Fair Lending:

Implications for the Indirect Auto Finance Market

Prepared by: Arthur P. Baines and Dr. Marsha J. Courchane

For: American Financial Services Association

Charles River Associates

1201 F Street, NW

Suite 700

Washington DC 20004

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INTRODUCTION

Over the past few years, regulatory focus on fair lending examination of the indirect automotive finance market has increased significantly. Recent regulatory developments that impact the indirect auto finance market include the issuance on March 21, 2013 of the Consumer Financial Protection Bureau (CFPB) Bulletin 2013-02,[1] "Indirect Auto Lending and Compliance with the Equal Credit Opportunity Act" (Bulletin) which details the manner in which certain policies related to dealer discretion have the potential to create significant fair lending risks for financial institutions that participate in this important consumer market.[2] At the same time, methodologies used by regulatory agencies for fair lending examinations have changed significantly. For example, the CFPB issued "Using Publicly Available Information to Proxy for Unidentified Race and Ethnicity" (White Paper) on September 17, 2014 which presents its methodology for using a proxy to assign race/ethnicity to consumers obtaining auto financing.

In this research, we illustrate the complexities of indirect automobile financing and evaluate current regulatory fair lending practices observed in the industry. The research uses data collected from a number of market participants and aggregated in order to inform the discussions concerning dealer compensation, prices observed in the market, and the costs and benefits to consumers of alternative dealer compensation methods.

Highlights of the study include demonstrating that:

- The markets for purchasing automobiles (the retail automotive market) and for financing automobiles (the automotive finance market) are complex, highly interconnected and highly competitive.

- Accurately analyzing dealer reserve is difficult for a number of reasons, and failure to consider these challenges increases the potential for drawing erroneous conclusions.

- The methods commonly used by regulators to proxy race and ethnicity, including the recently applied Bayesian Improved Surname Geocoding

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[1] CFPB Bulletin 2013-02, March 21, 2013.

[2] In this paper we use the term 'financial institution' to refer to any company that finances new or used vehicle sales. Financial institutions include banks, non-banks, credit unions, captive and non-captive companies, direct lenders and indirect finance companies, and buy-here pay-here dealers.

(BISG) method, are conceptually flawed in their *application* and subject to significant bias and estimation error.

- The use of biased race and ethnicity proxies creates significant measurement errors, which likely result in overstated disparities and overstatements of alleged consumer harm.

- The Department of Justice (DOJ) recognizes that dealer reserves depend on objective, observable business factors.   Failure to consider legitimate business factors for observed disparities increases the potential for reaching erroneous conclusions.

- Aggregating contracts originated by individual dealers to the portfolio level may create the appearance of differential pricing on a prohibited basis when none exists.

- When appropriately considering the relevant market complexities and adjusting for proxy bias and error, the observed variations in dealer reserve are largely explained.

- Alternative dealer compensation structures, such as "flats," may lead to increased borrowing costs for many minority and non-minority consumers and, in turn, may limit access to credit for some consumers.

A first step in designing an appropriate fair lending strategy is developing the conceptual framework. The intricacies of this very complex market require more complex strategies than those used to date. Given the realities of the regulatory landscape and the limited tools available for analysis, the ability to perform meaningful, accurate and actionable analyses of dealer reserves at the portfolio level is very circumscribed. Based on our analysis, we offer the following key recommendations:

- In calculating any disparities at the portfolio level, make adjustments to the population to:
  - Exclude any volumes from dealers with zero dealer reserve.
  - Exclude any volumes from dealers with no variance in reserve.
  - Exclude any dealers with counts insufficient to monitor dealer activity – specifically, exclude dealers with fewer than 2 contracts from a protected class member and 2 contracts from non-Hispanic whites and a total of 5 contracts. (Similar restrictions should be applied when analyzing for age or gender).
- Implement economic controls to adjust for general economic conditions beyond the control of the financial institution or dealer. Specifically, adjust for:

- o Location – the analyses should include MSA level fixed effect controls. Market demand/supply conditions vary by MSA.
  - o New/Used – these markets are completely different on many dimensions and the negotiation around trade in values may directly impact dealer reserves.
  - o Broad credit tranche – this is not equivalent to controlling for credit score in the buy rate analysis but rather recognizes that prime and subprime markets vary broadly.
  - o Month of origination.
- Adjust for the known bias in the use of the BISG proxy methodology:
  - o If using a continuous approach, determine the "count" of affected minority consumers by applying a threshold after the application of the continuous method. At the very least, the consumers with BISG probabilities less than 50% should not be included in any calculation of consumer harm.
  - o Require verification/certification that any consumer receiving settlement funds or other remediated responses actually is a member of a protected class.
  - o If funds remain in the settlement fund, these should revert to the financial institution and not become part of any regulatory "settlement fund."
- When applying the BISG method, use a stricter threshold for any actions taken prior to 2012. The BISG approach had never been used historically, no one would have used it for monitoring, and applying a recent innovation to past behavior is unfair to financial institutions. For all originations prior to 2011, a 70% BISG threshold, or similar, should be applied.
- Going forward, while financial institutions may, given sufficient volumes, monitor activity quarterly, no remediation should take place until the end of the year. This will help adjust for seasonality during an annual cycle.
- The analysis should include a dealer level focus. There must be adjustments for the aggregation issue.
- The continuous BISG methodology should not be used in any analysis of indirect auto underwriting. The econometric interpretation of such a result is overly difficult.

1. BACKGROUND

Historically, most research on fair lending has followed the focus of regulatory enforcement on discrimination in mortgage markets, and far less research or supervisory activity involved the automotive retail market. To assist in filling the research void that exists, this study provides examination of the following:

- the size and scope of the vehicle finance market.
- the history and evolution of indirect auto finance.
- the Equal Credit Opportunity Act (ECOA) and disparate treatment and impact.
- the history, applicability and accuracy of proxy analysis, including BISG.
- quantitative analysis of current pricing practices in the vehicle finance market.
- the identification and quantitative analysis of factors potentially impacting dealer participation.
- the identification and quantitative analysis of alternative dealer compensation methods, including an assessment of whether such alternative dealer compensation methods are likely to adversely impact the availability of credit for protected classes and lower income groups.

2. APPROACH AND METHODOLOGY

The research focuses on answering the following key questions:

1. What is the automotive finance market and how does it function?

2. Are there fair lending concerns with dealer discretion and dealer reserve?

   a. Can these concerns be reliably addressed?

      i. What are the challenges and how may they be addressed?

      ii. What information is needed for financial institutions and dealers to monitor fair lending risk?

      iii. What dealer reserve prices are observed in the market and what explains variations in those prices?

   b. What are the advantages and disadvantages of particular methodologies?

3. What are alternative dealer compensation structures and how would they impact consumers' cost and access to credit, as well as other market participants including dealers and financial institutions?

We have analyzed these questions through an examination of the historical record, economic and financial theory, prior research, and empirical analysis. Our findings and analysis are presented in the following sections.

2.1. DATA

The study utilizes information obtained from numerous publicly available automotive industry sources such as WardsAuto, Automotive News, Manheim, J.D. Powers, the National Automobile Dealers Association (NADA), the National Independent Automobile Dealers Association (NIADA) and others. Additionally, Experian Automotive made available to us a wide variety of data including information on dealers and financial institutions operating in the automotive finance market.

Beyond these industry data, this research used contract-level data for vehicle purchase transactions combined in a large database (CRA Contract Data) consisting of approximately 8.2 million new and used vehicle contracts originated during 2012 and 2013. The contracts were purchased from dealers by numerous financial institutions including banks, captive finance companies, other non-bank entities. Some of the financial institutions purchased contracts from dealers located across the country, while other focused on dealers in a particular geographic region. Some of the financial institutions purchased contracts across a broad spectrum of credit risk, while others specialized in particular credit tranches. The contributors include many of the 10 largest financial institutions in the indirect automotive finance market. For each contract the database included deal-specific attributes, including the contract rate, buy rate, amount financed, and term.[3] The database was anonymized with respect to the dealer that originated the contract, the financial institution to which it was assigned and the buyer and co-buyer (if applicable) associated with the contract.

We obtained geocoding and mapping services from Pelican Mapping in order to assign each contract to a census tract.[4]

3. THE RETAIL AUTOMOTIVE FINANCE MARKET

The retail automotive finance market is highly competitive and cyclical. Understanding the options available for the financing of vehicles, requires understanding the structure, size and segments of this market, the key participants

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[3] See Appendix H for a complete list of the fields included in the CRA Contract Data.

[4] Glenn Waldron, Pelican Mapping, assisted with this project. For further information, see http://pelicanmapping.com/.

and their respective roles. Any discussion of the prices charged by dealers, financial institutions or other market participants must be grounded in the economics of the relevant market(s). While this is not a particularly robust area of academic literature, some researchers have studied various aspects of the complex pricing mechanisms in the retail automotive market. A few have examined prices and race. We reference this literature throughout the study.

3.1. MARKET SIZE

The market for vehicle sales is large. WardsAuto reports sales of new and used vehicles in the U.S. during 2013 of 15.9 million and 42.0 million vehicles, respectively.[5] Annual new and used vehicle sales volumes are reported in Chart 1 for the period 1990-2013.

Chart 1. New and Used Vehicle Sales by Year, 1990-2013

Source: WardsAuto

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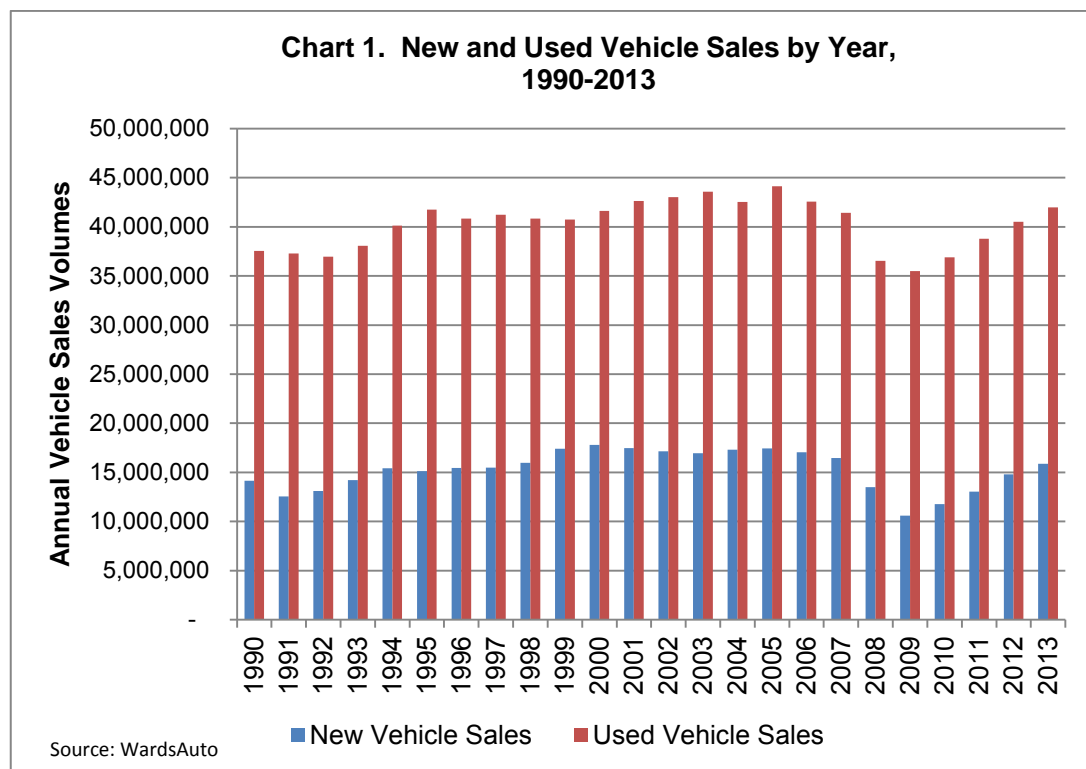
[5] New vehicle sales include cars, light trucks a medium/heavy trucks. Used vehicle sales include those by franchised dealers, independent dealers and casual/private sales. See 2014 NIADA Used Car Industry Report, at 17.

While sales volumes have rebounded since the Great Recession of 2008-2010, sales in 2013 were still below pre-recession levels. Cyclicality correlated with overall levels of economic activity reflects the norm in this market. Decreases in new sales volumes in 1991, 2001-2003 and 2007-2009 can be observed in Chart 1.   The 2013 new and used sales volumes suggest an automotive finance market of approximately $610 billion.[6]   As of June 30, 2014, auto finance debt represents about 8% of aggregate consumer debt, well behind mortgage debt (70%) and less than student loan debt (10%).[7]

3.2.   MARKET SEGMENTS

The automotive finance market provides access to credit through lease and purchase options for a wide range of market segments which include direct and indirect finance channels, new and used vehicles, and prime, non-prime, and subprime buyers.

3.2.1. DIRECT AND INDIRECT CHANNELS

Financial institutions in the direct channel originate loans directly to consumers for the purpose of purchasing a new or used vehicle. Once a consumer is approved by the financial institution, the consumer consummates the vehicle purchase, generally at a dealer, subject to the terms approved by the financial institution. In the direct channel, financing and purchasing the vehicle are related but separate transactions.

Financial institutions in the indirect channel purchase retail installment sale contracts (contracts) from a dealer. The pricing practices within the indirect channel are a key focus of current regulatory fair lending scrutiny. In the indirect channel, there is no direct contact between the financial institution and the buyer at the time of vehicle purchase. The contracts are negotiated by the dealer directly with the consumer. To facilitate these transactions, financial institutions determine which contracts they are willing to purchase and offer dealers wholesale financing rates, often called 'buy rates.' The dealer and consumer negotiate financing in the same transaction as the vehicle purchase. The dealer assigns the contract to a financial institution willing to

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[6] Market for new vehicles = 15.88M * 31,000*.793 = $390B, plus market for used vehicles = 42M * $10,000 * .52 = $220B = total vehicle finance market $610B.

[7] "Quarterly Report on Household Debt and Credit," Federal Reserve Bank of New York, August 2014, available at: http://www.newyorkfed.org/householdcredit/2014-q2/data/pdf/HHDC_2014Q2.pdf, last accessed September 8, 2014.

purchase it. In effect, the dealer is auctioning the contract and financial institutions are competing to purchase it and compensate the dealer.

While this research focuses on the indirect channel, the actions and reactions in one channel clearly impact the other channel (direct) and all participants in the market.

3.2.2. NEW AND USED VEHICLES

While the basic difference between these two market segments is obvious, a number of important differences may be less apparent. New vehicle transaction prices have a wide range and are significantly higher than used vehicle transaction prices for similar vehicle makes and models. According to NADA, the average retail selling price of a new vehicle in 2013 was $31,762.[8] Consequently, the vast majority of vehicle buyers finance their purchases. In 2013, approximately 79% of new vehicle sales were financed by the buyer at the time of purchase.[9] In addition to economic cyclicality, new vehicle sales trends reflect significant annual seasonality, which can be seen in Chart 2.   Model year changes and product life cycles contribute to these trends.

Chart 2. Seasonality of New Vehicle Sales, 2005-2009

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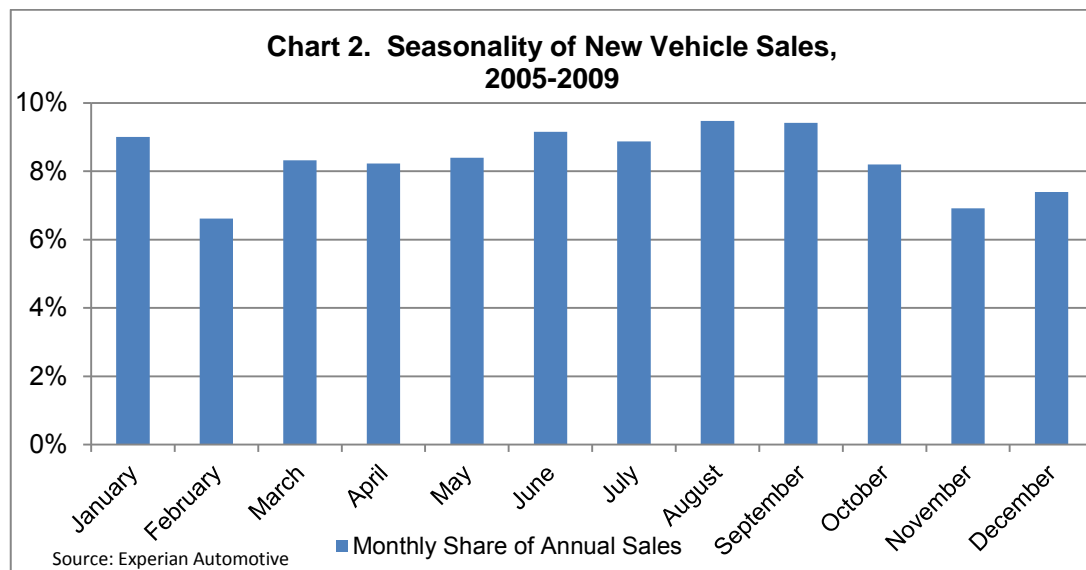
[8] NADA DATA, 2014, at 3, available at: http://www.nada.org/NR/rdonlyres/DF6547D8-C037-4D2E-BD77-A730EBC830EB/0/NADA_Data_2014_05282014.pdf, last accessed September 8, 2014.

[9] This percentage is based on analysis of vehicle titles by Experian Automotive. Of the remaining 21%, some consumers may use home equity lines of credit or other sources of financing.

Additionally, new vehicles are sold exclusively by franchised dealers.[10] We discuss the role of franchised dealers in greater detail below, but it is important to understand that franchised dealers, for a variety of reasons, are materially different than independent dealers.

Used vehicles, unlike new vehicles, may be sold by franchised dealers, independent dealers and in private transactions with no dealer involvement. These channels accounted for 37%, 34% and 29%, respectively, of used vehicle transactions in 2013.[11] Used vehicles can be further categorized as: 1) certified pre-owned (CPO) vehicles, generally 1-3 years old; 2) late-model vehicles, generally less than 6 years old, and 3) older-model used vehicles.[12] Transaction prices vary greatly within and across these different segments.[13]   NADA reports the average used vehicle price at franchised dealers was $18,111 in 2013.[14] This contrasts with the average used vehicle price at independent dealers and in private transactions of $9,500 and $7,000, respectively, in 2013.[15] The pricing distributions suggest that the need for consumers to obtain financing for used vehicles transactions varies significantly across these segments. In 2013, approximately 52% of all used vehicles sales were financed by the consumer.[16]

3.2.3. PRIME, NON-PRIME OR SUBPRIME CONSUMERS

The credit market segments within the automotive finance market are defined almost exclusively by the creditworthiness of the consumer. While different financial institutions may have different thresholds for each group, nearly all use some form of automated credit score, obtained from internal models or external sources, to

[10] The vast majority of franchised dealers are independent third parties. At any given point in time, there are a few manufacturer-owned dealers. These generally relate to highly specific facts and circumstance.

[11] WARDS Auto, U.S. Market Used Vehicle Sales, percentages for 2013.

[12] "2014 Used Car Market Report," Manheim, available at: http://www.niada.com/uploads/dynamic_areas/wp6QIPSw6C83LYM1dGrU/33/UCMR_2014_Final.pdf, last accessed September 8, 2014.

[13] For an interesting discussion of used vehicle prices, depreciation rates and the effect of asymmetric information on market structures, see Avner Offer, "The markup for lemons: quality and uncertainty in American and British used-car markets c. 1953-73," *Oxford Economic Papers* 59 (2007), i31-i48.

[14] *Op. Cit.,* NADA DATA 2014, at 3.

[15] WardsAuto, U.S. Market Used Vehicle Sales.

[16] *Op. Cit*, Analysis of vehicle titles by Experian Automotive.

categorize potential vehicle buyers. Unlike mortgage markets, where certain loan products came to be known as 'subprime products,' in auto finance there is no analogous subprime automotive product.[17]   For example, in automotive finance there are no commonly used automotive finance products that reflect interest only loans, negatively amortizing loans, or no documentation loans.

Based on data provided by Experian Automotive, the 2013 market for financed new vehicles consisted of 64% prime buyers, 20% non-prime buyers and 16% subprime buyers.[18] The distribution of buyers who finance used vehicle transactions in 2013 is significantly more weighted to the non-prime (22%) and subprime (43%) categories, with only 35% of financed used vehicle buyers in the prime category.

3.2.4. LEASE OR PURCHASE

Automotive finance products differentiate between lease and purchase contracts. Most auto finance leases are closed-end leases, providing long-term rental, with the consumer agreeing to lease the vehicle for a pre-determined period of time for a given monthly payment, with the return of the vehicle at the end of the period with no remaining liability, unless the consumer exercises a purchase option. Leases are most predominant in the new car market and are frequently subsidized by the vehicle manufacturer.   As such, their availability may be tied to specific vehicle makes and models. During the Great Recession, many financial institutions eliminated or significantly reduced the availability of leases, but lease penetration rates have rebounded in recent years. In 2012, leases accounted for approximately 18% of new vehicle deliveries.[19] While leases are not the subject of this study, they are one of the many choices available to consumers in the auto finance market and they may impact affordability in the new vehicle market.

Vehicle purchase agreements are structured as retail installment contracts in the indirect channel or as consumer loans in the direct channel. In both cases, the agreements specify the amount financed, the contract/loan term, and the annual percentage rate (APR). These components dictate a fixed monthly payment for the life of the contract or loan.

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[17] Product design in auto finance is constrained by the depreciating value of the underlying asset.

[18] Prime, non-prime and subprime are defined in the Experian Automotive report to be 680+, 620-679 and <620, respectively.

[19] Source: WardsAuto.

3.3.   MARKET PARTICIPANTS

The automotive finance market has four primary participants: consumers, financial institutions, dealers and manufacturers, each with distinct objectives, incentives and constraints.   These groups are not homogeneous and may be further segmented.

3.3.1. CONSUMERS

Industry reporting suggests that approximately 34 million consumers financed vehicle transactions in 2013 but limited information exists with respect to the demographics of this group.[20] WardsAuto reports selected demographics for new vehicle buyers. For example the median income of buyers of 2013 model year passenger cars is re- ported to exceed $90,000, and approximately one-third of such vehicle buyers are 60+ years of age, while only about 4.5% are under age 25. Eighty-five percent of new light duty truck buyers were male in 2013, while 38% of new passenger car buyers were women.[21] Survey data collected by the Census Bureau and Bureau of Labor Statistics reports vehicle ownership patterns vary considerably by race.

Data suggest that a diverse group of consumers finance vehicle purchases, and possess, on average, better credit and higher incomes than the overall population. Beyond the demographics, consumers have preferences and constraints that inform their vehicle purchase and finance decisions, as well as the prices they face and their willingness to pay them. Those include, but are not limited to, the following:

- The type of vehicle (class, make, model and options).
  - Strength of preference for desired vehicles.
- Flexibility with respect to timing of purchase.
- Alternative forms of transportation.
- Purchase vs. lease.
- Intended length of use.
- Experience from previous vehicle purchases.
- Need to sell existing vehicle:
  - Trade-in or sell independently.
- Availability of cash to use as down payment.
- Aggregate and/or monthly budget.

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[20] New vehicles financed = 15.88M * .793 = $12.53M, plus market for used vehicles financed = 42M * .52 = $21.84M = 34.37M financed vehicle transactions.

[21] Source: WardsAuto

- Where to service the vehicle post purchase.
- Time, inclination and access to:
  - Multiple dealers.
    - Affinity for comparison shopping.
  - Online vehicle information sites (Edmunds.com, Truecar.com, Cars.com, Kelly Blue book, Autotrader, manufacturers' websites, etc.).
  - Financial resources:
    - Creditworthiness.
    - Financial literacy.
    - Existing non-auto relationships with banks or credit unions.
    - Other direct automotive financial institutions.

While consumers vary in their preferences and resources, a key difference among them is their access to and usage of the Internet. A group of researchers has studied the degree to which the Internet has lowered consumer prices in the retail automobile market and found that prices fell by 22% of a dealer's average gross vehicle profit. [22] Their findings are "consistent with the Internet facilitating information search and removing important cues that salespeople can use to assess a consumer's willingness to pay." [23] Further, their research suggests use of the Internet may neutralize pricing differences previously explained by differences in education and income, among other attributes. [24] Economic theory and research suggests that the consumer who arrives at the dealer with an understanding of the finance rates available through the direct channel is better positioned to extract lower finance rates in the indirect channel at the dealer and may obtain rates lower than available in the direct channel.[25]

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[22] Florian Zettelmeyer, Fiona Scott Morton, Jorge Silva-Risso, "How the Internet Lowers Prices: Evidence from Matched Survey and Automobile Transaction Data," *Journal of Marketing Research*, Vol XLIII (May 2006), 168-181.

[23] Fiona Scott Morton, Florian Zettelmeyer, Jorge Silva-Risso, "Consumer Information and Discrimination: Does the Internet *Affect the Pricing of New Cars to Women and Minorities?," Quantitative* Marketing and Economics, 1, 65-92, 2003.

[24] *Ibid.*

[25]For an interesting study of asymmetric information in retail automotive sales please see: Meghan Busse, Florian Zettelmeyer, Jorge Silva-Risso, "$1000 Cash Back: Asymmetric Information in Auto Manufacturer Promotions," NBER working paper series, Working Paper 10887 http://www.nber.org/papers/w10887.

3.3.2. TYPES OF FINANCIAL INSTITUTIONS

Collectively, thousands of banks, credit unions, captive and independent finance companies compete in the market to finance vehicles. While banks and credit unions lend in many consumer markets, non-bank captive and independent finance companies are quite specific to the automotive finance market.[26] Some non-banks may offer other products and services to the dealer or its customers.

Captive finance companies are highly unique versions of a non-bank finance company. Traditionally, captive finance companies were the wholly-owned subsidiaries of the vehicle manufacturers.   The "Big 3" Detroit manufacturers,[27] as well as the three major Japanese manufacturers,[28] have historically had captive finance subsidiaries that played an important role in retailing and financing new vehicles. For example, Ford Motor Credit is the captive finance company of Ford Motor Company, which manufactures Ford and Lincoln vehicles. In addition to financing consumers' vehicle purchases, captive finance companies offer numerous products and services to the dealers franchised by the captive finance company's manufacturer parent. These products address the commercial lending needs of the dealer, such as floor-plan financing, working capital loans, and construction loans; as well as finance and insurance (F&I) products, such as extended warranties and Guaranteed Auto Protection (GAP) insurance, that the dealer sells to vehicle purchasers.[29] Additionally, captive finance companies enter into agreements with the manufacturer-parent to offer subsidized customer incentives to the auto finance market.[30] A common example of such customer incentives are manufacturer-subvented finance rates (e.g. the 0.0% APR).

