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I. INTRODUCTION

1. I have been asked by Plaintiffs' counsel to review and comment upon the April 28, 2010 class-certification report of Marsha J. Courchane.¹ A list of the materials I have reviewed since submitting my initial class certification report is attached as Appendix 1.²

2. Upon review of Dr. Courchane's report and the other materials, I continue to conclude that Class members suffered a disparate impact as a result of Defendants' mortgage pricing policies. I also conclude that disparate impact can be analyzed and demonstrated using common methods and proof, that the named Plaintiffs' claims are typical of those of the Class, and that monetary relief to the Class may be reliably estimated for each member of the Class and in the aggregate for the Class as a whole.

3. In her expert report, Dr. Courchane found positive, statistically significant disparities between the loan costs for minorities and the loan costs for white borrowers (as measured by the APR) in most of the samples she examined. The disparities found by Dr. Courchane are generally smaller than the disparities I estimated in my original report but still statistically significant.

4. Although Dr. Courchane finds statistically significant disparities between minority and white borrower loan costs, she disregards these disparities as not being economically significant.³ In this reply report, I show that these disparities are indeed economically significant.

1. Expert Report of Marsha J. Courchane, April 28, 2010 [hereinafter *Courchane Class Certification Report*].
2. Consultants from Navigant Economics provided assistance in the preparation of this report.
3. *Courchane Class Certification Report* at 5, 6.

5. Dr. Courchane discusses the differences in individual characteristics of the named Plaintiffs' loans in her report. Although characteristics among the named Plaintiffs vary, these differences are easily controlled for in the regression models that both Dr. Courchane and I employ. Dr. Courchane also claims that Greenpoint borrowers exist who paid higher loan costs than minorities with similar characteristics. However, none of these findings show that the claims of the named Plaintiffs are atypical of the claims of the Class as a whole.

6. Finally, Dr. Courchane argues that Defendants had non-exclusive engagements with mortgage brokers. Therefore, she argues, Defendants had no ability to control the fees charged to borrowers by those brokers.⁴ However, Dr. Courchane lists numerous examples of Defendants' restriction of fees charged by brokers to borrowers. Contrary to Dr. Courchane's assertions, Defendants could have imposed additional requirements on broker compensation such that minority borrowers would not suffer any disparate impact. Such requirements could have included the elimination of discretionary pricing policies.

II. OVERVIEW OF ACADEMIC LITERATURE ON MORTGAGE BROKERS

7. A good portion of Dr. Courchane's report consists of a fairly straightforward review of the role that mortgage brokers play in the whole market for residential mortgage originations.⁵ While I do not disagree with many aspects of her general description of the services that mortgage bankers can theoretically provide as part of the loan origination process, the tone of her narrative is puzzlingly pollyannaish in light of the events of the past decade and the very large body of academic work documenting the unsavory role that mortgage brokers played leading up to the subprime debacle and the ensuing financial crisis. In Dr. Courchane's report, mortgage brokers

4. *Id.* at 10-13.

5. *Id.* at 7-8, 10-15.

operate under conditions of intense competition and effective regulatory constraints, which together force brokers to make full and complete disclosures to borrowers, who in turn are perfectly well equipped to safeguard their own interests. In Dr. Courchane's presentation, there is no suggestion that mortgage brokers might be unfaithful to their clients or exploit individual weakness and financial illiteracy or systemically place borrowers in unsuitable and unsustainable mortgages or extract unjustified fees. This exceedingly benign perspective on the mortgage broker industry plays a critical role in her analysis because at the heart of her argument lies a contention that statistically significant differences in mortgage pricing for minority borrowers are most plausibly understood to be the result of differences in broker costs associated with minority borrowers. In the body of this report, I will present a range of testimonial and empirical evidence that directly contradicts Dr. Courchane's speculation that differential costs across mortgage brokers offer a credible explanation for statistically significant variation in mortgage pricing for minorities, but as a preliminary matter I think it is important to review the overwhelming body of evidence—both in the form of academic papers and government initiatives—that belie Dr. Courchane's premise that market forces and regulatory constraints during the 2004-2007 Class Period imposed effective restraints of abusive practices on the part of mortgage brokers.

8. In brief, academic research has identified and to a considerable degree corroborated empirically significant agency costs in the behavior of mortgage brokers. Some work has focused on the tendency of mortgage brokers to originate lower quality loans than those produced through direct loan originations.⁶ But an even larger body of academic work has documented the

6. See, e.g., Antje Berndt et al., *The Role of Mortgage Brokers in the Subprime Crisis* (Mar. 16, 2010) (avail. at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1573312) ("higher broker profits are associated with worse loan performance suggesting that brokers earned high profits on loans that turned out to be riskier ex post"); Edward Golding, Richard K. Green & Douglas A. McManus, *Imperfect Information and the Housing Finance Crisis* at 10

proclivity of mortgage brokers to exploit the ignorance and misunderstandings of individual borrowers to charge excessive fees and extract what's known as economic rents.⁷ Within the academic community, it is increasingly well-recognized that many individuals are not well-equipped to monitor the complex terms of residential mortgages and are especially vulnerable to opportunistic behavior on the part of mortgage brokers.⁸ As reviewed in my initial report, a substantial body of academic work has also documented the extent to which mortgage brokers and

(Feb. 2008) (Joint Center for Housing Studies, Harvard University) (noting differences in the quality of loans originated by mortgage brokers); William P. Alexander et al., *Some Loans Are More Equal than Others: Third-Party Originations and Defaults in the Subprime Mortgage Industry*, 30 REAL EST. ECON. 667 (2002) (presenting evidence from the 1990's that loans originated through mortgage brokers and other third parties are more likely to default and discussing apparent market reactions to this phenomenon). But see Todd J. Zywicki & Joseph D. Adamson, *The Law & Economics of Subprime Lending*, 80 U. COLO. L. REV. 1 (2009) (interpreting data to suggest mortgage brokers are more cost effective).

7. Michael LaCour-Little, *The Pricing of Mortgages by Brokers: An Agency Problem?*, 31 J. REAL EST. RES. 235 (2009) ("loans originated by [mortgage] brokers cost borrowers about 20 basis points more, on average, than retail loans and . . . this premium is higher for lower income and lower credit quality borrowers"); Adam B. Ashcraft & Til Schuermann, *Understanding the Securitization of Subprime Credit*, Federal Reserve Bank of New York Staff Report No. 318 (Mar. 2008) (discussion by Federal Reserve Board economists of the difficulties that financially unsophisticated borrowers face in choosing among mortgages); Howell E. Jackson & Laurie Burlingame, *Kickbacks or Compensation: The Case of Yield Spread Premiums*, 12 STAN. J.L. BUS. & FIN. 289 (2007); Susan E. Woodward, *Consumer Confusion in the Mortgage Market*, Sand Hill Econometrics Paper (July 14, 2003) [hereinafter *Consumer Confusion in the Mortgage Market*] ("Brokers have the advantage of experience and skill, plus information about wholesale terms that are unavailable to borrowers. . . . Brokers fees are also profoundly related to borrower education . . ."). See also Morris M. Kleiner & Richard M. Todd, *Mortgage Broker Regulations that Matter: Analyzing Earnings, Employment and Outcomes for Consumers* (Dec. 2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1077810, ("Issues related to [mortgage] broker incentives and integrity have repeatedly surfaced in recent policy discussions, partly because of rising concerns about mortgage fraud."). For a discussion of criminal behavior of mortgage brokers leading up to the subprime crisis, see Claire A. Hill, *Who Were the Villains in the Subprime Crisis, and Why it Matters*, 4 ENTREPRENEURIAL BUS. L. J. 323, 332-36 (2010).

8. See Susan E. Woodward & Robert E. Hall, *Diagnosing Consumer Confusion and Sub-Optimal Shopping Effort: Theory and Mortgage-Market Evidence* (May 2010), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1612602, ("Mortgage loans are leading examples of transactions where experts on one side of the market take advantage of consumers' lack of knowledge and experience."); Eric S. Belsky & Susan Wachter, *The Public Interest in Consumer and Mortgage Credit Markets* at 16 (Mar. 2010), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1582947, ("Lender/brokers have more information than borrowers . . . This can lead to economic rent seeking on the part of lender/originators, which can persist if the costs of obtaining accurate information are great or accurate cost information and options are not communicated to borrowers."); Golding, Green & McManus, *supra* note 6, at 10 ("The methods of rent seeking [on the part of mortgage brokers] take two forms: identifying borrowers who are particularly incapable of understanding mortgage pricing, and exploiting the implicit moral hazard arising from being able to initiate mortgages without capital, by shopping loan applications to various lenders."). See generally, Oren Bar-Gill, *The Law, Economics and Psychology of Subprime Mortgage Contracts*, 94 CORNELL L. REV. 1073, 1118-33 (2009).

other originators can exploit precisely the same consumer weaknesses on the part of minority borrowers to engage in discriminatory lending practices.⁹

9. The problematic practices of mortgage brokers have not simply been a concern of the academic community. Both Congressional leaders and regulatory authorities have also identified mortgage brokers as a sector of the financial services industry warranting significant supervisory attention. For much of the past decade, both the Department of Housing and Urban Development¹⁰ and the Federal Reserve Board¹¹ staff have been studying limitations in consumer understanding of disclosures with respect to mortgage broker compensation and, in the past two years, both agencies have adopted significant reforms with even more stringent proposals under consideration. In 2008, Congress itself enacted a new statutory requirement mandating licensing and oversight of mortgage brokers at the state level¹² and pending legislation includes more draconian measures.

9. See Class Certification Report of Howell E. Jackson, Mar. 15, 2010, at 15-19 [hereinafter *Class Certification Report of Howell E. Jackson*]. See also Alan M. White, *Borrowing While Black: Applying Fair Lending Laws to Risk-Based Mortgage Pricing*, 60 S.C.L.REV. 677, 679 (2009) (exploring a number of reasons why competitive forces may not eliminate racial disparities including facts that “[m]inority applicants are overrepresented in higher priced channels and loan product categories” and “because mortgage brokers retain the discretion to increase interest rates to certain borrowers in order to increase the brokers’ compensation.”) See also Cassandra Jones Havard, *Democratizing Credit: Examining the Structural Inequities of Subprime Lending*, 56 SYRACUSE L. REV. 233 (2006). For a recent review of the statistical studies of racial discrimination in personal finance, see Maya Sen, *Quantifying Discrimination: The Role of Race and Gender in the Awarding of Subprime Mortgage Loans* (Apr. 20, 2010) (reviewing work of the past decade).

10. Real Estate Settlement Procedures Act (RESPA): Rule To Simplify and Improve the Process of Obtaining Mortgages and Reduce Consumer Settlement Costs, 73 Fed. Reg. 68,204, 68,204 (Nov. 17, 2008). The RESPA reform process began with a 2002 Proposed Rule that would have provided for a revised Good Faith Estimate (GFE) to simplify settlement cost disclosures. That proposed rule was later withdrawn in 2004, but was followed by extensive commentary; years of consultation with industry, consumer, and government groups; two reports to Congress; and seven consumer and industry roundtables. Real Estate Settlement Procedures Act (RESPA): Rule To Simplify and Improve the Process of Obtaining Mortgages and Reduce Consumer Settlement Costs, 73 Fed. Reg. 14,030, 14,030 (Mar. 14, 2008).

11. See Federal Reserve Board Proposed Rule, 73 Fed. Reg. 1,672, 1,698 (Jan. 9, 2008) Federal Reserve Board Final Rule, 73 Fed. Reg. 44,522, 44,522 (July 30, 2008) (withdrawing aspects of original proposal with respect to yield spread premiums); Federal Reserve Board Proposal, 74 Fed. Reg. 43,232, (Aug. 26, 2009).

12. See The Secure and Fair Enforcement for Mortgage Licensing Act of 2008, 12 U.S.C. 5101 et seq. (2008).

10. This extensive academic literature and more recent government initiatives are relevant to Dr. Courchane's analysis in several respects. First, this literature belies the benign portrayal of mortgage brokers in her description of the role of mortgage brokers in the loan origination process. Notwithstanding Dr. Courchane's speculation to the contrary, it is abundantly clear that mortgage broker compensation has not invariably tracked the actual costs of loan originations. Over the past decade, mortgage brokers have in many contexts exploited uninformed and unsuspecting consumers to extract excessive compensation without regards to cost. Equally important, these problems have been well publicized and subject to robust public debate since well before the beginning of the class period in this litigation.¹³ Defendant Greenpoint and other residential mortgage originators making use of mortgage brokers in the 2004 to 2007 period were well aware of mounting criticisms of the practices of mortgage brokers, including a growing body of empirical evidence that mortgage brokers were charging minority borrowers higher origination fees than similarly situated white borrowers.¹⁴ An unstated assumption of Dr. Courchane's analysis— that during the class period defendant Greenpoint had no reason to be suspicious that

13. See Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEXAS L. REV. 1255, 1286-89 (2002) (identifying in detail the potentially problematic practices of mortgage brokers in light of lax regulation and poorly structured compensation regimes); see also Alexander et al., *supra* note 6 (presenting in 2002 empirical evidence of problem behavior of mortgage brokers and other third party originators in the 1990's). For an overview of regulatory debates over problematic mortgage broker compensation practices dating back to the early 2000's, see Jackson & Burlingame, *supra* note 7.

14. For example, in January 2002, the Senate Banking Committee held a public hearing on the predatory lending practices of mortgage brokers, at which many industry leaders were also present as witnesses. In that context, I testified: "While my study suggests that yield spread premiums are a very bad deal for average consumers, I believe these practices are particularly injurious to the least sophisticated members of society—groups of which the Department has historically been most protective. To test this hypothesis, I also examined the relationship between mortgage broker compensation and the racial identity of borrowers. The results indicated that mortgage brokers charged two racial groups - African-Americans and Hispanics - substantially more for settlement services than they did other borrowers. For African-Americans, the average additional charge was \$474 per loan, and for Hispanics, the average additional charge was \$580 per loan." See Testimony of Professor Howell E. Jackson Before the Senate Banking Committee (Jan. 2002) (avail. at http://banking.senate.gov/02_01hrg/010802/jackson.htm). For a contemporaneous corroboration of my findings, see *Consumer Confusion in the Mortgage Market*, *supra* note 7, at 28 ("Race does matter, controlling for other factors, even education. African Americans pay an additional \$500 in broker fees, and Hispanic borrowers \$275 more"). See also sources cited *supra* note 10-12 (discussing government investigations of discriminatory lending practices through wholesale lending channels over the past decade).

its mortgage brokers might be charging discriminatory fees to its minority borrowers or engaging in other abusive practices—is inconsistent with the public record. Moreover, as I explain below, defendant Greenpoint could easily have supplemented the manner in which it monitored its mortgage brokers to reduce the likelihood that its brokers would engage discriminatory pricing or other abusive practices.

III. DEFENDING STATISTICALLY SIGNIFICANT RACIAL DISPARITIES IN LOAN PRICING ON THE BASIS OF SPECULATION REGARDING VARIATION IN BROKER COSTS

11. A principal theme in Dr. Courchane's report is her assertion that statistically significant differences in mortgage pricing for minorities is most plausibly understood as a function of legitimate differences in mortgage broker costs.¹⁵ Putting aside for purposes of my analysis whether plaintiffs in a disparate impact case bear the burden of demonstrating the absence of legitimate business justifications, let me begin by making a few clarifying points about this line of argument. As I discussed in my deposition, there may indeed be some cost differences across mortgage brokers based on the costs of doing business in different markets or other factors. To some degree—and contrary to assertions in Dr. Courchane's report¹⁶—I controlled for these differences in my principal regression analyses through the use of geographic and explanatory variables, many of which are likely correlated with broker costs and effort. But the critical question is not whether there persists some degree of unexplained variation in broker costs; rather it is whether there exists a difference in broker costs for *minority* borrowers that justifies the persistent and statistically significant differential prices that defendant Greenpoint charged

15. *Courchane Class Certification Report*, at 8-9, 15-16.

16. *Id.* at 8-9.

minority borrowers.¹⁷ The record in this case—both testimonial and statistical—leads me to believe that there was no such differential in origination costs for minority borrowers.

A. Depositions of Mortgage Brokers

12. The most straightforward evidence is testimonial. The record in this case includes depositions of three separate mortgage brokers who originated wholesale mortgages for defendant Greenpoint during the class period. All three were asked direct questions about whether their costs for originating loans for borrowers varied based on the race of the borrowers. All were unequivocal in their answers:

Q. And in your experience, did the race of borrower correlate with the amount of work that the loan officer would have to do in connection with a loan?

A. No.¹⁸

Q. Do you know whether the amount of time the loan officer would take or the amount of work the loan officer would have to do on a particular loan would be affected by the borrower's race?

A. I don't think so. I would say no.

Q. So if the borrower were black instead of white, the amount of work the loan officer would have to do on the loan shouldn't be affected?

A. That's correct.¹⁹

Q. Is the race of a borrower one of the factors you look at in determining how much work you think it will take to process a loan?

A. No, definitely not.²⁰

17. As a matter of statistical analysis, costs variations that are uncorrelated with race should have no material effect on the racial disparity in APR's that my original report detected.

18. Deposition of Barry Jay Weiss (Apr. 14, 2010) at 100.

19. Deposition of Gregory Kudinger (Apr. 6, 2010) at 136-37.

20. Deposition of Kevin McDade (Apr. 13, 2010) at 62.

13. Also relevant to Dr. Courchane's analysis are the mortgage-broker deponent's statements about record keeping. A critical component of Dr. Courchane's argument is her assertion that there are important differences in the costs that mortgage brokers incur in originating the loans of different borrowers. Were this the case, one would expect that mortgage brokers would maintain careful records of the time expended on individual loan originations, lest the firms not appropriately compensate themselves for the effort expended on individual transactions. However, the deponents were also consistent in testifying that their firms did not maintain hourly records on loan originations.²¹ The absence of such recordkeeping, in my view, suggests that variation in broker effort across individual borrowers was not an important issue for these Greenpoint mortgage brokers.

B. Statistical Evidence

14. I conducted several additional tests of the data in this case to further investigate the possibility that the cost differential across mortgage brokers might somehow be causing the statistically significant disparities in APRs for defendant Greenpoint's minority borrowers. First, I reran my principal regressions including controls for each mortgage broker that defendant

21. Deposition of Kevin McDade (Apr. 13, 2010) at 69-70:

Q. Did your loan officers keep any time records that showed the amount of time they spent securing a loan for an individual consumer?

A. Hourly records? No. Now, there would be a record as to when they took the application and -- as far as how long it took to close it.

Deposition of Gregory Kudinger (Apr. 6, 2010) at 135-37:

Q. Do HomeFirst's loan officers keep time sheets of the amount of time they spend on a loan-by-loan basis?

A. No.

Q. Has HomeFirst ever required its loan officers to do so?

A. No.

Q. Has any lender ever required HomeFirst to keep time records?

A. No.

Greenpoint employed to originate its wholesale loans. Second, I also reran the same regressions adding in the pull-through rates of individual brokers that Dr. Courchane presented in her report. In both cases, statistically significant differences in the APRs of minority borrowers persisted, both for the full class period and for individual years. These results add further support for my view that differentials in the costs of individual brokers cannot explain the statistically significant differences in minority APRs.

1. Mortgage Broker Dummies

15. Notwithstanding the unequivocal testimony of mortgage broker witnesses that their costs did not vary based on the race of borrowers, it is at least theoretically possible that minority borrowers could tend to work with brokers who face higher costs than other borrowers or generally operate in markets with less vigorous competition. To explore these possibilities, I added a new set of unique dummy variables to represent each mortgage broker and then reran the principal regressions from my original report. The results are summarized below in Table 1. While adding dummy variables representing each mortgage broker slightly reduces the regression coefficients for African American borrowers in each of the five models, the regression coefficients for Hispanic borrowers are smaller in three models and larger in two models. In all five models, the regression coefficients for African American and Hispanic borrowers are still statistically significant at the one percent level. Consequently, controlling for differences in individual brokers does not explain the differences in minority APR basis points.

