(1), 31-56.
- COLLINS, J. Michael, Eric S. Belsky, and Karl E. Case. 2005. "Exploring the Welfare Effects of Risk-Based Pricing in the Subprime Mortgage Market." In Nicolas P. Retsinas and Eric S. Belsky, eds., *Building Assets, Building Credit*. Cambridge, MA / Washington, DC: Joint Center for Housing Studies, Brookings Institution Press, 138-151.
- CRESWELL, Julie, and Vikas Bajaj. 2007a. "Jittery Stock Market Drops as Mortgage Fallout Spreads." *New York Times*, August 1, C1, C2.
- CRESWELL, Julie, and Vikas Bajaj. 2007b. "Mortgage Crisis Begins to Spiral, and the Casualties Mount." *New York Times*, March 5, C1, C4.
- DU BOIS, W.E.B. 2003 [1903]. *The Souls of Black Folk*. New York: Barnes & Nobles Classics.
- DURKIN, Thomas A., and Michael E. Staten, eds. 2002. *The Impact of Public Policy on Consumer Credit*. Boston: Kluwer.
- DYMSKI, Gary. 1999. *The Bank Merger Wave: The Economic Causes and Social Consequences of Financial Consolidation*. Armonk, NY: M.E. Sharpe.
- ENGEL, Kathleen C., and Patricia A. McCoy. 2007. "Turning a Blind Eye: Wall Street Finance of Predatory Lending." *Fordham Law Review* 75(4), 2039-2103.
- ENGEL, Kathleen C., and Patricia A. McCoy. 2002. "A Tale of Three Markets: The Law and Economics of Predatory Lending." *Texas Law Review* 80(6), 1255-1381.
- FEDERAL DEPOSIT INSURANCE CORPORATION (FDIC). 2005. "Frequently Asked Questions about the New HMDA Data." Washington, DC: Federal Deposit Insurance Corporation.

- FEDERAL FINANCIAL INSTITUTIONS EXAMINATION COUNCIL (FFIEC). Annual. *Home Mortgage Disclosure Act, Raw Loan Application Register Data, CD ROM*. Washington, DC: Federal Reserve Board.
- FRIEDMANN, John C. 1982. "The World City Hypothesis." *Development and Change* 17(1), 69-83.
- HENDERSON, Nell. 2007. "Market Maelstrom: After Two-Day Nosedive, the Talk Ranged from Long-Term to Downturn." *Washington Post*, July 29, F1.
- HIBERNIA SOUTHCOAST CAPITAL. 2004. *W. Holding Company, Inc.* Equity Research, Financials, December 1. New Orleans, LA: Southcoast Capital.
- HOLLOWAY, Steven R. 1998. "Exploring the Neighborhood Contingency of Race Discrimination in Mortgage Lending in Columbus, Ohio." *Annals of the Association of American Geographers* 88(2), 252-276.
- HOLLOWAY, Steven R., and Elvin Wyly. 2001. "The Color of Money Expanded: Geographically Contingent Mortgage Lending in Atlanta, Georgia." *Journal of Housing Research* 12(1), 55-90.
- HOWELL, Benjamin. 2006. "Exploiting Race and Space: Concentrated Subprime Lending as Housing Discrimination." *California Law Review* 94, 101-147.
- IMMERGLUCK, Dan. 2004. *Credit to the Community: Community Reinvestment and Fair Lending Policy in the United States*. Armonk, NY: M.E. Sharpe.
- JENNINGS, James. 1994. *Understanding the Nature of Poverty in Urban America*. Westport, CT: Praeger.
- JOINT ECONOMIC COMMITTEE. 2007. *Sheltering Neighborhoods from the Subprime Foreclosure Storm*. Senate Banking Committee, Charles E. Schumer, D-NY, Chair. Washington, DC: U.S. Senate.
- KNOX, Paul L., and Peter J. Taylor, eds. 1995. *World Cities in a World-System*. Cambridge: Cambridge University Press.
- LEE, Matthew. 2007. "The Wells Fargo Watch." Inner City Press, <http://www.innercitypress.org/wells.html>, last accessed March 14.
- LI, Wei S., and Keith Ernst. 2006. *The Best Value in the Subprime Market: State Predatory Lending Reforms*. Durham, NC: Center for Responsible Lending. Paper also presented at the American Real Estate and Urban Economics Association Conference, January 2006.
- MASSEY, Doreen, and Richard Meegan, eds. 1985. *Politics and Method: Contrasting Studies in Industrial Geography*. London: Routledge.
- MYERS, Samuel, L., Jr., and Tsze Chan. 1995. "Racial Discrimination in Housing Markets: Accounting for Credit Risk." *Social Science Quarterly* 76, 543-561.
- MYRDAL, Gunnar. 1944. *An American Dilemma: The Negro Problem and American Democracy*. New York: Harper and Row.
- OFFICE OF THE COMPTROLLER OF THE CURRENCY. 2004. *Home Mortgage Disclosure Act Examination Procedures*. Advisory Letter OCC 2004-15. Washington, DC: OCC.
- ORIGINATION NEWS. 2006. "HMDA Lender Reports Show Subprime Up 70%." *Origination News* (Nonprime News section), 16(1), October, p. 81.
- PALETTA, Damian. 2004. "Bracing for Upcoming Release of HMDA Data." *American Banker*, November 30.
- PARKER, Dennis D. 2005. *Letter to Richard M. Kovacevich, President and CEO, and James M. Strother, Executive Vice President and General Counsel, Wells Fargo & Company*. April 19. Albany and New York City: New York Department of Law.
- PEARLSTEIN, Steven. 2007. "No Money Down Falls Flat." *Washington Post*, March 14, D1.
- PENNINGTON-CROSS, Anthony, Anthony Yezer, and Joseph Nichols. 2000. *Credit Risk and Mortgage Lending: Who Uses Subprime and Why?* Working Paper No. 00-03. Washington, DC: Research Institute for Housing America.