3.4.   MARKET CONCENTRATION

The automotive finance market in the U.S. is very diverse. In 2013, nearly 65,000 financial institutions financed vehicle purchases. The top 10 financial institutions accounted for only around 37.7% of all vehicle finance transactions, and no single

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[26] The larger non-bank auto finance companies include CarMax Auto Finance, Credit Acceptance and World Omni. Source: Experian Automotive.

[27] Chrysler Motors, Ford Motor, and General Motors.

[28] American Honda Motor, Nissan North America and Toyota Motor.

[29] Captive finance companies compete with banks, insurance companies and other finance companies to provide these products and services to the dealer.

[30] At times, other non-captive financial institutions may enter into agreements with manufacturers to provide manufacturer-sponsored customer incentives.

financial institution had more than 5.8% of the market.[31] The top 100 financial institutions combined accounted for only 68.6%, and conversely 15% of transactions were financed by institutions not among the top 1,000 financial institutions. See Table 1.

Table 1. 2013 Automotive Finance Market Shares			
Rank	Financial Institutions	Market Share	Cumulative Market Share
1	Wells Fargo Dealer Services	5.8%	5.8%
2	Ally	5.0%	10.7%
3	Chase Auto Finance	4.8%	15.5%
4	Toyota Financial Services	4.6%	20.1%
5	Capital One Auto Finance	3.8%	23.9%
6	American Honda Finance	3.6%	27.4%
7	Ford Motor Credit	3.4%	30.8%
8	Nissan Infiniti Financial Services	2.4%	33.3%
9	Bank of America	2.4%	35.6%
10	Santander Consumer Finance	2.1%	37.7%
	Top 50 Combined	-	63.4%
	Top 100 Combined	-	68.6%
	Top 1,000 Combined	-	84.3%

 Source: Experian Automotive

This differs significantly from concentration in the mortgage market, where the 10 largest mortgage originators accounted for over 52% of all originations in 2013.[32] A Herfindahl-Hirschman Index (HHI) follows in Chart 3, provided separately for new and used vehicle markets. This provides a measure of market competitiveness by year for the period 2005-2013. Even when financial institutions that financed fewer than 1,000 vehicles are excluded, the HHI indices are well below what the Department of Justice (DOJ) and Federal Trade Commission (FTC) would suggest are even moderately concentrated markets.

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[31] Data provided by Experian Automotive.

[32] See Inside Mortgage Finance Publications, *2013 Statistical Annual,* Volume I, Top 100 Mortgage Lenders.

Chart 3. Auto Finance Market Competitiveness

Source: Experian Automotive   [1] Per U.S. Department of Justice & Federal Trade Commission, Horizontal Merge Guidelines 5.2 (2010)
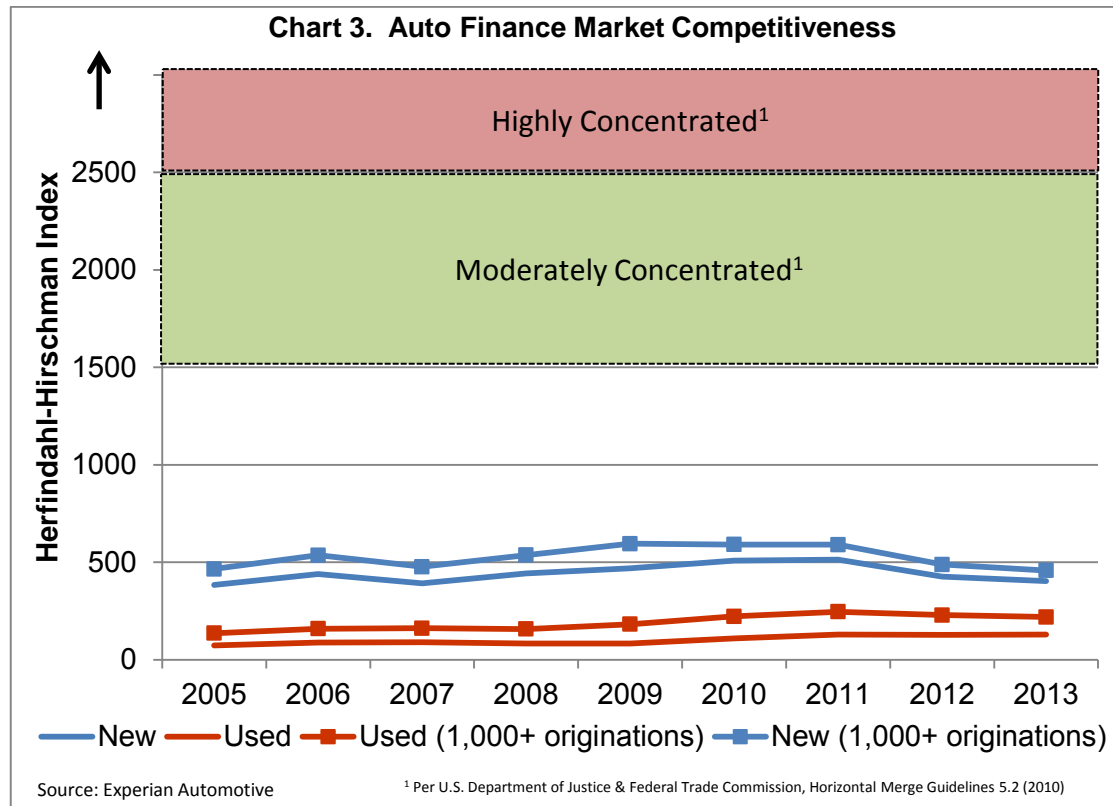
The HHIs calculated here appear to contradict the CFPB's market assessment as reported in their September 17, 2014 *Proposed Larger Participant Rule for Automotive Finance*, in which they note, "According to the Bureau's estimates based on Experian Automotive's AutoCount® database, the proposed automobile financing market includes over five hundred nonbank automobile lenders and is *fairly concentrated* [italics added]."

Financial institutions enter and exit the market with some frequency.   Experian Automotive data indicate that approximately 800 financial institutions entered the market after 2005 and each financed more than 1,000 vehicles during the period.[33] The converse is also true. There were approximately 1,000 financial institutions that financed more than 1,000 vehicles during the period, but were no longer in the market by January 2014. This phenomenon was heightened during the financial crisis, when numerous financial institutions tightened credit or exited the automotive

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[33] Based on analysis of financial institutions with at least 50 originations between January 2005 and January 2014.

finance space entirely. Conversely, as the vehicle market improved, numerous financial institutions entered, and in some cases re-entered, the market.

3.5.   SEGMENT SPECIALIZATION

Financial institutions often focus their activities in select segments of the auto finance market. While some financial institutions may compete in both the direct and indirect channels, it is more common to specialize in one or the other.   For example, captive finance companies generally focus on new and certified pre-owned segments and rarely compete in the direct channel.   Banks frequently focus on the prime and near-prime segments, while other financial institutions focus on subprime segments. Many non-bank finance company portfolios are comprised heavily of used vehicles. Some financial institutions are regional, while others have national coverage.

To better understand this specialization, we categorized the 50 financial institutions with the largest count of vehicle finance originations with regard to bank/non-bank, captive/non-captive, direct/indirect and credit market segments. We found the following:

- About half (55%) were banks.
- Approximately one third were captive finance companies or function as such for a manufacturer.
- About 8% were credit unions.
- Six financial institutions had portfolios comprised of more than 75% new vehicles, and all were captive finance companies.
- 28% had portfolios composed of more than 75% used vehicles.
- All 50 participate in the indirect channel, and several, generally banks, also participate in the direct channel.

3.6.   SOURCES OF CAPITAL

Financial institutions fund their lending activities through various sources of capital, including private investments, secondary markets (through securitization), deposits, wholesale lending arrangements with other financial institutions, and current capital. Each of these funding sources has an associated cost-of-borrowing and it may vary across sources and financial institutions. Depending on the nature of the financial institution, it may have access to some or all of these capital sources.   Many factors contribute to a financial institution's overall cost-of-borrowing, which in turn impacts the rates financial institutions offer dealers through the indirect channel and to consumers through the direct channel.   Differences in cost-of-funds may contribute

to the observed specialization across segments of certain financial institutions. For example, banks often focus on the prime market where the ability to offer lower rates is important. Non-depositories may compensate for higher borrowing costs by developing other advantages, such as strong customer relationships.

An important change in the automotive finance market during the last twenty years was the development of a secondary market for automotive finance asset-backed securities (AF-ABS). When the AF-ABS market originated in the mid-1980s, it was limited to the prime credit segment only. However, by the mid-1990s, AF-ABS markets for subprime and leases began to develop. During the ensuing 20 years, the AF-ABS market has increased seven-fold. See Chart 4.

Chart 4. Auto Finance -- Asset Backed Securities, 1986 to 2013 ($ Millions)

Source: www.abalert.com — Lease — Sub-Prime — Prime — All
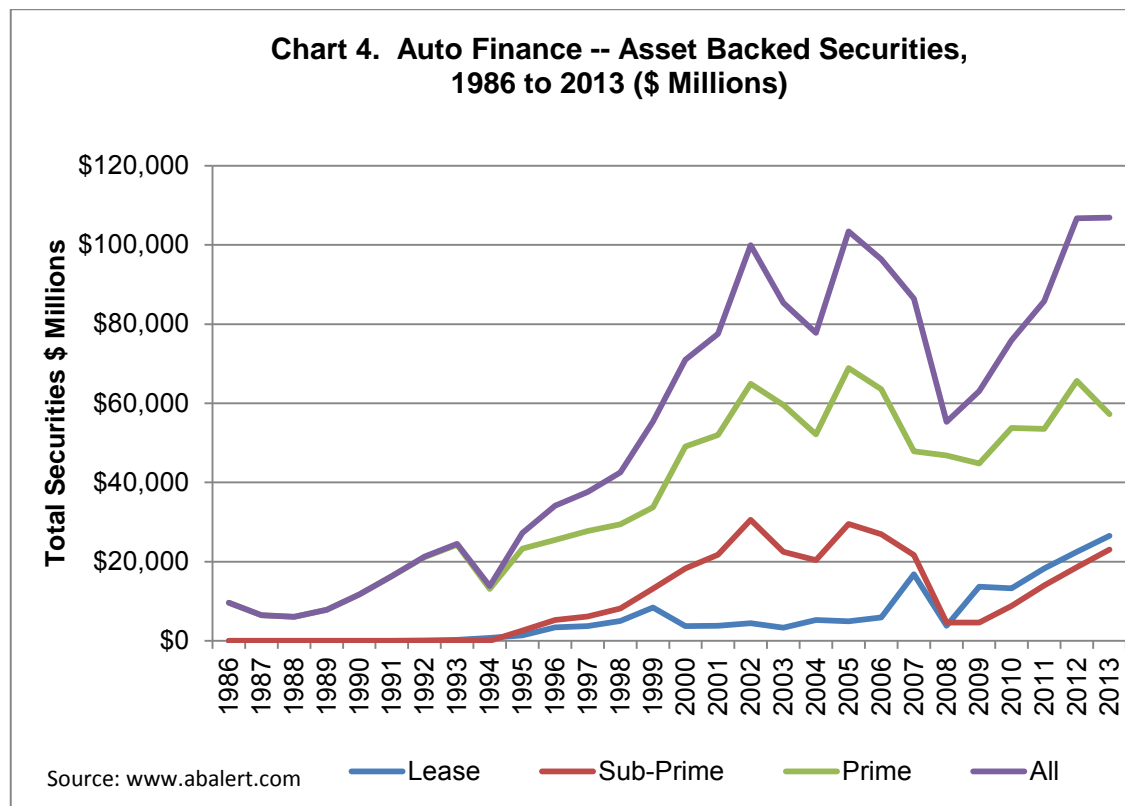
Secondary markets have provided significant liquidity, particularly to financial institutions operating in the subprime credit segment, expanding credit opportunities in that segment. During the Great Recession, while the residential mortgage backed securities (RMBS) markets virtually ceased to offer new issuances, the AF-ABS market was much less impacted. This is particularly true for the prime AF-ABS issuances. In part, the relative strength of the AF-ABS market reflects the significantly lower delinquency rates observed in the automotive credit markets relative to mortgage mar-

kets during the years 2008-2013. Data published by the Federal Reserve Bank of New York indicates that the 90+ day delinquency rates in auto finance have been less than that for student debt and credit cards since before 2003 and below that for student debt, credit cards, and mortgages since 2008.[34]

Delinquency rates in mortgage and auto markets have fallen in recent years so that by the first quarter of 2014 they are approximately the same as the levels observed prior to 2008, when mortgage delinquencies were at approximately half the rate of auto delinquencies.

3.7. COMPETITIVE FACTORS

Financial institutions operating in the indirect channel compete with one another on a number of dimensions in order to successfully source contracts from dealers. The indirect channel combines elements of a classic wholesale channel with elements of a commercial finance relationship. By offering dealers varying combinations of the following products and services, financial institutions find competitive advantages in the market and provide the dealer with improved financing options for its customers.

- Processing speed – Faster is better. When an application is submitted to the financial institution by the dealer, the speed with which the financial institution returns the underwriting decision and pricing to the dealer matters.
- Predictability – The dealer's ability to anticipate the financial institution's underwriting and pricing decision matters. This is particularly important on weekends, evenings and holidays when many consumers are shopping for vehicles, but the financial institution may not be processing applications.
- Segment specialization – Concentration in a particularly challenging segment, for example the subprime or used vehicles segments, where dealers may encounter more limited financing options.
- Product range offered to dealer – Offering the dealer a broad range of consumer and commercial financial products: floor-plan financing, construction loans, working capital lines, cash management services, and bank card processing broadens willingness of dealer to continue with financial institution relationship.

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[34] *Op Cit.*, "Quarterly Report on Household Debt and Credit," FRBNY, August 2014, available at: http://www.newyorkfed.org/householdcredit/2014-q2/data/pdf/HHDC_2014Q2.pdf

- Product range available to consumer – extended warranties, GAP insurance, and other ancillary products, sold to consumers by dealers' F&I departments, broadens options available to consumers.
- Flexibility – The ability of the dealer to request financial institution underwriting or pricing exceptions based on specific facts and circumstances appeals to dealers. For example, counter offers are more likely to help a dealer conclude a deal than are denials of credit.
- Continuity – A dedicated point(s) of contact at the financial institution who can review underwriting and pricing decisions or appeals to decisions enhances continuity from the dealer perspective.
- Prices (buy rates) – All else equal, lower is more competitive.
- Contract Compensation – All else equal, higher compensation makes the financial institution more attractive to a given dealer.
- Risk sharing – Sharing of prepayment and default risk matters, both in terms of percentage and time period. The lower the dealer's share of the risk, the more attractive the financial institution.
- Efficiency – A particular 'efficiency' development in the automotive finance market relates to online credit application networks such as Dealertrack, RouteOne, Open Dealer Exchange and others, which have significant relevance to understanding dealer compensation scenarios.

To expand relationships with dealers and compete in the market place, financial institutions over time have priced these wholesale and commercial products in numerous ways. Some common mechanisms include:

- Establishing dealer loyalty programs where lower buy rates are offered to dealers that meet certain criteria, such as:
  - Dealers that floor-plan with the financial institution.
  - Dealers that have other commercial lines of credit with financial institution.
  - Dealers with exclusive relationships who agree to submit every consumer application to the financial institution to consider.
- Charging lower prices on the floor-plan interest charges to dealers who achieve specified penetration rates.[35]
- Offering to purchase more of a dealer's non-prime and subprime contracts in exchange for a higher share of dealer prime contracts submitted to the financial institution.

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[35] In this context the penetration rate is measured from a financial institution's perspective as the percentage of as dealer's total retail contracts assigned to the financial institution.

- Providing the dealers that meet certain criteria with buy rate coupons that can be applied at the dealer's discretion to reduce the buy rate on a specific contract.
- Offering dealers cash management account services related to the funds transferred between the dealer and financial institution.
- Offering the dealer improved risk sharing arrangements in return for increased volume and/or better performing contracts.

That financial institutions focus on various market segments, have different costs-of-funds, compete on multiple dimensions and offer various products is well understood. In subsequent sections, we will consider the effect that these factors have on the analysis of dealer reserve in a fair lending context.

3.7.1. ONLINE CREDIT APPLICATION NETWORKS – THE EFFICIENT AUCTION

In the indirect channel, dealers have always performed the related tasks of collecting consumer information and submitting the completed credit applications to various financial institutions. Traditionally, both tasks could be time consuming. Until more recently, credit applications were often handwritten, incomplete and faxed to the financial institution, and frequently required significant exchange between the dealer and the financial institution. While the information sought by each financial institution had some commonality, there were also considerable differences historically. The process of submitting the credit application was ripe for improved efficiency.

In the early 2000s two companies were formed to offer the dealers an improved processing mechanism. Dealertrack and RouteOne, established in 2001 and 2002, respectively, built online credit application networks, allowing dealers to create credit applications online, obtain consumers' credit bureau reports and submit credit applications to financial institutions. Interestingly, RouteOne was formed by a group of captive finance companies: Ally Financial (then General Motors Acceptance Corp. (GMAC)), Ford Motor Credit Company, TD Auto Finance (then Chrysler Financial), and Toyota Financial Services.

Dealertrack and RouteOne have altered the automotive finance market in a manner analogous to how the Common Application has impacted the college admissions process.[36] Prior to the Common App, students were required to laboriously complete individualized college applications. Each one specified its own essay questions

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[36] https://www.commonapp.org/Login

and required highly customized answers.   The time necessary to complete each application was a major constraint, dictating the number of colleges to which one applied.   Prior to Dealertrack and RouteOne, dealers faced a similar constraint.   The automated submission platforms not only solved the time constraint, but also created a real-time market for pricing contracts.   As a result, the average number of financial institutions to which a dealer assigns contracts has steadily increased from approximately 7 in 2009 to nearly 10 during the first half of 2014.[37]   As we will see below, these averages greatly understate the number of financial institutions to which dealers assign contracts.

The participation of financial institutions and dealers in these online networks is significant. RouteOne reports 18,000 dealers and nearly 1,200 financial institutions participate in their network as of November 2014.[38] Dealertrack reports more than 1,400 financial institutions utilize their U.S. credit application processing network and more than 20,000 dealers utilize their services and products, resulting in more than 101 million processed transactions during 2013.[39]

The automated submission platforms have essentially allowed the dealers to conduct an auction for each contract among the financial institutions of their choosing. Arguably, the online credit application networks have shifted market power away from the financial institutions in the direction of the dealers and indirectly to consumers. This process enables dealers to meet or beat competitors' offers and provide the best possible rates and terms to their customers.

3.7.2. DEALERS

The vast majority of vehicle purchases occur at dealers, and all of the vehicle transactions referenced in the CFPB's March 2013 bulletin occurred at dealers. In the U.S. there are franchised dealers and independent dealers. Franchised dealers have agreements with vehicle manufacturers to sell the new vehicles of a specific "make" (i.e., Chevrolet, BMW, or Toyota), and they also sell used vehicles. NADA

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[37] *Automotive News*, F&I Report, August 13, 2014.

[38] http://www.routeone.com/finance-sources/indirect-auto-financing accessed on November 13, 2014.

[39] Dealertrack 2013 10-K Annual Report, at 6 and 31. Transactions are defined to included revenue-generating transactions processed in the U.S. Dealertrack, Dealertrack Aftermarket Services, Registration and Titling Solutions, Collateral Management Solutions and Dealertrack Canada networks.

reports there were 17,665 franchised dealers in 2013.[40] Independent dealers sell exclusively used vehicles, and there were approximately 37,026 operating in 2013.[41] The two dealer types share some similarities, as well as some important distinctions.

Similarities

Both franchised and independent dealers actively participate in the auto finance market and provide financing for a large majority of their vehicle-purchasing custom- ers. Neither act as a broker on behalf of the consumer.[42] While this may be obvious to some, a number of commentators have compared franchised dealers to mortgage brokers, presumably because dealers and mortgage brokers provide financing for consumers in their respective markets. Beyond that apparent similarity, the compar- ison falls short. Franchised and independent dealers stock inventories of vehicles and, frequently, parts that they sell to consumers.[43] They also purchase used vehi- cles directly from consumers, as well as from wholesale auctions. Both have F&I departments that commonly sell consumers warranty and insurance products and service contracts. Both make investments in facilities, equipment and personnel re- quired to sell and service vehicles.

Franchised and independent dealers combine products and services together in each transaction with a consumer. So while the transaction may begin with the test drive of a new or used vehicle, the transaction is likely to include a bundle of several products and services, including, for example, the service and maintenance of the vehicle post-sale. JD Powers Associates estimates that approximately 79.2% of new

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[40] NADA DATA 2014, at 5 available at: http://www.nada.org/NR/rdonlyres/DF6547D8-C037-4D2E-BD77-A730EBC830EB/0/NADA_Data_2014_05282014.pdf , last accessed September 8, 2014.

[41] 2014 NIADA Used Car Industry Report, at 16., available at: http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=3&ved=0CCwQFj AC&url=http%3A%2F%2Fwww.niada.com%2Fuploads%2Fdynamic_areas%2FBroV9gVnZiP 633Jla3e2%2F34%2FUCIR_2014_email_version.zip%3F&ei=1tcNVK_vJ8eyuASSsoCgCQ& usg=AFQjCNF3RBIbzUCbsDQjBTFFawikcrM7eg&bvm=bv.74649129,d.c2E, last accessed September 8, 2014.

[42] Arthur P. Baines and Dr. Marsha Courchane, "Automotive Finance: Will dealership finance reserve go the way of mortgage yield spread premiums?" available at: http://www.crai.com/uploadedFiles/Publications/Automotive-Finance-FE-Whitepaper-0313.pdf, last accessed September 8, 2014.

[43] As of July 1, 2014, franchised dealers had an inventory of 3.55M new vehicle inventories, or approximately 60 days supply, *Automotive News*, July 14, 2014 at 69.

vehicle financing is obtained through the franchised dealer.[44] Many new vehicle con-
sumers trade in a vehicle as part of the transaction. According to Manheim, a
wholesale used-vehicle auction house, "many dealers considered the provision of
used vehicle inventory through trade-ins to be the most important function their new
vehicle departments played in 2012."[45] Franchised dealer groups report more than
one F&I product included in the average transaction.[46] For example, Lithia Motors
Inc. and Group 1, publically traded companies that owns dealers, reported nearly
43% of vehicle sales included an extended service contract, and 22% of such sales
included GAP insurance.[47] These are consistent with NADA's published service
contract penetration rates.

The prices for many of these products and services are subject to negotiation, and
both the dealer and consumer have their respective reserve prices.[48] Consumers
negotiating vehicle purchases in today's market have considerably greater infor-
mation regarding the dealers' reserve prices, relative to the time periods studied in
earlier research.[49] With respect to arranging financing, dealers try to compete with
other dealers and with financing offers from the direct channel. From the perspective
of the dealer, each transaction represents the potential to earn revenue from the sale
of a set of products and services to the consumer. From an economic perspective,
the dealer and consumer are concurrently setting the prices for each of the products
and services included in the transaction.

For a variety of the reasons discussed above, dealers establish relationships with
multiple financial institutions.   Dealers require multiple commercial and wholesale
financial products and services. The online credit application networks have en-
hanced dealers' ability to work with multiple financial institutions with regard to ar-
ranging consumer financing. The dealers' F&I departments attempt to build relation-
ships with financial institutions that align with the market segments important to the

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[44] Richard Howse, How Different is the Indirect Channel from the Direct Channel? JD Power
& Associates, Mar 31, 2008.

[45] "2013 Used Car Market Report," Manheim, at 13, available at:
http://www.niada.com/uploads/dynamic_areas/wp6QIPSw6C83LYM1dGrU/287/Manheim%20
2013%20UCMR.PDF, last accessed September 8, 2014.

[46] "Public Group's Dual Focus: Car Sales, F&I," *Automotive News,* August 3, 2011.

[47] "Public group F&I results strike gold in Q4", Automotive News, February 19, 2014 and
"Weekly F&I Report," *Automotive News*, November 14, 2012.

[48] The Reserve price is the maximum/minimum price at which the consumer/dealer is willing
to complete the transaction.

[49] Ian Ayres and Peter Siegelman, "Race and Gender Discrimination in Bargaining for a New
Car," *American Economic Review*, Vol. 85, No. 3, June 1995, 304-321.

dealer – new, used, prime, and subprime.   While it may be easy to find financial institutions willing to purchase a contract for a new vehicle with a 85% loan-to-value (LTV) and a buyer FICO of 800, the dealer's challenge may be finding a financial institution offering a buy rate low enough to compete with the direct financing the buyer arranged prior to arriving at the dealer. Alternatively, a dealer may struggle to find a financial institution willing to purchase a contract for a buyer with a 550 FICO and recent bankruptcy, unless that dealer has relationships with financial institutions that specialize in the subprime segment.   Table 2 provides detail on the number of financial institutions to which dealers in California, Florida and Texas sold contracts.

Table 2. Financial Institutions to which Dealers Assigned Contracts							
			Number of Financial Institutions				
State	Measure	Metric	6-10	11-20	21-50	51+	Total
CA	Dealers	Count	978	937	1,011	568	6,767
		Share	14.5%	13.8%	14.9%	8.4%	100.0%
	Contracts	Count	66,291	139,724	776,107	1,316,934	2,360,406
		Share	2.8%	5.9%	32.9%	55.8%	100.0%
FL	Dealers	Count	769	558	835	221	7,226
		Share	10.6%	7.7%	11.6%	3.1%	100.0%
	Contracts	Count	51,887	85,956	736,595	549,830	1,560,334
		Share	3.3%	5.5%	47.2%	35.2%	100.0%
TX	Dealers	Count	1,635	1,067	985	806	19,510
		Share	8.4%	5.5%	5.0%	4.1%	100.0%
	Contracts	Count	135,702	143,835	389,053	1,572,052	2,474,393
		Share	5.5%	5.8%	15.7%	63.5%	100.0%

Source: Experian Automotive

The results are striking. Dealers have developed extensive networks of financial institutions. More than 80% of contracts were originated by dealers that assigned contracts to more than 20 financial institutions. More than half of all contracts in these states were originated by dealers that assigned contracts to more than 50 different financial institutions. That offers far more potential financing options than the average number of financial relationships per dealers that existed previously.