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TABLE 1: APR BASIS POINT DISPARITIES WHEN CONTROLLING FOR POSSIBILITY OF ADDITIONAL BROKER COSTS

	No Broker Controls ¹				With Broker Controls ²			
	African American	Hispanic	Obs	Adj. R ²	African American	Hispanic	Obs	Adj. R ²
Model (4), all years	9.44*** (0.44)	7.64*** (0.32)	372,038	0.87330	8.33*** (0.51)	6.23*** (0.37)	372,038	0.88546
Model (4-2004)	10.60*** (0.67)	7.21*** (0.49)	112,946	0.88526	8.20*** (0.79)	5.07*** (0.58)	112,946	0.89411
Model (4-2005) ³	7.29*** (0.59)	3.79*** (0.39)	110,582	0.83258	6.58*** (0.63)	3.49*** (0.47)	110,582	0.84944
Model (4-2006)	5.63*** (0.64)	1.66*** (0.46)	105,787	0.88072	5.02*** (0.80)	2.72*** (0.59)	105,787	0.88687
Model (4-2007)	7.15*** (0.98)	2.07*** (0.72)	42,723	0.87890	6.93*** (1.37)	3.51*** (1.03)	42,723	0.88471

Note: Robust standard errors in parentheses. Coefficients and standard errors for other explanatory variables are shown in Appendix 2.

*** Statistically significant at 1%, ** Statistically significant at 5%, * Statistically significant at 10%.

¹As reported in Table 6 of my original report.

²Dummy variables are added for each of the brokers in the sample:

27,152 brokers in 2004-2007

14,024 brokers in 2004

14,222 brokers in 2005

14,879 brokers in 2006

10,935 brokers in 2007

³Regular standard errors (instead of robust standard errors) for Model (4-2005) *with* the broker controls are given because robust standard errors are not calculable for this model with broker controls.

2. Pull-Through Rates

16. I also undertook a second, similar exercise, but this time utilizing as additional explanatory variables the pull-through rates that Dr. Courchane presented in her report. In her report, Dr. Courchane speculated that these differences in pull-through rates might explain the statistically significant differentials for minority-borrower APRs on the theory that minority borrowers might tend to work with mortgage brokers who close a smaller percentage of loan transactions and therefore need to charge higher rates on the transactions that are closed.

17. However plausible this speculation might be in theory, it does not withstand careful analysis. To test Dr. Courchane's hypothesis, I added a new set of dummy variables representing

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the pull-through rate quartiles, as shown in Table 7 of Dr. Courchane's report. I also tested the regression model by interacting the pull-through rate dummy variables with the broker size dummy variables from Table 7 of Dr. Courchane's report. The results of this analysis are presented in Table 2 below. While the regression coefficients for African American and Hispanic borrowers are slightly lower in all five models I tested after adding the pull-through rate dummy variables, the regression coefficients are still statistically significant at the one percent level. Consequently, controlling for differences in pull-through rates does not explain the differences in minority APRs.

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TABLE 2: APR BASIS POINT DISPARITIES WHEN CONTROLLING FOR
BROKER PULL-THROUGH RATES

	No Control for Pull-Through Rate ¹				With Pull-Through Rate Controls ²			
	African American	Hispanic	Obs	Adj. R ²	African American	Hispanic	Obs	Adj. R ²
Model (4), all years	9.44*** (0.44)	7.64*** (0.32)	372,038	0.87330	9.08*** (0.44)	7.50*** (0.32)	372,038	0.87338
Model (4-2004)	10.60*** (0.67)	7.21*** (0.49)	112,946	0.88526	10.26*** (0.67)	7.12*** (0.49)	112,946	0.88538
Model (4-2005)	7.29*** (0.59)	3.79*** (0.39)	110,582	0.83258	7.08*** (0.59)	3.71*** (0.39)	110,582	0.83269
Model (4-2006)	5.63*** (0.64)	1.66*** (0.46)	105,787	0.88072	5.22*** (0.64)	1.51*** (0.46)	105,787	0.88086
Model (4-2007)	7.15*** (0.98)	2.07*** (0.72)	42,723	0.87890	6.88*** (0.98)	1.91*** (0.72)	42,723	0.87895
Model (4), all years, with pull-through rate quartiles interacted with Dr. Courchane's categories of applications per broker ³					9.03*** (0.44)	7.48*** (0.32)	372,038	0.87341

Note: Robust standard errors in parentheses. Coefficients and standard errors for other explanatory variables are shown in Appendix 3.

*** Statistically significant at 1%, ** Statistically significant at 5%, * Statistically significant at 10%.

¹As reported in Table 6 of my original report.

²Dummy variables for the pull-through rate quartiles, as shown in Dr. Courchane's Table 7, are added to the regression model:

- 0% ≤ Pull-through rate ≤ 36%
- 36% < Pull-through rate ≤ 60%
- 60% < Pull-through rate ≤ 79%
- 79% < Pull-through rate ≤ 100%

Brokers for whom pull-through rates cannot be calculated are the omitted category.

³Dummy variables for the pull-through rate quartiles are interacted with dummy variables representing the broker size categories from Dr. Courchane's Table 7:

- Applications < 5
- 5 < Applications ≤ 10
- 10 < Applications ≤ 25
- Applications > 25

IV. CONTROLLING FOR SPECIFIC LOAN PROGRAMS IS INAPPROPRIATE IN DISPARATE IMPACT ANALYSIS

18. Another point of disagreement between Dr. Courchane's analysis and my original report is the use of specific loan programs as appropriate controls in disparate impact cases involving residential mortgage originations. According to Dr. Courchane, the addition of loan programs is necessary in order to control for specific loan characteristics,²² and she accordingly presents a number of additional regressions based on comparatively small samples limited to each of eleven individual loan programs.

19. In my view, Dr. Courchane's approach is inappropriate. Aside from compromising the sample size, the use of individual loan programs is problematic because it raises the possibility—demonstrated in other cases—that minority borrowers might be steered into some loan programs rather than others. And, indeed, as presented in Table 3, the minority participation rate in some of the loan programs that Dr. Courchane has selected is twice as high as it is in other programs.²³

22. Dr. Courchane describes loan programs as combining "several features, each of which may impact pricing, such as whether the loan is fixed or adjustable rate, whether it is an interest only product, whether the adjustment period for the rate is one year or longer, which index is used to determine rate changes, whether there is a piggy back second lien loan along with the first lien loan, whether the loan is larger in amount than the conforming loan limits used by Freddie Mac and Fannie Mae, and others." *Courchane Class Certification Report*, at 18.

23. As set forth in Table 3, African-American participation rates vary from six to twelve percent while Hispanic participation rates vary from 14 to 28 percent.

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TABLE 3: SUMMARY STATISTICS FOR THE LOAN PROGRAMS FROM
DR. COURCHANE'S TABLES 11-13

Program Code	Program Code Description	Total Count	% Af. Amer.	% Hisp.	% White	Mean Annual Income (\$000)	Mean FICO	Mean Loan Amount (\$000)
Not Top Products		213,910	8%	16%	58%	140	717	283
Top Ten Products		158,311	9%	19%	55%	142	714	258
CA-BBGX AU	CONFORMING A GX_30 YEAR FIXED AU	23,549	8%	15%	59%	87	719	227
AA-BBAP	ALT A AP_30 YEAR FIXED	21,824	12%	14%	62%	138	704	173
AA-KKAP 3/6 I.O.-PIG	ALT A AP_PIG_3YR/6MO LIBOR ARM I.O.	18,922	9%	14%	61%	147	709	236
AA-IIAP 1/1 12C-PIG	ALT A AP_PIG_1MO/1YR TREAS ARM 12 CEILING	18,564	7%	19%	53%	184	720	334
JA-KKAQ 3/6 I.O.-PIG	JUMBO A AQ_PIG_3YR/6MO I.O. LIBOR ARM	16,736	7%	23%	51%	117	719	317
AA-IIAP 1/1 12C	ALT A AP_1MO/1YR TREAS ARM 12 CEILING	14,600	8%	21%	50%	172	719	339
CS-BBAQ I.O.	CLOSED-END SECOND AQ_30 YEAR FIXED I.O.	14,154	11%	28%	44%	142	711	58
AA-KKAP 3/6 I.O.	ALT A AP_3YR/6MO LIBOR ARM I.O.	11,247	7%	18%	60%	155	701	269
JA-KKAQ 5/6 I.O.	JUMBO A AQ_5YR/6MO I.O. LIBOR ARM	9,714	7%	28%	47%	144	710	374
AA-KKAP 5Y/6M NEG I.O.	ALT A AP_5YR/6MO NEG AM LIBOR ARM I.O.	9,001	8%	21%	52%	174	724	373
AA-BBGX	ALT A GX_30 YEAR FIXED	5,436	6%	23%	53%	103	725	260

Note: The counts for each product do not exactly match the counts shown in Dr. Courchane's Table 12 because Dr. Courchane's Table 12 includes only those loans with sufficient data to be included in Model (4), whereas the counts in this table represent all loans with the given program codes regardless of the availability of other data on those loans.

20. For precisely these reasons, the better practice in my view is to control for the specific characteristics of each lending transaction (loan amount, loan characteristics, period until adjustment for adjustable mortgages, etc.) as the best way to reflect factors that legitimately affect loan quality and pricing. In my original report, I controlled for almost all of the features of loan programs that Dr. Courchane identifies as important, as well as many other controls of credit quality and underwriting risk.²⁴

21. As a further check, I reran the basic regression models adding dummy variables indicating each of the four ARM index types,²⁵ whether the loan was a conforming loan, the presence of an interest-only period, and whether the loan was a piggyback loan. (These represent the additional loan program characteristics that Dr. Courchane identified in her report as features that impact pricing.) The results of this analysis are presented in Table 4 below. Adding these dummy variables caused the regression coefficients for African American and Hispanic borrowers to slightly decrease in each of the models. However, in every case, the regression coefficients are statistically significant at the one percent level. Consequently, controlling for the presence of conforming loans, different ARM indices, interest-only periods, and piggyback loans does not explain the differences in minority APRs.

24. For example, Model (4) controls for the loan amount (but not necessarily the confirming limits), lien status (but not necessarily whether the loan is a piggyback loan), whether the loan has a fixed or adjustable rate, and the length of the adjustment period for adjustable rate loans. Model (4) does not control for the presence of an interest-only period in the loan, or the identity of the index used to determine rate changes.

25. LIBOR, Treasury, 12-month Treasury average index (MTA), and unknown.

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TABLE 4: APR BASIS POINT DISPARITIES WHEN CONTROLLING FOR CONFORMING A, ARM INDEX, INTEREST-ONLY, AND PIGGYBACK CHARACTERISTICS

	No Control for Conforming A, ARM Index, Interest-Only, and Piggyback Controls ¹				With Conforming A, ARM Index, Interest-Only, and Piggyback Controls ²			
	African American	Hispanic	Obs	Adj. R ²	African American	Hispanic	Obs	Adj. R ²
Model (4), all years	9.44*** (0.44)	7.64*** (0.32)	372,038	0.87330	8.61*** (0.43)	7.14*** (0.31)	371,685	0.87930
Model (4-2004)	10.60*** (0.67)	7.21*** (0.49)	112,946	0.88526	8.50*** (0.63)	6.27*** (0.47)	112,946	0.89450
Model (4-2005)	7.29*** (0.59)	3.79*** (0.39)	110,582	0.83258	5.99*** (0.55)	3.30*** (0.37)	110,475	0.85224
Model (4-2006)	5.63*** (0.64)	1.66*** (0.46)	105,787	0.88072	4.89*** (0.62)	1.50*** (0.44)	105,541	0.88865
Model (4-2007)	7.15*** (0.98)	2.07*** (0.72)	42,723	0.87890	6.80*** (0.96)	1.94*** (0.71)	42,723	0.88252

Note: Robust standard errors in parentheses. Coefficients and standard errors for other explanatory variables are shown in Appendix 4.

*** Statistically significant at 1%, ** Statistically significant at 5%, * Statistically significant at 10%.

¹As reported in Table 6 of my original report.

²Dummy variables for each of the 4 ARM index types (LIBOR, Treasury, 12-month Treasury average index (MTA), and unknown), a dummy variable equal to 1 if the loan program is a Conforming A loan, a dummy variable equal to 1 if the loan program has an interest-only period, and a dummy variable equal to 1 if the loan program is a piggyback loan. The Conforming A characteristic is based on the loan program code. The ARM index, interest-only component, and piggyback characteristics are identified based on the loan program descriptions.

22. To perform yet an additional check, I reran the basic regression models adding dummy variables for each of the 538 unique program codes in place of dummy variables for the 59 broader categories. The results of this analysis are presented in Table 5 below. While the regression coefficients for African American and Hispanic borrowers are lower when the individual program code dummy variables are utilized, the regression coefficients are all statistically significant at the one percent level, save one that is statistically significant at the five

percent level. Consequently, controlling for differences in loan program codes does not explain the differences in minority APRs.

TABLE 5: APR BASIS POINT DISPARITIES WHEN CONTROLLING FOR INDIVIDUAL PROGRAM CODES

	No Control for Individual Program Codes ¹				With Individual Program Code Controls ²			
	African American	Hispanic	Obs	Adj. R ²	African American	Hispanic	Obs	Adj. R ²
Model (4), all years	9.44*** (0.44)	7.64*** (0.32)	372,038	0.87330	7.32*** (0.39)	6.15*** (0.28)	372,038	0.90327
Model (4-2004)	10.60*** (0.67)	7.21*** (0.49)	112,946	0.88526	7.28*** (0.57)	5.33*** (0.42)	112,946	0.91496
Model (4-2005)	7.29*** (0.59)	3.79*** (0.39)	110,582	0.83258	5.10*** (0.50)	3.56*** (0.33)	110,582	0.87921
Model (4-2006) ³	5.63*** (0.64)	1.66*** (0.46)	105,787	0.88072	4.21*** (0.57)	1.50*** (0.43)	105,787	0.89783
Model (4-2007) ³	7.15*** (0.98)	2.07*** (0.72)	42,723	0.87890	5.89*** (0.88)	1.51** (0.68)	42,723	0.89357

Note: Robust standard errors in parentheses. Coefficients and standard errors for other explanatory variables are shown in Appendix 5.

*** Statistically significant at 1%, ** Statistically significant at 5%, * Statistically significant at 10%.

¹As reported in Table 6 of my original report.

²Dummy variables for each of the 538 unique program codes are added to Model (4), and the dummy variables representing the 59 broader categories are dropped (as are the dummy variables for HELOC and FHA/VA, which are represented by unique program codes.)

³Regular standard errors (instead of robust standard errors) for Model (4-2006) and (4-2007) *with* the program code controls are given because robust standard errors are not calculable for these models with individual program code controls.

V. EVEN WITH DR. COURCHANE'S PROPOSED ADJUSTMENTS TO MY PREFERRED MODEL, STATISTICALLY SIGNIFICANT RACIAL DISPARITIES PERSIST AND REPRESENT SIGNIFICANT ECONOMIC HARM

23. Dr. Courchane concludes that “by making only minor changes in assumptions [in Dr. Jackson’s model], the disparate impact results...are generally no longer significant.”²⁶ Presumably, Dr. Courchane means “economically significant” as opposed to statistically significant.²⁷ For example, Dr. Courchane believes that coefficients of under six basis points are “very low levels.”²⁸ However, even small disparities in APRs will result in substantial harm to minority borrowers.

24. By way of example, Table 6 demonstrates that, for a five basis point APR disparity, a typical African American borrower would have paid \$579 more than a typical white borrower (undiscounted), while a typical Hispanic borrower would have paid \$705 more than a typical white borrower (undiscounted) over the first five years of the loan. As illustrated in Table 7, these amounts would make up a substantial proportion of a typical consumer’s annual expenditures on basic staples such as food, gasoline, electricity, natural gas, and water service. While these examples assume a five basis point APR differential, the actual differential that I estimate is often much larger, especially for African American borrowers.²⁹

26. *Courchane Class Certification Report*, at 6.

27. In the analyses which Dr. Courchane presents in her Tables 12 and 14, the regression coefficients for African Americans and Hispanics are almost all statistically significant at generally accepted levels. *Courchane Class Certification Report*, at 20, 21. Similarly, my own regression results presented in this report demonstrate that the regression coefficients for African Americans and Hispanics are also statistically significant, even after controlling for the various variables which Dr. Courchane claims are necessary (see Table 4 above). Note: The additional regressions presented in this report are intended solely to rebut arguments made in Dr. Courchane’s report. My preferred model remains the one presented in my original report.

28. *Courchane Class Certification Report*, at 19.

29. See, for example, Table 5 above.

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TABLE 6: MONETARY RELIEF TO MINORITY BORROWERS USING A 5 BASIS POINT APR DISPARITY

	African Americans	Hispanics	Total
Over entire loan term			
Undiscounted (\$Millions)	\$84.3	\$220.4	\$304.7
Present Value of Relief (\$Millions)	\$60.9	\$158.6	\$219.5
Over 10 years			
Undiscounted (\$Millions)	\$34.7	\$90.4	\$125.0
Present Value of Relief (\$Millions)	\$33.9	\$88.1	\$121.9
Over 5 years			
Undiscounted (\$Millions)	\$17.5	\$45.5	\$63.0
<i>Number of Loans*</i>	30,175	64,611	94,786
<i>Avg undiscounted relief per loan over 5 years (\$)</i>	\$579	\$705	\$665
Present Value of Relief (\$Millions)	\$18.9	\$49.3	\$68.3
<i>Number of Loans*</i>	30,175	64,611	94,786
<i>Avg. discounted relief per loan over 5 years (\$)</i>	\$628	\$763	\$720

Note: For purposes of these illustrations, the present value (as of March 2010 when my original report was filed) of the undiscounted relief is calculated using the 20-year Treasury rate of 4.49 percent (as of Mar. 5, 2010, the same rate used in my original report) as the discount rate. Federal Reserve Statistical Release H.15, 20-year Treasury constant maturities (nominal), available at http://www.federalreserve.gov/releases/h15/data/Business_day/H15_TCMNOM_Y20.txt. For the 10-year and 30-year scenarios, in which most of the harm comes in the form of disparities in future interest payments, the present value is smaller than the undiscounted value. For the 5-year scenario, in which most of the harm comes in the form of disparities in past interest payments, the present value is higher than the undiscounted value.

TABLE 7: MONETARY RELIEF OVER 5 YEARS IMPLIED BY 5 BASIS-POINT DISPARITY AND JACKSON MODELS RELATIVE TO HOUSEHOLD EXPENDITURES

	African Americans ¹	Hispanics ¹
Avg. Monetary Relief over 5 Years per Loan ("Disparity") as Implied by: 5 BPS Disparity / Jackson APR Model (4) ²	\$579 / \$1,093	\$705 / \$1,076
<u>Avg. Annual Consumer Expenditures, 2004-2007²</u>		
Food at home	\$2,760	\$3,593
5 bps / Jackson APR Model (4) Disparity as % of expenditure	21% / 40%	20% / 30%
Gasoline and motor oil	\$1,613	\$2,111
5 bps / Jackson APR Model (4) Disparity as % of expenditure	36% / 68%	33% / 51%
Electricity	\$1,245	\$1,110
5 bps / Jackson APR Model (4) Disparity as % of expenditure	47% / 88%	63% / 97%
Natural gas	\$517	\$368
5 bps / Jackson APR Model (4) Disparity as % of expenditure	112% / 211%	192% / 293%
Water and other public services	\$339	\$374
5 bps / Jackson APR Model (4) Disparity as % of expenditure	171% / 322%	188% / 288%

Notes:

¹The median annual income reported for African American and Hispanic borrowers in Defendants' loan database is \$100,000 and \$103,000, respectively. The average annual income for African American and Hispanic households in the Consumer Expenditure Survey from 2004 to 2007 is \$40,853 and \$46,910, respectively.