- QUERCIA, Roberto G., Michael A. Stegman, and Walter R. Davis. 2004. "Assessing the Impacts of North Carolina's Predatory Lending Law." *Housing Policy Debate* 15(3), 573-601.
- RELMAN, John P., Fred Rivera, Meera Trehan, and Shilpa S. Satoskar. 2004. "Designing Federal Legislation that Works: Legal Remedies for Predatory Lending." In Gregory D.
- RENUART, Elizabeth. 2004. "An Overview of the Predatory Lending Process." *Housing Policy Debate* 15(3), 467-502.
- RICHARDSON, Chad, and Jose A. Pagan. 2002. *Human and Social Aspects of Cross-Border Development in the McAllen/Reynosa Area*. Working Paper No. 2002-9. Edinburg, Texas: Center for Border Economic Studies, University of Texas-Pan American.
- REUTERS. 2007. "Puerto Rico's Popular Quits U.S. Subprime Business." *Reuters Business* wire, January 9.
- ROSS, Stephen L., and John Yinger. 2002. *The Color of Credit: Mortgage Discrimination, Research Methodology, and Fair-Lending Enforcement*. Cambridge, MA: MIT Press.
- RUSHTON, Emory W. 2007. *Testimony by Emory Rushton, Senior Deputy Comptroller, Office of the Comptroller of the Currency, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, March 22*. Washington, DC: U.S. Senate.
- SASSEN, Saskia, ed. 2002. *Global Networks, Linked Cities*. New York: Routledge.
- SCHANCHE, Don Jr. 2003. "Pricey Paydays: Critics Say Georgia's Payday-Loan Industry is Growing Fast by Targeting the Desperate." *Macon Telegraph*, June 22, A1.
- SCHEESELE, Randall M. 2006. *Subprime and Manufactured Home Lending List*. Housing Finance Working Paper Series. Office of Policy Development and Research. Washington, DC: U.S. Department of Housing and Urban Development.
- SHORT, John Rennie. 2004. "Black Holes and Loose Connections in a Global Urban Network." *Professional Geographer* 56(2), 295-302.
- SORKIN, Andrew Ross. 2002. "HSBC to Buy a U.S. Lender for \$14.2 Billion." *New York Times*, November 15, p. C1, C10.
- SQUIRES, ed. 2004. *Why the Poor Pay More: How to Stop Predatory Lending*. Westport, CT: Praeger, 153-184.
- STEIN, Sydney H. 2005. *Office of the Comptroller of the Currency v. Eliot Spitzer, Opinion and Order; The Clearing House Association v. Eliot Spitzer, Opinion and Order*. 05-Civ-5636, 05-Civ-5629. New York: U.S. District Court.
- STIGLITZ, Joseph E., and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review* 71, 393-410.
- SUGRUE, Thomas J. 2005. *The Origins of the Urban Crisis: Race and Inequality in Postwar Detroit*. Second Edition. Princeton: Princeton University Press.
- SURRAN, Carl. 2007. "On Base: Fort Stewart." *Military Money*. <http://www.militarymoney.com>, last accessed March 7, originally published Spring, 2004.
- TAM, Jeffrey. 2007. "Rare HSBC Warning Spawns Fear." *The Standard (Financial Times, London)*, February 26.
- TIMMONS, Heather, and Julia Werdigier. 2007. "Asian Stocks Plunge on Fears over U.S. Economy." *New York Times*, March 15, C1.
- TAYLOR, Peter J. 2004. *World City Network: A Global Urban Analysis*. London and New York: Routledge.
- TWIDDY, David. 2007. "Financial Shakeups Throw Future of Subprime Lending into Limbo." *Associated Press State and Local Newswire*, February 24.
- UNGER, HENRY. 2003. "Predatory Lending Bill Sent to Perdue: Consumer Groups Angry Most Parties in Mortgage Financing Chain Won't be Liable." *Atlanta Journal-Constitution*, March 7, p. 1A.
- WALL STREET JOURNAL EDITORIAL PAGE. 2007. "Subprime Politics: The Housing Boom is Over; Time to Whoop on the Bankers." *Wall Street Journal*, February 7.

WHITEHOUSE, Mark. 2007. "Day of Reckoning: 'Subprime' Aftermath: Losing the Family Home." *The Wall Street Journal*, May 30.

WILLIAMS, Richard, Reynolds Nesiba, and Eileen Diaz McConnel. 2005. "The Changing Face of Inequality in Home Mortgage Lending." *Social Problems* 52(2), 181-208.

ZUCKOFF, Mitchell. 1992. "Shawmut is Said to Settle over Loan Scams." *Boston Globe*, February 22, Metro/Region Section, p. 1.