The degree to which a dealer values the competitive attributes of a given financial institution (see list above) varies according to the specific consumer for which the dealer is attempting to provide financing. The dealer has incentives to identify the lowest available buy rate – in that every dollar saved on the portion of finance charges accruing to the financial institution is potentially retained by the dealer through ei-

ther the dealer reserve subject to the effective cap, or the sale of other products and services in the transaction, or a combination of both. However, the dealer may have additional considerations as it contemplates the financial institution to which it will assign the contract, including whether the financial institution purchases contracts on a recourse or non-recourse basis and the conditions imposed on prepayment or default.

The options available to the dealer vary across financial institutions. Some financial institutions offer the dealer a choice of payment terms, while others do not. Common payments terms include:

1) Reduced upfront: under this scenario the dealer receives at contract origination a portion of the dollar value of the hypothetical dealer reserve calculated over the full term of the contract. The dealer generally has prepayment and default risk for anywhere from 90-160 days, after which the dealer is not subject to chargebacks of the dealer reserve. The portion varies across financial institution, but generally ranges from 70-80 percent. The percentage is determined, in part, by market forces and, in part, by the prepayment experience of the financial institution.
2) 100 percent upfront with chargebacks: under this scenario the dealer receives at contract origination the full dollar equivalent of the hypothetical dealer reserve calculated over the full term of the contract, and is subject to chargebacks during the life of the contract of the portion of the dealer reserve that does not materialize in the event of prepayment or default.
3) As-earned: under this scenario the dealer receives the portion of the consumer's finance charge associated with the dealer reserve each month the contract is in force. If the contract pays off early or defaults, the monthly payments to the dealer cease. In this scenario the dealer carries prepayment and default risk associated with the dealer reserve.

In situations without dealer reserve, the dealer will have an incentive to maximize the level of flat compensation available from the financial institution. The options available to the dealer may vary across financial institutions and commonly include a fixed dollar amount per contract, a fixed percent of the amount financed, or a combination of the two.

A further consideration involves whether or not the dealer needs to find a financial institution willing to purchase its less attractive contracts. In circumstances such as a contract for a buyer with an 800 FICO and a separate contract for a buyer with a 550 FICO, the dealers may attempt to negotiate a deal with a financial institution for as-

signing the 800 FICO contract only if the financial institution agrees to purchase the 550 FICO contract.

There are many other business reasons that impact the dealer's decision to assign the contract to a given financial institution.   The process is anything but random.

Differences between franchised and independent dealers

Important differences exist between franchised dealers and independent dealers. These differences emanate from the fact that franchise dealers sell new vehicles, are governed by franchise agreements with the relevant vehicle manufacturers, and are subject to extensive State franchise laws. Franchised dealers frequently have access to manufacturer-sponsored dealer and customer incentives. Franchised dealers are frequently supported by manufacturer-sponsored marketing programs.

Most state law and manufacturer franchise agreements require a franchised dealer to have the capability to service vehicles.[50] This applies to warranty and recall related servicing as well as general servicing of the vehicle. Franchised dealers must make investments in facilities, tools, computers, etc. required to service vehicles. For example, in 2013, franchised dealers maintained a $5.47 billion inventory of vehicle replacement parts.[51] Additionally, franchise agreements commonly require franchised dealers to maintain certain levels of customer satisfaction, capitalization, sales penetration, profitability, and facility investment. As such, franchised dealers require a significant amount of capital to fund physical facilities, inventory, payroll, and working capital.

As a result, franchised dealers have different, generally larger and more complex, cost structures than the average independent dealer, but also revenue opportunities not available to the independent dealer. For example, franchised dealers can generate significant revenue and related profits from their parts and service departments, while more than 30% of independent dealers have no service bays.[52] In our previous research, we have extensively examined the prices charged by the departments

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[50] For a discussion on the history of State Franchise laws see: Francine Lafontaine and Fiona Scott Morton, "State Franchise Laws, Dealer Terminations, and the Auto Crisis," *Journal of Economic Perspectives*, Volume 24, Number 3, Summer 2010, pages 233-250.

[51] *Op Cit.*, NADA DATA 2014, p. 12.

[52] *Op Cit.,* 2014 NIADA Used Car Industry Report, p. 10.

within franchised dealers, their associated cost structures and resulting profitability or losses.[53] We discuss this research in greater detail in subsequent sections.

3.7.3. VEHICLE MANUFACTURERS

In the automotive finance market, vehicle manufacturers have significant impact, primarily resulting from the practice of providing manufacturer-sponsored incentives in the market.   They use the incentives for a variety of reasons, such as:

- Reducing consumers' costs to finance vehicle purchases.
- Responding to competitive pressures.
- Reducing vehicle inventory levels at franchised dealers.
- Managing model-year changes.
- Smoothing highly seasonal sales patterns to better reflect the desire for constant production volumes.
- Launching new and/or redesigned vehicle models.
- Managing models through the product life-cycle.

Historically, the dollar volume which manufacturers spend on incentives is large, but varies over time. According to NADA, manufacturer-sponsored incentives in 2013 approached $2,500 per vehicle, somewhat below the per-unit peak of $2,932 during 2004.[54]   Manufacturer incentives come in four basic forms: dealer cash, customer cash, finance subsidies and lease subsidies. In 2013 these averaged approximately $300, $1,200 $2,600, and $4,100, respectively, per vehicle.   While customer cash and finance subsidies are visible to consumers, dealer cash generally is not. The effects of this asymmetric information structure have been reported in research studies that find dealers share a portion of dealer cash with customers even though it is generally not visible to them.[55]

Effectively, the manufacturer incentives reduce market prices for the vehicle and financing, which tend to increase demand, relative to levels without incentives. The impact of such incentives is not limited to the specific makes and models on which

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[53] *Op Cit.,* Baines and Courchane.

[54] NADA Used Vehicle Price Report: Incentive Analysis and Impact, Q4 2013, at 4 and 7. available at:
http://www.nada.com/B2B/Portals/0/assets/pdf/NADA%20UCG_White%20Paper_Incentive%20Analysis%20and%20Impact.pdf, last accessed September 8, 2014.

[55] *Op Cit.*, Meghan Busse, Florian Zettelmeyer, Jorge Silva-Risso, available at:
http://www.nber.org/papers/w10887

they are available.   For example, if Ford puts a 0.9% special finance rate on two-wheel drive F150 pickup trucks in the Northeast, this puts downward pressure on prices of the F150's competitors from other manufacturers.   The incentives also put downward pricing pressure on used pickup trucks that consumers consider to be alternatives to a new F150.[56] To the extent that financial institutions have leased F150's or its competitors in their portfolios, the incentive may impact the profitability (or lack thereof) of those leases.

It is hard to overstate the complexity of these manufacturer-sponsored incentives. The NADA study referenced above examines the intended and unintended impacts of these commonly used incentives. At any point in time, there may be thousands of unique incentives in the market. Commonly, they are model, trim and geographically specific, as in the hypothetical Ford F150 example above.   Frequently, the customer cash and finance subsidy incentives are structured as alternatives: cash rebate or special finance rate. Each has different rules with respect to dealer reserve and the financial institution to which the contract is assigned.   The cash rebate will be available to the consumer regardless of whether and with whom they finance the vehicle, while the special finance rate will be available only through dealer provided financing in the indirect channel with a specific financial institution -- generally the manufacturer's captive finance arm.

3.7.4. BRINGING IT ALL TOGETHER – TRANSACTIONS

In order to consummate the purchase of a vehicle with indirect financing provided by the dealer, the following steps must be completed:

1. The products and services included in the transaction must be agreed between dealer and consumer.
2. Prices for the included products and services (including the price of vehicle, trade-in value, and price of other F&I products) must be agreed between dealer and consumer.
3. Completed credit application must be submitted by the dealer through online credit application network to one or more financial institutions.
4. Financial institutions must agree to purchase the contract from dealer
5. Financial institutions and dealer must agree on buy rate and other key terms such as LTV and financing term.
6. Contract terms (e.g. amount financed, term and APR) must be agreed between dealer and consumer.

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[56] *Op Cit.*, NADA Used Vehicle Price Report: Incentive Analysis and Impact, Q4 2013, at 2.

7. Dealer must complete documentation requirements and comply with any conditions of the financial institution.

8. Consumer leaves the dealer in a newly purchased vehicle.

9. Dealers must assign contracts to financial institutions and provide the final contract and related documents.

10. The financial institution must compare the actual final contract to what it approved on-line, generally rescoring and re-pricing the contract based on the actual final contract.

11. The dealer and financial institution must finalize compensation to dealer for contract assignment.

In addition to the complexities already discussed, an additional intricacy exists. The steps detailed above need not, and rarely do, occur in this sequence. This particularly applies to spot delivery transactions, in which the dealer and consumer agree upon the terms of the contract and the consumer takes delivery of the vehicle before the financial institution has reviewed the consumer's credit applications. In such transactions, the consumer agrees that the contract may be rescinded if the financial institution does not approve the contract on the terms submitted. Spot deliveries are unique to automotive financing and no corollary exists in mortgage markets. When spot deliveries occur, the dealer reserve is arguably an artifact of the contract rate set by the dealer, rather than the explicit 'marking-up' of a buy rate.

On all contracts, it is only after the dealer provides the final contract documents to the financial institution, that the financial institution validates the contract terms; rescores, re-prices and funds the contract; and finalizes dealer compensation associated with contract assignment. The dealer has important contractual obligations to extinguish its floor plan line of credit and pay the providers of other products and services included in the transaction, such as the provider of an extended service contract.

Given the unique circumstances surrounding these transactions at the dealership, the comparison to mortgage brokers that regulators appear to rely upon is at best superficial. To recognize the absurdity of the comparison, consider the situation in which the house-buying consumer purchased the real estate from an inventory of such properties owned by the broker, while at the same time the broker bought the consumer's current property, sold the consumer a property and casualty insurance policy, a warranty, and service contract on the house, and then eight months after the sale the homeowner called the broker to send someone to paint the house and to fix a leaking roof. Clearly this does not happen in the world of mortgage brokers. It does, however, happen with vehicle purchases for which the dealer and the consumer are simultaneously pricing multiple products and services in a single transac-

tion, while the mortgage broker and the consumer price a single product in a transaction that is dependent on a series of related but separate transactions. Both markets are highly complex, but starkly different.

In Section 5, we analyze and discuss the prices observed in the current market place.

4.   FAIR LENDING COMPLIANCE FOR INDIRECT AUTOMOTIVE FINANCE

4.1.   BACKGROUND

Indirect auto finance is the focus of renewed and heightened regulatory scrutiny. The CFPB has issued a Bulletin regarding fair lending risk in indirect auto finance, and it purports to be cooperating with the DOJ on ongoing investigations, while coordinating with its sister agencies (the Federal Reserve Board (FRB), the Federal Deposit Insurance Corporation(FDIC) and the Office of the Comptroller of the Currency (OCC)) to develop acceptable methodologies and operations for the examination and supervision of the indirect auto finance market with respect to fair lending risk.

The regulatory authority of the various agencies with respect to fair lending is complicated, sometimes overlapping, and occasionally uneven. Created by the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 ("Dodd-Frank Act"), the CFPB was given broad authority over various companies involved in consumer finance activities. This includes bank and non-bank institutions, credit rating agencies, mortgage brokers, loan servicers, etc. Notably, the CFPB's authority does not extend to dealers.[57] The CFPB has made it a priority to 'even the playing field' with respect to its regulatory authority over certain consumer finance products, including indirect auto finance. For example, prior to the creation of the CFPB, banks were subject to recurring fair lending exams by their respective Federal regulators, however non-banks were not. On October 8, 2014, the CFPB announced a proposed larger participant rule covering the auto finance market, which would extend its examination authority to cover non-banks.[58] Both the CFPB and DOJ

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[57] The CFPB does have authority over "buy-here pay-here" dealers.

[58] CFPB authority covers certain financial institutions above specific size thresholds. See 12 U.S.C Title 12 §5515. Supervision of very large banks, savings associations, and credit unions provides for coverage of (1) an insured depository institution with total assets of more than $10,000,000,000 and any affiliate thereof; or (2) an insured credit union with total assets of more than $10,000,000,000 and any affiliate thereof. See

have enforcement authority with respect to fair lending and consumer finance. A memorandum of understanding (MOU), among the federal supervisory agencies provides a framework for the coordination of their enforcement authority in this area.[59] An MOU also exists between the CFPB and DOJ.[60] In addition, cooperation is intended between the CFPB and the state banking and financial regulatory agencies.[61]

Dealers are subject to regulatory oversight from the FTC, and that agency has brought enforcement actions against a number of dealers during 2014.[62] This exercise of regulatory authority over financial institutions and dealers has significant relevance to the implementation of standards and methodologies for the examination of fair lending risk in the automotive finance market.   While the CFPB has recognized the value provided by dealers who provide retail installment sales contracts for buyers and that dealers deserve fair compensation for that role, the CFPB clearly believes that there is a potential fair lending risk present when dealers can discount the contract rate or when dealer reserves exist.[63] The CFPB, however, has no authority to regulate dealer behavior directly.   The CFPB does have regulatory authority over many financial institutions to which the dealers assign the finance contract.   In the current regulatory landscape, the CFPB vigorously exercises that authority.

This bifurcated regulatory authority requires focus on the examination of indirect automotive finance contracts. For the last ten years, when looking at mortgage originations, regulators required focus on segments (geographic or loan product type) of the market. In fact, even when no disparities were identified at a portfolio level, regulators insisted discrimination could still exist, in, for example, local metropolitan statistical areas (MSA) or at the hands of individual loan officers (retail channel) or wholesale brokers. In the case of indirect auto finance, because the

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https://www.federalregister.gov/articles/2012/05/25/2012-12718/procedural-rules-to-establish-supervisory-authority-over-certain-nonbank-covered-persons-based-on#h-9

[59] See http://files.consumerfinance.gov/f/201206_CFPB_MOU_Supervisory_Coordination.pdf.

[60] See http://files.consumerfinance.gov/f/201212_cfpb_doj-fair-lending-mou.pdf

[61] See http://files.consumerfinance.gov/f/201212_cfpb_statement_of_Intent_for_sharing_information_with_sbfsr.pdf

[62] See http://www.ftc.gov/news-events/media-resources/consumer-finance/auto-marketplace and http://www.ftc.gov/news-events/press-releases/2014/01/ftc-announces-sweep-against-10-auto-dealers for recent enforcement actions.

[63] CFPB Bulletin 2013-02 at 1.

CFPB cannot exercise examination authority over individual dealers, the agency focuses primarily on the portfolio level. The result of this is that even if no individual dealer has any disparities among consumers with whom business is conducted, aggregation within any particular finance company's portfolio across dealers may still lead to a finding of disparate impact.

Evidence of the heightened focus on indirect auto finance can be observed by reviewing three recent issuances from the CFPB: 1) the CFPB Bulletin addressing indirect auto financing and compliance with ECOA, 2) the December 2013 announcement that the CFPB had entered into consent orders with Ally Bank and Ally Financial (Ally) regarding the fair lending implications of allowing dealer discretion in pricing, and 3) the Summer 2014 Supervisory Highlights (Supervisory Highlights) and White Paper on proxy accuracy.[64]

The CFPB takes the position that indirect auto finance companies are liable under ECOA for pricing disparities caused by the financial institution's policies that allow dealers discretion in pricing finance contracts (e.g. establishing the price the dealer will charge for entering the finance contract for the buyer).[65] The Bulletin makes clear that the CFPB defines indirect auto lenders to include: depository institution, non-bank affiliates of depository institutions, independent nonbanks, and captive nonbanks.[66] In the Bulletin, the CFPB suggests it would be better to move toward "eliminating dealer discretion to mark up buy rates and fairly compensating dealers using another mechanism, such as a flat fee per transaction, which does not result in discrimination."[67] The Bulletin appears to parallel the approach to fair lending compliance that has resulted from regulatory enforcement actions against lenders in the mortgage brokerage space.

The CFPB Bulletin identifies features of a strong fair lending compliance management program, including the "regular analysis of loan data in all product areas for potential disparities on a prohibited basis in pricing, underwriting or other aspects of the credit transaction."[68] The Bulletin makes clear the CFPB's position regarding dealer

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[64] "Using publically available information to proxy for unidentified race and ethnicity A methodology and assessment," CFPB, Summer 2014, released on September 17, 2014, available at: http://www.consumerfinance.gov/reports/using-publicly-available-information-to-proxy-for-unidentified-race-and-ethnicity/, last accessed October 19, 2014.

[65] *Op Cit*, CFPB Bulletin 2013-02 at 2.

[66] *Op Cit*, CFPB Bulletin 2013-02 at 1.

[67] *Op Cit*, CFPB Bulletin 2013-02 at 4.

[68] *Op Cit*, CFPB Bulletin 2013-02 at 4.

discretion, stating that "an indirect auto lender that permits dealer markup and compensates dealers on that basis may be liable for these policies and practices if they result in disparities on a prohibited basis."[69] The CFPB expects quantitative monitoring of the dealer discretion, suggesting the monitoring should be performed for each dealer from which the financial institution purchased contracts and across the aggregated portfolio.

While the CFPB and other regulators are highly focused on one specific component of the cost of credit to the consumer, which is the dealer reserve or 'markup' available to dealers ,[70] the examination of this single price in isolation from the rest of the transaction and related market dynamics presents challenges and increases the potential for reaching erroneous conclusions. Understanding the market requires both an explanation and quantification of key aspects of this market.

The Ally consent orders provide some limited insight into the analytical framework through which the CFPB is analyzing this issue; however, neither these consent orders, the Bulletin, or the CFPB White Paper provide specifics on the analytic methods the CFPB uses to estimate disparities, quantify consumer harm or identify harmed consumers or the methods that it might expect financial institutions to use.[71] Based on our knowledge and experience the CFPB's analytical framework can be summarized in four steps:

1. Develop proxies for race and ethnicity for each contract in the portfolio.
2. Estimate the raw pricing disparities, measured in basis points, across race and ethnicity groups.
3. Quantify the total amount of "harm," measured in dollars, across the entire portfolio.
4. Identify the contracts associated with harmed consumers.

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[69] *Op Cit*, CFPB Bulletin 2013-02 at 3.

[70] *Op Cit*, CFPB Bulletin 2013-02 at 2.

[71] The CFPB White Paper addresses only proxy methods. It sheds no light on how the CFPB analyzes proxied contracts and measures disparities.

From public presentations, it is clear that various federal regulators utilize different approaches to address key analytical challenges.[72]   We address these differences in subsequent sections.

4.2.   ECOA – DISPARATE IMPACT AND TREATMENT

The Equal Credit Opportunity Act was passed by Congress in 1974 and was implemented through the Federal Reserve Board's Regulation B (Reg B). According to the FRB's Consumer Compliance Handbook, 'The statute requires financial institutions and other firms engaged in the extension of credit to "make credit equally available to all creditworthy consumers without regard to sex or marital status." Moreover, the statute makes it unlawful for "any creditor to discriminate against any applicant with respect to any aspect of a credit transaction (1) on the basis of race, color, religion, national origin, sex or marital status, or age (provided the applicant has the capacity to contract); (2) because all or part of the applicant's income derives from any public assistance program; or (3) because the applicant has in good faith exercised any right under the Consumer Credit Protection Act." In keeping with the broad reach of the prohibition, the regulation covers creditor activities before, during, and after the extension of credit.' [73]

Except with respect to dealers and other specified creditors, the Dodd-Frank Act transferred the implementation authority over Regulation B from the FRB to the CFPB and granted rule-making authority under ECOA to the CFPB and, with respect to entities within its jurisdiction, granted authority to the CFPB to supervise for and enforce compliance with ECOA and its implementing regulations.[74]

Regulatory agencies, including the CFPB, have generally defined three methods of proving lending discrimination under ECOA. The 1994 Interagency Task Force on Fair Lending, which was adopted by all of the relevant federal regulatory agencies, defines the methods as follows:

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[72] See "Indirect Auto Lending: Fair Lending Considerations," Outlook Live Webinar, August 6, 2013, Consumer Financial Protection Bureau, Federal Reserve Board and U.S. Department of Justice, available at: http://www.philadelphiafed.org/bank-resources/publications/consumer-compliance-outlook/outlook-live/2013/indirect-auto-lending.cfm, last accessed September 8, 2014.

[73] http://www.federalreserve.gov/boarddocs/supmanual/cch/fair_lend_reg_b.pdf, last accessed September 8, 2014.

[74] http://files.consumerfinance.gov/f/201306_cfpb_laws-and-regulations_ecoa-combined-june-2013.pdf, last accessed September 8, 2014.

- "Overt evidence of discrimination," when a lender blatantly discriminates on a prohibited basis;
- Evidence of "disparate treatment," when a lender treats applicants differently based on one of the prohibited factors; and
- Evidence of "disparate impact," when a lender applies a practice uniformly to all applicants but the practice has a discriminatory effect on a prohibited basis and is not justified by business necessity.[75]

In an April 2012 bulletin, the CFPB reaffirmed its view that the legal doctrine of disparate impact remains applicable as the CFPB exercises its supervision and enforcement authority to enforce compliance with ECOA and Reg B.[76]

Examination for evidence of disparate impact, sometimes referred to as the "effects test," requires application of a multiple-step test.[77] A thorough understanding of the disparate impact method is absolutely essential to understand the current regulatory activity related to dealer pricing discretion. The Federal Financial Institution Regulatory Guidance 09-06 explained the disparate impact test as follows.

> When a lender applies a racially or otherwise neutral policy or practice equally to all credit applicants, but the policy or practice disproportionately excludes or burdens certain persons on a prohibited basis, the policy or practice is described as having a "disparate impact."

> The fact that a policy or practice creates a disparity on a prohibited basis is not alone proof of a violation. When an Agency finds that a lender's policy or practice has a disparate impact, the next step is to seek to determine whether the policy or practice is justified by "business necessity." The justification must be manifest and may not be hypothetical or speculative. Factors that may be relevant to the justification could include cost and profitability. Even if a policy or practice that has a disparate impact on a prohibited basis can be justified by business necessity, it still may be found to be in violation if an alternative policy or practice could serve the same purpose with less discriminatory effect. Finally, evidence of discriminatory intent is not necessary to es-

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[75] See guidance for the Federal Financial Institution Examination Council members at http://www.federalreserve.gov/boarddocs/caletters/2009/0906/09-06_attachment.pdf ("FFIEC 09-06"), last accessed September 8, 2014.

[76] CFPB Bulletin 2012-04 (Fair Lending), available at:
 http://files.consumerfinance.gov/f/201404_cfpb_bulletin_lending_discrimination.pdf, last accessed September 8, 2014.

[77] *Ibid*, CFPB Bulletin 2012-04 (Fair Lending).

tablish that a lender's adoption or implementation of a policy of practice that has a disparate impact is a violation of the FHAct or ECOA.[78]

While there is debate about the legal doctrine of disparate impact and its applicability under ECOA, clearly the intent of the CFPB, DOJ, and private plaintiffs is to apply the doctrine to consumer lending.[79]

In indirect auto finance in the late 1990s and early 2000s, private plaintiffs sued numerous financial institutions under the disparate impact legal doctrine, alleging that their policies regarding dealer reserve violated ECOA. These litigations were settled, generally with defendants agreeing to put in place additional controls regarding dealer reserves.[80] Generally, the agreed caps were progressive by term, whereby longer terms were subject to lower caps.

In 2007, two independent dealers, Springfield Ford Inc. (Springfield) and Pacifico Ford Inc. (Pacifico), entered separate Consent Orders with the DOJ to resolve claims that they violated ECOA with respect to the dealer reserves charged to African American consumers.[81] The dealers agreed to start all dealer reserve negotiations from the same starting point, measured in basis points (bps), and deviate downward "only for a good faith, competitive reason that is consistent with ECOA."[82] The orders define seven reasons that are consistent with ECOA, to include:

- A lower cap imposed by the financial institution for the particular transaction.
- A constraint on the customer's ability to satisfy monthly payment requirements.
- A statement by the customer that he or she has access to an equal or more favorable offer from another dealer or financial institution.
- A special promotional offer extended to all customers on the same terms.

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[78] *Op Cit*, FFIEC 09-06 at 6.

[79] The Supreme Court (The Court) recently agreed to hear a case regarding whether disparate impact theory is applicable under the Fair Housing Act, which as noted in the FFIR guidance, is structured similarly to ECOA. It is the third such case the Court has agreed to hear, however, as the first two cases settled prior to The Court rendering a decision.

[80] http://www.nclc.org/litigation/case-index-closed-cases.html, last accessed September 8, 2014.

[81] http://www.justice.gov/opa/pr/2007/August/07_crt_639.html, last accessed September 8, 2014.

[82] http://www.justice.gov/crt/about/hce/documents/pacifico_order.pdf, at 4, and http://www.justice.gov/crt/about/hce/documents/springfield_order.pdf, at 4, last accessed September 8, 2014.

- The fact that a particular transaction is eligible for subvented interest rates.
- The fact that the transaction is eligible for Springfield/Pacifico Ford's employee incentive program.
- Documented inventory reduction considerations related to specific vehicles.

These seven reasons recognize many of the economic and business realities described above, and their causal impact on observed dealer reserve prices.

4.3. FAIR LENDING AND DEALER RESERVE

During the last two years, the CFPB has increased its scrutiny on fair lending with respect to indirect automotive finance. It is not always clear whether the agency is applying a disparate treatment test or a disparate impact test during its examinations. It is also unclear whether or not model controls that might impact dealer reserve are allowed during the consideration of these matters.

The CFPB's Bulletin, subsequent public comments and the Ally consent orders strongly suggest that the CFPB and DOJ believe that their analysis can determine evidence of disparate impact by comparing average differences on dealer reserve between minority and non-Hispanic white consumers, in the absence of explanatory factors, competitive factors, or dealer specific factors that might impact the level of dealer reserve. The CFPB's Supervisory Highlights serves to further suggest the CFPB believes a disparate impact theory applies to dealer reserve.

> "Findings of disparities in discretionary markup in an indirect auto lender's portfolio typically constitute a pattern or practice of discrimination if the disparities cannot be justified by a 'legitimate business need that cannot reasonably be achieved as well by means that are less disparate in their impact.'"[83]

At a CFPB-sponsored Automotive Finance Forum in November of 2013, senior representatives of the CFPB asserted that their analyses have identified circumstances where "similarly-situated" minority buyers paid higher dealer reserves. In the Ally consent order, the CFPB reported that they were unpersuaded by Ally's rationale for including controls in the analysis, stating that "Respondents failed to provide adequate evidence that additional variables appropriately reflected legitimate business needs." Consequently, with the exception of avoiding any comparison of consumers who received subvened interest rates to those who did not receive subvened interest

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[83] CFPB Supervisory Highlights, Summer 2014, released September 17, 2014, at 13-14, available at: http://files.consumerfinance.gov/f/201405_cfpb_supervisory-highlights-spring-2014.pdf, last accessed October 22, 2014.

rates, the disparities reported appear to be raw differences.[84] This implies that all of the consumers being compared were 'similarly situated' even though no attempt was made to ensure that they were similarly situated.