² The monetary relief under the Jackson APR Model (4) of \$1,093 (African Americans) and \$1,076 (Hispanics) over 5 years is found in Table 9 of my original report.

³U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Expenditure Survey*, available at <http://www.bls.gov/cex/>.

**VI. THE NUMBER OF MORTGAGE BROKERS THROUGH WHICH DEFENDANT GREENPOINT
ORIGINATED LOANS DOES NOT PREVENT DEFENDANT'S DISCRETIONARY PRICING PRACTICES
FROM DISADVANTAGING MINORITIES NOR DOES IT RELIEVE DEFENDANT OF THE
RESPONSIBILITY OR CAPACITY TO OVERSEE THEIR MORTGAGE ORIGATION PRACTICES IN
WHOLESALE MARKETS**

25. I also differ with respect to Dr. Courchane's suggestion that the large number of mortgage brokers with which defendant Greenpoint did business either diminished the possibility that defendant Greenpoint's Discretionary Policy could disadvantage minority borrowers or relieved the firm of either the responsibility or ability to oversee its mortgage origination practices in the wholesale markets.

26. To begin with, my analysis of this matter is not based on any assumption that either defendant Greenpoint or its mortgage brokers possessed any degree of market power. Rather, as explained in my original report, my view is that defendant Greenpoint and its mortgage brokers had significant informational and institutional advantages with respect to less well informed and more vulnerable borrowers. Support for my view on this subject can be found in my own prior research on the subject as well as the extensive academic studies and governmental analyses recounted above. But it is also confirmed in the record of this case. The employees of mortgage brokers have very strong personal incentives to maximize profits from individual borrowers—in the case of HomeFirst Mortgage Corp., one of defendant Greenpoint's mortgage brokers, individual sales personnel retained a full 70 percent of mortgage broker charges beyond a basic processing fee³⁰—and it was widely understood within the industry that sales personnel with such incentives would exploit uninformed clients to raise income.³¹

30. See Deposition of Gregory Kunding (Apr. 6, 2010) at 40-41.

31. In the following exchange, Mr. Kunding acknowledges that mortgage brokers will attempt to extract extra fees where they can:

27. Contrary to Dr. Courchane's suggestions, it would also not have been infeasible for defendant Greenpoint to impose effective constraints on the compensation of mortgage brokers. As explained in my original report,³² defendant Greenpoint's standard contract with mortgage brokers did include limits on the amount of total compensation a mortgage broker could receive. The level of this limitation – at five percent of the loan amount – was too high to impose any effective constraint on broker discretion. The firm could, however, easily have strengthened that contractual requirement to regulate mortgage broker compensation in a more meaningful way. To the extent that individual transactions did in fact entail extraordinary amounts of efforts, Greenpoint could have granted waivers to its compensation cap as part of its very extensive program of granting waivers to other aspects of its loan underwriting standards. And, such a process would have produced contemporaneous evidence to corroborate the need to charge higher APRs in those cases. Just as its extensive mortgage broker network did not inhibit defendant Greenpoint from administering an underwriting exceptions program that extended to roughly 40 percent of its loan originations, the firm could also have implemented a waiver program for total mortgage broker compensation about some predetermined and effective cap.

28. More fundamentally, I differ with Dr. Courchane on the critical—and largely legal—question of whether Defendant Greenpoint bears responsibility for justifying the statistically significant disparity in the APRs of its mortgages to minority borrowers during the class period. Dr. Courchane's view, apparently, is that as long as some portion of a discriminatory

Q. And is it accurate that you generally quoted rates so that you could earn a 1 percent return?

A. Well, that would be our minimum. I mean, we wanted at least 1 percent. I mean, if we could get 1-1/4 or if we could get 1-1/2, I mean, clearly we would do that. But when you're dealing with A paper, it's very competitive, and it was very hard to do that. . . ."

Deposition of Gregory Kunding (Apr. 6, 2010) at 106.

32. *Class Certification Report of Howell E. Jackson* at 19.

APR differential is based on differences in mortgage broker compensation, then defendant Greenpoint is relieved of any legal responsibility under the FHA or ECOA for statistically significant differences in the APRs of its minority borrowers. I disagree. To begin with, the APR differential is on the mortgages that Greenpoint itself originated. The logic of the APR calculation is that origination costs represent a cost of extending credit, and under the Truth in Lending Act, defendant Greenpoint is the entity extending that credit. Moreover, as I explained in my original report, the decision to originate loans through mortgage brokers rather than direct lending was also Greenpoint's choice.³³ It would be anomalous and create the most perverse of incentives to permit racial disparities in the APRs of mortgages originated through the wholesale channel but not through the retail channel, especially as the difference between a mortgage broker and a direct lender employee is seldom transparent to borrowers. Moreover, in terms of setting policy moving forward, mortgage originators such as Greenpoint can quite easily add effective oversight of discriminatory practices of mortgages brokers through their underwriting process. This can be done either through exceptions procedures of the sort outlined above supplemented by the sort of periodic ex post statistical reviews of the sort that Dr. Courchane and I have performed for this litigation. While such safeguards may not currently be standard industry practices, my prediction is that they will be once the large number of pending FHA and ECOA cases alleging discriminatory lending practices in the wholesale origination market are resolved.

33. *Class Certification Report of Howell E. Jackson* at 11.

VII. THE TYPICALITY OF THE NAMED PLAINTIFFS' CLAIMS IS NOT CONTRADICTED BY DR. COURCHANE'S DISCUSSION OF THEIR INDIVIDUAL CHARACTERISTICS

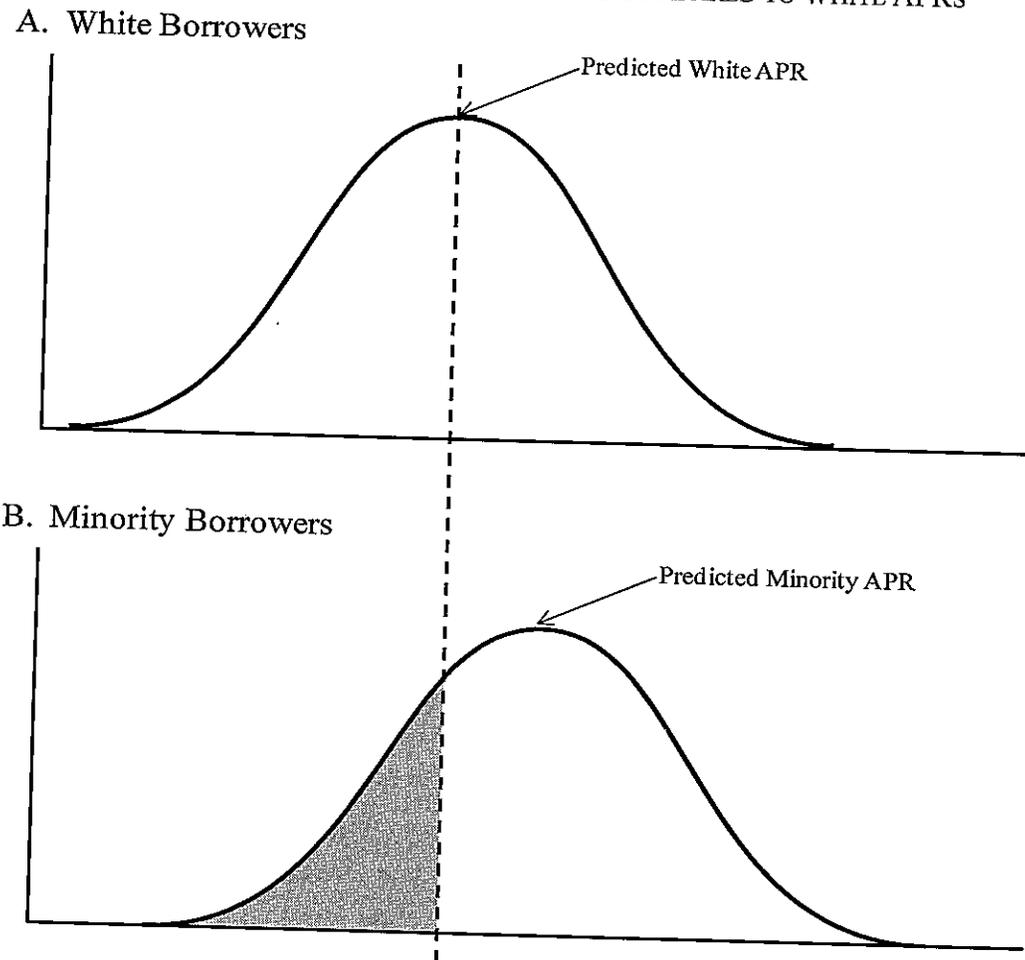
29. Finally, I will respond to Dr. Courchane's contention that the named plaintiffs in the case do not satisfy the requirements of typicality on the grounds that the named plaintiffs received an APR that was less than a hypothetically predicted APR that Dr. Courchane generated by inserting the characteristics of the named plaintiffs and their loans in my preferred regression but not including the dummy for race. Under my preferred approach to damages, each member of the plaintiff class would be entitled to a measure of damages reflecting an estimate of the average loss to class members.³⁴ Under Dr. Courchane's approach, only those class members with hypothetically predicted APRs below the actual APR each class member received would be entitled to damages.

30. For several reasons, I prefer the approach presented in my original report. To begin with, the calculation under my approach is simpler, generating the same measure of damages for each class member. More importantly, my approach offers a fairer and more effective remedy in cases of actionable discriminatory lending. To illustrate this point, consider Figure 1 (below). The Figure illustrates a pair of actual distributions of APRs for white borrowers and minorities with identical characteristics under a regression model of the sort I have used in my analyses. Because our models are not perfect—that is, because they don't explain all the variation in APRs—the actual distributions reflect a range of APRs for both whites (A) and minorities (B), but centered around two predicted APRs, which represents estimates of the APRs for both whites and minorities under the model. The predicted APR for whites is lower than the predicted APR for minorities. And the difference between those two predictions would be equal to the regression's

34. As explained in my original report, I believe we possess sufficient data to estimate damages under this approach and I am working on a model to do so.

estimate of racial disparity (in this case, on the order of 10 basis points for African Americans and something less than that for Hispanics).

FIGURE 1: DISTRIBUTION OF MINORITY APR'S AS COMPARED TO WHITE APRS



31. Under Dr. Courchane's approach, if the actual APR of a class member is less than the APR that the model would predict for a white borrower with identical characteristics (that means in the shaded area of the distribution of actual minority APRs in Figure 1), then the class member in question would not be entitled to relief and also should not be eligible to serve as a named plaintiff. In my view, such an individual should be entitled to relief equal to the average damages suffered by class members and should be entitled to serve as a named plaintiff. I would

offer several reasons. First, my approach recognizes that there will always be some variation in actual APRs that result in some borrowers getting better loan terms than our models predict. In the absence of discrimination, some minority borrowers (as well as some white borrowers) would be in the extreme left hand side of the distribution with APRs, well below the model's predicted levels. My approach to damages—granting average relief to all members of the class—would restore that equitable distribution, whereas Dr. Courchane's approach would limit the ability of minority borrowers to obtain much better than predicted APRs. In essence, Dr. Courchane's approach would keep minorities out of the extreme left side of the white-borrowers' distribution, even after compensation had been awarded. Conversely, Dr. Courchane's approach would, in my view, overcompensate minority borrowers in the right hand side of the distribution by providing compensation awards that bring all such borrowers down to the predicted APR of white borrowers. Finally, to the extent that more educated minority borrowers are most likely to seek out legal assistance in redressing discriminatory lending practices and to the extent that these educated borrowers are more likely to negotiate somewhat better terms than others, Dr. Courchane's approach to typicality will tend to reduce the effectiveness of civil rights enforcement in this field as it will tend to disqualify as named plaintiffs the minority borrowers most likely to initiate litigation.

VIII. CONCLUSION

32. Dr. Courchane's report includes no evidence that change the underlying findings of disparate impact in my original report. The differences in our regression models are minor, in that we use common variables and find statistically significant disparities. Although the disparate impact of Defendants' loan pricing policies remains statistically significant in Dr. Courchane's models, she dismisses the magnitude of the measured disparities as so small that they are not

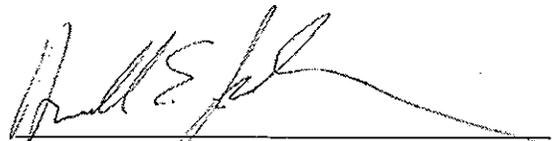
-30-

economically significant. However, I demonstrate that her measured disparities, understated though they may be, are economically significant. Dr. Courchane's discussion of the differences between the individual named Plaintiffs and the existence of white borrowers with higher loan costs does not disprove the commonality or typicality of their claims on behalf of the Class. Finally, her arguments regarding causation are unpersuasive because Defendants could have chosen to fund loans with less broker pricing discretion, which would have in all likelihood reduced the uncovered racial disparities in APRs paid.

* * *

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on June 14, 2010.

A handwritten signature in black ink, appearing to read 'Howell Edmunds Jackson', is written over a horizontal line. The signature is stylized and cursive.

Howell Edmunds Jackson

APPENDIX 1: MATERIALS RELIED UPON

All Materials Relied Upon in the Class Certification Report of Howell E. Jackson, Mar. 15, 2010.

Testimony:

Expert Report of Marsha J. Courchane (April 28, 2010).
 Class Certification Report of Howell E. Jackson (Mar. 15, 2010).
 Deposition of Kevin McDade (Apr. 13, 2010).
 Deposition of Gregory Kudinger (Apr. 6, 2010).
 Deposition of Barry Jay Weiss (Apr. 14, 2010).

Laws, Regulations, and Other Government Publications:

Real Estate Settlement Procedures Act (RESPA): Rule To Simplify and Improve the Process of Obtaining Mortgages and Reduce Consumer Settlement Costs, 73 Fed. Reg. 68,204, 68,204 (Nov. 17, 2008).
 Federal Reserve Board Final Rule, 73 Fed. Reg. 44,522, 44,522 (July 30, 2008).
 The Secure and Fair Enforcement for Mortgage Licensing Act of 2008, 12 U.S.C. 5101 et seq. (2008).

Academic Articles & Other Studies, Presentations:

William P. Alexander et al., *Some Loans Are More Equal than Others: Third-Party Originations and Defaults in the Subprime Mortgage Industry*, 30 REAL EST. ECON. 667 (2002)
 Oren Bar-Gill, *The Law, Economics and Psychology of Subprime Mortgage Contracts*, 94 CORNELL L. REV. 1073 (2009).
 Eric S. Belsky & Susan Wachter, *The Public Interest in Consumer and Mortgage Credit Markets* (Mar. 2010).
 Antje Berndt et al., *The Role of Mortgage Brokers in the Subprime Crisis* (Mar. 16, 2010).
 Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEXAS L. REV. 1255, 1286-89 (2002).
 Edward Golding, Richard K. Green & Douglas A. McManus, *Imperfect Information and the Housing Finance Crisis* (Feb. 2008) (Joint Center for Housing Studies, Harvard University).
 Cassandra Jones Havard, *Democratizing Credit: Examining the Structural Inequities of Subprime Lending*, 56 SYRACUSE L. REV. 233 (2006).
 Claire A. Hill, *Who Were the Villains in the Subprime Crisis, and Why it Matters*, 4 ENTREPRENEURIAL BUS. L. J. 323 (2010).
 Morris M. Kleiner & Richard M. Todd, *Mortgage Broker Regulations that Matter: Analyzing Earnings, Employment and Outcomes for Consumers* (Dec. 2007).
 Michael LaCour-Little, *The Pricing of Mortgages by Brokers: An Agency Problem?*, 31 J. REAL EST. RES. 235 (2009).
 Maya Sen, *Quantifying Discrimination: The Role of Race and Gender in the Awarding of Subprime Mortgage Loans* (Apr. 20, 2010).
 Susan E. Woodward, *Consumer Confusion in the Mortgage Market* (July 14, 2003).
 Susan E. Woodward & Robert E. Hall, *Diagnosing Consumer Confusion and Sub-Optimal Shopping Effort: Theory and Mortgage-Market Evidence* (May 2010).
 Susan E. Woodward, *Consumer Confusion in the Mortgage Market* (July 14, 2003).
 Todd J. Zywicki & Joseph D. Adamson, *The Law & Economics of Subprime Lending*, 80 U. COLO. L. REV. 1 (2009).