Perhaps the CFPB's approach reflects the statutory limits of its authority, whereby it has broad supervisory and enforcement authority of financial institutions, but no authority over dealers engaged in indirect financing.[85] However, in its Bulletin, the CFPB describes the relevant policy as follows, "…auto lenders have policies that allow auto dealers to mark up lender-established buy rates that compensate dealers for those markups in the form of reserve…"[86] The CFPB goes on, "Because of the incentives these create, and the discretion they permit, there is a significant risk that they will result in pricing disparities on the basis of race, national origin and potentially other prohibited bases."[87]

The CFPB's description makes clear that an accurate analysis of pricing disparities, unlike a traditional disparate impact fair lending test, critically hinges on an assessment of how dealers are exercising the discretion afforded them under these policies. Key to their argument is the phrase "the discretion they permit." This is consistent with the DOJ consent orders with Pacifico and Springfield, which recognized that numerous economic and business realities at the dealer-level have a causal outcome on dealer reserves.

This approach has some parallels in two areas commonly analyzed in the fair lending context -- underwriting and traditional risk-based pricing. In such analyses, it would be common to estimate raw denial rates two or more times higher for some minority applicants relative to non-minority applicants. In our experience, this fact alone would rarely generate regulatory concern. Further, it is common for these areas to involve varying degrees of judgment or discretion, from exceptions to underwriting decisions to adjustments to par pricing, and the mere presence of discretion would not result in raw disparities becoming the metric of concern. It is understood that differences in raw average denial rates generally reflect differences between minority and non-minority applicants in average wealth accumulation, income and credit worthiness as measured by commonly used credit scores, down payments and re-

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[84] See http://files.consumerfinance.gov/f/201312_cfpb_consent-order_ally.pdf, last accessed September 8, 2014.

[85] The CFPB has authority with respect to 'buy-here, pay-here" dealers.

[86] CFPB Bulletin 2013-02 at 2.

[87] CFPB Bulletin 2013-02 at 1.

serves.[88] It is only after the consideration of these and other relevant and non-prohibited explanatory factors that estimated differences on a prohibited basis give rise to regulatory concern. Rarely also would fair lending examinations of pricing decisions proceed without control variables needed to reflect similar products and consumers.

However, this parallel extends only so far. In underwriting and traditional risk-based pricing, generally the financial institution alone makes the final decisions, and they are generally guided by extensive policies, procedures and practices that govern the use of automated models and discretion. In the case of dealer reserve, it is the dealer who exercises the discretion in the context of a transaction with multiple prices simultaneously negotiated and where the relevant policies, procedures, practices and business realities are primarily those of the dealers. The analysis is further complicated because, as discussed above, the dealer commonly has the option to assign the contract to one of numerous financial institutions, each with potentially different policies governing dealer reserve discretion. Further, financial institutions rarely afford dealers unbridled discretion. Rather, dealer reserve is commonly subject to caps, which frequently vary by term (longer terms, lower caps), credit quality (lower credit tiers, lower caps) or specific models and geographies in the context of manufacturer-sponsored subvention programs (generally zero dealer reserve). The most prevalent caps are 250 bps on terms 60 months or less and 200 bps on terms longer than 60 months. [89, 90] As average contract lengths have increased, a larger share of contracts is subject to the relatively common 200 bps cap. These trends are observed in the CRA Contract Data as reported in Appendix I. Additionally, there are variations in the complexity of these cap structures.

The complex, multi-party nature of these transactions among consumers, dealers, vehicle manufacturers and multiple financial institutions gives rise to a number of challenges to the assessment of dealer discretionary pricing, at either the dealer level or the financial institution portfolio level.

Challenges include:

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[88] See Squires, Gregory D. and Charis E. Kubrin, 2006, *Privileged Places: Race, Residence and the Structure of Opportunity*, Lynn Rienner Publishers, Inc., Boulder, CO.

[89] *Op. Cit.*, CFPB Supervisory Highlights, 2014.

[90] The settlements reached in the private litigations on dealer reserve established caps that differ by length of contract: 250 bps on terms less than 61 months, and 200 bps on terms longer than 60 months.

- The race, ethnicity and gender of the vehicle buyer(s) are unknown to the financial institution and its regulators, as financial institutions are prohibited from collecting this information in the automotive finance market.

- The vehicle purchase transaction includes complex sequential decisions made by both the dealer and consumer, which result from the components of the vehicle purchase (new, used, trade-in, options, insurance, warranties, servicing). Given these complexities and the resultant pricing dynamics, attempts to evaluate the cost of financing in isolation from the prices of other products and services accompanying the vehicle purchase, presents many challenges and increases the potential for drawing erroneous conclusions.[91]

- Many dealer specific, supply-side, factors impact the dealer's pricing and profitability on the vehicle purchase transactions and thus the amount of dealer reserve. While the DOJ has recognized that several of these factors may have a direct impact on dealer reserves, these factors are generally unknown to the financial institution and regulators.[92]

- Many consumer specific, demand-side, factors impact the consumer's willingness and/or ability to purchase the vehicle and/or associated products and services and may also impact the amount of dealer reserve. Here again, the DOJ has recognized that several of these factors may have a direct impact on dealer reserves; however, these factors are generally unknown to the financial institution and regulators.[93]

- Differences in pricing strategies across dealers may, when aggregated to financial institution's portfolio level, create the appearance of differential pricing on a prohibited basis when none exists.

- Finally, given the highly competitive nature of automotive finance, each financial institution observes the pricing of only a subset of a dealer's contract portfolio, rather than that of the entire dealer portfolio. The assignment of contracts is not random, and may reflect the dealer's desire to maximize reserve for a given buy rate, which suggests that conclusions about dealer compensation patterns cannot be ascertained from the analysis of the con-

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[91] In previous research, the authors have extensively examined this pricing dynamic and found that dealers price these transactions, on average, at a level that does not generate net profits. See Baines and Courchane, 2014.

[92] See DOJ Consent Orders in Pacifico and Springfield at: http://www.justice.gov/crt/about/hce/documents/pacifico_order.pdf, at 4, and http://www.justice.gov/crt/about/hce/documents/springfield_order.pdf, at 4, last accessed September 8, 2014.

[93] *Ibid*, DOJ Consent Orders in Pacifico and Springfield

tracts assigned to a given individual financial institution but would require focus on the individual dealers' full books of business.

4.4.   IDENTIFYING RACE AND ETHNICITY FOR VEHICLE PURCHASES

Financial institutions generally are prohibited from collecting race/ethnicity information in the automotive finance market. Fair lending analysis requires the construct of proxies. Proxy methods have been used for non-HMDA reportable loan products since the mid-1990s. This includes, but is not limited to home equity loans, direct and indirect automotive finance, credit cards, student loans and small business loans. In these areas, race, ethnicity and gender proxies are commonly used to analyze general fair lending compliance issues related to underwriting of credit applications and pricing of the originated products. During this time, regulatory authorities and the financial institutions over which they have authority have used various methods based on publicly available information from the Census Bureau to proxy these attributes. The most commonly used proxy method simply relied on the protected class share of population in a Census tract. For example, a majority-minority Census tract has a population that is more than 50% minority.

The use of a proxy necessarily inserts uncertainty into the identification of a consumer's race or ethnicity or gender as all current methodologies depend upon the use of probabilistic measures to assign race/ethnicity. The use of Census Bureau data to develop race and ethnicity proxies raises a number of questions concerning the accuracy of the proxies for consumers with different race/ethnicity indicators, potential bias in the measures, and potential mitigations for the biases, if any. Prior to addressing those questions, the Census Bureau data metrics are discussed.

Census Bureau population counts are available by race/ethnicity for specific geographies.[94] The Census Bureau reports population counts at various geographic levels, which are, from largest to smallest: State, county, tract, block group and block. In the 2010 Census there were 73,057 tracts, 217,740 block groups and 11,078,297 blocks.[95]   As such, the average population of a tract was approximately 4,240, while the average population of a block was just 29.[96] As an example, the

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[94] http://www2.census.gov/census_2010, last accessed September 8, 2014.

[95] https://www.census.gov/geo/maps-data/data/tallies/tractblock.html, last accessed on November 13, 2014.

[96] Based on a 2010 total U.S. population of 308.4M and excluding the water only tracts and blocks.

Census Bureau counts of the 18 and older population (18+) and the associated shares for a tract in Washington, DC are presented in Table 3.[97]

Table 3. Population, 18 and Over, Tract 0050.02 - Washington, DC				
Race/Ethnicity	**Tract Counts**	**Intra-Tract Shares**	**U.S. 18+ Population Count**	**Share of U.S.**
Hispanic	1,340	24.5%	36,138,485	0.0037%
African American	1,008	18.4%	27,327,470	0.0037%
Asian/Pacific Islander	307	5.6%	11,637,514	0.0026%
American Indian	15	0.3%	1,600,043	0.0009%
White	2,693	49.2%	157,123,289	0.0017%
2+ Races	109	2.0%	3,177,961	0.0034%
Total	5,472	100.0%	237,004,762	0.0023%

Source: Census Bureau

The 18+ Hispanic population of the tract is 1,340, which represents 24.5% of the total tract 18+ population and .0037% of the U.S., Hispanic 18+ population.

In the past two years, the BISG methodology has been used by the CFPB and DOJ to assign race/ethnicity, when unknown.[98] To the geographic population information, this methodology adds information on the likelihood of race/ethnicity based on surname, using the Census Bureau surname list. This list was tabulated from the 2000 Census and includes 151,671 surnames that occurred 100 or more times. [99] For each surname the Census Bureau calculates six mutually exclusive racial and

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[97] As used in this document, "African American" includes "Black or African American," "Hispanic" includes "Hispanic or Latino," and "Asian" includes both "Asian" and "Native Hawaiian or Other Pacific Islander," as defined by the Office of Management and Budget. See Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity (October 30, 1997), available at http://www.whitehouse.gov/omb/fedreg_1997standards. Last accessed on November 6, 2014.

[98] This methodology was not communicated, as far as can be determined from public sources, to any financial institutions before Spring 2013.

[99] In order to protect confidentiality of the race/ethnicity of specific individuals, the Census Bureau reports names that occur 100 times or more and do not report cells with 1 – 4 observations. See "Demographic Aspects of Surnames from Census 2000," David L. Word, Charles D. Coleman, Robert Nunziata and Robert Kominski, available at: http://www.census.gov/genealogy/www/data/2000surnames/surnames.pdf, last accessed September 8, 2014.

ethnic group proportions.   These proportions generally sum to 100% for each surname. For example, Table 4 reports the Census Bureau race/ethnicity proportions for the surname "Johnson."

Table 4. Race/Ethnicity Probabilities for Surname "Johnson"	
Race/Ethnicity	**Share**
Hispanic	1.5%
African American	33.8%
Asian/Pacific Islander	0.4%
American Indian	0.9%
White	61.6%
2+ Races	1.8%
Total	100.0%

Source: Census Bureau

The distribution of names by race/ethnicity probabilities are presented in Chart 5. The interpretation of the columns is better understood through examples.

- 88.2% of the surnames included in the Census Bureau list are reported to have African American probabilities less than or equal to 10%.
- Conversely, 0.08% of the surnames are reported to have African American probabilities greater than 90%.
- 67.8% of the surnames are reported to have non-Hispanic white probabilities greater than 90%.

Chart 5. Distribution of Census Bureau Surnames[1] by Race/Ethnicity Probabilities

Source: Census Bureau   **Surname Probability Deciles**   [1]Public file Includes 151,671
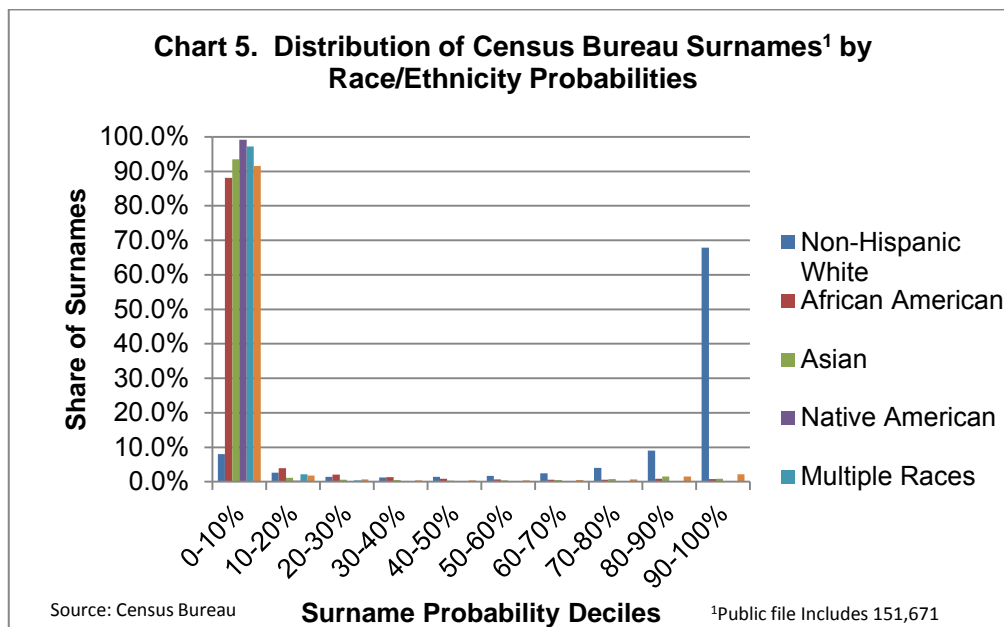
The surname list has not been updated based on 2010 Census results. This means that the information does not reflect the degree to which any of these surname probabilities have changed over the past 14 years. Given the significant demographic changes observed in the last 14 years, the changes could be meaningful.

There are many ways these two data sources can be used, individually or in combination, to develop race/ethnicity proxies. In the current regulatory environment, various regulatory agencies have suggested approaches they believe appropriate for the institutions over which they have authority. The basic question for which the data are used is to determine the probabilities that a random person from a given tract with a given surname belongs to specific race/ethnicity groups. The information must, due to limitations of the data, reflect the general population that is 18 or older, and not the population of persons who may be interested in automobile purchase and financing. To the extent that the purchase and finance decisions are not random with respect to race/ethnicity, using these measures may impart unknown bias. In the next section, the validity of this assumption is assessed.

4.4.1. VEHICLE PURCHASES BY RACE/ETHNICITY SHARES

The race/ethnicity of financed vehicle purchases are not captured or known. However there are two well-known consumer surveys that shed some light on this question. They are the American Community Survey (ACS) and the Consumer Expenditure Survey (CEX).

The Census Bureau conducts the ACS as a "nationwide survey that collects and produces information on demographic, social, economic and housing characteristics about our nation's population every year."[100] The Census Bureau mails survey questionnaires to approximately 295,000 household each month.[101] Policy makers and planners at Federal, State and local governments, as well as businesses and academics all use the collected data.

The data collected in ACS include detailed information on vehicle ownership by race/ethnicity and geography. Table 5 below reports the level of vehicle ownership by race/ethnicity nationally for 2012. A number of important patterns can be observed. First, Americans broadly own vehicles – approximately 60% of

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[100] American Community Survey Information Guide, U.S. Census Bureau, http://www.census.gov/acs/www/Downloads/ACS_Information_Guide.pdf, last accessed September 8, 2014.
[101] *Ibid*, at 8.

households have two or more vehicles, and 1 in 5 households have 3 or more vehicles. However there are notable differences by race/ethnicity. Minority households are significantly more likely relative to white households not to own any vehicle. The ACS reports 11.2%, 19.0% and 10.2% of Hispanic, African American and Asian households, respectively, did not own a vehicle during 2012, as compared to 6.8% of non-Hispanic white households. At the other end of the continuum, Hispanic and Asian households are just about as likely as white households to own more than 2 vehicles, while African American households are 38% less likely than white households to own more than 2 vehicles.

Table 5. National Household Vehicle Ownership by Race/Ethnicity - 2012				
Vehicles per Household	Hispanic	Black	Asian	White
% of Household with No Vehicle	11.2%	19.0%	10.2%	6.8%
% of Household with 1 Vehicle	31.4%	41.6%	29.2%	33.5%
% of Household with 2 Vehicles	37.1%	26.8%	40.1%	39.4%
% of Household with >2 Vehicles	20.4%	12.6%	20.6%	20.4%

Source: Census Bureau, American Community Survey

Disaggregation of these results by state, (see Appendix C for state-level vehicle ownership by race/ethnicity, 2010-2012) shows that while these general patterns observed between minority and white households are consistent, there are wide differences in vehicle ownership from state to state. For example, during 2012 in New York 49%, 47%, 41% and 19% of Hispanic, Black, Asian and white households, respectively, had no vehicle, while in Utah the shares are 5%, 9%, 6% and 4%, respectively. These variations are not surprising and likely result from numerous factors, including urban/rural mix, availability of public transportation, differences in cost of vehicle ownership and other economic factors. This wide variation across states suggests a relationship between areas of low vehicle ownership and race/ethnicity.

The ACS survey data do have limitations. A household can own a vehicle, without financing the purchase, as occurred for about 41% of all vehicle transactions in 2013.[102] The vast majority of these non-financed vehicle transactions are relatively lower-cost used vehicles which may suit a buyer due to the buyer's own financial capacity, use as a non-primary vehicle, use for a young driver, etc. The ACS data do not permit the identification of vehicles owned as the result of a financed transaction.

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[102] Based on Experian Automotive analysis of vehicle titles from 2013. 1-(((15.9M*.79) + (42M*.52)) / (15.9M + 42M))

Fortunately, the Consumer Expenditure Survey allows us to identify by race/ethnicity households that financed vehicle transactions. The CEX data are collected quarterly for the Bureau of Labor Statistics (BLS) by the Census Bureau.[103] According to BLS, "it is used by economic policymakers examining the impact of policy changes on economic groups, by the Census Bureau as the source of thresholds for the Supplemental Poverty Measure, by businesses and academic researchers studying consumer's spending habits and trends, by other Federal agencies, and, perhaps most importantly, to regularly revise the Consumer Price Index market basket of goods and services and their relative importance."[104]

Table 6 below uses CEX data and reports the share of financed vehicle purchases by race/ethnicity, separating new and used transactions for 2010 - 2012.

Table 6. Household Population Shares Compared to Financed Vehicle Purchase Rates by Race/Ethnicity				
Race/Ethnicity	Household/Purchase	2012	2011	2010
African American	All Households	13.0%	12.7%	12.6%
	Financed New Vehicle	6.0%	6.0%	8.3%
	Financed Used Vehicle	14.4%	11.5%	10.2%
Hispanic	All Households	13.7%	13.6%	13.2%
	Financed New Vehicle	11.9%	11.9%	11.5%
	Financed Used Vehicle	15.6%	16.0%	14.6%
Asian	All Households	4.8%	4.6%	4.6%
	Financed New Vehicle	5.7%	6.8%	3.3%
	Financed Used Vehicle	2.9%	4.2%	3.1%
Non-Hispanic White	All Households	67.4%	68.1%	68.4%
	Financed New Vehicle	75.3%	74.2%	75.6%
	Financed Used Vehicle	65.1%	67.8%	69.7%

Source: Consumer Expenditure Survey, Q1-2010 to Q1-2013.

These data reveal an important distinction between new and used transactions. African American and Hispanic households appear to finance new vehicles at lower rates than their population shares would suggest. These comparisons are made at the national level, and CEX data does not allow for comparison within smaller geographies, thus we cannot determine from CEX whether these results vary by geography.

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[103] http://www.bls.gov/cex/, last accessed September 8, 2014.

[104] http://www.bls.gov/cex/, last accessed September 8, 2014.

Taken together, the ACS and CEX data suggest that minority groups do not purchase or finance vehicles in proportion to their shares of the overall population. This appears to be most pronounced with respect to African American and Hispanic households and new vehicle transactions. Thus, the use of proxies built upon geographic and surname population shares may lead to the overestimation of minority probabilities associated with any given vehicle contract, assigning a contract to a minority buyer when the buyer is not a minority. In subsequent sections we quantify the extent to which this overestimation occurs and discuss the implications.

4.4.2. SPECIFIC PROXY METHODS

The CFPB advocates the use of BISG as its proxy method of choice, and began directing practitioners to a paper by researchers at Rand that analyzes the accuracy of BISG.[105] On September 17, 2014, the CFPB released its White Paper assessing the accuracy of BISG relative to other proxy methods. We share the CFPB's view that it is critically important to assess BISG's accuracy and applicability for proxying race/ethnicity for consumers making indirect auto finance purchases.   However, such testing should not be limited to an assessment of BISG's performance relative to surname or geography only proxies. More comprehensive testing is required to determine BISG's objective reliability, and we do so in this section.

BISG differs substantively from other commonly used proxy methods, and requires complex statistical computer coding. It also requires the practitioner to make several assumptions, many of which are not described within the Rand article.   Among the required assumptions that must be made for the proxy method are the following:

- The geographic level: tract, block group or block.
- The population: all or 18+.
- Options for when an address cannot be accurately mapped to the desired geographic level.
- Options for geographies with 'masked' population counts.
- Treatment of surnames that do not appear on the Census Bureau surname list – for example, dropping them entirely or assigning population shares.
- Treatment of hyphenated surnames, such as Pierre-Louis.
- Treatment of compound surnames, such as De La Torre.
- Treatment of surnames where the proportions do not sum to 100.

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[105] Elliott, Marc N. et al, "Using the Census Bureau's Surname List to Improve Estimates of Race Ethnicity and Associated Disparities," *Health Serv Outcomes Res Method* (2009) 9:69–83.

- Assignment of race/ethnicity for contracts with more than one surname (buyer and co-buyer) and/or more than one address.

The CFPB's White Paper describes its implementation of BISG and was accompanied by programming code that reports many, but not all, of the CFPB's assumptions. Appendix D describes the assumptions we made to implement BISG for the purposes of this study and Appendix E contrasts them with the CFPB's assumptions.[106] In both implementations, BISG creates a vector of six race/ethnicity probabilities for each surname and address combination - Hispanic, African American, Asian/Pacific Islander, American Indian, White non-Hispanic, and two or more races. The six probabilities sum to 100%, but for technical reasons it is extremely unlikely that any single probability will equal 100%. BISG does not use the intra-tract population shares. Rather, it uses the share of the U.S. population of each race/ethnicity group residing within the tract. For example, combining the Census Bureau data reported above for a Washington, DC tract and the surname 'Johnson,' we calculate the following BISG vector.

Table 7. BISG Calculation Example			
Race/Ethnicity	Surname "Johnson"	Tract 0050.02 Wash, DC	BISG Probability
Hispanic	1.5%	0.0037%	2.3%
African American	33.8%	0.0037%	51.1%
Asian/PI	0.4%	0.0026%	0.5%
American Indian	0.9%	0.0009%	0.3%
White	61.6%	0.0017%	43.2%
2+ Races	1.8%	0.0034%	2.6%
Total	100.0%	0.0023%	100.0%

Source: Census Bureau

It is generally the case that all six probabilities will be populated by a number greater than zero and less than 100. In those situations where a tract has no members of a given race/ethnicity group, the BISG probability associated with that group will be zero for all addresses in the tract, regardless of surname. Likewise if none of the

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[106] In our collective experience, proxies have generally been calculated with tract-level populations, rather than block group or block, and we will use tract-level populations here, unless otherwise noted.   While beyond the scope of this paper, there is reason to believe that proxies based on the smaller geographic areas are subject to relatively larger, non-random errors that increase as the time period under review becomes progressively farther away from the decennial census.

individuals with a given surname belong to a particular race/ethnicity group, the BISG probability associated with that group will be zero for all individuals with that surname, regardless of the tract in which they reside.

The above example offers a number of observations. While 61.6% of people with the surname Johnson reported to the Census Bureau that they were white, the BISG probability associated with white is only 43.2% because a lower share, 0.0017%, of the U.S. white population resides in this tract relative to the corresponding African American share. This contrasts with the intra-tract white population share of 49.2%. The opposite occurs with respect to African American. The BISG probability associated with African American is 51.1% despite only 33.8% of people with the surname Johnson having self-reported to be African American. This is because a relatively higher share, .0037%, of the U.S. African American population resides in this tract.

As illustrated, the BISG methodology takes two separate pieces of information, combining them to adjust the probabilities associated with a race/ethnicity group beyond what would be expected using either data point individually. This additional impact will be referred to as 'lift.' In Appendix F we provide tables that report the average BISG probabilities observed for various combinations of surname probabilities and intra-tract population shares. These tables are based on the BISG probabilities in the CRA Contract Data. For example, the average African American BISG probability is 83.5%, when the underlying surname probabilities and intra-tract shares are between 40-50%.

Finally, to understand the implications of the testing reported in the next section, it is essential to understand how these probabilities are used in fair lending testing. There are two primary methodologies used for defining the proxy -- threshold-based methods and continuous methods.

In threshold-based approaches, a race/ethnicity probability threshold is established, for example 75%. All consumers with a categorical probability exceeding the threshold are assigned to that group. In this way, consumers (and their contracts) can be classified into groups of 'likely' African Americans, Hispanics, Asians, non-Hispanic whites. Prices and other attributes can then be analyzed across the groups.

In the continuous methodology, contracts are not assigned to a definitive group, but rather each consumer is assigned a vector of probabilities and each contract contributes to the overall analysis proportionate with these probabilities. An example may be illustrative. Let there be 10 contracts from 10 individual buyers. Each buyer has been defined the vector of probabilities of 60% white, 20% African

American and 20% Hispanic. Under the continuous approach, each contract would be weighted 60% white, 20% African American and 20% Hispanic.

4.4.3. TESTING OF SPECIFIC PROXY METHODS

To test the accuracy of BISG and other proxy methods, the CFPB utilized a database of consumer mortgage transactions reported under the Home Mortgage Disclosure Act (HMDA) for which race and ethnicity are self-reported. Utilizing the consumer's surname and addresses, the CFPB calculated BISG probabilities for each mortgage application and compared them to the self-reported race/ethnicity. The Rand authors used 2006 enrollment data from a large national health plan. Like HMDA, the health plan data included self-reported race/ethnicity as well as the address and surname information required to calculate BISG probabilities. They compare the estimated BISG probabilities to the self-reported race/ethnicity within the health plan data.