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Appendix 2: APR Basis Point Disparities When Adding Broker Controls (Table 1)

Dependent variable: APR (basis points)	Model (4)	Model (4-2004)	Model (4-2005) ¹	Model (4-2006)	Model (4-2007)
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Race: African American	8.33*** (0.51)	8.20*** (0.79)	6.58*** (0.63)	5.02*** (0.80)	6.93*** (1.37)
Race: Hispanic	6.23*** (0.37)	5.07*** (0.58)	3.49*** (0.47)	2.72*** (0.59)	3.51*** (1.03)
Race: American Indian	-4.74** (1.98)	-3.37 (2.97)	-3.94 (2.65)	1.61 (3.19)	-3.97 (5.09)
Race: Asian	1.54*** (0.49)	0.48 (0.76)	0.14 (0.61)	0.52 (0.83)	1.85 (1.48)
Race: Hawaiian	2.53** (1.15)	2.87 (2.15)	0.99 (1.44)	-0.54 (1.76)	-0.93 (3.17)
Race: Missing	4.48*** (0.47)	4.49*** (0.67)	3.26*** (0.63)	3.57*** (0.80)	3.53*** (1.21)
Subordinate lien	238.55*** (1.26)	195.23*** (3.60)	214.34*** (2.13)	292.31*** (2.16)	321.15*** (3.08)
Missing FICO	61.04*** (4.31)	56.08*** (5.10)	67.58*** (4.49)	51.31*** (6.74)	8.14 (8.20)
300 <= FICO < 600	109.42*** (6.64)	133.53*** (7.96)	81.60*** (5.91)	53.18*** (6.91)	23.19*** (6.65)
600 <= FICO < 620	82.67*** (4.88)	88.89*** (6.76)	67.35*** (4.23)	54.94*** (6.96)	36.69*** (12.02)
620 <= FICO < 640	39.24*** (0.90)	38.12*** (1.24)	26.36*** (1.09)	53.74*** (1.58)	43.35*** (2.14)
640 <= FICO < 660	36.91*** (0.52)	28.90*** (0.72)	28.73*** (0.65)	49.86*** (0.86)	42.82*** (1.51)
660 <= FICO < 680	23.82*** (0.37)	14.87*** (0.56)	17.45*** (0.49)	33.71*** (0.60)	31.49*** (1.05)
680 <= FICO < 700	12.80*** (0.33)	7.56*** (0.48)	8.43*** (0.41)	21.26*** (0.55)	20.56*** (0.96)
700 <= FICO < 720	4.02*** (0.32)	4.69*** (0.49)	2.89*** (0.40)	4.96*** (0.54)	5.55*** (0.90)
720 <= FICO < 740	1.43*** (0.34)	2.23*** (0.52)	1.32*** (0.43)	1.27** (0.60)	1.36 (0.98)
0K <= Loan Amount < 40K	45.14*** (1.36)	59.23*** (2.57)	41.40*** (1.45)	25.08*** (2.12)	38.89*** (4.44)
40K <= Loan Amount < 50K	31.80*** (1.39)	49.97*** (2.04)	45.23*** (1.53)	8.33*** (2.20)	13.11*** (4.48)
50K <= Loan Amount < 75K	29.64*** (0.84)	38.13*** (1.18)	42.51*** (1.03)	13.91*** (1.49)	11.16*** (2.55)
75K <= Loan Amount < 150K	13.00*** (0.52)	18.95*** (0.76)	19.67*** (0.69)	11.47*** (0.90)	6.56*** (1.54)
150K <= Loan Amount < 200K	3.38*** (0.49)	9.23*** (0.73)	8.27*** (0.66)	4.33*** (0.79)	0.29 (1.34)
200K <= Loan Amount < 300K	-0.99** (0.41)	3.17*** (0.65)	3.67*** (0.56)	0.59 (0.63)	-3.75*** (1.07)
300K <= Loan Amount < 500K	-4.41*** (0.35)	-1.10* (0.60)	-0.19 (0.49)	-1.73*** (0.51)	-4.34*** (0.88)
40% < total debt ratio <= 45%	7.63*** (0.32)	2.45*** (0.53)	3.07*** (0.41)	5.65*** (0.50)	3.52*** (0.78)
Total debt ratio > 45%	-5.42*** (0.52)	-4.15*** (0.76)	-4.02*** (0.63)	-1.38 (0.97)	-4.53*** (1.14)
No total debt ratio	12.54** (5.53)	7.62 (7.32)	-0.86 (7.91)	0.93 (8.47)	-9.81 (19.33)
(First lien) x (LTV missing)	-14.60 (11.34)		-23.87 (15.17)	-96.68*** (18.48)	
(First lien) x (0% < LTV <= 60%)	-97.06*** (0.73)	-88.09*** (1.04)	-87.93*** (1.00)	-96.97*** (1.65)	-105.05*** (1.34)
(First lien) x (60% < LTV <= 70%)	-92.15*** (0.71)	-81.94*** (1.02)	-83.14*** (0.96)	-94.03*** (1.62)	-105.01*** (1.27)
(First lien) x (70% < LTV <= 80%)	-81.69*** (0.62)	-71.73*** (0.91)	-75.50*** (0.85)	-79.93*** (1.52)	-88.22*** (0.95)
(Subordinate lien) x (CLTV missing)	-43.92 (28.50)		-132.88*** (44.81)	-28.40 (33.24)	
(Subordinate lien) x (0% < CLTV <= 80%)	-102.61*** (2.91)	-103.55*** (6.09)	-118.05*** (2.53)	-97.15*** (4.31)	-107.05*** (12.36)
(Subordinate lien) x (80% < CLTV <= 90%)	-36.33*** (1.26)	-26.48*** (3.46)	-43.13*** (1.20)	-32.30*** (1.66)	-35.81*** (4.00)
HELOC	-39.19*** (11.69)	-187.68*** (18.06)	-7.36 (8.01)		
FHA/VA	-111.26***	-83.09***	-91.83***	-86.59***	-90.84***

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	Model (4)	Model (4-2004)	Model (4-2005) ¹	Model (4-2006)	Model (4-2007)
<i>Dependent variable: APR (basis points)</i>					
	(5.65)	(10.35)	(7.28)	(8.35)	(9.82)
Coapplicant present	-2.27***	-2.39***	-1.68***	-1.85***	-4.46***
	(0.24)	(0.37)	(0.31)	(0.42)	(0.69)
Self-employed borrower or co-borrower	13.31***				-1.85**
	(0.80)				(0.76)
<i>Documentation type</i>					
Alternative Doc	-23.76***	53.67***			
	(8.72)	(7.84)			
Low Doc	48.09***	57.26**	58.40*	38.16	38.55*
	(17.17)	(23.14)	(31.57)	(30.35)	(22.42)
NED	-33.50***			2.79	
	(7.04)			(11.82)	
NID	58.91***	50.30***	64.69***	79.70***	74.64***
	(5.62)	(7.57)	(8.08)	(8.63)	(19.32)
NID/NAD	97.15***	80.94***	71.83***	109.61***	99.45***
	(6.65)	(8.12)	(9.03)	(11.06)	(22.17)
NID/NAV	126.65***	90.64***	144.31***	91.30***	78.60***
	(7.30)	(8.89)	(11.50)	(10.61)	(22.84)
NID/NED	81.70***	69.89***	79.40***	97.01***	99.60***
	(5.87)	(7.55)	(8.36)	(9.27)	(20.53)
NID/NED/NAD	91.29***	84.21***	95.61***	108.53***	85.21***
	(5.60)	(7.39)	(7.98)	(8.64)	(19.37)
NIV/NAV	42.09***	18.75***	29.55***	59.22***	50.90***
	(0.63)	(0.92)	(0.86)	(1.14)	(1.38)
Stated Income	41.22***	28.52***	31.59***	51.39***	46.91***
	(0.31)	(0.42)	(0.37)	(0.64)	(1.00)
Streamlined Refi	12.23	-42.16	65.60**		
	(39.70)	(39.68)	(26.26)		
Unknown doc type	-20.83**		-28.70***	14.09	
	(10.22)		(10.68)	(11.05)	
Lender paid mortgage insurance			13.30***	15.06***	
			(4.64)	(3.74)	
Escrow/impound waiver indicator = 'Y' or 'Yes Impounds'			-2.44***	-3.47***	
			(0.35)	(0.41)	
Loan purpose: Home improvement	5.76***	-0.39			
	(1.06)	(1.99)			
Loan purpose: Refinance	0.87***	-5.09***			
	(0.26)	(0.40)			
Cash-out refinance			0.59	15.19***	6.81***
			(0.36)	(0.49)	(0.83)
Rate & term refinance			-6.25***	-1.82***	-5.58***
			(0.43)	(0.54)	(0.87)
Rate lock ≥ 30 days		-0.57	2.27***	1.75**	
		(0.61)	(0.54)	(0.86)	
No prepayment penalty		1.53***			
		(0.53)			
1-yr prepayment penalty			2.82***	2.79***	
			(0.80)	(0.57)	
Prepayment penalty > 1 year			5.53***	-2.57***	
			(0.40)	(0.53)	
<i>Loan term</i>					
5-year term	-8.36	-74.99***		107.07***	
	(7.82)	(6.76)		(5.70)	
7-year term	9.20	-56.82***		12.35	
	(9.11)	(9.52)		(8.33)	
10-year term	84.26*	151.41***	12.18	58.43	243.51***
	(43.18)	(22.10)	(25.45)	(44.80)	(21.43)
15-year term	73.50***	108.71***	108.12***	-32.82	-69.91*
	(10.98)	(17.31)	(6.55)	(54.28)	(40.86)
20-year term	-55.56***	-165.43***	-37.57**	15.12	-5.47
	(13.42)	(13.24)	(17.38)	(21.16)	(3.81)
25-year term	33.01**	81.15***	66.06***	30.02	-8.55
	(12.92)	(19.36)	(12.54)	(34.24)	(18.87)
40-year term	20.55***		17.60***	13.24***	11.41***
	(0.50)		(0.65)	(0.71)	(2.15)
<i>Loan payment terms</i>					
ARM (unknown term)	-177.15***	-279.77***		30.99***	
	(2.63)	(2.14)		(8.83)	
ARM 10YR/1YR	11.24**	-83.33***	0.33	59.38***	22.17*
	(5.43)	(5.54)	(29.77)	(7.40)	(11.71)
ARM 10YR/6MO	6.52***	-87.02***	17.26***	54.11***	48.10***
	(1.19)	(1.77)	(2.72)	(2.39)	(2.96)

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	Model (4)	Model (4-2004)	Model (4-2005) ¹	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
ARM 1MO/1MO	-156.99*** (1.12)	-269.56*** (1.10)	-88.65*** (1.54)	6.72 (11.12)	
ARM 1MO/1YR	-36.34*** (0.44)	-223.84*** (1.58)	-59.52*** (0.53)	31.95*** (0.66)	117.49*** (1.47)
ARM 1MO/2YR	6.83*** (2.25)		-28.96*** (3.57)	60.92*** (2.71)	130.59*** (7.40)
ARM 1MO/3YR	15.63*** (1.72)		-21.61*** (2.91)	63.07*** (2.12)	132.38*** (4.53)
ARM 1MO/5YR	18.52*** (1.54)		-19.52*** (2.59)	68.72*** (1.90)	127.41*** (4.03)
ARM 1YR/10YR	-248.98*** (78.51)				
ARM 1YR/1MO	-102.67*** (9.21)		-42.04*** (13.57)	15.13* (8.85)	
ARM 1YR/1YR	-19.73*** (1.13)	-182.80*** (1.55)	3.87*** (1.03)	70.44*** (5.89)	
ARM 1YR/25YR	-208.49*** (24.44)		-257.99*** (56.62)		
ARM 1YR/30YR	-141.75*** (6.32)		-172.52*** (16.89)	-79.71*** (10.55)	
ARM 2YR/1MO	-138.64*** (13.09)			-10.29 (17.22)	
ARM 2YR/6MO	-2.04*** (0.78)	8.01 (8.12)	-11.80*** (0.98)	65.35*** (1.42)	83.85*** (4.55)
ARM 3MO/1YR	-65.32*** (0.90)	-198.95*** (1.84)	-61.15*** (0.92)	17.69 (16.68)	
ARM 3MO/2YR	-15.52** (7.92)		-23.75*** (6.61)		
ARM 3MO/3YR	-10.63 (7.22)		-17.32** (7.07)		
ARM 3MO/5YR	-0.04 (8.63)		-4.61 (8.36)		
ARM 3YR/10YR	-92.14** (44.08)	-255.86*** (52.49)			
ARM 3YR/15YR	-138.72*** (16.73)	-242.73*** (22.67)	-175.32*** (31.96)		
ARM 3YR/1MO	-138.50*** (16.84)			-49.18** (23.57)	
ARM 3YR/1YR	-52.80*** (2.29)	-170.75*** (3.43)	-34.88*** (3.01)	26.56*** (3.22)	62.09*** (10.33)
ARM 3YR/20YR			-40.89 (25.27)		
ARM 3YR/25YR	-39.93*** (13.58)	-179.87*** (20.02)	-101.51*** (17.12)		
ARM 3YR/30YR	-44.41*** (4.73)	-107.70*** (11.52)	-57.90*** (7.55)	-44.27*** (9.55)	-16.90 (12.86)
ARM 3YR/6MO	-65.14*** (0.43)	-190.30*** (0.58)	-36.07*** (0.50)	45.70*** (0.65)	61.64*** (1.83)
ARM 4YR/1YR	-0.44 (4.06)			51.40*** (4.91)	66.79** (33.40)
ARM 5YR/10YR	1.02 (57.81)	-141.54*** (27.32)		3.10 (48.56)	
ARM 5YR/15YR	-60.87*** (16.71)	-172.01*** (21.55)	-121.14*** (38.83)		
ARM 5YR/1MO	-126.17*** (20.70)			-4.69 (9.75)	
ARM 5YR/1YR	-39.54*** (1.31)	-156.51*** (2.01)	-31.96*** (2.12)	27.43*** (1.91)	53.65*** (5.92)
ARM 5YR/20YR	51.90*** (16.60)	84.66*** (15.20)			
ARM 5YR/25YR	-18.16 (13.67)	-130.12*** (20.05)	-118.10*** (15.82)	-69.89** (35.17)	-22.63 (19.56)
ARM 5YR/30YR	-88.55*** (3.30)	-79.88*** (15.53)	-54.77*** (7.46)	-58.46*** (7.76)	-12.97*** (4.68)
ARM 5YR/6MO	-28.11*** (0.41)	-160.23*** (0.57)	-15.91*** (0.64)	37.44*** (0.62)	63.48*** (0.84)
ARM 6MO/6MO	-159.46*** (0.68)	-255.00*** (0.75)	-112.56*** (1.07)	49.80 (34.88)	

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Dependent variable: APR (basis points)	Model (4)	Model (4-2004)	Model (4-2005) ¹	Model (4-2006)	Model (4-2007)
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
ARM 6YR/1YR	-21.04*** (4.01)			42.18*** (5.76)	70.00** (35.52)
ARM 7YR/1YR	-26.50*** (1.60)	-103.66*** (7.31)	-30.69*** (2.99)	24.23*** (2.50)	29.45 (25.04)
ARM 7YR/6MO	-21.37*** (0.88)	-129.38*** (1.58)	-11.83*** (2.03)	29.81*** (1.40)	42.88*** (1.95)
Balloon (unknown term)	-114.65*** (11.14)	-143.79*** (17.56)			
20/10 Balloon	-86.72 (62.62)		-85.73** (40.91)		
25/10 Balloon	-132.03*** (48.75)	-290.19*** (34.90)	40.67 (51.20)	-63.66 (47.40)	
25/15 Balloon	-154.35*** (45.56)				125.37*** (42.53)
30/10 Balloon	-137.35*** (43.24)	-247.31*** (23.86)	-79.86*** (26.80)	-85.44* (45.37)	-216.28*** (22.10)
30/15 Balloon	-78.38*** (11.00)	-126.09*** (17.30)	-122.34*** (6.50)	54.48 (54.26)	95.59** (40.90)
40/10 Balloon	-120.45*** (44.83)				-217.12*** (25.30)
40/15 Balloon	-104.22*** (12.77)				86.01** (41.31)
40/30 Balloon	-29.51*** (1.61)		-15.25*** (3.68)	9.78*** (2.04)	12.45** (5.18)
5/25 Balloon					
5-year fixed	114.61*** (13.52)				
10-year fixed	-61.92 (43.30)	-175.56*** (28.33)	-31.72 (27.47)	-33.58 (44.54)	-203.69*** (26.33)
15-year fixed	-85.59*** (11.00)	-150.68*** (17.29)	-136.39*** (6.55)	18.51 (54.29)	58.57 (40.93)
20-year fixed	48.89*** (13.60)	156.93*** (13.55)	24.32 (17.50)	-27.10 (21.35)	
40-year fixed	-48.73*** (2.57)			-161.82*** (33.41)	-5.81* (3.33)
Unknown term	-84.90*** (11.15)		-31.97*** (12.25)		
<i>Property & residence type</i>					
Investment, unknown type	71.66*** (2.38)	64.25*** (1.70)	45.26*** (14.59)	93.74*** (20.72)	
Investment, Commercial - Mixed use w/ residential	65.09*** (3.00)	91.61*** (5.41)	88.32*** (7.16)	54.55*** (8.01)	59.77*** (4.13)
Investment, Commercial - Mixed use w/o residential	53.67*** (4.56)	135.99*** (8.30)		38.19*** (13.35)	80.12*** (4.83)
Investment, Commercial - Multi-family > 4	42.30*** (2.59)	75.59*** (5.95)	65.75*** (7.15)	34.83*** (7.74)	54.46*** (3.20)
Investment, Commercial - Other	67.54*** (17.16)	89.76*** (20.59)			
Investment, Condo - High Rise	49.90*** (1.73)	49.80*** (2.92)	38.99*** (2.03)	59.97*** (3.35)	65.82*** (5.51)
Investment, Condo - Low Rise	50.58*** (0.76)	43.16*** (1.24)	39.13*** (0.88)	63.31*** (1.40)	61.82*** (2.32)
Investment, Condo - Mid Rise	56.18*** (3.30)	59.69*** (7.01)	32.26*** (3.67)	61.72*** (5.43)	64.79*** (7.15)
Investment, Condo - Site	48.06*** (5.22)	49.21*** (6.41)	44.95*** (7.22)	50.96*** (6.47)	73.40*** (25.73)
Investment, Condotel	28.67 (21.78)			77.74* (41.49)	32.42** (15.88)
Investment, Coop	33.16*** (8.77)	53.60*** (8.88)			
Investment, Duplex	57.60*** (0.75)	55.41*** (1.08)	51.69*** (0.90)	59.95*** (1.26)	65.16*** (2.27)
Investment, Fourplex	68.50*** (0.99)	69.20*** (1.28)	58.65*** (1.14)	74.94*** (1.78)	73.16*** (3.32)
Investment, PUD-1 unit attached	47.02*** (1.11)	45.22*** (1.95)	36.43*** (1.35)	56.39*** (2.03)	51.32*** (3.54)
Investment, PUD-1 unit detached	48.57*** (0.70)	48.49*** (1.08)	40.08*** (0.86)	54.09*** (1.28)	55.62*** (2.20)
Investment, PUD-2 units	47.76*** (6.43)	55.48*** (8.02)	52.20*** (8.03)	54.89*** (9.93)	60.20*** (19.93)
Investment, PUD-3 units	61.33***	64.77***	75.61***	22.63***	

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Dependent variable: APR (basis points)	Model (4)	Model (4-2004)	Model (4-2005) ¹	Model (4-2006)	Model (4-2007)
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Investment, PUD-4 units	(18.54) 58.97***	(13.94) 72.11***	(24.95) 56.51***	(5.12) 62.64***	73.23***
Investment, Single Family Attached	(4.28) 50.43***	(7.66) 43.73***	(5.38) 47.48***	(7.21) 61.56***	(10.62) 56.44***
Investment, Single Family Detached	(1.29) 48.45***	(1.74) 47.08***	(1.51) 41.32***	(2.50) 56.57***	(3.97) 55.21***
Investment, Triplex	(0.42) 71.51***	(0.62) 72.03***	(0.51) 60.93***	(0.77) 77.59***	(1.21) 78.35***
Primary, unknown type	(1.26) -0.67	(1.63) 2.71*	(1.35) -33.05**	(2.19) 33.15*	(3.94)
Primary, Commercial - Mixed use w/residential	(1.98) 120.42***	(1.44) 103.13***	(13.90) 115.28***	(19.33) 37.54***	
Primary, Commercial - Multi-family > 4	(17.81) 127.81***	(17.36) 164.76***	(24.82) 129.33**	(4.42) 57.10***	
Primary, Condo - High Rise	(43.20) 8.46***	(26.44) 8.53***	(58.90) 5.72***	(11.46) 8.48***	12.18***
Primary, Condo - Low Rise	(1.26) 5.48***	(2.98) 2.46***	(1.61) 1.72***	(1.81) 9.56***	(3.32) 6.60***
Primary, Condo - Mid Rise	(0.49) 8.72***	(0.79) 0.37	(0.63) 4.75**	(0.78) 16.32***	(1.40) 7.66
Primary, Condo - Site	(1.84) 2.83	(3.54) -1.63	(2.37) 2.81	(3.10) -2.67	(4.99) -2.80
Primary, Coop	(2.39) 5.82***	(4.22) 6.72	(3.14) 8.46***	(3.70) 12.28***	(9.14) 1.72
Primary, Duplex	(1.78) 11.90***	(4.09) 14.43***	(2.43) 10.06***	(1.97) 12.95***	(3.76) 15.98***
Primary, Fourplex	(0.76) 30.12***	(1.27) 43.15***	(0.99) 28.78***	(1.10) 30.65***	(1.92) 24.59***
Primary, Manufactured Home	(2.09) 13.15*	(2.84) -4.06	(2.64) 13.33	(3.12) 10.72	(5.67) -6.81
Primary, PUD-1 unit attached	(7.22) -0.21	(23.98) 1.49	(11.46) 0.47	(8.50) -3.90***	(8.77) -4.62**
Primary, PUD-1 unit detached	(0.70) -2.26***	(1.26) -1.09*	(0.88) -1.90***	(1.11) -4.77***	(2.28) -4.88***
Primary, PUD-2 units	(0.40) 6.86	(0.62) 5.68	(0.50) 36.81**	(0.70) -31.60	(1.21)
Primary, PUD-3 units	(12.72) 102.89***	(8.22) 88.58***	(17.72)	(19.37)	
Primary, PUD-4 units	(18.07) 22.31	(12.53) -27.05	46.93**	19.42	
Primary, Single Family Attached	(21.50) 0.21	(21.31) -0.53	(22.40) -0.31	(48.32) 3.77***	0.73
Primary, Triplex	(0.89) 35.77***	(1.47) 41.33***	(1.15) 30.19***	(1.41) 33.89***	(2.74) 28.88***
Second home, unknown type	(1.57) 19.64***	(2.29) 19.68***	(2.05) 20.60	(2.22) 58.19**	(3.68)
Second home, Condo - High Rise	(5.86) 17.99***	(4.85) 33.79***	(42.09) 14.91***	(23.78) 25.64***	24.09***
Second home, Condo - Low Rise	(2.79) 23.30***	(5.36) 15.07***	(3.45) 14.80***	(4.30) 35.80***	(8.04) 32.60***
Second home, Condo - Mid Rise	(1.62) 16.65***	(2.83) 27.50***	(1.94) 14.76**	(2.53) 19.86**	(4.22) 9.56
Second home, Condo - Site	(5.35) 19.74	(7.85) -12.50**	(6.83) -13.48	(9.03) 23.87	(11.51) 28.80
Second home, Coop	(17.46) 25.13***	(5.86) 82.73***	(16.99) 17.26*	(20.62) 5.57	(48.04) 47.23***
Second home, PUD-1 unit attached	(5.71) 23.16***	(6.56) 10.19	(9.78) 20.90***	(10.79) 30.54***	(6.44) 11.93
Second home, PUD-1 unit detached	(3.34) 18.55***	(6.75) 21.62***	(4.28) 16.29***	(5.11) 23.77***	(10.09) 9.19*
Second home, Single Family Attached	(1.53) 9.22	(3.42) 25.61**	(1.63) 15.93**	(2.79) 3.16	(4.78) 2.32
Second home, Single Family Detached	(6.85) 17.49***	(10.32) 16.18***	(7.33) 15.61***	(16.86) 21.47***	(20.22) 15.08***
Constant	(1.06) 571.82***	(1.66) 654.66***	(1.29) 688.25	(2.01) 692.04***	(2.62) 686.75***
	(40.72)	(26.09)	(344,332.12)	(15.68)	(37.35)
Observations	372038	112946	110582	105787	42723
R-squared	0.89402	0.90776	0.86954	0.90339	0.91559
Adjusted R-squared	0.88546	0.89411	0.84944	0.88687	0.88471
Robust standard errors in parentheses					

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	Model (4)	Model (4-2004)	Model (4-2005) ¹	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only

*** p<0.01, ** p<0.05, * p<0.1

Coefficients and standard errors for rate lock month, rate lock week, state, MSA, and broker dummy variables excluded from this table for brevity.