We adopt a similar approach to the CFPB and utilize a proprietary database of consumer mortgage transactions reported under HMDA. The CRA HMDA database contains approximately 292,000 mortgage applications and 190,000 originations. BISG probabilities are calculated for each application and compared to the self-reported race/ethnicity. The results discussed below are based on the applicant pool, which is more diverse with respect to FICO, income and other observable measures, relative to the origination pool. The accuracy metrics for BISG and the other proxy methods reported below deteriorate when calculated for the mortgage origination pool.

Table 8 reports the results at 50% and 80% threshold levels. False positives are situations where the proxy method suggests a consumer belongs to a group, when in fact they have asserted they do not. False negatives include consumers that self-report belonging to a particular group, but for whom the proxy method fails to categorize them at the given threshold.   In essence, we are examining the accuracy of the proxy when the proxy suggests a relatively high probability of belonging to a specific group, and excluding those applications with relatively lower probabilities of belonging to any group.

| | | | | | | Share of Actual Group | | |
Proxy Method	Race/ Ethnicity	Count of Borrow-ers in Group	Proxy = Yes Actual = Yes	Proxy = Yes Actual = No	Proxy = No Actual = Yes	Correct-ly Iden-tified by Proxy	Not Identi-fied by Proxy (false nega-tives)	Percent Wrong-ly In-cluded (false posi-tives)
BISG-50%	African Amer-ican	23,036	11,095	8,592	11,941	48.2%	51.8%	43.6%
	Hispanic	22,004	15,841	3,554	6,163	72.0%	28.0%	18.3%
	Asian	9,662	5,761	1,513	3,901	59.6%	40.4%	20.8%
	Non-Hispanic White	234,746	219,447	21,109	15,299	93.5%	6.5%	8.8%
BISG-80%	African Amer-ican	23,036	5,567	1,606	17,469	24.2%	75.8%	22.4%
	Hispanic	22,004	12,892	1,964	9,112	58.6%	41.4%	13.2%
	Asian	9,662	4,857	806	4,805	50.3%	49.7%	14.2%
	Non-Hispanic White	234,746	182,304	10,759	52,442	77.7%	22.3%	5.6%
Tract-50%	African Amer-ican	23,036	5,743	4,516	17,293	24.9%	75.1%	44.0%
	Hispanic	22,004	4,829	4,327	17,175	21.9%	78.1%	47.3%
	Asian	9,662	348	363	9,314	3.6%	96.4%	51.1%
	Non-Hispanic White	234,746	215,411	35,848	19,335	91.8%	8.2%	14.3%
Tract-80%	African Amer-ican	23,036	2,275	671	20,761	9.9%	90.1%	22.8%
	Hispanic	22,004	1,723	575	20,281	7.8%	92.2%	25.0%
	Asian	9,662	10	6	9,652	0.1%	99.9%	37.5%
	Non-Hispanic White	234,746	134,561	12,245	100,185	57.3%	42.7%	8.3%
Name-50%	African Amer-ican	23,036	2,570	2,384	20,466	11.2%	88.8%	48.1%
	Hispanic	22,004	15,852	3,799	6,152	72.0%	28.0%	19.3%
	Asian	9,662	5,531	1,400	4,131	57.2%	42.8%	20.2%
	Non-Hispanic White	234,746	205,789	26,437	28,957	87.7%	12.3%	11.4%
Name-80%	African Amer-ican	23,036	832	182	22,204	3.6%	96.4%	17.9%
	Hispanic	22,004	14,612	2,965	7,392	66.4%	33.6%	16.9%
	Asian	9,662	4,726	805	4,936	48.9%	51.1%	14.6%
	Non-Hispanic White	234,746	131,001	8,323	103,745	55.8%	44.2%	6.0%

Table 8.
Comparison of Proxy Approaches at Identifying Race/Ethnicity

Source: HMDA augmented with proprietary data

A number of important trends are observed. There are clear differences across race/ethnicity groups. Geography alone does a poor job of identifying minority groups. Even at a 50% threshold only 24.9%, 21.9% and 3.6% of African American, Hispanic and Asian applicants, respectively, are correctly identified. Obviously, these percentages are even smaller when the threshold is increased to 80%. Name alone improves the results with respect to Hispanic and Asian applicants, but significantly reduces the share of African American applicants correctly identified. Given these poor results, the interest in more sophisticated alternatives is understandable.

The BISG results, however, are mixed. At an 80% threshold, BISG correctly identifies 24.2%, 58.6% and 50.3% of African American, Hispanic and Asian applicants, respectively, however this implies false negative rates of 75.8%, 41.4% and 49.7%, respectively. At this threshold, BISG fails to identify 3 out of 4 African American applicants and 4 out of 10 Hispanic applicants. While these rates are improved by moving to a 50% threshold, it comes at the expense of large increases in the rate of false positives – 43.6%, 18.3% and 20.8%, respectively. More intuitively, 4 out of 10 applicants that a BISG 50% threshold proxy identifies as African American are, in fact, not African American.

While we find that BISG-based probabilities may be relatively less inaccurate than geography-only and name-only proxy methods, the methodology is characterized by objectively high error rates. The CFPB's results, as reported in their White Paper are directionally consistent with these results; however we identified larger error rates. For example, the CFPB reported BISG, at an 80% threshold, correctly identified 39% of the actual African American consumers, compared to the 24.2% we identify.[107] These differences highlight just how wide-ranging the error rates can be based on alternative populations.

While we lack information on how the CFPB chose its test population, it is significantly less diverse with respect to race and ethnicity than our test population. Hispanic and African American applicants represent just 5.8% and 6.2%, respectively, of the CFPB's test population. The corresponding percentages in our test population are 7.5% and 7.8%. This may contribute to the CFPB's relatively lower, albeit still high, error rates.

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[107] "Using publically available information to proxy for unidentified race and ethnicity A methodology and assessment," CFPB, Summer 2014, released on September 17, 2014.

The size of these errors, combined with their potential to impact the estimated disparities and the associated alleged consumer harm, warrant further testing not performed in the CFPB's White Paper. Principally,

- Are the applicants who are identified representative of those that the proxy method fails to identify?
- Does representativeness vary across race/ethnicity group?
- Are the observed error rates non-random?
- What implications do these biases and error rates have on the subsequent steps in the CFPB's analytical approach?

To investigate these questions, we examined the false positive and false negative-rates by tract race/ethnicity concentration, FICO ranges, income ranges and low-and-moderate income (LMI) tract definitions. [108] The results are presented in Appendix G.

While the patterns vary, the errors are non-random with respect to the four attributes. False negative rates are highest in tracts with the lowest shares of the group in question. For example, in tracts that are less than 10% African American, BISG at an 80% probability threshold fails to identify 98.0% of the actual African American applicants in such tracts. The false negative rates decrease as the within-tract share increases.

More problematic are the correlations with FICO, income and LMI status. In the case of African American and Hispanic applicants, false positive and negative rates have a generally strong positive correlation with FICO, income and LMI status. As FICO, income, and relative income (LMI status) increase, the ability of the BISG approach to identify accurately African Americans and Hispanics is diminished, as indicated by increased false negative rates. BISG's predictions become increasingly less accurate in identifying African American and Hispanic as FICO scores and incomes rise. Hence the African American and Hispanic applications identified under a threshold based approach appear not to be representative of the respective populations.

Using the continuous probability methodology of BISG does not improve the situation. With this methodology, all of the applications are included, regardless of the probability of belonging to a group identified by proxy. The correlations with FICO, income and LMI status remain in a continuous application. Table 9 presents the results of an additional simple test. We computed the average of the BISG

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[108] As defined by Census.

probabilities for each race/ethnicity group across all 292,000 applications and the actual average share of the application pool that belongs to each group. The BISG methodology estimates that 11% of the applicant pool is African American, while the actual share is only 7.8%. This is a 41% overestimation of the African American share of the pool. As this test is a zero-sum-game, BISG must underestimate the shares of other groups – in this case, that group is non-Hispanic whites.

Table 9. Accuracy of Estimate using a Continuous BISG Methodology					
Race/Ethnicity	Actual Count	Actual Percent	BISG Count	Average BISG Percent	BISG Error
African American	23,036	7.8%	32,415	11.0%	40.7%
Hispanic	22,004	7.5%	22,200	7.6%	0.9%
Asian	9,662	3.3%	10,028	3.4%	3.8%
Non-Hispanic White	234,746	80.0%	223,031	76.0%	-5.0%

Source: HMDA augmented with proprietary data

The CFPB's results, as reported in their White Paper, are consistent with our results, although they found a larger overestimation for Hispanic and Asian consumers, while we found larger overestimation for African American consumers.[109] While the differences measured in percentage shares between the proxy outcome and the actual outcome may appear relatively small, they can represent large differences in population counts. For example, we find that BISG probabilities estimate approximately 32,415 African American in the test population, compared to the actual count of 23,036 African Americans – an overestimation of 41%. The CFPB reported a 21% overestimation of African Americans in their test population as shown in Table 10 below, reproduced from the CFPB's White Paper.

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[109] "Using publically available information to proxy for unidentified race and ethnicity: A methodology and assessment," CFPB, Summer 2014, released on September 17, 2014, at 14, 15, 19, 20, 34, 35 and 36. available at: http://www.consumerfinance.gov/reports/using-publicly-available-information-to-proxy-for-unidentified-race-and-ethnicity/, last accessed October 19, 2014.

Table 10. CFPB: Classification Over Ranges of BISG Proxy For Non-Hispanic Black					
Black BISG Proxy Probability Range	Total Applications (1)	Estimated Black (BISG) (2)	Reported Black (3)	Reported White (4)	Reported Other Minority (5)
0-10	160,733	1,859	1,466	139,684	19,583
10-20	9,742	1,387	941	8,403	398
20-30	4,916	1,207	906	3,814	196
30-40	3,101	1,072	726	2,242	133
40-50	2,229	997	738	1,408	83
50-60	1,680	922	736	877	67
60-70	1,417	920	765	596	56
70-80	1,407	1,057	963	391	53
80-90	1,517	1,293	1,222	241	54
90-100	3,693	3,548	3,408	200	85
Total	190,435	14,262	11,871	157,856	20,708

Source: CFPB "Using Publically Available Information to Proxy for Unidentified Race and Ethnicity," September 2014

Hence, BISG applied in either a continuous or threshold method, fails to well identify African American, Hispanic and Asian consumers representative of the respective populations.

To test the impact of the non-random random errors and resulting non-representativeness of the BISG probabilities on the subsequent steps in the CFPB's analytic framework, we conducted a simple test. Using our HMDA test population, we regressed the annual percentage rate (APR) on race and ethnicity without any other controls[110] (e.g. the same raw regression the CFPB uses in step 2 to measure disparities in dealer reserve).[111] We first used actual race and ethnicity as the explanatory variables, and we next used the BISG continuous method to proxy race and ethnicity in the same manner used by the CFPB. In both cases the exact same

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[110] We used HMDA originations, rather than applications, for this test.
[111] *Op. Cit.*, CFPB Supervisory Highlights, 2014 at 10.

set of loans are included in the test population. These results are reported in Table 11.

Table 11. Comparison of Estimated *Raw* APR Disparities using Actual vs Proxied Race / Ethnicity					
Minority Group	Method	# Minorities	# Non-Hispanic Whites	Coef. (bps)	P-Value
African American	Actual Race / Ethnicity	12,022	157,579	14.1	0.000
	BISG Proportional	19,072	148,247	26.4	0.000
Hispanic	Actual Race / Ethnicity	13,587	157,579	19.0	0.000
	BISG Proportional	13,991	148,247	29.7	0.000
Asian	Actual Race / Ethnicity	6,405	157,579	-5.2	0.000
	BISG Proportional	6,848	148,247	-7.3	0.000

Source: HMDA augmented with proprietary data

When we use actual race and ethnicity to measure the raw APR disparity, we find raw disparities of 14.1 and 19.0 bps for African American and Hispanic mortgage borrowers, respectively.[112] However, when we use BISG proxies for race and ethnicity, we measure raw disparities of 26.4 and 29.7 bps, respectively. As a result of using biased proxy probabilities, the observed disparities are inflated by 87% and 57% for African American and Hispanic, respectively. Using HMDA data, we find that the biases and error rates inherent in the proxies used in step 1 of the CFPB's analytical approach, may lead to significant overestimation of disparities in step 2.

The biases measured using HMDA data are complex, but reflect lower rates of home ownership among Hispanic, African American, and Asian households relative to white non-Hispanic households. As discussed above, vehicle ownership also varies by race and ethnicity, with minorities significantly less likely to purchase, finance and own vehicles relative to non-minorities.

These biases and errors observed in step 1 and 2 of the CFPB's analytical framework have significant implications on the subsequent steps. They result in an overestimation of the CFPB's quantification of consumer harm (e.g. step 3). The CPFB calculates two types of consumer harm - direct and indirect.[113] To quantify

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[112] We would expect an APR model with no controls to measure some level of disadvantageous disparity with respect to race/ethnicity due to differing distributions of credit scores.

[113] *Op. Cit.*, CFPB Supervisory Highlights, 2014 at 4.

direct harm, the CFPB applies the estimated disparities identified in step 2, measured in bps, to each contract in the portfolio and computes the dollar equivalent value, assuming that no contracts pay off before term.[114] Thus every contract in the portfolio contributes some amount to the quantified harm, weighted by the relevant BISG probabilities and summed across the entire portfolio. Thus, if the number of minorities implied by the proxy method in step 1 is overstated (for example by the 41% we observed above) the quantification of harm will be overstated by a similar magnitude. Additionally, if the disparities estimated in step 2 are overstated (for example, by the 87% and 57% overstatements we observed above), the direct harm will be overstated by a similar magnitude – and completely incremental to the overstatement resulting from the proxy method implying more minorities than actually exist in the portfolio. The CFPB calculates indirect harm by assigning a fixed dollar amount (e.g. $150) per allegedly harmed consumer. Hence, an overestimation of the number of allegedly harmed consumers by 41% results in an overestimation of indirect harm by approximately the same magnitude as both use 41% more protected class consumers.

The CFPB has not noted any corrections made for these overestimations, yet the Supervisory Highlights report that "Examination and enforcement teams have already reached resolutions with several supervised institutions that will collectively pay about $136 million to provide redress for up to 425,000 consumers…"[115] The Ally consent order is more explicit, reporting that approximately 100,000 African American consumers, 125,000 Hispanic consumers and 10,000 Asian consumers paid higher markups than the average of similarly situated non-Hispanic white markup.[116]

In the context of the automotive finance market, we calculated BISG probabilities for each of the 8.2 million consumers in the CRA Contract Data. A continuous-method application of BISG predicts 1,005,410 African American consumers. This BISG method cannot, however, identify which contracts the CFPB determine to be African American consumers. In fact, even though nearly 6 million of the contracts in our database have BISG African American probabilities of less than 10%, BISG, as applied by the CFPB, would suggest that 92,636 of these low probability contracts are associated with African American consumers. Chart 6 shows the counts of BISG- implied African American consumers by probability deciles. BISG applied in

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[114] The CFPB has considered adjusting this for contracts paying off before term.

[115] *Ibid.*

[116] http://files.consumerfinance.gov/f/201312_cfpb_consent-order_0010.pdf

this manner is analogous to taking 6 million part-time workers and suggesting that they are equivalent to 92,000 full-time equivalents (FTEs).

One can observe these same phenomena in Tables 5 and 9-12 in the CFPB's White Paper. For example, in the CFPB's White Paper Table 10, reproduced above, the CFPB used a continuous BISG method to estimate 1,859 African American consumers exist in the group of 160,733 applicants. However, BISG provides no ability to identify which of the 160,733 are the theoretical 1,859 African American consumers. All 160,733 applications would be included in the CFPB's analysis and all would be given an African American weighting less than 10%, including the 1,466 consumers who are in fact African American. A similar pattern, less pronounced, is observed with respect to BISG-implied Hispanic and Asian consumers as reported by either the CFPB or in our results.

Chart 6.
Count of African American Consumers Implied by Application of BISG Continuous Method, by the probability deciles

Legend:
- 0% - 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- 40% - 50%
- 50% - 60%
- 60% - 70%
- 70% - 80%
- 80% - 90%
- 90% - 100%

Count of African American Consumers Implied by Application of BISG Continuous Method = 1,005,410
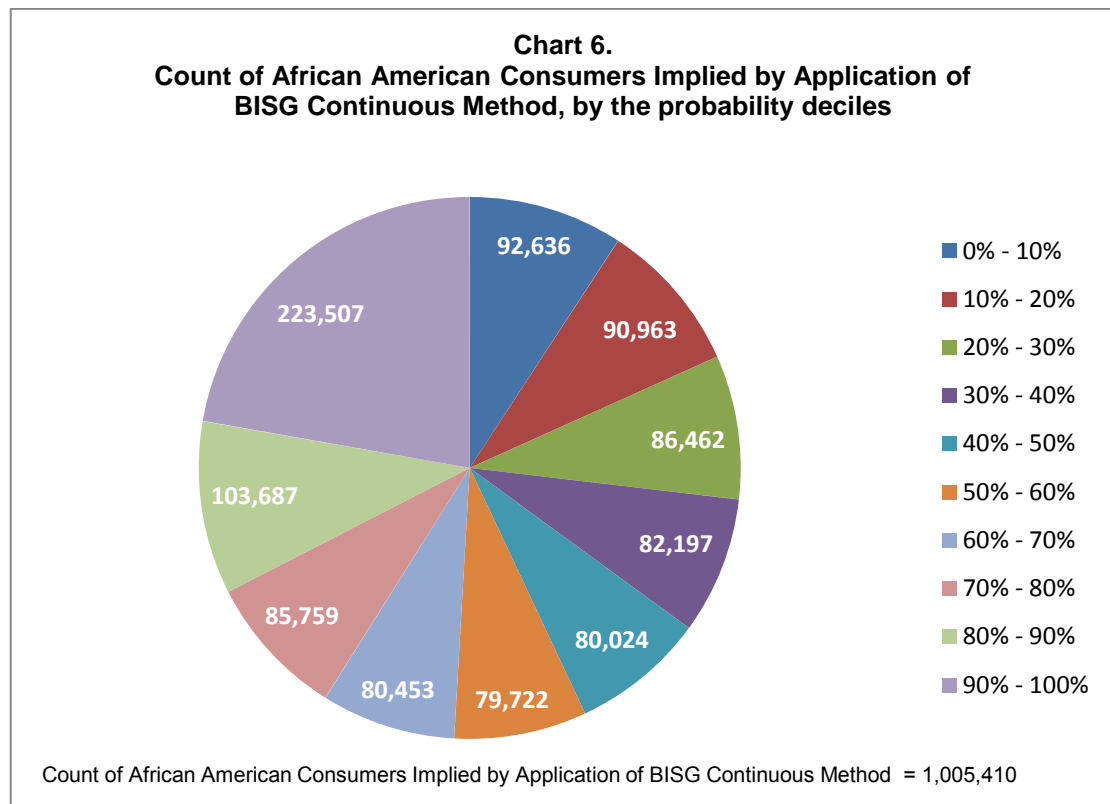
BISG applied in this manner provides essentially no useful information for the purpose of identifying and remunerating allegedly harmed consumers (e.g. step 4). Not only does this application dramatically overestimate the number of harmed consumers (and the alleged harm), but it also provides no ability to identify which contracts are associated with the allegedly harmed consumers. For example, as we

saw in Table 8 above, even among consumers with a greater than 80% probability of being African American, 22.4% of these consumers are in fact not African American. BISG has limited ability to differentiate the actual African Americans from the false positives implied by BISG.

To summarize, the methods commonly used by regulators to proxy race and ethnicity, including the recently applied BISG method, are conceptually flawed in their application. So while BISG may be relatively less inaccurate than proxies based on geography or surname alone, BISG remains subject to significant biases. The CFPB's use of biased race and ethnicity proxies creates significant measurement errors in the subsequent steps of its analytic framework, which likely result in dramatically overstated disparities, alleged harm and minority consumers.

4.5.   MEASUREMENT OF DEALER RESERVE

Once the race/ethnicity determination is made, regulators may focus on various aspects of the consumer transaction. One generating much attention has been the measurement of disparities, if any, between the amounts of dealer reserve on minority compared to non-minority vehicle purchase contracts. The value of dealer reserves generally is measured either in bps, representing a share of the contract rate, or in dollars, or in dollars as a percent of the amount financed, etc. Additionally, it can be measured on either a gross or net basis, where gross is based on the term at origination and net is based on the actual term reflecting prepayment behavior.   In our experience, the empirical results are sensitive to the units of measurement of dealer reserve.   This sensitivity is consistent with economic theory as well as factors specific to automotive finance.

From the consumer's perspective, the contract rate, which includes any dealer reserve, measured in bps, is an important consideration, disclosed in the origination documentation. As well, a consumer's ultimate finance charges, also disclosed, are a function of the amount financed and term, not simply the contract rate.   Everything else equal, 130 bps of dealer reserve on a $17,974 contract is significantly less than the same reserve on a $27,430 contract.[117] Additionally, a consumer's sensitivity to the level of the contract rate and dealer reserve reflects numerous factors specific to the consumer including their expectations regarding prepayment and their ability to negotiate. While some vehicle contracts run full term, a large share of contracts may

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[117] These dollar amounts reflect the average amount financed on used and new vehicles, respectively, during Q4 2013. Source: Experian Automotive as published in the Automotive News F&I report, March 19, 2014.

pay off early. As a result, consumers pay, on average, the expected value of the to-tal finance charge rather than the gross amount of finance charges.

Consistent with the actual consumer payment, the dealer receives the expected val-ue of the dealer reserve, not the gross amount. This amount is paid to the dealer in dollars, not bps. This dynamic may be further complicated if a given financial institu-tion allows each dealer from which it purchases contracts several alternatives for the calculation of the expected value of the dealer reserve. Hence, 130 bps of gross dealer reserve does not yield the same dollar-denominated payment to every dealer from whom the financial institution purchases such a contract, even if the amount financed and contract length are identical.

As the dealer considers its various revenues associated with a particular vehicle sale, it measures the value of the options in dollars. The implications of this are ob-servable in the data. We observe negative correlations between the dealer reserve measured in bps and the amount financed. These patterns are generally observed within each race/ethnicity group. Additionally, the dealer may trade off the expected value of the dealer reserve with the available level of flat fees offered by various fi-nance institutions if no dealer reserve is present (e.g. for those contracts for which the contract rate equals the buy rate).   The flat fees have commonly ranged from $0 to $250 or $300. More recently, some financial institutions have been experimenting with various forms of alternative flat compensation structures, such as 1% or 2% of the amount financed. Consequently, it is uncommon to see dealer reserves that equate to less than the available flat compensation amount.

Some of these patterns can be tested with the CRA Contract Data. In Appendix I we see dealer reserves in bps are larger on used transactions relative to new, but lower when measured in dollars.

4.6.   COMPLEXITY OF THE TRANSACTION

The nature and structure of vehicle purchase transactions differs substantially from other forms of consumer finance. A thorough understanding of these differences is critical if one is to analyze and compare pricing outcomes accurately across various buyer segments.

The dealer and consumer face a complex set of contingent possibilities, costs, pref-erences and incentives as they attempt to reach mutually agreeable terms on a vehi-cle purchase. Attempts to evaluate dealer compensation, in isolation from these fac-tors, may lead to erroneous conclusions. Some of these factors are common in data collected by financial institutions, including:

- Certain transaction specific attributes: new vs. used, age of a used vehicle, the presence and price of certain F&I products, presence and value of a trade-in, the make and model of the vehicle, the presence of a manufacturer-sponsored cash rebate used in the down payment, term of the contract, loan-to-value, debt-to-income, payment-to-income ratios, and the applicable cap on dealer reserve.
- Certain dealer-specific attributes: terms of the agreement between dealer and financial institution such as the dealer-reserve payment plan the dealer operates under, whether the dealer has a floor-plan arrangement or other borrowing relationships with the financial institution, and the State-level regulatory requirements applicable to the dealer.
- Certain consumer-specific attributes generally used in the underwriting process such as income, credit scores, time at residence, and the presence of an existing monthly auto payment.

The data demonstrate strong correlations between race/ethnicity and many of these factors. The CRA Contracts database demonstrates the following with respect to minorities:

- Disproportionate representation in the used vehicle segment.
- Longer original contract terms on average.
- Different choices with respect to the options afforded under manufacturer sponsored subvention programs.

The entire range of the contingent possibilities, costs, preferences and incentives are simply unknown to the financial institution, regulators and the fair lending analyst. In the next two sections we will discuss some of these unknown factors.

4.6.1. UNKNOWN CONSUMER-SPECIFIC FACTORS

As one attempts to analyze the pricing outcomes that resulted from the negotiation of a complex set of contingent possibilities, costs, preferences and incentives to reach mutually agreeable terms on a vehicle purchase, a significant information gap exists with respect to the vehicle purchaser's motivations. Unknown demand-side factors potentially impacting the consumer's negotiation of prices in the transaction include:

- Timing on the need to finalize the vehicle purchase.
- Ownership of another vehicle.
- Number of accessible dealers.
- Ability to shop across multiple dealers and direct lenders.
- Internet access.

- Amount of research engaged in prior to arriving at the dealer -- prices, rates, financial institutions and other relevant information.
- Flexibility with respect to make, model, color, and other options.
- Servicing at the dealer from whom they purchase the vehicle.
- Planned length of ownership.
- Intent to prepay contract.

The answers to these questions impact the prices the consumer will pay at the dealership. In the Pacifico and Springfield consent orders, the DOJ recognized that several factors, such as access to a more competitive rate, may have a direct impact on dealer reserves. Not only are these important factors, but they may vary by prohibited basis. Unlike a well-designed randomized controlled trial for which statistical sampling methods are used to increase the likelihood that such factors are randomly distributed across both the treatment and non-treatment groups and thus held constant, we have no such experiment that can be conducted with respect to vehicle purchases.

Limited academic research has been done on these questions with respect to race and ethnicity, but one finding of the studies is that women and minority vehicle buyers obtain greater benefit from internet access as compared to men and non-Hispanic white vehicle buyers.[118] The results of research prior to the internet-age, which found that dealers quoted lower prices to white males relative to black and female test buyers using identical scripted bargaining strategies, is consistent with the value of such access to women and minorities.[119] Certainly, the Census Bureaus' statistics on internet access confirm a "digital divide" in which African American, Hispanic and age-65+ consumers are significantly less likely to use the internet, relative to non-Hispanic white and under 65 consumers.[120]

The statistics cited in previous sections confirm that vehicle ownership patterns vary considerably by race/ethnicity – resulting in certain minority groups being less likely to have an existing vehicle while searching for a replacement or additional vehicle. While there are clear differences among groups in the average contract length at

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[118] Florian Zettelmeyer, Fiona Scott Morton, Jorge Silva-Risso, "How the Internet Lowers Prices: Evidence from Matched Survey and Automobile Transaction Data," *Journal of Marketing Research*, Vol XLIII (May 2006), 168-181.