Dummy variables are added for each of the brokers in the sample:

27,152 brokers in 2004-2007

14,024 brokers in 2004

14,222 brokers in 2005

14,879 brokers in 2006

10,935 brokers in 2007

¹Regular standard errors (instead of robust standard errors) for Model (4-2005) with the broker controls are given because robust standard errors are not calculable for this model with broker controls.

Appendix 3: APR Basis Point Disparities When Controlling for Broker Pull-Through Rates (Table 2)

Dependent variable: APR (basis points)	Model (4) ¹	Model (4-2004) ¹	Model (4-2005) ¹	Model (4-2006) ¹	Model (4-2007) ¹	Model (4) ²
	2004 loans only	2005 loans only	2006 loans only	2007 loans only		Pull-through rate quartiles interacted with Dr. Courchane's categories of applications per broker
Race: African American	9.08*** (0.44)	10.26*** (0.67)	7.08*** (0.59)	5.22*** (0.64)	6.88*** (0.98)	9.03*** (0.44)
Race: Hispanic	7.50*** (0.32)	7.12*** (0.49)	3.71*** (0.39)	1.51*** (0.46)	1.91*** (0.72)	7.48*** (0.32)
Race: American Indian	-5.88*** (2.02)	-7.36** (2.97)	-3.05 (2.40)	0.50 (3.01)	-0.48 (4.10)	-5.89*** (2.02)
Race: Asian	2.50*** (0.39)	-0.78 (0.59)	1.21*** (0.44)	0.80 (0.60)	0.41 (0.98)	2.50*** (0.39)
Race: Hawaiian	4.10*** (1.08)	4.66** (1.90)	2.52** (1.22)	0.57 (1.50)	-2.39 (2.50)	4.06*** (1.08)
Race: Missing	3.70*** (0.42)	3.85*** (0.59)	2.56*** (0.54)	3.25*** (0.65)	2.01** (0.85)	3.64*** (0.42)
0% ≤ Pull-through rate ≤ 36%	1.16 (6.82)	6.02 (7.72)	26.02*** (8.69)	26.84*** (6.59)		
36% < Pull-through rate ≤ 60%	-0.06 (6.80)	1.79 (7.64)	24.45*** (8.63)	25.23*** (6.54)	-1.94** (0.97)	1.77 (6.88)
60% < Pull-through rate ≤ 79%	-3.25 (6.79)	-1.61 (7.64)	22.39*** (8.62)	22.16*** (6.54)	-3.34*** (0.98)	-3.91 (6.84)
79% < Pull-through rate ≤ 100%	-4.36 (6.80)	-2.43 (7.64)	21.45** (8.62)	20.66*** (6.55)	-4.55*** (1.10)	-3.49 (6.84)
Applications < 5, 0% ≤ Pull-through rate ≤ 36%						-0.28 (7.06)
Applications < 5, 60% < Pull-through rate ≤ 79%						2.79* (1.56)
Applications < 5, 79% < Pull-through rate ≤ 100%						2.49** (1.06)
5 < Applications ≤ 10, 0% ≤ Pull-through rate ≤ 36%						3.23 (6.98)
5 < Applications ≤ 10, 36% < Pull-through rate ≤ 60%						-4.74*** (1.41)
10 < Applications ≤ 25, 0% ≤ Pull-through rate ≤ 36%						-1.21 (6.88)
10 < Applications ≤ 25, 36% < Pull-through rate ≤ 60%						-2.79** (1.22)
10 < Applications ≤ 25, 60% < Pull-through rate ≤ 79%						0.19 (0.92)
10 < Applications ≤ 25, 79% < Pull-through rate ≤ 100%						0.46 (0.93)
Applications > 25, 0% ≤ Pull-through rate ≤ 36%						2.41 (6.87)
Applications > 25, 36% < Pull-through rate ≤ 60%						-1.60 (1.15)
Applications > 25, 60% < Pull-through rate ≤ 79%						0.49 (0.83)
Applications > 25, 79% < Pull-through rate ≤ 100%						-2.45*** (0.82)
Subordinate lien	235.28*** (1.23)	194.71*** (3.48)	212.61*** (3.97)	290.96*** (1.98)	324.84*** (2.75)	235.30*** (1.23)
Missing FICO	64.20*** (4.35)	57.84*** (4.90)	69.16*** (7.28)	48.76*** (6.34)	12.56** (6.03)	64.18*** (4.35)
300 ≤ FICO < 600	113.29*** (6.93)	133.41*** (8.00)	87.27*** (11.33)	45.90*** (6.13)	28.02*** (5.52)	113.33*** (6.92)
600 ≤ FICO < 620	87.57*** (4.90)	91.30*** (6.40)	76.00*** (7.97)	51.94*** (5.50)	31.48*** (9.09)	87.57*** (4.90)
620 ≤ FICO < 640	40.18*** (0.91)	40.69*** (1.18)	28.31*** (1.29)	55.64*** (1.47)	47.03*** (1.89)	40.14*** (0.91)
640 ≤ FICO < 660	37.97*** (0.51)	31.22*** (0.68)	30.22*** (0.71)	51.69*** (0.78)	44.80*** (1.24)	37.95*** (0.51)
660 ≤ FICO < 680	24.80*** (0.37)	16.10*** (0.52)	19.23*** (0.49)	35.04*** (0.54)	33.66*** (0.86)	24.79*** (0.37)
680 ≤ FICO < 700	13.24*** (0.32)	8.75*** (0.45)	9.12*** (0.40)	22.33*** (0.50)	22.55*** (0.77)	13.22*** (0.32)
700 ≤ FICO < 720	4.03*** (0.31)	5.35*** (0.45)	3.55*** (0.37)	5.17*** (0.48)	6.38*** (0.72)	4.02*** (0.31)
720 ≤ FICO < 740	1.75*** (0.34)	2.57*** (0.49)	1.79*** (0.40)	2.08*** (0.55)	2.75*** (0.80)	1.75*** (0.34)
0K ≤ Loan Amount < 40K	47.96*** (1.31)	64.01*** (2.36)	47.65*** (2.40)	27.61*** (1.90)	37.48*** (3.81)	48.04*** (1.31)
40K ≤ Loan Amount < 50K	35.02*** (1.35)	51.56*** (1.90)	49.99*** (2.23)	10.45*** (2.02)	12.74*** (3.83)	35.06*** (1.35)

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	Model (4) ¹	Model (4-2004) ¹	Model (4-2005) ¹	Model (4-2006) ¹	Model (4-2007) ¹	Model (4) ²
						rule-in-group rate quartiles interacted with Dr. Courchane's categories of applications per broker
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only	
50K <= Loan Amount < 75K	31.66*** (0.80)	38.34*** (1.07)	44.03*** (1.12)	15.45*** (1.32)	13.38*** (2.07)	31.69*** (0.80)
75K <= Loan Amount < 150K	13.00*** (0.49)	18.99*** (0.68)	19.13*** (0.62)	10.98*** (0.78)	5.18*** (1.17)	13.02*** (0.49)
150K <= Loan Amount < 200K	2.48*** (0.47)	8.43*** (0.66)	6.98*** (0.57)	2.97*** (0.69)	-1.00 (1.02)	2.52*** (0.47)
200K <= Loan Amount < 300K	-1.73*** (0.39)	2.59*** (0.59)	2.26*** (0.46)	-0.90* (0.54)	-4.76*** (0.81)	-1.70*** (0.39)
300K <= Loan Amount < 500K	-5.38*** (0.34)	-1.54*** (0.55)	-1.37*** (0.38)	-2.98*** (0.44)	-5.09*** (0.67)	-5.36*** (0.34)
40% < total debt ratio <= 45%	7.90*** (0.31)	2.46*** (0.50)	3.07*** (0.41)	5.12*** (0.45)	3.30*** (0.65)	7.87*** (0.31)
Total debt ratio > 45%	-7.20*** (0.52)	-5.33*** (0.75)	-5.72*** (0.68)	-3.05*** (0.91)	-6.41*** (0.96)	-7.23*** (0.52)
No total debt ratio	14.42*** (5.42)	16.46*** (6.43)	2.86 (9.54)	3.10 (6.83)	-4.24 (17.36)	14.41*** (5.42)
(First lien) x (LTV missing)	-15.74 (11.65)		-24.22 (22.07)	-101.33*** (19.40)		-15.50 (11.64)
(First lien) x (0% < LTV <= 60%)	-100.27*** (0.71)	-91.23*** (0.95)	-90.41*** (1.16)	-100.98*** (1.49)	-107.32*** (1.06)	-100.20*** (0.71)
(First lien) x (60% < LTV <= 70%)	-95.39*** (0.69)	-84.55*** (0.94)	-85.16*** (1.13)	-97.16*** (1.47)	-107.48*** (0.99)	-95.32*** (0.69)
(First lien) x (70% < LTV <= 80%)	-84.47*** (0.60)	-72.84*** (0.83)	-77.26*** (1.05)	-82.79*** (1.38)	-90.74*** (0.73)	-84.39*** (0.60)
(Subordinate lien) x (CLTV missing)	-45.63 (27.89)		-135.05*** (26.53)	-34.48 (32.40)		-45.28 (27.91)
(Subordinate lien) x (0% < CLTV <= 80%)	-103.54*** (2.81)	-101.10*** (5.88)	-118.95*** (4.98)	-102.49*** (3.88)	-98.28*** (10.67)	-103.61*** (2.81)
(Subordinate lien) x (80% < CLTV <= 90%)	-34.94*** (1.24)	-22.63*** (3.45)	-43.53*** (2.39)	-34.33*** (1.59)	-39.07*** (3.76)	-34.96*** (1.24)
HELOC	-46.48*** (11.33)	-176.40*** (16.00)	-11.65 (15.35)			-46.37*** (11.34)
FHA/VA	-122.48*** (3.98)	-100.90*** (7.72)	-93.10*** (6.41)	-84.05*** (5.09)	-90.93*** (5.06)	-122.28*** (3.97)
Coapplicant present	-2.68*** (0.24)	-2.81*** (0.33)	-1.92*** (0.29)	-2.18*** (0.38)	-5.27*** (0.56)	-2.68*** (0.24)
Self-employed borrower or co-borrower	15.39*** (0.77)				-2.17*** (0.60)	15.39*** (0.77)
<i>Documentation type</i>						
Alternative Doc	-16.68*** (4.91)	53.95*** (3.51)				-15.21*** (4.91)
Low Doc	48.68*** (13.87)	5.72 (20.52)	56.30** (27.86)	52.70*** (8.93)	14.68 (18.00)	49.37*** (13.86)
NED	-44.13*** (5.92)			1.69 (7.69)		-44.21*** (5.92)
NID	58.98*** (5.50)	46.43*** (6.67)	61.09*** (9.67)	79.15*** (6.96)	68.73*** (17.37)	58.92*** (5.50)
NID/NAD	104.38*** (6.62)	77.71*** (7.22)	75.29*** (10.84)	105.72*** (9.18)	94.26*** (19.40)	104.29*** (6.62)
NID/NAV	134.92*** (7.10)	89.69*** (7.71)	139.90*** (15.62)	92.37*** (8.55)	72.20*** (20.11)	134.94*** (7.10)
NID/NED	83.84*** (5.72)	66.38*** (6.63)	79.72*** (9.80)	102.34*** (7.51)	90.95*** (18.11)	83.74*** (5.72)
NID/NED/NAD	95.18*** (5.48)	81.78*** (6.48)	95.89*** (9.60)	108.62*** (6.98)	82.00*** (17.39)	95.06*** (5.48)
NID/NAV	44.68*** (0.60)	19.91*** (0.79)	30.31*** (0.76)	61.82*** (0.99)	52.94*** (1.10)	44.67*** (0.60)
Stated Income	43.81*** (0.29)	31.13*** (0.37)	34.19*** (0.37)	53.74*** (0.57)	48.15*** (0.81)	43.79*** (0.29)
Streamlined Refi	9.04 (36.47)	-34.16 (29.63)	47.77 (44.28)			8.65 (36.50)
Unknown doc type	-21.82** (10.47)		-22.56* (12.85)	21.43** (10.28)		-22.10** (10.46)
Lender paid mortgage insurance			8.61 (7.51)	14.87*** (3.36)		
Escrow/impound waiver indicator = 'Y' or 'Yes Impounds'			-2.30*** (0.30)	-3.65*** (0.34)		
Loan purpose: Home improvement	7.02*** (1.03)	0.99 (1.79)				6.95*** (1.03)
Loan purpose: Refinance	1.59*** (0.25)	-5.23*** (0.36)				1.58*** (0.25)
Cash-out refinance			0.84** (0.35)	15.78*** (0.43)	7.28*** (0.65)	

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	Model (4) ¹	Model (4-2004) ¹	Model (4-2005) ¹	Model (4-2006) ¹	Model (4-2007) ¹	Model (4) ²
Dependent variable: APR (basis points)						
Rate & term refinance		2004 loans only	2005 loans only	2006 loans only	2007 loans only	rui-inthrough rate quartiles interacted with Dr. Courchane's categories of applications per broker
			-5.75*** (0.39)	-0.76* (0.46)	-4.92*** (0.67)	
Rate lock ≥ 30 days		-0.80 (0.55)	0.85* (0.48)	1.38* (0.72)		
No prepayment penalty		2.57*** (0.41)				
1-yr prepayment penalty			1.63** (0.65)	3.32*** (0.48)		
Prepayment penalty > 1 year			5.99*** (0.32)	-0.12 (0.42)		
<i>Loan term</i>						
5-year term	86.82*** (3.24)	-80.28*** (6.33)		100.59*** (4.58)		86.64*** (3.24)
7-year term	13.79* (8.08)	-67.04*** (7.91)	-1.50 (1.31)	8.41*** (1.91)		13.99* (8.10)
10-year term	99.49** (43.06)	148.27*** (15.69)	-8.43 (49.05)	74.19** (35.16)	282.79*** (6.43)	99.50** (42.93)
15-year term	79.11*** (10.70)	99.51*** (15.31)	112.92*** (13.56)	-24.99 (45.16)	-5.92 (54.56)	78.94*** (10.72)
20-year term	-8.07 (7.74)	-84.25*** (9.84)	-41.37*** (13.74)	-17.67*** (2.34)	-7.73*** (2.81)	-8.11 (7.76)
25-year term	42.34*** (12.22)	67.74*** (16.83)	75.00*** (18.87)	-141.48*** (6.50)	-9.15 (12.89)	42.47*** (12.22)
40-year term	21.60*** (0.45)		18.36*** (0.48)	13.29*** (0.59)	10.79*** (1.48)	21.63*** (0.45)
<i>Loan payment terms</i>						
ARM (unknown term)	-189.85*** (2.30)	-284.18*** (1.88)		29.96*** (7.75)		-189.62*** (2.30)
ARM 10YR/1YR	5.98 (4.65)	-82.85*** (4.75)	3.90 (5.64)	49.81*** (3.26)	25.84 (18.48)	6.25 (4.65)
ARM 10YR/6MO	6.86*** (1.03)	-88.94*** (1.56)	20.85*** (2.20)	57.84*** (1.91)	57.10*** (2.34)	6.86*** (1.03)
ARM 1MO/1MO	-167.18*** (1.01)	-273.44*** (0.92)	-91.93*** (1.74)	20.61 (12.74)		-166.98*** (1.01)
ARM 1MO/1YR	-34.46*** (0.39)	-223.90*** (1.38)	-59.24*** (0.46)	30.34*** (0.54)	118.17*** (1.00)	-34.44*** (0.39)
ARM 1MO/2YR	9.25*** (2.07)		-26.58*** (3.25)	58.51*** (2.41)	126.84*** (5.45)	9.19*** (2.07)
ARM 1MO/3YR	20.86*** (1.57)		-19.51*** (2.49)	64.86*** (1.83)	127.96*** (3.15)	20.85*** (1.57)
ARM 1MO/5YR	21.56*** (1.41)		-19.21*** (2.27)	67.20*** (1.63)	128.78*** (3.13)	21.47*** (1.41)
ARM 1YR/10YR	-197.72*** (43.04)			-97.05*** (35.27)		-199.64*** (42.93)
ARM 1YR/1MO	-105.40*** (9.42)		-40.99*** (11.55)	10.98 (7.62)		-105.09*** (9.41)
ARM 1YR/1YR	-21.21*** (1.11)	-183.64*** (1.34)	4.57*** (0.74)	66.97*** (4.96)		-21.18*** (1.11)
ARM 1YR/25YR	-219.16*** (24.46)		-270.34*** (20.74)			-218.23*** (23.21)
ARM 1YR/30YR	-144.10*** (5.07)		-197.72*** (11.66)	-70.43*** (8.05)	8.63** (4.18)	-144.32*** (5.08)
ARM 2YR/1MO	-162.90*** (10.52)			-25.88*** (9.06)		-163.28*** (10.51)
ARM 2YR/6MO	-0.83 (0.69)	4.37 (7.24)	-10.90*** (0.75)	64.71*** (1.12)	82.83*** (2.87)	-0.84 (0.69)
ARM 3MO/1YR	-63.66*** (0.79)	-196.85*** (1.56)	-57.34*** (0.77)	35.23** (17.68)		-63.54*** (0.79)
ARM 3MO/2YR	-18.57*** (6.40)		-25.95*** (5.92)			-18.47*** (6.42)
ARM 3MO/3YR	-10.34 (6.66)		-16.66** (6.59)			-10.09 (6.64)
ARM 3MO/5YR	-1.40 (8.85)		-9.78 (8.89)			-1.55 (8.88)
ARM 3YR/10YR	-104.51** (43.20)	-280.42*** (16.70)				-107.13** (43.04)
ARM 3YR/15YR	-141.97*** (16.20)	-239.29*** (18.72)	-202.00*** (23.72)		-28.74 (54.77)	-141.91*** (16.11)
ARM 3YR/1MO	-120.19*** (10.16)			-13.22 (9.44)		-120.22*** (10.14)
ARM 3YR/1YR	-55.16*** (2.11)	-176.97*** (2.72)	-38.39*** (3.52)	25.96*** (2.79)	69.61*** (7.55)	-55.14*** (2.11)
ARM 3YR/20YR	-39.43** (15.76)	-55.15*** (17.13)	-6.40 (31.83)			-39.43** (15.74)
ARM 3YR/25YR	-47.49***	-167.07***	-103.78***	161.16***		-47.72***

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	Model (4) ¹	Model (4-2004) ¹	Model (4-2005) ¹	Model (4-2006) ¹	Model (4-2007) ¹	Model (4) ²
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only	run-through rate quartiles interacted with Dr. Courchane's categories of applications per broker
ARM 3YR/30YR	(12.84) -44.22*** (4.30)	(17.37) -117.56*** (9.44)	(24.22) -53.08*** (9.42)	(32.21) -48.68*** (7.69)		(12.84) -44.43*** (4.29)
ARM 3YR/6MO	-68.87*** (0.40)	-191.63*** (0.50)	-36.61*** (0.45)	44.87*** (0.52)	63.84*** (1.18)	-68.85*** (0.40)
ARM 4YR/1YR	4.97 (3.83)			55.27*** (4.59)	67.72*** (3.15)	4.81 (3.83)
ARM 5YR/10YR	-14.19 (55.85)	-128.69*** (28.29)		14.45 (35.63)		-13.67 (55.78)
ARM 5YR/15YR	-74.78*** (15.94)	-169.76*** (19.94)	-138.02*** (29.43)	29.31 (45.99)	43.07 (54.66)	-74.56*** (15.93)
ARM 5YR/1MO	-119.62*** (17.48)			6.62 (9.06)		-120.56*** (17.37)
ARM 5YR/1YR	-38.04*** (1.05)	-160.25*** (1.70)	-31.42*** (1.45)	32.70*** (1.40)	64.15*** (4.40)	-38.04*** (1.04)
ARM 5YR/20YR				-12.41 (12.95)		
ARM 5YR/25YR	-22.10* (12.97)	-116.81*** (17.40)	-126.97*** (22.47)	91.52*** (9.87)	23.80 (23.07)	-22.07* (12.97)
ARM 5YR/30YR	-91.46*** (2.98)	-71.47*** (12.43)	-61.91*** (9.31)	-54.10*** (6.33)	-16.30*** (3.01)	-91.54*** (2.98)
ARM 5YR/6MO	-28.29*** (0.37)	-161.71*** (0.48)	-16.28*** (0.47)	36.69*** (0.49)	64.19*** (0.59)	-28.27*** (0.37)
ARM 6MO/6MO	-168.08*** (0.58)	-256.97*** (0.60)	-114.62*** (1.34)	74.29*** (23.22)		-167.96*** (0.58)
ARM 6YR/1YR	-15.03*** (3.51)			50.97*** (4.73)	70.53*** (10.20)	-15.09*** (3.51)
ARM 7YR/1YR	-22.21*** (1.19)	-107.25*** (4.82)	-30.28*** (1.47)	30.07*** (1.90)	40.76* (23.80)	-22.29*** (1.19)
ARM 7YR/6MO	-20.94*** (0.76)	-129.17*** (1.37)	-11.26*** (1.35)	30.50*** (1.12)	45.44*** (1.37)	-20.94*** (0.76)
Balloon (unknown term)	152.96*** (10.79)	70.24*** (15.37)				150.74*** (10.88)
20/10 Balloon	-81.02 (61.30)	-175.98*** (16.53)	-74.04 (54.94)			-82.15 (60.87)
25/10 Balloon	-133.09*** (47.25)	-259.15*** (16.47)		4.73 (51.60)	-77.82* (39.95)	-132.97*** (47.26)
25/15 Balloon	-141.85*** (45.40)				20.96 (61.74)	-141.58*** (44.64)
30/10 Balloon	-157.28*** (43.11)	-242.10*** (17.64)	-62.09 (50.05)	-102.41*** (35.42)	-262.32*** (7.28)	-157.43*** (42.99)
30/15 Balloon	-83.78*** (10.72)	-116.34*** (15.30)	-127.37*** (13.37)	47.68 (45.13)	34.39 (54.57)	-83.59*** (10.73)
40/10 Balloon	-141.20*** (44.92)				-255.49*** (10.87)	-140.62*** (44.81)
40/15 Balloon	-109.49*** (11.98)				32.67 (54.73)	-108.93*** (11.99)
40/30 Balloon	-29.67*** (1.37)		-12.36*** (2.23)	10.27*** (1.69)	19.40*** (3.46)	-29.78*** (1.37)
5/25 Balloon	-88.52*** (7.34)					-88.28*** (7.39)
10-year fixed	-83.03* (43.17)	-187.72*** (21.35)	-26.59 (53.20)	-52.65 (34.95)	-247.10*** (16.18)	-82.99* (43.05)
15-year fixed	-88.84*** (10.72)	-142.90*** (15.29)	-141.76*** (13.53)	10.46 (45.17)	-7.54 (54.60)	-88.68*** (10.73)
20-year fixed	-0.23 (8.07)	71.63*** (10.26)	23.87* (14.02)			-0.21 (8.10)
40-year fixed	-51.67*** (2.20)			-150.78*** (2.47)	-6.37** (2.50)	-51.69*** (2.20)
Unknown term	-90.60*** (11.09)		-32.48** (13.06)			-90.37*** (11.06)
<i>Property & residence type</i>						
Investment, unknown type	79.02*** (2.38)	70.17*** (1.53)	40.02*** (14.72)	93.09*** (20.43)		78.83*** (2.38)
Investment, Commercial - Mixed use w/ residential	66.29*** (2.73)	97.17*** (4.84)	95.94*** (8.83)	48.20*** (6.59)	62.56*** (3.00)	66.13*** (2.73)
Investment, Commercial - Mixed use w/o residential	56.89*** (3.77)	144.44*** (19.71)		41.74*** (9.18)	84.58*** (3.35)	56.54*** (3.76)
Investment, Commercial - Multi-family > 4	41.72*** (2.31)	87.86*** (5.03)	70.49*** (8.80)	29.13*** (6.32)	56.11*** (2.29)	41.50*** (2.31)
Investment, Commercial - Other	76.65*** (11.19)	85.79*** (14.05)				76.23*** (11.41)

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	Model (4) ¹	Model (4-2004) ¹	Model (4-2005) ¹	Model (4-2006) ¹	Model (4-2007) ¹	Model (4) ²
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only	multi-through rate quartiles interacted with Dr. Courchane's categories of applications per broker
Investment, Condo - High Rise	46.15*** (1.66)	47.78*** (2.63)	35.98*** (1.54)	55.64*** (3.12)	68.06*** (4.63)	46.21*** (1.66)
Investment, Condo - Low Rise	51.44*** (0.72)	44.84*** (1.14)	40.49*** (0.84)	66.18*** (1.20)	65.18*** (1.86)	51.42*** (0.72)
Investment, Condo - Mid Rise	58.83*** (3.15)	59.82*** (6.38)	36.56*** (2.86)	62.96*** (4.89)	63.66*** (5.87)	58.81*** (3.15)
Investment, Condo - Site	50.46*** (5.08)	48.40*** (5.75)	51.55*** (7.74)	48.04*** (5.62)	53.33** (21.50)	50.30*** (5.07)
Investment, Condotel	31.31** (12.53)			29.18** (13.81)	29.44*** (9.01)	31.21** (12.53)
Investment, Coop	4.18*** (1.30)	50.25*** (1.45)				5.64*** (1.32)
Investment, Duplex	58.89*** (0.73)	58.07*** (1.01)	53.21*** (0.95)	62.48*** (1.12)	68.21*** (1.77)	58.93*** (0.73)
Investment, Fourplex	69.29*** (0.94)	71.87*** (1.14)	60.60*** (1.24)	76.63*** (1.52)	80.21*** (2.79)	69.30*** (0.94)
Investment, PUD-1 unit attached	46.86*** (1.08)	45.93*** (1.69)	35.29*** (1.17)	58.59*** (1.80)	58.04*** (3.16)	46.89*** (1.08)
Investment, PUD-1 unit detached	49.90*** (0.66)	50.04*** (0.96)	42.03*** (0.78)	56.05*** (1.12)	58.84*** (1.82)	49.98*** (0.66)
Investment, PUD-2 units	44.89*** (6.16)	52.60*** (7.00)	54.50*** (7.12)	61.40*** (7.32)	74.61*** (15.98)	44.90*** (6.14)
Investment, PUD-3 units	75.88*** (25.06)	66.22*** (17.71)	80.13*** (19.64)	12.55*** (2.24)		75.73*** (24.89)
Investment, PUD-4 units	54.28*** (4.31)	74.75*** (6.62)	45.69*** (5.26)	62.29*** (5.70)	73.56*** (11.27)	54.41*** (4.30)
Investment, Single Family Attached	52.44*** (1.26)	46.06*** (1.62)	48.68*** (1.58)	62.56*** (2.22)	62.50*** (3.08)	52.46*** (1.26)
Investment, Single Family Detached	49.52*** (0.40)	48.59*** (0.55)	42.67*** (0.50)	58.95*** (0.67)	59.25*** (0.97)	49.54*** (0.40)
Investment, Triplex	74.10*** (1.27)	76.50*** (1.50)	62.83*** (1.64)	79.90*** (2.06)	80.77*** (3.19)	74.08*** (1.27)
Primary, unknown type	2.20 (1.97)	5.06*** (1.31)	-40.76** (17.33)	35.18* (18.74)		2.04 (1.97)
Primary, Commercial - Mixed use w/ residential	119.25*** (18.17)	105.25*** (15.71)	140.53*** (28.57)	38.27*** (2.56)		118.98*** (18.27)
Primary, Commercial - Multi-family > 4	150.93*** (34.48)	151.24*** (25.20)	140.85*** (33.52)	15.65** (6.84)		149.80*** (33.98)
Primary, Condo - High Rise	9.07*** (1.20)	7.33*** (2.66)	6.99*** (1.43)	9.63*** (1.59)	14.81*** (2.74)	9.01*** (1.20)
Primary, Condo - Low Rise	5.34*** (0.48)	1.95*** (0.73)	1.90*** (0.58)	9.68*** (0.70)	7.82*** (1.10)	5.34*** (0.48)
Primary, Condo - Mid Rise	9.66*** (1.86)	1.70 (2.89)	5.59** (2.28)	18.20*** (2.93)	8.45** (4.26)	9.62*** (1.86)
Primary, Condo - Site	2.02 (2.38)	-1.55 (4.00)	2.62 (2.62)	0.03 (3.39)	-4.54 (7.73)	2.00 (2.38)
Primary, Coop	6.22*** (1.64)	7.16* (3.84)	10.73*** (1.95)	11.66*** (1.70)	0.40 (2.94)	6.10*** (1.64)
Primary, Duplex	11.14*** (0.73)	15.37*** (1.18)	10.56*** (0.94)	13.08*** (0.98)	17.44*** (1.56)	11.11*** (0.73)
Primary, Fourplex	30.89*** (2.05)	45.13*** (2.55)	29.03*** (2.39)	32.69*** (2.79)	27.53*** (4.91)	30.83*** (2.05)
Primary, Manufactured Home	13.25* (7.87)	-0.08 (24.04)	13.45 (11.22)	23.38** (9.08)	-0.17 (8.30)	13.15* (7.87)
Primary, PUD-1 unit attached	-0.41 (0.69)	0.52 (1.18)	0.41 (0.81)	-4.61*** (1.01)	-3.54** (1.80)	-0.43 (0.69)
Primary, PUD-1 unit detached	-2.89*** (0.39)	-1.79*** (0.58)	-1.74*** (0.48)	-4.97*** (0.63)	-5.20*** (0.98)	-2.89*** (0.39)
Primary, PUD-2 units	4.80 (12.78)	4.65 (8.90)	47.00*** (16.85)	-30.15*** (1.58)		4.80 (12.75)
Primary, PUD-3 units	61.31*** (0.87)	86.90*** (1.05)				61.67*** (1.18)
Primary, PUD-4 units	27.28* (16.09)	-15.53** (7.43)	48.89** (22.76)	23.19 (28.14)		26.80* (15.98)
Primary, Single Family Attached	-0.23 (0.88)	-0.68 (1.33)	-0.49 (1.15)	3.14** (1.27)	-1.44 (2.39)	-0.25 (0.88)
Primary, Triplex	36.14*** (1.55)	44.78*** (2.18)	31.71*** (2.00)	34.40*** (1.98)	31.35*** (2.91)	36.12*** (1.55)
Second home, unknown type	28.58*** (5.98)	26.37*** (4.40)	24.98*** (9.60)	60.63*** (23.17)		28.32*** (5.97)
Second home, Condo - High Rise	17.54*** (2.76)	31.13*** (5.30)	14.89*** (3.15)	26.82*** (3.77)	19.16*** (6.30)	17.59*** (2.76)
Second home, Condo - Low Rise	24.68*** (1.54)	17.30*** (2.55)	16.40*** (1.86)	37.39*** (2.16)	30.01*** (3.33)	24.65*** (1.54)
Second home, Condo - Mid Rise	17.03***	28.23***	17.67***	19.98**	5.26	16.78***

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	Model (4) ¹	Model (4-2004) ¹	Model (4-2005) ¹	Model (4-2006) ¹	Model (4-2007) ¹	Model (4) ²
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only	pull-through rate quartiles interacted with Dr. Courchane's categories of applications per broker
Second home, Condo - Site	(5.25) 8.43 (17.61)	(7.17) -33.93*** (5.35)	(5.68) -17.01 (15.21)	(8.53) 30.44 (20.98)	(8.55) 77.48*** (4.29)	(5.24) 8.77 (17.52)
Second home, Coop	29.74*** (5.30)	69.16*** (1.57)	16.46*** (5.99)	6.47 (8.63)	43.16*** (3.64)	29.52*** (5.29)
Second home, PUD-1 unit attached	20.64*** (3.63)	10.92* (5.79)	19.00*** (4.26)	29.71*** (4.92)	21.38 (13.45)	20.61*** (3.62)
Second home, PUD-1 unit detached	17.95*** (1.45)	20.73*** (3.08)	17.13*** (1.50)	21.66*** (2.46)	11.27*** (4.02)	17.92*** (1.45)
Second home, Single Family Attached	12.43* (6.88)	22.83** (10.89)	14.89** (6.40)	17.85 (13.87)	14.11 (17.09)	12.49* (6.88)
Second home, Single Family Detached	17.30*** (1.04)	15.47*** (1.56)	16.81*** (1.30)	24.95*** (1.86)	15.73*** (2.06)	17.31*** (1.04)
Constant	565.69*** (35.93)	643.36*** (24.08)	681.28*** (59.05)	698.45 (7,252.53)	688.71*** (35.82)	566.17*** (35.97)
Observations	372038	112946	110582	105787	42723	372038
R-squared	0.87360	0.88595	0.83353	0.88151	0.88045	0.87364
Adjusted R-squared	0.87338	0.88538	0.83269	0.88086	0.87895	0.87341

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Coefficients and standard errors for rate lock month, rate lock week, state, and MSA dummy variables excluded from this table for brevity.

¹Dummy variables for the pull-through rate quartiles, as shown in Dr. Courchane's Table 7, are added to the regression model:

0% ≤ Pull-through rate ≤ 36%

36% < Pull-through rate ≤ 60%

60% < Pull-through rate ≤ 79%

79% < Pull-through rate ≤ 100%

Brokers for whom pull-through rates cannot be calculated are the omitted category.

²Dummy variables for the pull-through rate quartiles are interacted with dummy variables representing the broker size categories from Dr. Courchane's Table 7:

Applications < 5

5 < Applications ≤ 10

10 < Applications ≤ 25

Applications > 25

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Appendix 4: APR Basis Point Disparities When Controlling for Conforming A, ARM Index, Interest-Only, and Piggyback Characteristics (Table 4)

Dependent variable: APR (basis points)	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006)	Model (4-2007)
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Race: African American	8.61*** (0.43)	8.50*** (0.63)	5.99*** (0.55)	4.89*** (0.62)	6.80*** (0.96)
Race: Hispanic	7.14*** (0.31)	6.27*** (0.47)	3.30*** (0.37)	1.50*** (0.44)	1.94*** (0.71)
Race: American Indian	-5.24*** (1.97)	-4.63* (2.67)	-1.59 (2.32)	-0.38 (2.86)	-0.55 (4.00)
Race: Asian	2.63*** (0.38)	0.84 (0.57)	1.49*** (0.41)	1.18** (0.57)	1.72* (0.97)
Race: Hawaiian	4.09*** (1.05)	4.28** (1.86)	2.09* (1.14)	0.81 (1.41)	-1.42 (2.44)
Race: Missing	4.15*** (0.41)	3.51*** (0.56)	2.71*** (0.51)	3.85*** (0.62)	2.83*** (0.84)
Subordinate lien	230.96*** (1.24)	165.28*** (3.44)	193.80*** (4.00)	278.18*** (1.93)	309.98*** (2.79)
Missing FICO	63.64*** (4.24)	55.34*** (4.79)	68.06*** (7.01)	51.41*** (6.45)	15.10*** (5.83)
300 <= FICO < 600	105.70*** (6.36)	122.10*** (7.19)	81.48*** (10.30)	47.32*** (5.99)	28.08*** (5.41)
600 <= FICO < 620	82.41*** (4.61)	83.15*** (6.01)	71.50*** (7.39)	52.96*** (5.42)	30.94*** (8.87)
620 <= FICO < 640	40.19*** (0.86)	37.12*** (1.09)	29.00*** (1.18)	56.33*** (1.40)	50.01*** (1.79)
640 <= FICO < 660	36.29*** (0.50)	28.17*** (0.64)	28.08*** (0.66)	51.39*** (0.76)	44.57*** (1.20)
660 <= FICO < 680	23.53*** (0.36)	13.31*** (0.50)	17.59*** (0.47)	34.62*** (0.53)	33.89*** (0.85)
680 <= FICO < 700	12.55*** (0.32)	6.30*** (0.44)	7.76*** (0.37)	22.50*** (0.49)	22.27*** (0.76)
700 <= FICO < 720	3.58*** (0.31)	3.41*** (0.44)	2.34*** (0.35)	5.44*** (0.47)	6.53*** (0.71)
720 <= FICO < 740	1.59*** (0.33)	1.20** (0.47)	1.28*** (0.38)	2.27*** (0.53)	2.95*** (0.79)
0K <= Loan Amount < 40K	47.05*** (1.31)	59.55*** (2.29)	46.18*** (2.37)	28.43*** (1.90)	40.38*** (3.86)
40K <= Loan Amount < 50K	33.31*** (1.34)	48.63*** (1.81)	47.97*** (2.19)	10.08*** (2.03)	15.56*** (3.89)
50K <= Loan Amount < 75K	30.79*** (0.79)	37.86*** (1.01)	43.22*** (1.06)	15.10*** (1.30)	16.74*** (2.07)
75K <= Loan Amount < 150K	14.31*** (0.48)	20.58*** (0.66)	20.88*** (0.59)	10.98*** (0.75)	9.00*** (1.15)
150K <= Loan Amount < 200K	4.94*** (0.46)	11.40*** (0.64)	9.94*** (0.53)	3.53*** (0.65)	2.60*** (1.00)
200K <= Loan Amount < 300K	1.52*** (0.38)	6.37*** (0.58)	5.80*** (0.44)	0.26 (0.51)	-1.42* (0.79)
300K <= Loan Amount < 500K	-3.10*** (0.33)	0.13 (0.54)	0.56 (0.36)	-2.01*** (0.41)	-2.35*** (0.65)
40% < total debt ratio <= 45%	7.89*** (0.30)	3.44*** (0.47)	3.89*** (0.38)	4.69*** (0.44)	2.62*** (0.63)
Total debt ratio > 45%	1.25** (0.52)	4.04*** (0.71)	3.47*** (0.64)	3.40*** (0.91)	-0.87 (0.98)
No total debt ratio	9.82* (5.31)	18.11*** (5.95)	-2.49 (8.84)	3.56 (6.95)	-4.09 (17.41)
(First lien) x (0% < LTV <= 60%)	-95.61*** (0.68)	-92.29*** (0.90)	-88.37*** (1.05)	-97.09*** (1.38)	-104.58*** (1.03)
(First lien) x (60% < LTV <= 70%)	-92.64*** (0.66)	-88.78*** (0.89)	-86.73*** (1.03)	-94.97*** (1.35)	-105.81*** (0.95)
(First lien) x (70% < LTV <= 80%)	-85.60*** (0.58)	-83.25*** (0.80)	-84.00*** (0.96)	-82.83*** (1.27)	-91.28*** (0.70)
(Subordinate lien) x (CLTV missing)					
(Subordinate lien) x (0% < CLTV <= 80%)	-109.31*** (2.88)	-97.58*** (5.99)	-119.41*** (5.07)	-103.73*** (3.97)	-98.31*** (10.86)
(Subordinate lien) x (80% < CLTV <= 90%)	-33.30*** (1.26)	-19.27*** (3.57)	-41.68*** (2.46)	-32.18*** (1.63)	-35.93*** (3.82)
HELOC	-48.01*** (11.52)	-200.84*** (17.03)	-22.73 (15.01)		
FHA/VA	-150.56*** (3.87)	-123.34*** (7.22)	-122.52*** (6.10)	-107.09*** (5.06)	-106.92*** (5.02)