[119]Fiona Scott Morton, Florian Zettelmeyer, Jorge Silva-Risso, "Consumer Information and Discrimination: Does the Internet Affect the Pricing of New Cars to Women and Minorities?," *Quantitative Marketing and Economics*, 1, 65-92, 2003.

[120] http://www.census.gov/hhes/computer/files/2012/Computer_Use_Infographic_FINAL.pdf

origination, it is difficult to infer whether this suggests different expectations regarding expected length of ownership or early payoff.

The observed differences among minority and non-minority buyers with respect to manufacturer-sponsored customer incentives offer some limited insights. Such manufacturer programs are commonly structured as a consumer choice between cash back at purchase (e.g. $1,000) or a subvented contract rate (e.g. 0.9%). Our database suggests that minorities, relative to non-minorities, disproportionately choose the subvented contract rate. These programs nearly always prohibit the dealer from adding dealer reserve and require the contract to be assigned to the financial institution serving as the manufacturer captive. Such programs may represent a valuable option for consumers with greater sensitivity to the interest rate. Non-minorities disproportionately choose the cash back, suggesting potentially less sensitivity to the contract rate and a higher expectation of early payoff. These patterns should be viewed cautiously. Frequently such programs are offered on only selected vehicles and geographies, which may impact the observed patterns. Additionally, the patterns may change over time and across manufacturers. During the time periods analyzed in the private litigation on dealer reserve, it was not uncommon to observe minorities disproportionately choosing the cash rebate option. Given that the cash-rebate is commonly credited towards the down payment, this option can be helpful to consumers with relatively less savings upon which to draw.

Finally, we do not observe the dealer reserves on transactions that did not consummate in a sale. This could be the result of the buyer deciding to arrange their own financing or purchase from an alternative dealer, unwillingness of the consumer to accept the transaction terms presented by the dealer, or the inability of the dealer to identify a financial institution willing to purchase the contract. We do not observe transactions that were approved by the financial institution but assigned by the dealer to an alternative institution. Such observations would convey useful insights regarding the dealers and consumer's preferences, options and constraints.

In the automotive finance market we have unobservable customer-specific factors that have a causal impact on observed prices and correlation with prohibited basis.

4.6.2. UNKNOWN DEALER-SPECIFIC FACTORS

A similar information gap exists with respect to important dealer-specific factors. The dealer reserves charged by dealers cannot be fully understood without a thorough understanding of the dealer business model. The CFPB has consistently recognized that dealers deserve compensation for arranging consumers' financing. In its March 2013 Bulletin, the CFPB said "Dealer reserve is one method lenders use to compen-

sate dealers for the value they add by originating loans and finding financing sources."[121]   How dealers operate, the interrelated nature of the products they offer, their cost structures, and the competitive environment impact the pricing policies and practices that govern what dealers charge for products and services. Unknown supply-side factors include:

- Dealer pricing policies and dealer reserve policies.
  - Example: has the dealer implemented NADA's suggested Fair Lending program.[122]
- Cost structure and expected departmental profitability targets.
- How often do they spot deliver the vehicle.
- Pull-through rate.[123]
- Back-end coverage ratio.[124]
- Number of relationships with indirect financial institutions.
- Assessment of the consumers' potential to prepay early.
- Vehicle inventory levels.
- Inventory carrying costs.
- Presence of manufacturer-sponsored dealer incentives.
- Financial strength and stability.
- Ratio of new/used vehicle sales.
- Dependence upon repeat buyers.
- Proximity to other dealers.

While some of these factors can be held constant over all consumers at a given dealer, others cannot. For example, a dealer implementing NADA's fair credit compliance program may deviate downward the dealer reserve it charges a given consumer based on a specific set of criteria – the same set of criteria established in the previously discussed DOJ consent orders with Pacifico and Springfield. While these criteria have a causal impact on observed dealer reserves, their presence is un-

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[121] CFPB Bulletin 2013-02 at 1.

[122] NADA Fair Credit Compliance Policy & Program, 2014, currently available at http://www.nada.org/NR/rdonlyres/316F7BE3-499B-4A54-B56A-EFDF8414B04B/0/NADA_Fair_Credit_CompliancePolicy_Program.pdf.

[123] Pull-through rate is defined as the rate at which applications submitted by the dealer to various financial institutions are converted into actual contracts.   Pull-through is distinct from the conversion rate, which is defined as the rate at which the dealer converts consumers "in the door" of the dealer into a vehicle purchase.

[124] Back-end coverage ratios measure the share of a dealers fixed costs that are covered by profitability from its service and parts departments.

known to the financial institution, regulators and the fair lending analyst, and this results in variation across transactions within the dealer. Several examples follow.

Early prepayment rates are significantly higher among super-prime (760+ FICO) consumers and dealers understand their historical early prepayment rates. During this period, the dealer has direct risk to the dealer reserve, as the entire amount is generally subject to rebate for the first 90-180 days in the event the contract does not perform or prepays during that period. Hence, dealers are less inclined to charge dealer reserves as their assessment of early prepayment risk increases. As we have seen previously, FICO is correlated with race/ethnicity and errors in BISG proxies.

As noted earlier, the financial institution does not know if the vehicle was spot delivered, with the contract rate established prior to the financial institution reviewing the credit application and underwriting the application. A strict reading of the CFPB's Supervisory Highlights might suggest that spot deliveries be excluded from monitoring analysis.

> "The Supervisory focus on indirect auto lending, however, has been primarily concerned with the fair lending risk created by lenders' policies that compensate dealers by allowing them the discretion to mark up each consumer's interest rate *after* the lender has already underwritten the consumer's loan application and generated a risk-based price."[125]

Vehicle inventory levels vary daily, weekly and seasonally based on a complex interplay of market demand and wholesale production and availability. The dealer may be considerably more willing to agree to lower transaction prices (including dealer reserve) on a vehicle that has been in inventory for some time as compared to a vehicle in higher-demand with more limited inventories. The DOJ has recognized that inventory considerations legitimately may have a direct impact on dealer reserves.

The presence of manufacturer-sponsored dealer incentives creates a similar supply-side dynamic. Dealer incentive payments averaged $300 per vehicle in 2013 according to NADA and can be considerably larger. They are commonly structured by the manufacturer as a hurdle – sell the required number of vehicles in the allotted time period and collect the per vehicle payment on all vehicles, or miss the hurdle and collect no incentive payments. The expected value of the dealer incentive increases dramatically as the dealer approaches the sales threshold, and thus may be willing to accept considerably lower pricing on the last couple of vehicles prior to the

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[125] *Op. Cit.*, CFPB Supervisory Highlights, 2014 at 5-6.

hurdle.[126] Because these are commonly model or even trim specific, they may have little impact on transactions for other models/trims within the same dealer. Finally, while it may be tempting to think of manufacturer-incentives (both dealer and cos-tumer) as relevant only to the market for new vehicles, that would be incorrect. Both incentives effectively reduce the price differential between new and used vehicles. When combined with the lower financing rates available on new vehicles, relative to used vehicles, the price differential is further reduced and potential used vehicle buyers may become new vehicle buyers.

In the automotive finance market, unobservable dealer-specific factors have a causal impact on observed prices and may be correlated with prohibited basis status, but this is not testable directly with available data.

The supply-side factors, such as cost structure, that are held constant across con-sumers at a given dealer, create a different challenge when attempting to understand observed difference across dealers at the portfolio-level. We examine these chal-lenges in the next section.

4.7.   PRICING DIFFERENCES ACROSS DEALERS

Pricing differences across dealers may create the appearance of disadvantageous pricing when aggregated to the financial institution's portfolio.

The CFPB has clearly mandated portfolio-level analysis. While the CFPB's March 2013 Bulletin says, "…indirect auto lenders that retain dealer markup and compensa-tion policies *may wish* (emphasis added) to address the fair lending risks of such policies by….conducting regular analyses of both dealer-specific and portfolio-wide loan pricing for potential disparities on a prohibited basis resulting from dealer markup…"[127], their public statements have been more forceful. The CFPB/DOJ consent order with Ally requires both dealer-level and portfolio-level monitoring.[128]

A fundamental challenge of portfolio-level analysis is the aggregation of contracts sourced from dealers with different operating models, cost structures, pricing poli-cies, competitive landscapes and regulatory structures. These differences reflect the myriad of the dealer-specific attributes outlined in the previous section. As such,

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[126] Meghan Busse, Florian Zettelmeyer, Jorge Silva-Risso, "$1000 Cash Back: Asymmetric Information in Auto Manufacturer Promotions," NBER working paper series, Working Paper 10887 http://www.nber.org/papers/w10887

[127] CFPB Bulletin, 2013-02 at 4-5.

[128] http://files.consumerfinance.gov/f/201312_cfpb_consent-order_0010.pdf

even if each dealer sets prices in a manner that is neutral with respect to race and ethnicity, differences in the relative proportion of consumer market segments served by each group can result in the appearance of pricing disparities on a prohibited basis when the contracts from different dealers are aggregated to the financial institution's portfolio level.

Consider an example for which the financial institution's portfolio consists exclusively of contracts originated by two dealers. Both dealers have implemented the NADA Fair Credit Compliance Policy and Program and originate the identical number of contracts. The first dealer established its standard dealer reserve at 200 bps, while the second dealer established its standard dealer reserve at 150 bps. Neither dealer ever deviates downward from these standard amounts. Further, assume that the first dealer is in a higher-cost urban area and serves proportionately more African American consumers, while the second dealer is located in a lower-cost suburban area and serves proportionately fewer African American consumers. When portfolio level analysis is performed using the CFPB's methods, a statistically significant disadvantageous disparity will be observed, when in fact, there is no pricing disparity at either dealer individually and the dealer reserve differentials reflect the cost differentials faced by the dealers. The observed portfolio-level disparity is simply the result of aggregating across dealers with different pricing structures.

4.8.   OBSERVABILITY OF DEALER CONTRACTS

Only a portion of dealer contracts are observable to a given financial institution. In this highly competitive market, dealers have relationships with numerous financial institutions. The aggregate numbers are illuminating: during 2013 there were approximately 34 million financed vehicle sales, originated at more than 55,000 dealers (franchised and independent), and financed by more than 65,000 financial institutions. We saw earlier how often dealers assign contracts to more than 50 different financial institutions. The economic, business and technology factors underpinning this phenomenon were explained earlier, but it has important implications on the analysis of observed pricing. The assignment of contracts is not random, and any given financial institution purchases a relatively small share of the contracts originated by each dealer. The financial institution cannot assess the application of dealer discretion with respect to dealer reserve and ECOA in a holistic manner.

Assessing the contracts the financial institution purchased from a given dealer is also challenging. Larger financial institutions purchase contracts from thousands of dealers, and it is not uncommon for medium-sized financial institutions to have relationships with well more than a thousand dealers. However, only a handful of dealers will be associated with more than a couple hundred contracts in the financial institu-

tion's portfolio. Given the issues with proxies, transaction complexity, and consumer- and deal-specific attributes, low contract volumes make the analysis of observed dealer reserves within a dealer subject to significant measurement error.   In our experience dealer-level analysis, without sufficient volume thresholds, results in 'chasing randomness.'

In its September 2014 Supervisory Highlights, the CFPB acknowledged the challenge of measuring for disparate impact with low volume dealers, but stopped short of providing guidance as to specific contract volumes that it considers sufficient to enable meaningful dealer-level monitoring.[129] We note that the CFPB, in the same discussion, explicitly ruled out the exclusion of low volume dealers from portfolio-level monitoring. We hasten to point out the contradiction. If a dealer has too few contracts for meaningful comparison of prices charged to different groups, it is unclear why those contracts would be included in an aggregation exercise. Consider an example where no contracts from a dealer have an African American BISG probability greater than 80%, or even 50%. Including the contracts from this dealer does not add to the identification of potential disparities. Given the significant errors in proxy, combined with the complexity of these transaction and the unknown factors, the inclusion of such dealers in a portfolio-level analysis is specious.

5.   OBSERVED PRICES IN THE CURRENT MARKET

In this section we analyze the prices observed in the automotive finance market during 2012 and 2013. We utilize the CRA Contract Data described in Section 4. The database includes both standard and subvented retail installment contracts and does not include vehicle leases. We estimate that it includes more than 30% and 10% of all financed new and used, respectively, vehicle purchases during the period. Descriptive statistics of the CRA Contract Data are provided in Appendix I, separately for new and used transactions, including and excluding subvented contracts. Consistent with the discussion above regarding the complexity, competitiveness and interconnectedness of the automotive retail and finance markets, we will analyze both transaction prices and financing prices.

We have previously studied transaction prices in the retail automotive market over a ten year period, utilizing financial data from five large, publically traded dealership groups.[130] This research found that franchised dealers priced the sale and financing of new and used vehicles, on average, at levels that are not sufficient to cover their

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[129] *Op. Cit.*, CFPB Supervisory Highlights, 2014, at 20.
[130] *Op. Cit.*, Baines and Courchane, 2013.

costs, much less generate a profit and pay a return on invested capital.[131] During the period analyzed (2002–2011), all, or nearly all, dealer net profits came from the servicing of vehicles after the sale. From the customer's perspective, the cost of purchasing and financing a vehicle is apparently being subsidized by future repair and maintenance costs (even though using the dealer for both functions is not required) in an interesting twist on the old expression "buy now, pay later."

These analyses established that dealers are, on average, pricing vehicles at a level that does not generate net profits, even after one includes the significant incentives paid to franchised dealers by the manufacturers. While the F&I department (including dealer reserve) generates a positive net profit, it is not large enough to offset the net losses generated by the pricing of new and used vehicles. Of course the facts and circumstances of each individual transaction, as well as the dealers' overall volume of sales, will impact the profitability of the various departments involved in the transaction. Nonetheless, the sale and financing of new and used vehicles reflect the dealers' inability, on average, to extract excessive profits.

As we indicated at the time, we observed only average prices, not the range of prices paid by consumers. Therefore, we could not examine transaction prices with respect to a prohibited basis. Nonetheless, these findings are consistent with the observed market practice that dealers and consumers are purchasing and pricing multiple products and services in one transaction. These pricing dynamics provide a useful frame of reference as we attempt to evaluate the price of financing and draw accurate conclusions.

5.1.   OBSERVED CONTRACT RATES AND BUY RATES

We observe average dealer reserves of 66 bps and 117 bps on new and used vehicle transactions, respectively, when subvented contracts are included.[132] Chart 7 reports the distribution of observed dealer reserves across the entire CRA Contract Data.

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[131] We analyzed net profit, rather than gross profit which fails to consider the majority of dealer costs.

[132] With only minor exceptions, dealers are not granted discretion to charge a dealer reserve on a subvented contract. Commonly, the dealer is paid a flat dollar amount as part of the manufacturer-sponsored incentive program.

Chart 7. Distribution of Dealer Reserve CRA Contract Data

- Subvented
- 0 BPS
- 1 - 50 BPS
- 51 - 100 BPS
- 101 - 150 BPS
- 151 - 200 BPS
- 201 - 250 BPS
- 251 - 300 BPS

Based on CRA Contract Database of 8.2 million contracts, including subvented
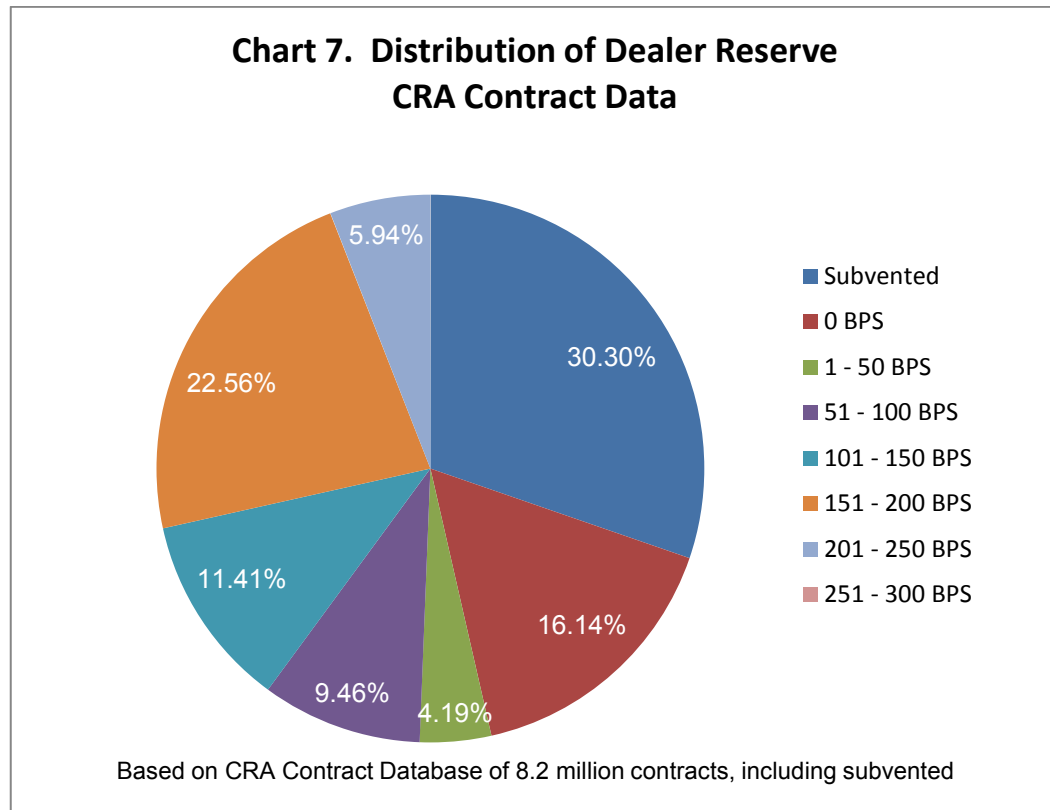
Consistent with the earlier discussion regarding common caps on dealer reserve, 99% of transactions had dealer reserves equal to or less than 250 bps. Approximately 46% of all transactions had no dealer reserve (e.g. 'par' contracts).   When subvented contracts are excluded, the observed dealer reserve are 110 bps and 132 bps on new and used, respectively, vehicle transactions, and approximately 23% of the transactions have no dealer reserve (see Appendix I). From this point on, we have excluded the subvented contracts from the analysis/discussion, as the dealer generally does not have discretion to charge a dealer reserve on such contracts.

These averages (excluding subvented contract) equate to about $14 and $12 on the average monthly payments for new and used transactions, respectively. These amounts are consistent with the data reported by the publically-traded auto groups.

These rates, however, are significantly lower than those reported by selected consumer advocacy groups.[133]

To understand how dealers establish financing rates, we first analyzed the relationship between buy rates, contract rates and the implied dealer reserve. Consistent with standard risk-based pricing, buy rates are commonly a direct function of a number of factors, and while they may vary from one financial institution to the next, they almost always include the following:

- FICO/Custom Scores – higher scores, lower rates.
- New transactions have lower rates relative to used transactions.
- Older used vehicles have higher rates relative to newer used vehicles.
- Longer terms have higher rates relative to shorter terms.

As one would expect, we found buy rates and contract rates followed these patterns in aggregate regardless of race/ethnicity. Some commentators have noted that dealer reserves, expressed in bps, increase as creditworthiness declines, and we observe this pattern in the CRA Contract Data. These patterns are readily observable in the descriptive statistics reported in Appendix I.

These general trends obscure some interesting relationships among buy rate, contract rate and dealer reserve. When we hold constant risk, as measured by FICO, new/used and term, we observe wide ranges of buy rates (and contract rates) within every risk bucket.[134] Further the amount of dealer reserve appears not be random within each bucket. Within most non-prime and subprime risk buckets, dealer reserves decline as the buy rates increase.   Consumers with the highest dealer reserves are observed to have among the lowest buy rates and contract rates. It is consistent with the dealer's ability and incentive to search multiple financial institutions for the lowest buy rate available on any given contract. In these credit tranches, dealers are increasing their dealer reserves by sourcing lower buy rates. Notwithstanding the higher dealer reserve, the consumers associated with these contracts are benefiting in the form of lower contract rates relative to other consumers of similar credit who faced higher buy rates and smaller dealer reserves. If BISG probabilities are to be believed, African American and Hispanic consumers disproportionately occupy these credit tranches. From the financial institutions perspective, this observation presents a dilemma. It suggests that financial institutions that offer the

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[133] See, for example, Delvin David and Joshua M. Frank, "Under the Hood: Auto Loan Interest Rate Hikes Inflate Consumer Costs and Loan Losses," Center For Responsible Lending, April 19, 2011.

[134] We did not separate used vehicles by age of the vehicle.

most competitive (lowest) buy rates within the non-prime and subprime credit segments, may observe larger dealer reserves relative to financial institutions with less competitive rates.

The pattern in the prime segments is somewhat different. While we still observe a relatively wide range of buy rates and contract rates within each bucket, the lowest buy rates in a bucket are associated with relatively lower dealer reserves. In these categories, it appears that some consumers are able to extract nearly all of the value associated with lower buy rates. The dealer uses a network of competitive financial institutions to obtain a low buy rate, which is passed on to the consumer without a dealer reserve (however, the dealer generally gets paid a flat amount on such contracts). BISG probabilities suggest that non-Hispanic white consumers disproportionately occupy this credit tranche. In this credit tranche financial institutions with the most competitive rates would expect to see the lowest dealer reserves.

The divergent dealer reserve patterns across credit segments, combined with the relative shares with which each race/ethnicity group populate these segments, will lead to the potentially errant observation of pricing disparities if one uses the analytic framework utilized by the CFPB. Ironically, financial institutions with the most competitive buy rates may observe larger disparities relative to financial institutions with higher buy rates. This is one more indication that focusing exclusively on a single element of a pricing transaction can result in flawed findings.

The vigorous competition among financial institutions that is observed today results from financial institutions competing to offer dealers lower buy rates. The effect of caps currently set by many financial institutions is to pass some of the benefit of the lower buy rate on to the consumer. Dealers have strong incentives to collect their dealer reserve on the lowest buy rate they can obtain from their network of financial institutions. While the degree to which consumers benefit may vary across credit tranche, significant benefits to consumers were identified in all credit tranches

5.2.   SIMILARLY SITUATED CONSUMERS AND CONTROLS

With no controls for the complexities and challenges discussed above, we measure raw, or uncontrolled, disparities of 16.9, 9.4, and 13.4 bps for BISG-predicted African American, Hispanic and Asian consumers, respectively.[135] All regression results are reported in Appendix J. These results are generated using the same method that the

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[135] Results are based on an OLS regression technique, regressing dealer reserve (bps) on continuous BISG probabilities for race and ethnicity with no other explanatory variables.

CFPB uses in their analytic framework and the basis upon which it believes there is a fair lending risk associated with dealer reserve. We note that the adjusted R-squared on this raw regression is less than 1%, suggesting that the proxied race probabilities explain less than 1% of the variation in dealer reserves. In other circumstances, such as a well-designed randomized controlled trial, the low adjusted R-squared may be less of a concern. However, in this context, we believe it is a cause for concern.

These raw disparities ignore numerous factors, discussed above, that directly impact the dealer reserves charged by dealers. For example, this analysis ignores all seven factors identified by the DOJ as having a legitimate, causal impact on dealer reserve.[136] Thus, these results are not based on a comparison of similarly situated consumers, which is a fundamental premise and requirement of fair lending testing. These disparities also ignore the substantial problems identified in traditional and BISG proxy methods. In the following sections we will make adjustments, to the extent possible, for these issues.

5.2.1.   ADJUSTING FOR PROXY BIAS

While the BISG probabilities cannot be corrected with respect to accuracy, one can mitigate the observed biases related to FICO, geography, income and LMI status. This may be accomplished to a limited extent by controlling for these factors directly in the model. We have tested a number of different specifications from these controls.

FICO

We have tested two specifications. The first segments FICO by major credit tranches: Super prime (760+), prime (720-759), non-prime (620-719) and subprime (<620). This specification has a number of advantages. In addition to partially controlling proxy bias, it reflects important market structures. As discussed above, dealers' options for arranging financing vary across these credit tranches. Consumers' finance options also vary significantly across these tranches, with those in lower credit tranches more reliant on dealer provided financing. Additionally, several of the unobservable attributes of consumers, such as 'the existence of a

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[136] See Pacifico and Springfield settlements

competitive offer" are correlated with credit scores.[137] As such, credit tranche categories can serve as a proxy for these attributes.

Estimating the raw model with the inclusion of this credit tranche specification reduces the observed disparities, measured in bps, by 68% and 82% to 5.4 and 1.8 for contracts proxied to be African American and Hispanic, while the proxied Asian disparity slightly increased to 14.0 bps.

Second, we tested more refined FICO bands, segmenting FICO by 20 point categories, for example from 900-880, 879-860, 859-840, etc. This specification more closely models the observed bias in the proxy error.

Estimating the raw model and substituting this FICO specification for the credit tranches generates similar results. Observe disparities, measured in bps, of 4.5, 1.4 and 14.5 for contracts proxied to be African American, Hispanic and Asian, respectively.

Geography

We have tested two specifications of geography. The first is a simple state control. In addition to partially controlling proxy bias, it reflects important regulatory structures as states have different regulations with respect to consumer finance rates, indirect automotive finance and consumer protection.   Estimating the raw model and including state controls, the observed disparities are 20.9, 12.6 and 15.2 bps for contracts proxied as African American, Hispanic and Asian, respectively.

Second, we refined the geography to control for MSA/MD (MSA) while maintaining the state control for contracts not in an MSA (e.g. more rural).[138] In addition to the advantages of a state control, this specification reflects important market structures - for example, the varying cost structures across dealers, discussed above. One of the drivers of those differences is location. Dealers located in Tysons Corner VA, (Washington-Arlington-Alexandria MSA 47894) likely face higher costs than dealers located in Southwestern VA. A similar control was commonly used by regulators in the fair lending analysis of wholesale mortgage broker fees, including yield spread premiums.

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[137] One of the seven factors identified by the DOJ in the Springfield and Pacifico settlements as causing differences in observed dealer reserves.

[138] MSA refers to Metropolitan Statistical Areas. MD is a Metropolitan Division. These represent Census geographical designations.

Estimating the raw model and substituting the MSA specification for the former, we observe disparities of 19.8, 13.1 and 9.9 for contracts proxied to be African American, Hispanic and Asian, respectively.

Income

Given the longstanding concerns in fair lending analysis of controlling for absolute income, rather than relative measures such as payment-to-income ratios, we have tested a relative income specification based on the LMI splits used in the analysis of BISG proxies. We have created four indicators based on the LMI status of the tract in which the consumer resides - <50%, 50-80%, 80-120% and 120%+.

Estimating the raw model and including LMI splits, the observed disparities decrease by 24%, 25% and 3% for contracts proxied to be African American, Hispanic and Asian, respectively.

Finally, we tested a model combining credit tranches and MSA controls. With a more conservative approach, we choose to leave the LMI splits out of this model. We found the observed disparities declined by 54%, 41% and 25% to 7.8, 5.6 and 10.1 bps for contracts proxied to be African American, Hispanic, and Asian, respectively. We refer to this as the 'base model.' The adjusted-R-squared increased from 1% on the raw model to 5% with these two controls. We performed additional testing on the base model that strongly suggests these patterns hold within each race and ethnicity group. Using a threshold method to identify likely members of each race and ethnicity group, we ran the base model on each group individually and the results are reported in Appendix J. The coefficients are directionally consistent across each regression.

5.2.2. DEAL SPECIFIC CONTROLS

With the base model making important, but admittedly partial, adjustment for some of the challenges associated with proxing race and ethnicity, we can consider how to address some of the deal-specific challenges raised in Section 4.

It is relatively easy to control for dealer reserve caps that differ by term and new vs. used transactions. As noted above, it is common for financial institutions to have a 250 bps cap on contract lengths up to 60 months, and 200 bps on longer terms. Additionally, while average contract lengths have gotten longer over recent years, we observe in the CRA Contract Data certain minority groups, as identified by BISG, disproportionately have terms longer than 60 months, relative to non-minorities. Selected minority groups, as identified by BISG, are also more likely to purchase

used vehicles (where average dealer reserves are relatively higher) vs. new vehicles (where average dealer reserves are relatively lower).

Estimating the base model with the addition of a control for new/used and an indicator for contract length greater than 60, observed disparities on all three proxied minority groups are below 10 bps. We performed the same additional tests on the full model and found the coefficients across BISG-predicted race/ethnicity groups to be directionally consistent across each regression.

In summary, after adjusting, in part, for the biases inherent in race and ethnicity proxies, and controlling for basic and observable objective factors that impact dealer reserve, we observe potential disparities for African American, Hispanic and Asian consumers, identified by proxy, in the range of 6 - 9 bps. Given the average amounts financed and contract terms in our data, this equates to less than $1 of monthly payment, or approximately 0.2% of the average monthly payment amount. Furthermore, this analysis does not consider the many unobservable factors that have a causal impact on dealer reserve, including those recognized by the DOJ, which include, among others whether or not the consumer had a competing offer of financing from another dealer or finance company, and whether or not the dealer has implemented a dealer reserve policy similar to the NADA Fair Credit Compliance Policy and Program.

5.2.3.   UNKNOWN FACTORS

As discussed above, these unknown dealer-specific, consumer-specific and deal-specific attributes impact the dealer reserves. For example, the seven factors articulated by the DOJ in the Springfield and Pacifico consent orders, are not available to the financial institution and we could not directly test their impact on observed dealer reserve disparities (see section 5 for a more complete discussion of unknown attributes).

While we cannot observe these factors and control for them directly, we can proxy for them. When a contract is observed to have zero dealer reserve, it may reflect the downward adjustments contemplated by the DOJ in Pacifico and Springfield, and it is economically reasonable to assume that one of more of the seven factors in those consent orders was potentially present. As we reported earlier approximately 23% of the non-subvented contracts have no dealer reserve. There are econometric issues with including zero dealer reserve contracts in the estimation, so we exclude them. This econometric limitation does not negate the economic and market significance of par contracts, thus our approach here is to exclude them from the analysis. If we exclude from our analysis all contracts with zero dealer reserves the observed raw

disparities fall to 7.9, 6.3 and 11.6 bps for African American, Hispanic and Asian contracts identified by proxy, respectively.   These results suggest that more than half (54%) of the observed raw disparity measured for proxied African Americans is driven by the frequency of par contracts, rather than the level of positive dealer reserve.   With respect to proxied Hispanic and Asian contracts, the frequency of par contracts accounts for 33% and 14%, respectively, of the raw disparity. From this perspective, we see how the analysis of dealer reserve critically hinges on a full understanding of the circumstances surrounding par contracts.

Once we apply the same controls described above and re-run the regression excluding contracts with no dealer reserve, we identify disparities of 5.2, 6.4 and 5.5 bps, respectively. Disparities at this level are in the range of $.50 - $.60 per month and economically de minimis as a share of the average monthly payment.

Chart 8. Steps for Analyzing Dealer Reserve Disparities

Step 1	Uncontrolled 'Raw' Disparities	9-17 bps
Step 2	Adjust for BISG bias	6-10 bps
Step 3	Control for relevant observable factors	6-9 bps
Step 4	Proxy for unobservable consumer and dealer attributes	5-6 bps
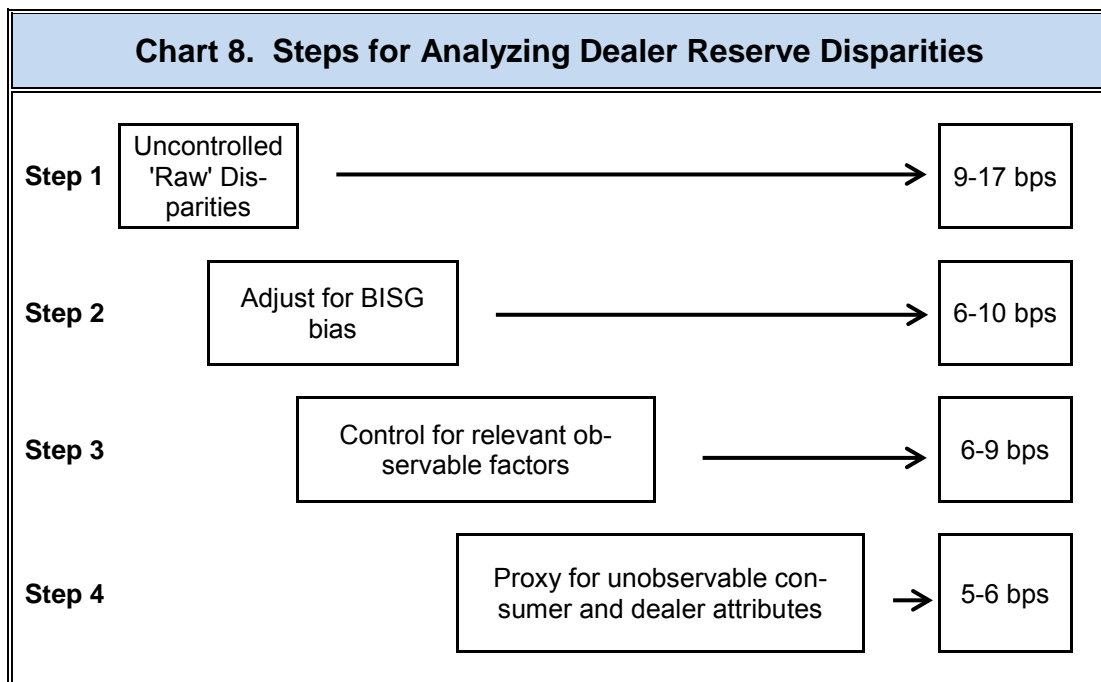
6.   ALTERNATIVE DEALER COMPENSATION MODELS

In this section we analyze certain alternative dealer compensation models advocated by the CFPB. We present a number of hypothetical scenarios and use the CRA Contract Data to estimate costs and benefits to consumers under these alternative scenarios.

6.1.   CFPB AND DOJ PREFERENCES

The CFPB has made clear its strong preference for certain alternatives to the current dealer compensation model. These appear to include flat dollar fees, flat percent of amount financed and 'hybrids.'[139] The DOJ, in public presentations, has included an additional alternative as outlined above in the Pacifico and Springfield settlements.

6.2.   TESTING

As a simplifying assumption, we hold dealer revenue constant. This is consistent with the observed market, where despite dealers' extensive networks of financial institutions, dealers appear to be losing money on the sale of new and used vehicles, even after profits from the F&I department are included in the analysis.[140] A scenario where dealers earn less money in aggregate on the financing of vehicle appears unlikely and perhaps unsustainable.   This is also consistent with our objective to study the costs and benefits to consumers rather than dealers.

If a compensation structure required flats (fixed compensation per contract), financial institutions would likely directly set the contract rate they offer to dealers.   These contract rates would have to be substantially higher than current buy rates in order to pay flats on every contract, because the current buy rates are not set at a level to pay flats on 100% of contracts. As we observed above, in the current market financial institutions pay flats on no more than 23% of contracts (e.g. those with no dealer reserve).

Given this dynamic, one can test for:

- Who receives the higher contract rates and how much higher would those rates would be.

- Who receives lower rates and how much lower would those rates would be.

To address these questions, we implement four scenarios and report the results in Appendix K. The starting point was to calculate the dollar value of all dealer reserves across the entire portfolio. In each scenario we systematically converted the aggregate dealer reserves into equal flat amounts per contract. Next, we converted the flat amount in bps and added it to the observed buy rate – essentially

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[139] *Op. Cit.,* CFPB Supervisory Highlights, Summer 2014.
[140] *Op. Cit.,* Baines and Courchane, 2013.

increasing each buy rates by an amount sufficient to pay the required flat. In this way, we re-priced the contract rate on each contract in the portfolio. Here again, we excluded subvented contracts from consideration. Each scenario tested a different mechanism for determining which contracts to re-price and by how much, always with the constraint of holding total dealer compensation constant.

6.2.1. SCENARIO 1

In scenario 1, we determine total dealer compensation separately for the new and used vehicle segments within each financial institution. The rationale for this is simple and reflects existing market realities. Buy rates are uniformly higher for used vehicles, all else equal; and used vehicles are considerable less expensive on average. These factors are important in converting dealer compensation into a flat and then back into the number of bps sufficient to pay the flat. It is also important to make these calculations separately for each financial institution, as they have different costs of capital, cost structures, etc. which influence the buy rates they offer in the market.

Across the portfolio, we observed 55% of contract rates were lowered, while 45% were raised. The average decline was approximately 66 bps, while the average increase was 82 bps. The increase equates to additional $581 on average over the term of the contract.

With respect to race and ethnicity, proxied minority contracts were lowered only slightly more frequently than non-minority contract. Conversely, 42%, 43% and 43% of proxied African American, Hispanic and Asian contracts, respectively, would face higher contract rates in this scenario.

6.2.2. SCENARIO 2

In scenario 2, we added a third factor to the re-pricing mechanism – credit tranche. We believe this to be a more realistic assumption, as buy rates vary dramatically over the credit range and scenario 1 failed to consider this reality. Thus, in this scenario we calculated total dealer compensation within each financial institution, separately by new and used and six credit tranches. We then re-priced the contracts within each of these buckets.

Despite the important addition of credit tranche, the results are largely similar. Fifty-six percent of contract rates were lowered, while 44% were raised. The dollars are similar to those observed in Scenario 1, as are the results with respect to race and ethnicity.

It is important to note that in scenarios 1 and 2, 100% of the par contracts are re-priced to higher contract rates. This strikes us as a highly unlikely outcome for a variety of reasons discussed earlier – principally flats are already paid on most of these contracts. Additionally, many of these are likely to have present one or more of the factors outlined by DOJ in Springfield/Pacifico. Finally, these are disproportionately consumers with prime credit ratings, highly attractive to financial institutions, and as such consumers with potentially numerous financing options outside of the indirect channel.

In scenarios 3 and 4, we add the following constraint - the contract rate remains unchanged on par contracts.

6.2.3. SCENARIO 3

Scenario 3 parallels scenario 1, but for the additional constraint on par contracts. The results are striking. Less than half of the contracts (48%) face lower contract rates, and the dollar value of the average lower rate is decreased by 39% (to $291 from $476).

As before, proxied minority contracts are lowered at slightly higher rates, but nearly the same shares (27%-30%) of minority and non-minority contracts are raised.

6.2.4. SCENARIO 4

Scenario 4 parallels scenario 2, but for the additional constraint on par contracts. The results are not meaningfully divergent from scenario 3.

Summary

In all scenarios we observed significant shares of proxied minority contracts were re-priced to higher contract rates – in the range of 60 – 84 bps. So while the dealer reserve in the alternative world would be 0, the contract rates would be significantly higher for these consumers. These price increases are many multiples larger than any observed potential dealer reserve disparity. Additionally, they are at a level that creates significant concern regarding access to credit. Price increases of this magnitude have the real potential to price some individuals out of the market. Furthermore, we have not attempted to model the incentive dealers would have to assign a given contract to the financial institution offering the highest flat rate. Hence, these scenarios may underestimate the share of consumers facing higher contract rates.

In all scenarios, we observed that the share of raised contracts is nearly always the highest in the 760+ credit score tier. While scenarios 3 and 4 mitigate this result, it is not eliminated.   It warrants an important caveat. These are consumers with the highest credit worthiness, and thus the most financing alternatives. Such a pricing scheme has the potential to drive some portion of them out of the indirect channel entirely. That could potentially have ramifications on the participants in the indirect automotive finance market.   Do certain financial institutions leave the market entirely or switch to the direct channel? Can dealers remain in the business of arranging financing under such a scenario? The market is complicated and competitive, and it would be speculative to attempt to answer these questions with the data available to us in this Study.

Finally, we have not attempted to model the impact of the incentive dealers would have to assign contracts to the financial institutions with larger flats. Higher flats necessitate a higher contract rate, all else equal. Hence, these scenarios may underestimate the share of consumers facing higher contract rates under a flat or hybrid compensation structure.

7.   CONCLUSIONS AND RECOMMENDATIONS

Given the dramatically increased regulatory activity concerning dealer reserve, we have examined indirect automobile finance practices, focusing on fair lending super-vision. There is no question that the indirect auto market is highly competitive and complex. Failure to consider either competition or pricing complexities allows for the application of an overly-simplistic and biased analytical framework, which leads regu-lators to pursue overly onerous civil-money penalties from financial institutions.

Given the asymmetric nature of information between dealers and financial institu-tions, financial institutions and their regulators are in a less than ideal position to evaluate the pricing dynamics of transactions at dealers. Despite those limitations, our analysis finds that these pricing dynamics are largely explained by several objec-tive factors, rather than by race and ethnicity.

Given the realities of the regulatory landscape and the limited tools available for analysis, the ability to perform meaningful, accurate and actionable analyses of deal-er reserves at the portfolio level is very circumscribed. To partially account for the market complexities and the bias inherent in the BISG methodology, we recommend the following:

(1) In calculating any disparities at the portfolio level, make adjustments to the population to:
   a. Exclude any volumes from dealers with zero dealer reserve.

b. Exclude any volumes from dealers with no variance in reserve.
c. Exclude any dealers with counts insufficient to monitor dealer activity – specifically, exclude dealers with fewer than 2 contracts from a minority consumer and 2 contracts from non-Hispanic white consumers and a total of 5 contracts. (Similar restrictions should be applied when analyzing for age or gender).

(2) Implement economic controls to adjust for general economic conditions beyond the control of the financial institution or dealer. Specifically, adjust for:
a. Location -- the analyses should include MSA level fixed effect controls to control for competitiveness in local markets. Market demand/supply conditions clearly vary by MSA.
b. New/Used – these markets are completely different on many dimensions and the negotiation around trade in values may directly impact dealer reserves.
c. Broad credit tranche – this is not equivalent to controlling for credit score in the buy rate analysis but rather recognizes that prime and subprime markets vary broadly.
d. Month of origination.

(3) Adjust for the known bias in the use of the BISG proxy methodology
a. If using a continuous approach, determine the "count" of affected minority consumers by applying a threshold after the application of the continuous method. That is, at the very least, the consumers with BISG probabilities less than 50% should not be included in any calculation of consumer harm.
b. Require verification/certification that any consumer receiving settlement funds or other remediated responses actually is a member of a protected class.
c. If funds remain in the settlement fund, these should revert to the financial institution and not become part of any regulatory "settlement fund."

(4) When applying the BISG method, use a stricter threshold for any actions taken prior to 2012. The BISG approach had never been used historically, no one could have used it for monitoring, and applying a recent innovation to past behavior is unfair to financial institutions. For all originations prior to 2011, a 70% BISG threshold, or similar, should be applied.

(5) Going forward, while financial institutions may, given sufficient volumes, monitor activity quarterly, no remediation should take place until the end of the year. This will help adjust for seasonality during an annual cycle.

(6) The analysis should include a dealer level focus. There must be adjustments for the aggregation issue.

(7) The continuous BISG methodology should not be used in any analysis of indirect auto underwriting. The econometric interpretation of such a result is overly difficult.

8. APPENDIX A. PROJECT TEAM

Charles River Associates is a leading global consulting firm that offers economic, financial, and business management expertise to major law firms, corporations, accounting firms, and governments around the world (see www.crai.com). CRA consultants have provided guidance in complex cases with a focus on analytics and its Financial Economics team, based in Washington, DC, and led by Dr. Marsha Courchane, undertook this research project. Our team combines a strong understanding of the retail automotive market, considerable experience conducting fair lending analyses in this and in other consumer finance markets, and specific experience with the methodologies used by various regulatory agencies, including the CFPB. In the course of our ongoing work and research, we regularly interact with financial institution regulators, leading academics, researchers at Census Bureau and elsewhere, and representatives from various banking and financial services associations, as well as others.

The project team was led by Arthur Baines and Marsha Courchane. Mr. Baines is a Vice President in the Financial Economics practice at CRA and has years of experience performing fair lending related analysis for bank and non-bank financial institutions in the indirect auto market and other consumer finance products; studying the retail automotive market in the United States; and developing econometric and financial models.   Mr. Baines' early work in fair lending analysis was in connection with the regulatory investigations, conducted in the mid-1990s, of underwriting and pricing practices of non-bank auto finance companies.   Subsequently, Mr. Baines analyzed the portfolios of numerous indirect auto financial institutions in the private litigations of the early 2000s alleging pricing discrimination related to dealer reserves. Currently, Mr. Baines and the CRA Financial Economics Practice are involved in numerous fair lending regulatory exams and investigations of finance institutions, including many brought by the CFPB and DOJ.   Beyond the fair lending analysis, Mr. Baines has undertaken numerous projects related to the retail automotive market. He has studied the profitability of dealers, vehicle allocation and distribution systems, commercial financing of dealers and the complex relationship among dealers, manufacturer, customer and finance company (both captive and non-captive). Prior to joining CRA in 2010, Mr. Baines was a partner in the financial services practice at PwC and focused on automotive retail finance and vehicle distribution.

Dr. Courchane heads the Financial Economics Practice of Charles River Associates. She specializes in financial institution analyses for regulatory reviews and in support of litigation. Dr. Courchane is a leading expert in the areas of mortgage and consumer lending, including analyses of indirect vehicle finance for regulatory clients.

Her research and analyses with respect to mortgage markets, discrimination in lending, consumer credit, securitization, credit risk, and redlining issues has been widely cited and published in several journals , including the *Atlantic Economic Journal, Journal of Real Estate Research, Journal of Economics and Business, Housing Policy Debate, Applied Economics, Journal of Housing Economics, Journal of Housing Research, Journal of Real Estate Finance and Economics, Canadian Journal of Economics, Property Management, International Real Estate Review and Real Estate Economics.* She serves on the editorial board for the *Journal of Housing Research*, the *Journal of Real Estate Research*, and for the *International Journal of Housing Markets and Analysis* and referees for several journals. Dr. Courchane is a Fellow of the Weimer School of Advanced Studies in Real Estate and Land Economics. She is a member of Counselors in Real Estate (CRE). She is the Executive Vice President of the American Real Estate and Urban Economics Association (2008–2015) and served on the Board of Directors of the American Real Estate Society (2008–2014). Dr. Courchane also worked previously as a *Senior Financial Economist* in the Risk Analysis Division of the Office of the Comptroller of the Currency, Washington, DC. Her employment and her research have focused on fair lending analyses over the past twenty years.

9.   APPENDIX B. GLOSSARY OF TERMS AND ACRONYMS

- ACS – American Community Survey

- AF-ABS – Auto finance asset backed securities

- AFSA – American Financial Services Association

- Ally - Ally Financial

- APR – Annual percentage rate

- Back-end ratio - Back-end coverage ratios measure the share of a dealer's fixed costs that are covered by profitability from its service and parts departments.

- Big 3 – Detroit-based manufacturers Chrysler, Ford, General Motors

- BISG – Bayesian Improved Surname Geocoding

- BLS – Bureau of Labor Statistics

- BPS – basis points

- Bulletin – CFPB Bulletin 2013-02, March 21, 2013.

- Buy Here Pay Here – a dealership that finances vehicle purchases and does not assign the resulting contract to a financial institution.

- Buy rate – the wholesale financing rates offered to the dealer by a financial institution in the indirect auto finance market.

- CEX - Consumer Expenditure Survey

- CFPB – Consumer Financial Protection Bureau

- CFPB White Paper - "Using publically available information to proxy for unidentified race and ethnicity, A methodology and assessment," CFPB, Summer 2014, released on September 17, 2014.

- Contract – Retail installment contract associated with the purchase of a new or used vehicle from a dealer

- Contract rate – The note rate negotiated between the dealer and consumer.

- The Court – The U.S. Supreme Court

- CPO – Certified Pre-Owned, a subset of the used vehicle market

- CRA – Charles River Associates, Inc.

- CRA Contract Data – A database consisting of approximately 8.2 million vehicle contracts originated during 2012 and 2013 via the indirect auto channel.

- Customer incentives – Manufacturer-sponsored incentives offered to the consumer, generally cash rebates of subvented contract rates.

- Dealer incentives – Manufacturer-sponsored incentives offered to the dealer for the sale of specific vehicles.

- Dealer participation – The dollars paid to the dealer by the financial institution to acquire the contract. Participation includes dealer reserve and flats.

- Dealer reserve – The amount by which the contract rate exceeds the buy rate.

- Dealer reserve payment plan – The terms offered by the financial institution to the dealer governing the payment of dealer reserve to the dealers.

- Dodd Frank Act - Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010

- DOJ – Department of Justice

- ECOA – Equal Credit Opportunity Act

- F&I – Finance and Insurance

- FDIC – Federal Deposit Insurance Corp

- Flats – dealer compensation, generally in the form of a fixed dollar amount or fixed percentage of the amount financed.

- FRB – Federal Reserve Board

- FTC – Federal Trade Commission

- FTE – Full-time equivalent

- GAP - Guaranteed Auto Protection

- GMAC – General Motors Acceptance Corp.

- HHI - Herfindahl-Hirschman Index

- HMDA – Home Mortgage Disclosure Act

- Hybrids – a dealer compensation structure that combines flat dollar amounts and flat percentages of the amount financed.

- Lift – the increase in race/ethnicity probabilities resulting from utilizing geography and surname probabilities in combination

- LMI – Low Moderate Income

- LMI Status – The relative ranking of a geography on the LMI scale

- LTV – the loan-to-value ratio, in the indirect auto finance market it is commonly called the advance percent.

- Make - The manufacturer of the vehicle. For example: Ford, Chevrolet, Toyota, BMW, etc.

- Manufacturer-sponsored incentives – Financial incentives offered by the manufacturer on the sale of a specific vehicle(s).

- MOU – memorandum of understanding

- MSA – metropolitan statistical area

- NADA – National Automobile Dealers Association

- NIADA – National Independent Automobile Dealers Association

- Note Rate – synonymous with the contract interest rate, excluding any one time fees.

- OCC – Office of the Comptroller of the Currency

- Pacifico - Pacifico Ford Inc.

- Raw – Refers to the comparison of a given metric (e.g., denial rate) without controlling for any relevant factors.

- Reg B - Federal Reserve Board's Regulation B, through which ECOA is implemented

- RMBS – Residential mortgage backed securities

- Similarly Situated – used in fair lending analyses, referring to a group of 2 or more applicants/buyers with similar relevant attributes.

- Springfield - Springfield Ford Inc.

- Vehicle model – Model differentiates vehicles of the same make. For example: Honda Accord, Ford Explorer, Chrysler 300.

- Vehicle trim – Trim differentiate vehicles of the same make and model. For example: Honda accord LE, Honda accord LX.

- YSP – Yield spread premium

- 18+ - Age designation, 18 years old and older.