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)					
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Coapplicant present	-2.51*** (0.23)	-2.40*** (0.32)	-1.61*** (0.27)	-1.91*** (0.36)	-5.26*** (0.55)
Self-employed borrower or co-borrower	12.17*** (0.78)				-1.78*** (0.60)
Documentation type					
Alternative Doc	-16.41*** (4.64)	46.18*** (3.30)			
Low Doc	36.33*** (13.33)	-11.44 (21.39)	36.05 (28.70)	32.31*** (9.05)	-1.85 (18.63)
NED	-56.73*** (5.79)			-21.02*** (7.75)	
NID	46.95*** (5.40)	30.45*** (6.18)	51.81*** (8.97)	64.84*** (7.08)	53.42*** (17.44)
NID/NAD	88.71*** (6.46)	61.63*** (6.70)	67.73*** (10.05)	88.64*** (9.19)	75.78*** (19.48)
NID/NAV	115.71*** (6.99)	64.86*** (7.30)	120.88*** (15.00)	74.62*** (8.67)	57.39*** (19.96)
NID/NED	70.11*** (5.60)	51.00*** (6.19)	72.68*** (9.08)	85.47*** (7.58)	73.03*** (18.21)
NID/NED/NAD	79.45*** (5.37)	64.72*** (6.01)	86.89*** (8.90)	92.11*** (7.10)	65.67*** (17.46)
NIV/NAV	22.13*** (0.66)	-2.76*** (0.90)	8.86*** (0.82)	44.84*** (1.14)	34.71*** (1.44)
Stated Income	31.70*** (0.32)	21.02*** (0.38)	22.92*** (0.39)	41.82*** (0.70)	32.78*** (1.13)
Streamlined Refi	37.30 (28.50)	-16.39 (26.63)	66.20 (42.86)		
Lender paid mortgage insurance			7.11 (6.89)	11.54*** (3.31)	
Escrow/impound waiver indicator = 'Y' or 'Yes Impounds'			-0.71*** (0.27)	-2.23*** (0.32)	
Loan purpose: Home improvement	5.05*** (1.01)	4.35** (1.77)			
Loan purpose: Refinance	1.66*** (0.24)	-0.53 (0.36)			
Cash-out refinance			4.37*** (0.35)	15.31*** (0.43)	7.76*** (0.64)
Rate & term refinance			-4.65*** (0.37)	-0.59 (0.44)	-5.17*** (0.65)
Rate lock >= 30 days		0.65 (0.52)	1.75*** (0.44)	1.61** (0.71)	
No prepayment penalty		5.59*** (0.40)			
1-yr prepayment penalty			-1.51** (0.59)	2.32*** (0.44)	
Prepayment penalty > 1 year			2.61*** (0.29)	-0.26 (0.38)	
Loan term					
5-year term	92.91*** (3.28)	-50.28*** (6.48)		115.95*** (4.62)	
7-year term	33.86*** (7.60)	-34.96*** (7.34)	22.65*** (1.25)	24.40*** (1.84)	
10-year term	120.80*** (39.09)	165.84*** (18.92)	32.18 (43.89)	71.03** (31.52)	264.39*** (6.50)
15-year term	69.36*** (10.87)	107.59*** (16.31)	104.92*** (12.98)	-21.33 (44.75)	-11.90 (55.17)
20-year term	3.31 (502.62)	3.59 (12,421.44)	57.70 (971.31)	-42.45 (2,413.08)	1.33 (2.77)
25-year term	35.46*** (12.24)	82.61*** (17.74)	71.77*** (18.46)	-47.06 (31.62)	0.37 (12.22)
40-year term	18.56*** (0.40)		15.37*** (0.40)	10.43*** (0.50)	11.16*** (1.38)
Conforming A loan program	-50.73*** (0.53)	-58.38*** (0.70)	-51.41*** (0.61)	-37.05*** (0.88)	-30.12*** (1.22)
LIBOR ARM Index	52.15 (485.98)	-43.13 (13,949.80)	-23.05 (2,517.05)	89.59 (.)	-56.72 (43,839.18)
MTA ARM Index	-52.55 (.)		-273.99*** (20.26)	-90.15*** (31.63)	
Treasury ARM Index	-11.87 (544.73)	-81.53 (12,819.17)	-92.84 (.)	18.14 (1,837.56)	-86.16 (42,983.56)
Unknown ARM Index	-4.46 (637.26)	-73.10 (12,593.41)			

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)					
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Interest-only loan program	-12.95*** (0.36)	-4.26*** (0.51)	-4.25*** (0.43)	6.61*** (0.50)	11.72*** (0.71)
Piggyback loan program	-1.38*** (0.26)	15.25*** (0.36)	7.04*** (0.29)	-8.35*** (0.39)	-26.10*** (6.12)
Loan payment terms					
ARM (unknown term)	-223.13 (681.44)	-231.16 (13,913.89)			
ARM 10YR/1YR	-12.15 (697.44)	-6.65 (12,865.07)	52.67 (.)	-23.85 (.)	85.42 (40,610.29)
ARM 10YR/6MO	-47.98 (556.35)	-58.28 (13,670.26)	34.99 (661.51)	-40.88 (.)	104.63 (40,145.00)
ARM 1MO/1MO	-225.08 (728.69)	-243.60 (13,488.69)	-78.92 (1,381.17)	-77.84 (2,389.29)	
ARM 1MO/1YR	-41.71 (749.08)	-160.34 (14,349.41)	17.08 (1,240.08)	5.59 (.)	200.03 (36,541.10)
ARM 1MO/2YR	-13.67 (595.40)		33.97 (.)	16.90 (578.77)	198.31 (42,435.89)
ARM 1MO/3YR	-1.11 (633.56)		45.44 (1,887.40)	24.39 (.)	200.73 (38,362.34)
ARM 1MO/5YR	1.07 (532.98)		45.80 (.)	28.42 (.)	201.65 (39,832.55)
ARM 1YR/10YR	-169.56 (.)				
ARM 1YR/1YR	-74.47 (536.15)	-150.98 (12,214.20)	18.43 (.)	-24.69 (.)	
ARM 1YR/25YR	-167.02 (.)				
ARM 1YR/30YR	-95.18 (1,209.69)		80.17*** (20.52)	23.38 (31.91)	5.24 (4.10)
ARM 2YR/1MO					
ARM 2YR/6MO	-57.29 (736.72)	24.39 (14,304.55)	2.10 (1,462.67)	-34.51 (.)	129.08 (42,953.87)
ARM 3MO/1YR	-74.02 (688.47)	-134.73 (14,237.83)	14.11 (.)	-13.44 (573.28)	
ARM 3MO/2YR	-41.18 (455.45)		32.77 (2,207.15)		
ARM 3MO/3YR	-36.00 (703.04)		39.18 (222.14)		
ARM 3MO/5YR	-30.05 (714.67)		44.48 (1,373.25)		
ARM 3YR/10YR	-123.15 (742.09)	-217.76 (13,685.70)			
ARM 3YR/15YR	-119.78 (741.73)	-160.87 (14,016.72)	-95.10 (.)		62.80 (38,683.28)
ARM 3YR/1YR	-60.96 (670.30)	-99.80 (14,684.40)	28.81 (.)	-38.04 (.)	132.28 (40,831.05)
ARM 3YR/20YR	-39.12** (15.50)	-55.93*** (16.37)	-7.03 (32.07)		
ARM 3YR/25YR	-29.96 (733.15)	-94.66 (13,332.37)	-0.90 (621.97)	49.80 (.)	
ARM 3YR/30YR	-35.17 (504.68)	-30.00 (13,924.26)	44.91 (.)	-62.65 (.)	62.98 (39,503.60)
ARM 3YR/6MO	-123.75 (629.86)	-161.31 (14,229.77)	-23.71 (1,643.57)	-55.29 (2,418.55)	110.09 (37,122.59)
ARM 4YR/1YR	6.19 (851.66)			15.12 (.)	137.69 (41,794.97)
ARM 5YR/10YR	-27.16 (689.99)	-66.06 (13,851.54)		0.53 (.)	
ARM 5YR/15YR	-55.10 (694.81)	-94.05 (11,486.30)	-32.20 (.)	13.58 (.)	132.14 (38,676.79)
ARM 5YR/1YR	-37.98 (630.90)	-84.10 (12,972.70)	47.37 (924.76)	-5.06 (2,516.77)	132.96 (37,814.78)
ARM 5YR/25YR	-4.04 (648.89)	-44.29 (14,322.65)	-26.05 (697.96)	-15.59 (1,811.88)	96.59 (38,621.19)
ARM 5YR/30YR	-81.56 (563.60)	17.07 (13,320.45)	35.81 (1,212.37)	-68.51 (1,752.31)	66.99 (42,678.60)
ARM 5YR/6MO	-84.77 (688.27)	-131.58 (13,280.14)	-5.07 (1,171.73)	-64.78 (.)	109.29 (40,043.02)
ARM 6MO/6MO	-208.89 (600.68)	-217.48 (12,792.44)	-66.42 (.)	-16.47 (.)	

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
ARM 6YR/1YR	-17.45 (678.89)			11.22 (.)	140.87 (43,534.40)
ARM 7YR/1YR	-22.96 (690.77)	-5.02 (12,049.84)	47.60 (.)	-9.25 (.)	102.48 (41,717.09)
ARM 7YR/6MO	-77.52 (561.84)	-98.68 (13,350.62)	1.11 (.)	-70.29 (.)	91.88 (41,331.43)
Balloon (unknown term)	161.30*** (10.95)	62.25*** (16.36)			
20/10 Balloon	-105.87* (57.79)	-195.98*** (19.59)	-108.15** (50.17)		
25/10 Balloon	-156.09*** (43.71)	-275.71*** (19.55)	-30.86 (46.37)	-68.80* (37.35)	
25/15 Balloon	-132.16*** (42.40)				20.77 (61.62)
30/10 Balloon	-180.84*** (39.17)	-253.67*** (20.55)	-98.69** (44.96)	-96.13*** (31.80)	-248.33*** (7.32)
30/15 Balloon	-84.56*** (10.88)	-125.50*** (16.30)	-122.30*** (12.78)	48.24 (44.74)	43.11 (55.18)
40/10 Balloon	-166.40*** (41.14)				-237.35*** (10.52)
40/15 Balloon	-103.91*** (12.13)				38.27 (55.34)
40/30 Balloon	-46.18*** (1.37)		-26.92*** (2.11)	4.45*** (1.66)	16.78*** (3.36)
5/25 Balloon	-75.03*** (7.27)				
10-year fixed	-113.40*** (39.26)	-205.80*** (24.14)	-69.52 (48.55)	-43.32 (31.30)	-220.50*** (16.80)
15-year fixed	-81.30*** (10.88)	-145.53*** (16.29)	-135.06*** (12.96)	9.12 (44.77)	2.64 (55.21)
20-year fixed	-2.38 (647.38)	-3.48 (12,961.16)	-64.12 (821.03)	35.51 (.)	
40-year fixed	-44.03*** (2.15)			-127.15*** (2.32)	-0.96 (2.37)
<i>Property & residence type</i>					
Investment, unknown type	72.38*** (2.28)	62.79*** (1.46)	36.43*** (10.52)	51.79*** (13.29)	
Investment, Commercial - Mixed use w/ residential	60.56*** (2.70)	88.38*** (4.71)	85.07*** (8.52)	41.07*** (6.62)	64.37*** (2.88)
Investment, Commercial - Mixed use w/o residential	51.07*** (3.75)	130.59*** (20.00)		34.34*** (9.51)	86.36*** (3.32)
Investment, Commercial - Multi-family > 4	36.22*** (2.29)	77.66*** (4.94)	58.79*** (8.56)	20.46*** (6.36)	56.23*** (2.25)
Investment, Commercial - Other	71.62*** (11.22)	77.73*** (13.38)			
Investment, Condo - High Rise	43.96*** (1.57)	46.59*** (2.36)	36.33*** (1.36)	53.16*** (2.86)	65.58*** (4.52)
Investment, Condo - Low Rise	46.97*** (0.69)	42.69*** (1.08)	38.06*** (0.77)	61.71*** (1.14)	62.23*** (1.84)
Investment, Condo - Mid Rise	55.24*** (3.00)	58.65*** (5.95)	34.32*** (2.33)	58.30*** (4.57)	63.28*** (5.85)
Investment, Condo - Site	47.30*** (4.66)	47.40*** (5.35)	46.17*** (6.98)	45.47*** (4.63)	60.53*** (21.87)
Investment, Condotel	29.06* (16.00)			32.47** (13.69)	25.80*** (6.89)
Investment, Coop	-5.00*** (1.27)	48.71*** (1.40)			
Investment, Duplex	54.18*** (0.70)	53.30*** (0.96)	50.25*** (0.87)	59.30*** (1.07)	65.63*** (1.74)
Investment, Fourplex	63.63*** (0.91)	65.84*** (1.06)	56.75*** (1.13)	72.80*** (1.47)	77.55*** (2.75)
Investment, PUD-1 unit attached	43.22*** (1.03)	41.88*** (1.61)	33.02*** (1.04)	54.41*** (1.65)	55.51*** (3.11)
Investment, PUD-1 unit detached	46.28*** (0.63)	45.71*** (0.92)	39.60*** (0.71)	52.44*** (1.05)	55.58*** (1.80)
Investment, PUD-2 units	37.10*** (5.69)	44.95*** (6.26)	48.24*** (6.06)	60.53*** (6.63)	63.27*** (12.18)
Investment, PUD-3 units	63.87*** (22.29)	55.83*** (14.60)	61.35*** (3.34)	21.43*** (2.08)	
Investment, PUD-4 units	48.94*** (4.06)	69.45*** (5.78)	45.43*** (4.69)	56.41*** (5.30)	70.88*** (11.15)

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Investment, Single Family Attached	47.88*** (1.21)	43.02*** (1.44)	45.35*** (1.42)	59.19*** (2.14)	60.44*** (3.04)
Investment, Single Family Detached	45.72*** (0.39)	44.85*** (0.54)	40.34*** (0.46)	55.62*** (0.65)	56.30*** (0.96)
Investment, Triplex	67.87*** (1.22)	69.70*** (1.38)	58.68*** (1.49)	75.29*** (2.00)	78.55*** (3.16)
Primary, unknown type	2.73 (1.92)	5.49*** (1.26)	-18.52** (7.67)	0.21 (30.51)	
Primary, Commercial - Mixed use w/ residential	111.44*** (17.75)	92.71*** (15.62)	127.91*** (27.40)	33.40*** (2.52)	
Primary, Commercial - Multi-family > 4	144.65*** (32.37)	139.01*** (24.22)	127.76*** (34.23)	1.16 (6.88)	
Primary, Condo - High Rise	8.49*** (1.17)	6.84*** (2.59)	6.24*** (1.36)	10.27*** (1.53)	13.11*** (2.68)
Primary, Condo - Low Rise	5.05*** (0.47)	1.45** (0.71)	1.33** (0.56)	9.40*** (0.68)	7.78*** (1.08)
Primary, Condo - Mid Rise	10.26*** (1.79)	3.41 (2.83)	7.10*** (2.05)	18.27*** (2.83)	8.38** (4.13)
Primary, Condo - Site	0.67 (2.33)	-2.86 (4.01)	0.17 (2.43)	0.52 (3.30)	-4.74 (7.73)
Primary, Coop	1.59 (1.55)	3.22 (3.86)	7.88*** (1.84)	12.38*** (1.57)	-2.33 (2.82)
Primary, Duplex	10.19*** (0.72)	15.37*** (1.13)	10.13*** (0.88)	12.36*** (0.94)	17.03*** (1.51)
Primary, Fourplex	28.28*** (1.96)	40.43*** (2.32)	28.10*** (2.24)	30.63*** (2.56)	26.42*** (4.88)
Primary, Manufactured Home	14.82* (7.64)	4.25 (20.44)	18.52 (11.55)	25.78*** (8.94)	-0.04 (8.23)
Primary, PUD-1 unit attached	-0.50 (0.68)	0.02 (1.15)	-0.29 (0.77)	-4.30*** (1.00)	-3.92** (1.78)
Primary, PUD-1 unit detached	-3.21*** (0.38)	-2.28*** (0.57)	-1.98*** (0.46)	-5.31*** (0.61)	-5.29*** (0.97)
Primary, PUD-2 units	7.69 (12.48)	8.40 (8.16)	42.19** (16.76)	-28.29*** (1.54)	
Primary, PUD-3 units	50.40*** (0.86)	71.35*** (1.01)			
Primary, PUD-4 units	28.33* (15.73)	-10.61 (14.12)	51.51** (22.05)	24.01 (28.63)	
Primary, Single Family Attached	0.34 (0.86)	0.39 (1.26)	-0.33 (1.10)	3.40*** (1.24)	-1.53 (2.42)
Primary, Triplex	32.91*** (1.48)	39.86*** (2.10)	29.82*** (1.80)	32.66*** (1.82)	29.52*** (2.82)
Second home, unknown type	33.09*** (5.72)	30.58*** (4.06)	33.37*** (8.89)		
Second home, Condo - High Rise	17.53*** (2.68)	29.84*** (5.20)	16.36*** (3.00)	26.48*** (3.32)	19.89*** (6.26)
Second home, Condo - Low Rise	24.42*** (1.47)	19.89*** (2.31)	17.57** (1.65)	35.77*** (2.00)	30.49*** (3.29)
Second home, Condo - Mid Rise	17.21*** (4.94)	31.36*** (7.22)	19.63*** (5.35)	16.54** (7.65)	9.75 (7.67)
Second home, Condo - Site	11.69 (17.10)	-21.80*** (5.38)	-7.16 (12.55)	29.67 (20.81)	66.99*** (4.37)
Second home, Coop	29.02*** (4.81)	62.69*** (1.52)	18.90*** (5.23)	14.04* (7.42)	42.49*** (3.43)
Second home, PUD-1 unit attached	19.99*** (3.48)	15.82*** (5.07)	19.11*** (3.96)	24.79*** (4.42)	21.64 (13.44)
Second home, PUD-1 unit detached	18.46*** (1.40)	22.74*** (2.93)	18.64*** (1.36)	20.21*** (2.33)	11.93*** (4.04)
Second home, Single Family Attached	11.38* (6.74)	23.83** (10.46)	15.36** (5.98)	16.47 (13.18)	15.49 (15.40)

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006)	Model (4-2007)
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Second home, Single Family Detached	18.08*** (1.01)	19.17*** (1.44)	18.29*** (1.17)	25.01*** (1.80)	15.26*** (2.01)
Constant	586.55*** (33.66)	662.61*** (21.42)	724.80*** (56.89)	736.28 (11,987.27)	695.49*** (38.62)
Observations	371685	112946	110475	105541	42723
R-squared	0.87951	0.89502	0.85297	0.88925	0.88397
Adjusted R-squared	0.87930	0.89450	0.85224	0.88865	0.88252

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Coefficients and standard errors for rate lock month, rate lock week, state, and MSA dummy variables excluded from this table for brevity.

Dummy variables for each of the 4 ARM index types (LIBOR, Treasury, 12-month Treasury average index (MTA), and unknown),

a dummy variable equal to 1 if the loan program is a Conforming A loan,

a dummy variable equal to 1 if the loan program has an interest-only period, and

a dummy variable equal to 1 if the loan program is a piggyback loan.

The ARM index, interest-only component, and piggyback characteristics are identified based on the loan program descriptions.

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Appendix 5: APR Basis Point Disparities When Controlling for Individual Program Codes (Table 5)

Dependent variable: APR (basis points)	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006) ¹	Model (4-2007) ¹
		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Race: African American	7.32*** (0.39)	7.28*** (0.57)	5.10*** (0.50)	4.21*** (0.57)	5.89*** (0.88)
Race: Hispanic	6.15*** (0.28)	5.33*** (0.42)	3.56*** (0.33)	1.50*** (0.43)	1.51** (0.68)
Race: American Indian	5.14*** (1.79)	3.42 (2.33)	1.78 (2.12)	5.05* (2.70)	-0.82 (3.91)
Race: Asian	2.68*** (0.34)	0.85* (0.50)	0.89** (0.37)	1.34** (0.59)	2.23** (0.94)
Race: Hawaiian	3.57*** (0.96)	4.82*** (1.72)	2.00* (1.08)	0.68 (1.53)	-1.78 (2.56)
Race: Missing	3.78*** (0.36)	3.35*** (0.51)	2.68*** (0.46)	4.02*** (0.58)	2.72*** (0.81)
Subordinate lien	-16.73 (30.16)	5.49 (26.04)	283.42*** (37.52)	-300.50*** (49.64)	
Missing FICO	44.08*** (3.35)	44.55*** (4.18)	45.12*** (5.74)	35.91*** (5.37)	12.90 (8.31)
300 <= FICO < 600	44.31*** (4.07)	50.54*** (6.58)	38.41*** (6.42)	46.96*** (6.47)	31.87*** (7.09)
600 <= FICO < 620	42.25*** (3.42)	41.10*** (5.43)	36.72*** (4.87)	46.33*** (5.12)	36.12*** (8.34)
620 <= FICO < 640	31.55*** (0.79)	21.34*** (0.96)	17.74*** (1.07)	51.23*** (1.09)	49.38*** (1.53)
640 <= FICO < 660	29.87*** (0.47)	17.53*** (0.60)	18.33*** (0.63)	46.07*** (0.66)	42.98*** (1.04)
660 <= FICO < 680	20.59*** (0.33)	8.40*** (0.45)	12.05*** (0.43)	33.13*** (0.50)	32.75*** (0.78)
680 <= FICO < 700	12.30*** (0.28)	5.14*** (0.40)	6.91*** (0.34)	22.14*** (0.48)	21.94*** (0.75)
700 <= FICO < 720	3.89*** (0.28)	3.12*** (0.40)	2.61*** (0.32)	5.55*** (0.47)	6.90*** (0.71)
720 <= FICO < 740	1.72*** (0.30)	1.21*** (0.43)	1.57*** (0.34)	2.46*** (0.51)	3.41*** (0.76)
0K <= Loan Amount < 40K	46.39*** (1.23)	55.86*** (2.17)	41.32*** (2.16)	32.77*** (1.29)	47.93*** (2.17)
40K <= Loan Amount < 50K	27.05*** (1.25)	39.87*** (1.69)	34.73*** (2.01)	13.44*** (1.37)	22.96*** (2.34)
50K <= Loan Amount < 75K	25.45*** (0.72)	31.85*** (0.91)	34.37*** (0.96)	15.18*** (1.06)	19.55*** (1.66)
75K <= Loan Amount < 150K	13.27*** (0.43)	16.95*** (0.59)	18.03*** (0.52)	11.11*** (0.78)	9.50*** (1.20)
150K <= Loan Amount < 200K	6.09*** (0.40)	9.41*** (0.57)	9.87*** (0.47)	4.37*** (0.75)	2.48** (1.15)
200K <= Loan Amount < 300K	2.70*** (0.34)	5.17*** (0.51)	6.06*** (0.38)	0.90 (0.63)	-1.64* (0.98)
300K <= Loan Amount < 500K	-1.86*** (0.29)	0.73 (0.48)	1.69*** (0.32)	-1.31** (0.56)	-2.76*** (0.88)
40% < total debt ratio <= 45%	6.40*** (0.27)	2.58*** (0.42)	3.73*** (0.35)	4.90*** (0.40)	2.55*** (0.59)
Total debt ratio > 45%	4.22*** (0.47)	3.44*** (0.62)	4.05*** (0.59)	9.03*** (0.75)	4.20*** (0.90)
No total debt ratio	11.35** (4.99)	3.72 (5.03)	0.83 (6.45)	1.06 (8.39)	2.91 (12.71)
(First lien) x (LTV missing)	-353.49*** (42.44)		-3.85 (11.49)	-673.52*** (50.28)	
(First lien) x (0% < LTV <= 60%)	-85.21*** (0.63)	-76.18*** (0.85)	-82.96*** (0.98)	-92.16*** (1.26)	-102.63*** (1.10)
(First lien) x (60% < LTV <= 70%)	-84.57*** (0.61)	-72.68*** (0.85)	-82.36*** (0.95)	-91.09*** (1.23)	-103.43*** (1.09)
(First lien) x (70% < LTV <= 80%)	-80.73*** (0.54)	-71.07*** (0.76)	-79.69*** (0.89)	-80.23*** (1.10)	-89.01*** (0.75)
(Subordinate lien) x (CLTV missing)	-34.87 (35.34)		-105.07*** (33.60)	-50.00** (21.37)	
(Subordinate lien) x (0% < CLTV <= 80%)	-102.05*** (3.06)	-128.40*** (7.42)	-142.68*** (6.50)	-82.69*** (2.05)	-88.83*** (4.40)
(Subordinate lien) x (80% < CLTV <= 90%)	-30.12*** (1.27)	-17.82*** (3.64)	-39.22*** (2.46)	-30.74*** (0.85)	-38.15*** (1.60)
Coapplicant present	-2.27*** (0.21)	-1.64*** (0.29)	-1.21*** (0.25)	-1.70*** (0.36)	-4.75*** (0.55)

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006) ¹	Model (4-2007) ¹
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Self-employed borrower or co-borrower	10.00*** (0.68)				-0.68 (0.57)
<i>Documentation type</i>					
Alternative Doc	-2.27 (3.85)	42.72*** (2.87)			
Low Doc	18.46 (11.98)	-33.42 (23.05)	-3.27 (27.71)	15.27 (49.83)	0.77 (17.62)
NED	-55.28*** (5.69)			1.66 (49.46)	
NID	33.76*** (5.06)	15.44*** (5.26)	28.78*** (6.55)	51.65*** (8.47)	40.19*** (12.72)
NID/NAD	40.79*** (5.77)	26.88*** (5.81)	34.93*** (7.30)	72.53*** (10.80)	60.88*** (15.79)
NID/NAV	24.29*** (6.21)	0.21 (6.86)	30.82** (13.93)	59.48*** (10.68)	44.69*** (16.97)
NID/NED	58.25*** (5.29)	38.58*** (5.31)	44.73*** (6.72)	67.29*** (9.12)	58.82*** (13.67)
NID/NED/NAD	60.91*** (5.07)	48.19*** (5.15)	52.86*** (6.57)	70.83*** (8.55)	54.26*** (12.79)
NID/NAV	41.06*** (1.05)	30.29*** (2.19)	27.15*** (1.59)	52.80*** (1.27)	48.30*** (1.48)
Stated Income	27.55*** (0.30)	15.15*** (0.38)	21.26*** (0.40)	34.01*** (0.54)	25.12*** (0.86)
Streamlined Refi	-18.17 (19.14)	-27.37 (17.22)	4.00 (26.46)		
Unknown doc type	-14.52** (6.99)		-18.68* (11.14)	3.22 (8.56)	
Lender paid mortgage insurance			-10.46** (5.17)	16.74*** (2.49)	
Escrow/impound waiver indicator = 'Y' or 'Yes Impounds'			-0.68*** (0.24)	-2.46*** (0.39)	
Loan purpose: Home improvement	2.02** (0.92)	3.43** (1.63)			
Loan purpose: Refinance	0.23 (0.22)	-0.10 (0.32)			
Cash-out refinance			2.19*** (0.32)	11.16*** (0.41)	5.88*** (0.62)
Rate & term refinance			-4.74*** (0.34)	-2.04*** (0.46)	-6.68*** (0.68)
Rate lock >= 30 days		1.20** (0.47)	2.27*** (0.40)	1.94*** (0.73)	
No prepayment penalty		4.94*** (0.36)			
1-yr prepayment penalty			-3.24*** (0.59)	-0.14 (0.56)	
Prepayment penalty > 1 year			-0.09 (0.26)	-1.66*** (0.49)	
<i>Loan term</i>					
10-year term	47.97 (50.63)	6.59 (23.22)	-39.18 (29.86)	100.42*** (35.01)	260.63*** (47.32)
15-year term	2.45 (12.03)	-13.57 (21.50)	14.87 (14.13)	9.63 (9.71)	-3.07 (23.67)
25-year term	-63.71*** (13.92)	-100.92*** (21.92)			
40-year term	4.93 (4.73)		9.21 (7.17)	3.74 (9.23)	57.91 (47.67)
<i>Property & residence type</i>					
Investment, unknown type	51.15*** (1.96)	34.38*** (1.38)	24.70*** (8.73)	48.81** (22.06)	
Investment, Commercial - Mixed use w/ residential	51.63*** (5.53)	38.97*** (5.30)	-46.28 (29.30)	29.50 (49.17)	-21.55*** (4.45)
Investment, Commercial - Mixed use w/o residential	52.76*** (6.48)	63.94** (26.88)		24.43 (50.71)	
Investment, Commercial - Multi-family > 4	31.64*** (5.70)	27.11*** (5.67)	-72.50** (29.27)	9.79 (49.08)	-25.89*** (3.95)
Investment, Commercial - Other	56.83*** (12.15)	31.69** (13.24)			
Investment, Condo - High Rise	30.96*** (1.50)	20.39*** (2.13)	24.17*** (1.27)	44.32*** (2.63)	59.34*** (3.98)
Investment, Condo - Low Rise	34.01*** (0.67)	18.00*** (1.05)	24.28*** (0.74)	51.61*** (1.01)	55.42*** (1.64)

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006) ¹	Model (4-2007) ¹
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Investment, Condo - Mid Rise	41.25*** (2.85)	34.09*** (5.76)	21.84*** (2.32)	49.91*** (4.01)	57.90*** (5.82)
Investment, Condo - Site	36.05*** (4.59)	21.09*** (5.60)	37.28*** (6.80)	36.74*** (7.82)	47.83** (21.19)
Investment, Condotel	29.59* (16.18)			9.14 (49.46)	33.50 (21.22)
Investment, Coop	-17.07*** (1.26)	22.18*** (1.38)			
Investment, Duplex	38.25*** (0.67)	26.59*** (0.96)	32.65*** (0.87)	48.97*** (1.05)	59.74*** (1.60)
Investment, Fourplex	46.54*** (0.84)	36.65*** (1.05)	38.90*** (1.03)	61.57*** (1.25)	70.56*** (2.15)
Investment, PUD-1 unit attached	31.09*** (0.98)	15.42*** (1.56)	20.81*** (0.99)	45.21*** (1.66)	48.25*** (2.53)
Investment, PUD-1 unit detached	32.57*** (0.61)	18.71*** (0.94)	24.75*** (0.71)	43.02*** (1.02)	48.65*** (1.54)
Investment, PUD-2 units	20.74*** (4.80)	14.25*** (5.08)	22.17*** (5.41)	57.47*** (14.19)	59.63** (29.56)
Investment, PUD-3 units	27.40** (12.62)	21.73** (8.84)	50.25*** (9.45)	29.73 (48.67)	
Investment, PUD-4 units	33.61*** (3.65)	36.97*** (5.46)	30.95*** (4.16)	44.58*** (5.17)	64.91*** (10.55)
Investment, Single Family Attached	33.54*** (1.11)	19.47*** (1.32)	29.38*** (1.33)	48.65*** (1.80)	52.15*** (2.48)
Investment, Single Family Detached	31.65*** (0.40)	19.08*** (0.59)	25.44*** (0.51)	46.06*** (0.61)	50.16*** (0.86)
Investment, Triplex	49.63*** (1.09)	41.56*** (1.33)	39.30*** (1.35)	63.86*** (1.65)	69.54*** (2.75)
Primary, unknown type	1.72 (1.64)	1.27 (1.14)	-13.11 (8.51)	-7.08 (21.70)	
Primary, Commercial - Mixed use w/ residential	84.34*** (15.59)	39.96*** (14.17)		28.87 (69.38)	
Primary, Commercial - Multi-family > 4	124.54*** (23.67)	81.80*** (26.51)	-3.76 (45.92)		
Primary, Condo - High Rise	5.82*** (1.05)	6.78*** (2.27)	2.50** (1.19)	7.74*** (1.66)	11.03*** (2.79)
Primary, Condo - Low Rise	4.90*** (0.42)	1.12* (0.62)	0.77 (0.50)	8.36*** (0.69)	7.45*** (1.10)
Primary, Condo - Mid Rise	9.78*** (1.61)	2.72 (2.35)	5.32*** (1.83)	16.67*** (2.59)	7.58** (3.83)
Primary, Condo - Site	0.17 (2.09)	-3.98 (3.46)	-1.25 (2.19)	0.65 (3.14)	-5.47 (6.52)
Primary, Coop	1.46 (1.38)	2.59 (3.39)	5.37*** (1.61)	7.95*** (2.29)	0.84 (3.84)
Primary, Duplex	7.87*** (0.64)	3.95*** (0.97)	5.59*** (0.78)	11.27*** (0.98)	16.15*** (1.49)
Primary, Fourplex	16.03*** (1.77)	18.54*** (2.10)	14.58*** (2.06)	21.33*** (2.87)	18.77*** (5.45)
Primary, Manufactured Home	0.36 (5.79)	4.18 (13.86)	3.90 (10.72)	13.33 (8.41)	-0.49 (9.41)
Primary, PUD-1 unit attached	-0.87 (0.62)	-0.48 (0.99)	-0.26 (0.70)	-4.34*** (0.96)	-5.12*** (1.64)
Primary, PUD-1 unit detached	-3.85*** (0.35)	-1.52*** (0.50)	-2.60*** (0.42)	-5.24*** (0.56)	-5.19*** (0.88)
Primary, PUD-2 units	9.33 (11.94)	1.66 (7.98)	32.32*** (11.28)	-33.51 (48.64)	
Primary, PUD-3 units	56.65*** (0.99)	38.93*** (1.14)			
Primary, PUD-4 units	27.58* (15.74)	-16.22*** (1.41)	40.89* (23.81)	22.11 (28.10)	
Primary, Single Family Attached	0.62 (0.76)	-0.54 (1.11)	0.45 (0.96)	3.05** (1.26)	-0.83 (1.92)
Primary, Triplex	18.74*** (1.33)	15.83*** (1.89)	14.59*** (1.59)	23.49*** (2.11)	23.74*** (3.51)
Second home, unknown type	30.69*** (5.05)	22.98*** (3.73)	27.69*** (6.51)	20.81 (30.97)	
Second home, Condo - High Rise	12.71*** (2.44)	26.10*** (3.87)	8.15*** (2.86)	22.12*** (4.36)	19.65*** (5.95)
Second home, Condo - Low Rise	18.13*** (1.34)	11.22*** (1.83)	9.01*** (1.55)	29.33*** (2.26)	27.82*** (3.36)
Second home, Condo - Mid Rise	9.71** (4.51)	23.18*** (4.44)	6.56 (4.91)	13.39* (7.45)	13.86 (12.25)

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	Model (4)	Model (4-2004)	Model (4-2005)	Model (4-2006) ¹	Model (4-2007) ¹
Dependent variable: APR (basis points)		2004 loans only	2005 loans only	2006 loans only	2007 loans only
Second home, Condo - Site	0.50 (15.85)	8.80** (4.23)	-16.28 (12.75)	21.36 (18.48)	59.08 (47.27)
Second home, Coop	11.36** (4.49)	79.79*** (1.43)	9.77** (4.14)	-0.54 (17.40)	38.44 (48.67)
Second home, PUD-1 unit attached	11.29*** (3.25)	10.41** (4.36)	8.50** (4.11)	19.73*** (4.87)	22.96*** (8.12)
Second home, PUD-1 unit detached	10.13*** (1.30)	12.24*** (2.63)	8.69*** (1.35)	14.36*** (2.04)	10.86*** (3.25)
Second home, Single Family Attached	5.89 (5.95)	15.08* (8.95)	3.33 (4.88)	9.55 (11.92)	16.77 (15.08)
Second home, Single Family Detached	11.93*** (0.90)	11.46*** (1.24)	9.85*** (1.09)	19.79*** (1.62)	12.62*** (2.12)
Constant	566.10*** (18.11)	520.53*** (14.94)	645.61*** (37.48)	830.21 (365,394.92)	827.04 (902,740.57)
Observations	372038	112946	110582	105787	42723
R-squared	0.90356	0.91553	0.88023	0.89864	0.89522
Adjusted R-squared	0.90327	0.91496	0.87921	0.89783	0.89357

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Coefficients and standard errors for rate lock month, rate lock week, state, and MSA dummy variables excluded from this table for brevity.

Dummy variables for each of the 538 unique program codes are added to Model (4), and the dummy variables representing the 59 broader categories are dropped (as are the dummy variables for HELOC and FHA/VA, which are represented by unique program codes.)

¹Regular standard errors (instead of robust standard errors) for Model (4-2006) and (4-2007) with the program code controls are given because robust standard errors are not calculable for these models with individual program code controls.