10.　APPENDIX C. HOUSEHOLD VEHICLE OWNERSHIP BY STATE AND RACE/ETHNICITY, 2010-2012

Year	State	# of Housing Units	% of Household with No Vehicle				% of Household with 1 Vehicle				% of Household with 2 Vehicles				% of Household with >2 Vehicles			
			Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White
2010	AL	19,649	5.7%	13.9%	6.7%	4.0%	31.3%	40.7%	30.0%	30.1%	38.8%	29.2%	42.9%	40.7%	24.2%	16.2%	20.5%	25.1%
2010	AK	2,447	3.9%	14.1%	6.4%	11.3%	28.8%	30.2%	34.2%	31.0%	41.8%	47.5%	43.0%	37.6%	25.5%	8.1%	16.4%	20.0%
2010	AZ	24,894	7.4%	14.9%	5.8%	6.2%	33.2%	41.4%	27.9%	39.9%	38.9%	31.1%	47.7%	38.6%	20.4%	12.6%	18.5%	15.3%
2010	AR	11,859	5.6%	16.4%	5.8%	5.1%	33.8%	42.7%	26.8%	32.0%	37.3%	26.5%	43.6%	41.3%	23.2%	14.4%	23.7%	21.6%
2010	CA	128,639	7.5%	14.5%	7.1%	6.9%	28.2%	39.4%	25.9%	35.2%	37.7%	30.2%	40.8%	37.7%	26.6%	15.9%	26.2%	20.2%
2010	CO	20,387	6.9%	13.7%	4.2%	5.1%	29.9%	41.9%	27.0%	31.9%	38.7%	29.7%	41.6%	40.6%	24.6%	14.7%	27.2%	22.4%
2010	CT	14,099	18.4%	20.6%	6.5%	5.7%	31.5%	39.3%	33.6%	32.0%	33.4%	27.4%	40.9%	40.2%	16.7%	12.7%	19.0%	22.1%
2010	DE	3,451	3.3%	15.3%	3.8%	5.1%	38.6%	40.5%	32.8%	33.2%	42.1%	30.3%	46.7%	41.7%	16.0%	13.9%	16.7%	20.0%
2010	DC	2,695	38.6%	38.8%	37.6%	26.3%	41.3%	41.6%	43.9%	51.4%	14.4%	14.7%	16.7%	18.2%	5.7%	5.0%	1.7%	4.0%
2010	FL	78,534	8.0%	12.4%	4.2%	5.5%	36.2%	44.3%	28.2%	43.0%	39.6%	30.7%	46.4%	38.6%	16.2%	12.6%	21.3%	13.0%
2010	GA	37,092	8.0%	12.6%	4.2%	3.5%	33.2%	42.5%	27.3%	30.0%	39.3%	29.9%	47.7%	43.2%	19.5%	15.0%	20.8%	23.4%
2010	HI	4,684	9.3%	6.2%	9.1%	9.0%	32.2%	42.3%	29.5%	39.2%	40.2%	34.6%	35.7%	36.5%	18.4%	16.9%	25.8%	15.4%
2010	ID	6,045	3.0%	14.4%	7.7%	4.4%	27.0%	28.3%	19.0%	27.1%	39.5%	35.3%	45.8%	39.1%	30.5%	22.0%	27.4%	29.3%
2010	IL	49,771	9.2%	23.6%	11.5%	7.6%	32.2%	44.4%	31.7%	34.1%	37.6%	22.3%	39.3%	39.6%	21.0%	9.7%	17.6%	18.7%
2010	IN	26,177	5.1%	14.3%	7.3%	5.4%	33.8%	46.3%	34.7%	31.7%	39.2%	27.1%	39.7%	40.2%	21.9%	12.3%	18.3%	22.8%
2010	IA	12,727	5.3%	17.2%	3.2%	5.5%	29.9%	43.4%	33.8%	29.2%	38.8%	28.8%	43.1%	40.2%	26.1%	10.6%	19.9%	25.1%
2010	KS	11,512	4.7%	12.7%	2.2%	4.8%	29.2%	38.1%	23.6%	30.0%	37.1%	32.5%	50.4%	40.0%	29.0%	16.8%	23.8%	25.2%
2010	KY	17,844	7.8%	17.5%	2.9%	6.7%	35.0%	41.7%	34.2%	32.5%	41.3%	27.5%	47.5%	39.3%	15.9%	13.2%	15.5%	21.5%
2010	LA	17,853	7.6%	17.1%	6.0%	4.9%	31.9%	42.7%	33.0%	35.1%	42.8%	27.0%	43.5%	41.8%	17.8%	13.1%	17.5%	18.3%
2010	ME	5,476	9.8%	17.2%	6.9%	6.6%	30.6%	37.0%	32.9%	33.8%	28.8%	26.5%	48.9%	41.1%	30.8%	19.3%	11.4%	18.6%
2010	MD	22,345	6.8%	17.2%	6.1%	5.8%	29.7%	38.8%	26.4%	30.1%	38.1%	29.2%	44.0%	40.5%	25.4%	14.7%	23.4%	23.6%
2010	MA	26,251	25.2%	25.7%	17.1%	10.2%	41.6%	43.5%	35.2%	34.7%	24.6%	22.5%	36.6%	39.2%	8.6%	8.3%	11.1%	15.9%
2010	MI	39,940	8.3%	18.1%	5.6%	5.7%	31.0%	46.7%	28.1%	33.6%	42.2%	25.3%	46.9%	40.9%	18.5%	9.9%	19.4%	19.7%
2010	MN	21,347	6.7%	22.5%	8.6%	5.8%	31.0%	40.6%	28.4%	30.0%	38.4%	27.1%	45.5%	40.9%	24.0%	9.8%	17.6%	23.2%
2010	MS	11,494	4.2%	13.6%	5.9%	3.8%	27.8%	39.5%	23.6%	30.5%	45.8%	29.3%	36.9%	40.8%	22.2%	17.6%	33.5%	24.8%
2010	MO	24,826	8.1%	19.6%	5.5%	5.8%	31.5%	45.4%	29.7%	32.1%	41.9%	25.2%	42.4%	40.4%	18.5%	9.8%	22.4%	21.8%
2010	MT	4,108	7.9%	0.6%	9.4%	5.0%	24.5%	32.3%	11.1%	27.5%	32.8%	43.1%	42.2%	39.0%	34.8%	24.0%	37.3%	28.4%

American Financial Services Association

Year	State	# of Housing Units	% of Household with No Vehicle				% of Household with 1 Vehicle				% of Household with 2 Vehicles				% of Household with >2 Vehicles			
			Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White
2010	NE	7,421	8.1%	13.0%	5.7%	3.9%	22.7%	43.7%	30.3%	30.1%	43.9%	31.3%	42.9%	41.0%	25.3%	12.1%	21.1%	25.0%
2010	NV	10,568	7.3%	17.0%	4.6%	6.6%	31.4%	42.5%	31.2%	37.3%	41.5%	28.6%	43.0%	39.3%	19.8%	11.8%	21.3%	16.7%
2010	NH	5,316	11.2%	11.8%	2.3%	5.5%	29.7%	23.7%	24.3%	30.3%	38.1%	46.4%	52.0%	42.9%	21.0%	18.0%	21.3%	21.3%
2010	NJ	33,113	20.6%	22.6%	8.2%	7.3%	35.2%	40.6%	32.1%	33.4%	30.6%	26.2%	42.2%	40.0%	13.5%	10.6%	17.4%	19.3%
2010	NM	7,743	5.1%	9.9%	5.0%	5.1%	29.5%	37.5%	25.5%	37.4%	40.1%	34.8%	50.6%	38.3%	25.3%	17.8%	18.9%	19.2%
2010	NY	74,105	48.4%	47.9%	40.0%	18.7%	27.3%	32.8%	30.9%	33.8%	16.5%	14.0%	20.7%	33.1%	7.8%	5.3%	8.3%	14.4%
2010	NC	39,101	6.4%	13.6%	3.1%	4.4%	31.2%	40.0%	30.4%	31.0%	41.9%	29.8%	45.2%	40.9%	20.5%	16.7%	21.3%	23.7%
2010	ND	2,879	2.8%	5.8%	23.5%	5.6%	42.9%	53.5%	21.3%	28.9%	39.8%	34.5%	46.0%	37.8%	14.5%	6.2%	9.2%	27.7%
2010	OH	47,925	8.2%	19.7%	5.6%	6.4%	32.3%	45.0%	26.0%	31.7%	40.6%	25.9%	48.8%	40.5%	18.9%	9.3%	19.6%	21.4%
2010	OK	14,951	4.1%	13.4%	2.9%	4.7%	34.1%	40.4%	30.2%	32.4%	41.0%	29.3%	42.6%	41.0%	20.7%	16.8%	24.3%	21.9%
2010	OR	15,711	8.2%	15.6%	7.7%	7.8%	28.0%	35.9%	29.4%	32.4%	40.3%	34.4%	44.6%	38.1%	23.5%	14.2%	18.4%	21.7%
2010	PA	50,856	20.9%	33.7%	12.0%	8.2%	35.9%	39.2%	32.4%	33.6%	30.9%	20.5%	41.8%	39.0%	12.3%	6.6%	13.8%	19.2%
2010	RI	4,235	14.7%	21.7%	7.7%	8.7%	43.1%	44.1%	38.5%	35.4%	29.6%	28.3%	38.2%	37.1%	12.6%	6.0%	15.6%	18.8%
2010	SC	19,107	5.9%	15.4%	6.1%	4.1%	30.0%	39.1%	32.1%	31.5%	43.0%	27.9%	43.8%	42.5%	21.1%	17.5%	18.0%	21.8%
2010	SD	3,304	12.8%	10.8%	16.1%	5.8%	23.9%	30.0%	36.2%	28.1%	36.6%	47.6%	35.2%	35.7%	26.7%	11.6%	12.6%	30.3%
2010	TN	25,940	4.0%	14.2%	4.1%	4.7%	30.5%	43.2%	21.4%	30.9%	44.1%	28.3%	50.7%	40.6%	21.4%	14.3%	23.8%	23.8%
2010	TX	91,135	6.4%	12.2%	4.3%	4.2%	32.7%	42.7%	31.1%	34.3%	39.8%	31.3%	44.8%	42.8%	21.1%	13.8%	19.8%	18.7%
2010	UT	9,144	4.9%	8.0%	5.8%	4.3%	28.1%	32.6%	30.1%	25.8%	38.3%	34.5%	38.8%	41.9%	28.8%	24.9%	25.3%	27.9%
2010	VT	2,649	4.0%	15.2%	4.0%	6.9%	26.8%	23.9%	34.6%	34.2%	31.2%	37.6%	27.1%	38.4%	37.9%	23.3%	34.3%	20.5%
2010	VA	31,503	5.7%	12.0%	4.0%	4.3%	26.3%	37.6%	25.1%	29.9%	42.8%	30.8%	45.0%	39.7%	25.3%	19.6%	25.9%	26.1%
2010	WA	27,101	5.8%	11.1%	7.5%	6.4%	28.6%	38.6%	29.6%	31.6%	39.1%	33.5%	41.3%	38.1%	26.5%	16.8%	21.6%	24.0%
2010	WV	7,788	12.0%	17.4%	10.4%	8.0%	35.2%	48.2%	35.3%	34.7%	38.0%	25.9%	41.6%	37.9%	14.9%	8.5%	12.7%	19.4%
2010	WI	23,700	6.1%	20.8%	10.1%	6.1%	30.0%	44.1%	31.9%	31.7%	42.6%	25.8%	35.6%	41.7%	21.3%	9.3%	22.3%	20.6%
2010	WY	2,336	2.7%	10.7%	4.8%	3.6%	29.4%	31.6%	22.9%	25.8%	36.2%	39.2%	17.0%	38.0%	31.7%	18.6%	55.3%	32.6%
2010	**National**	**1,203,777**	**11.2%**	**19.0%**	**9.9%**	**6.7%**	**31.2%**	**41.1%**	**28.7%**	**33.2%**	**36.8%**	**27.1%**	**40.3%**	**39.6%**	**20.8%**	**12.8%**	**21.1%**	**20.5%**

American Financial Services Association

Year	State	# of Housing Units	% of Household with No Vehicle				% of Household with 1 Vehicle				% of Household with 2 Vehicles				% of Household with >2 Vehicles			
			Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White
2011	AL	19,803	4.0%	13.6%	2.8%	4.0%	28.3%	41.3%	24.6%	29.7%	42.7%	27.8%	43.1%	41.2%	25.0%	17.3%	29.6%	25.1%
2011	AK	2,353	9.8%	15.8%	3.2%	10.7%	28.6%	34.0%	32.6%	30.9%	38.4%	35.6%	36.7%	41.2%	23.2%	14.7%	27.4%	17.1%
2011	AZ	24,862	8.3%	13.8%	6.7%	6.3%	33.9%	44.5%	29.8%	40.4%	37.7%	29.5%	44.7%	38.4%	20.1%	12.1%	18.8%	14.9%
2011	AR	11,927	5.2%	14.3%	5.2%	4.8%	35.9%	43.6%	28.2%	32.8%	39.4%	27.6%	47.8%	41.8%	19.5%	14.4%	18.8%	20.6%
2011	CA	129,032	8.0%	14.9%	7.5%	7.0%	28.9%	39.6%	26.4%	35.8%	37.3%	29.7%	40.7%	37.3%	25.8%	15.7%	25.4%	19.9%
2011	CO	20,507	6.4%	13.7%	6.1%	4.9%	31.3%	41.1%	28.1%	32.3%	38.7%	29.3%	39.3%	40.9%	23.7%	15.9%	26.5%	21.9%
2011	CT	14,066	18.7%	22.6%	6.8%	6.1%	40.1%	41.6%	31.0%	31.8%	27.7%	25.5%	43.9%	40.3%	13.5%	10.2%	18.2%	21.9%
2011	DE	3,552	2.3%	10.7%	6.6%	4.1%	29.8%	44.2%	30.0%	31.4%	44.3%	30.2%	47.8%	43.5%	23.5%	15.0%	15.5%	21.0%
2011	DC	2,800	44.1%	40.7%	43.5%	33.1%	37.0%	42.7%	42.0%	47.3%	16.8%	12.9%	10.5%	16.4%	2.2%	3.7%	3.9%	3.2%
2011	FL	78,931	8.8%	13.2%	4.5%	5.5%	35.6%	43.4%	27.4%	43.7%	40.1%	31.3%	48.7%	38.2%	15.6%	12.0%	19.4%	12.5%
2011	GA	36,816	6.9%	12.7%	4.7%	3.8%	34.6%	43.0%	28.1%	30.6%	39.3%	30.0%	46.4%	43.5%	19.2%	14.2%	20.7%	22.1%
2011	HI	4,698	7.9%	9.5%	8.7%	9.1%	31.5%	38.6%	30.2%	42.1%	36.5%	31.8%	37.7%	34.7%	24.2%	20.0%	23.4%	14.1%
2011	ID	6,001	4.9%	12.5%	4.9%	4.7%	25.1%	34.9%	30.7%	28.9%	40.1%	38.0%	38.9%	39.0%	29.8%	14.6%	25.4%	27.4%
2011	IL	49,620	9.9%	25.4%	10.8%	7.9%	31.7%	43.4%	32.4%	34.4%	38.5%	23.5%	40.6%	39.9%	20.0%	7.6%	16.3%	17.8%
2011	IN	26,004	5.6%	15.8%	7.5%	6.1%	33.6%	44.5%	35.5%	31.9%	42.4%	28.2%	38.0%	40.4%	18.4%	11.5%	19.0%	21.6%
2011	IA	12,731	7.7%	14.5%	10.7%	5.5%	35.9%	36.6%	35.9%	29.9%	32.7%	32.6%	30.2%	40.1%	23.7%	16.3%	23.2%	24.5%
2011	KS	11,497	5.8%	10.1%	7.7%	5.0%	29.5%	45.9%	25.4%	30.0%	43.6%	30.0%	46.9%	38.8%	21.2%	14.0%	20.0%	26.2%
2011	KY	17,772	10.9%	19.0%	8.9%	6.7%	32.5%	42.5%	32.5%	32.8%	39.3%	26.3%	37.9%	39.3%	17.3%	12.2%	20.8%	21.1%
2011	LA	17,877	8.1%	17.2%	8.3%	4.8%	37.1%	43.1%	28.2%	33.7%	38.1%	28.2%	40.3%	43.0%	16.7%	11.5%	23.1%	18.4%
2011	ME	5,597	15.9%	21.9%	4.9%	7.5%	29.5%	37.2%	29.0%	34.0%	30.4%	25.7%	40.8%	41.2%	24.2%	15.3%	25.4%	17.2%
2011	MD	22,429	9.1%	17.0%	6.5%	6.2%	29.9%	39.7%	26.5%	30.4%	38.3%	29.3%	43.7%	39.4%	22.7%	13.9%	23.3%	24.1%
2011	MA	26,396	24.8%	24.5%	18.4%	10.1%	40.2%	42.5%	35.5%	35.6%	26.1%	24.3%	35.0%	38.7%	8.9%	8.7%	11.1%	15.6%
2011	MI	39,709	5.3%	18.8%	5.9%	6.0%	34.3%	48.3%	33.5%	33.4%	42.8%	24.3%	40.4%	40.6%	17.7%	8.6%	20.3%	20.0%
2011	MN	21,451	12.6%	20.7%	7.9%	5.9%	34.0%	41.7%	31.7%	30.2%	34.6%	23.2%	41.3%	41.2%	18.8%	14.5%	19.0%	22.7%
2011	MS	11,476	3.8%	12.4%	6.7%	4.2%	34.4%	41.2%	28.3%	31.2%	36.5%	30.3%	45.3%	41.3%	25.3%	16.1%	19.8%	23.4%
2011	MO	24,772	6.3%	19.8%	7.5%	5.8%	29.8%	42.7%	33.2%	31.9%	42.4%	26.6%	41.9%	40.5%	21.5%	10.8%	17.4%	21.9%
2011	MT	4,128	0.9%	0.0%	0.9%	4.9%	28.4%	43.5%	24.6%	29.5%	41.2%	40.7%	43.2%	37.4%	29.5%	15.8%	31.4%	28.2%

Year	State	# of Housing Units	% of Household with No Vehicle				% of Household with 1 Vehicle				% of Household with 2 Vehicles				% of Household with >2 Vehicles			
			Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White
2011	NE	7,487	4.5%	18.2%	6.8%	5.4%	33.9%	36.0%	24.6%	28.8%	39.0%	30.0%	47.6%	40.8%	22.6%	15.7%	21.0%	24.9%
2011	NV	10,441	7.4%	17.3%	6.7%	7.0%	33.3%	44.0%	33.6%	38.3%	40.8%	25.7%	41.4%	37.4%	18.4%	13.0%	18.3%	17.3%
2011	NH	5,335	8.5%	13.5%	8.9%	4.8%	25.7%	35.8%	27.9%	31.2%	48.2%	31.6%	45.0%	43.3%	17.6%	19.2%	18.2%	20.6%
2011	NJ	33,077	21.5%	23.5%	8.1%	7.3%	35.7%	40.8%	31.6%	34.3%	29.3%	25.2%	43.7%	38.1%	13.5%	10.5%	16.6%	20.3%
2011	NM	7,708	6.1%	7.1%	8.2%	6.4%	29.6%	33.2%	28.8%	36.8%	37.2%	43.7%	37.2%	36.6%	27.1%	16.0%	25.7%	20.2%
2011	NY	74,129	47.9%	47.1%	38.4%	19.4%	28.4%	32.4%	33.2%	33.6%	16.1%	15.4%	20.6%	32.9%	7.7%	5.1%	7.7%	14.1%
2011	NC	38,903	6.4%	14.2%	3.7%	4.5%	33.3%	40.0%	27.0%	30.1%	40.1%	29.1%	47.8%	42.2%	20.2%	16.7%	21.5%	23.3%
2011	ND	2,885	4.2%	4.4%	23.0%	4.8%	21.3%	29.1%	35.1%	29.7%	55.1%	22.8%	17.1%	38.0%	19.4%	43.7%	24.8%	27.5%
2011	OH	47,813	8.4%	20.5%	4.8%	6.4%	37.1%	45.4%	29.5%	32.8%	38.3%	24.8%	46.4%	39.6%	16.2%	9.4%	19.4%	21.3%
2011	OK	14,775	5.1%	14.1%	5.2%	5.0%	32.1%	43.8%	28.4%	33.1%	43.8%	28.6%	47.7%	39.5%	19.0%	13.4%	18.7%	22.4%
2011	OR	15,782	7.4%	18.3%	6.0%	7.8%	30.0%	31.1%	30.4%	33.3%	40.5%	37.5%	44.7%	38.1%	22.1%	13.1%	18.9%	20.8%
2011	PA	51,005	19.9%	33.8%	15.2%	8.4%	35.2%	39.2%	31.4%	33.5%	30.8%	20.5%	38.8%	38.6%	14.0%	6.5%	14.6%	19.5%
2011	RI	4,299	19.2%	21.3%	9.3%	8.3%	38.1%	40.3%	33.2%	35.9%	34.7%	26.2%	40.2%	39.2%	8.0%	12.2%	17.2%	16.6%
2011	SC	19,134	6.1%	15.1%	3.5%	4.5%	33.7%	40.5%	24.0%	30.6%	41.0%	28.0%	54.1%	43.2%	19.2%	16.5%	18.4%	21.8%
2011	SD	3,318	2.0%	9.9%	0.0%	6.7%	41.5%	37.9%	43.0%	27.7%	30.4%	33.2%	34.5%	36.7%	26.1%	19.0%	22.5%	28.8%
2011	TN	26,007	5.2%	15.1%	5.0%	5.0%	29.4%	44.7%	25.5%	31.5%	42.9%	27.0%	43.7%	40.1%	22.5%	13.2%	25.8%	23.4%
2011	TX	91,625	6.6%	12.2%	4.2%	4.2%	32.5%	44.4%	28.7%	34.0%	40.6%	29.9%	46.2%	42.7%	20.2%	13.5%	20.8%	19.1%
2011	UT	9,135	5.4%	7.7%	5.6%	4.9%	28.7%	38.1%	23.3%	26.6%	41.6%	32.8%	43.5%	42.5%	24.3%	21.4%	27.6%	26.0%
2011	VT	2,670	5.5%	6.7%	6.2%	5.7%	31.6%	49.4%	25.3%	32.2%	38.6%	20.7%	37.4%	42.7%	24.3%	23.3%	31.0%	19.4%
2011	VA	31,525	5.7%	12.5%	3.9%	4.5%	26.7%	36.5%	27.3%	29.4%	40.9%	30.6%	45.0%	40.3%	26.7%	20.4%	23.8%	25.8%
2011	WA	27,196	5.6%	14.6%	6.9%	6.7%	28.0%	39.1%	29.4%	30.7%	39.0%	31.0%	41.2%	37.8%	27.4%	15.3%	22.5%	24.9%
2011	WV	7,754	9.7%	24.8%	9.9%	8.6%	29.8%	38.4%	36.0%	36.0%	35.1%	24.6%	28.2%	36.9%	25.3%	12.2%	25.8%	18.5%
2011	WI	23,662	8.7%	22.6%	9.5%	6.2%	32.7%	46.6%	29.2%	31.7%	41.1%	24.0%	44.5%	41.0%	17.5%	6.8%	16.7%	21.0%
2011	WY	2,358	3.7%	24.4%	9.0%	3.4%	27.1%	11.4%	45.6%	25.5%	41.9%	31.8%	22.0%	39.6%	27.3%	32.4%	23.4%	31.5%
2011	**National**	**1,204,830**	**11.5%**	**19.2%**	**10.1%**	**6.9%**	**31.7%**	**41.4%**	**29.2%**	**33.4%**	**36.7%**	**26.9%**	**40.2%**	**39.5%**	**20.1%**	**12.4%**	**20.6%**	**20.2%**

American Financial Services Association

Year	State	# of Housing Units	% of Household with No Vehicle				% of Household with 1 Vehicle				% of Household with 2 Vehicles				% of Household with >2 Vehicles			
			Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White
2012	AL	19,697	2.8%	13.7%	3.8%	4.1%	28.0%	41.2%	28.0%	30.5%	47.0%	27.0%	48.7%	39.9%	22.2%	18.1%	19.5%	25.5%
2012	AK	2,293	7.6%	1.9%	7.4%	11.0%	28.7%	46.1%	29.8%	32.5%	45.6%	41.2%	37.3%	33.7%	18.1%	10.9%	25.4%	22.8%
2012	AZ	25,180	7.3%	13.7%	6.4%	6.3%	31.8%	43.7%	32.2%	41.2%	40.5%	30.7%	44.0%	37.6%	20.5%	11.9%	17.4%	14.9%
2012	AR	12,007	5.7%	16.1%	5.9%	4.9%	28.6%	45.7%	35.5%	32.8%	43.4%	26.6%	42.8%	40.9%	22.4%	11.6%	15.7%	21.3%
2012	CA	129,254	7.4%	14.9%	7.5%	6.9%	29.0%	40.1%	26.7%	35.6%	38.2%	29.6%	40.9%	37.8%	25.4%	15.4%	24.9%	19.6%
2012	CO	20,584	7.9%	10.9%	5.7%	4.8%	30.3%	39.0%	25.6%	32.4%	37.9%	33.5%	43.1%	40.6%	23.9%	16.6%	25.5%	22.3%
2012	CT	14,055	17.4%	20.4%	5.6%	6.0%	36.1%	40.5%	28.3%	31.3%	31.8%	27.5%	48.0%	40.7%	14.7%	11.5%	18.1%	22.0%
2012	DE	3,532	6.3%	12.1%	3.6%	4.0%	29.5%	36.9%	29.6%	33.6%	41.0%	31.7%	40.0%	43.3%	23.2%	19.3%	26.8%	19.2%
2012	DC	2,781	41.8%	41.4%	35.5%	31.7%	43.0%	40.7%	43.5%	49.0%	10.4%	13.1%	12.9%	16.7%	4.8%	4.8%	8.2%	2.5%
2012	FL	79,097	8.4%	13.7%	4.4%	5.8%	36.4%	44.7%	29.6%	43.8%	39.6%	29.8%	46.6%	38.0%	15.5%	11.7%	19.3%	12.3%
2012	GA	37,216	7.3%	13.0%	4.7%	3.7%	33.9%	42.6%	25.9%	30.7%	39.8%	29.6%	46.0%	42.1%	19.1%	14.8%	23.4%	23.4%
2012	HI	4,700	6.1%	8.9%	8.4%	9.5%	35.5%	42.6%	31.7%	41.9%	34.8%	37.7%	35.6%	35.3%	23.6%	10.8%	24.2%	13.4%
2012	ID	5,961	5.3%	1.3%	2.8%	4.9%	25.4%	40.0%	22.2%	28.5%	39.1%	29.5%	30.0%	39.8%	30.2%	29.2%	45.1%	26.8%
2012	IL	49,694	9.6%	25.9%	13.3%	7.7%	31.1%	43.5%	32.1%	34.2%	39.8%	21.6%	39.9%	39.3%	19.5%	9.0%	14.7%	18.7%
2012	IN	26,125	6.0%	16.6%	6.4%	5.8%	30.3%	44.6%	35.9%	31.7%	38.5%	28.0%	42.1%	40.1%	25.1%	10.8%	15.6%	22.4%
2012	IA	12,767	5.5%	13.9%	7.0%	5.2%	28.8%	41.8%	33.9%	28.9%	42.2%	29.2%	37.7%	41.1%	23.6%	15.1%	21.4%	24.9%
2012	KS	11,545	5.4%	12.6%	8.0%	5.1%	28.3%	42.5%	33.3%	30.1%	42.2%	29.6%	36.6%	39.4%	24.1%	15.2%	22.1%	25.3%
2012	KY	17,964	6.9%	17.8%	7.6%	6.8%	33.7%	44.8%	31.9%	31.9%	41.7%	25.6%	38.8%	39.6%	17.6%	11.8%	21.7%	21.8%
2012	LA	17,930	6.8%	15.7%	4.8%	5.1%	35.4%	44.6%	33.6%	34.4%	41.3%	27.0%	43.7%	42.0%	16.5%	12.6%	17.8%	18.4%
2012	ME	5,538	11.1%	21.0%	2.5%	6.5%	40.4%	45.9%	20.9%	35.2%	38.0%	22.4%	49.3%	39.2%	10.4%	10.7%	27.3%	19.1%
2012	MD	22,494	8.3%	17.1%	5.9%	5.8%	29.1%	40.0%	25.7%	30.6%	39.3%	28.1%	45.6%	39.7%	23.3%	14.8%	22.8%	23.8%
2012	MA	26,220	23.0%	24.5%	16.3%	9.7%	41.3%	43.0%	34.0%	35.1%	27.3%	23.9%	37.5%	39.1%	8.4%	8.6%	12.1%	16.1%
2012	MI	39,659	8.4%	20.7%	6.8%	5.8%	32.0%	44.3%	30.5%	33.3%	40.1%	26.0%	43.7%	40.5%	19.5%	9.0%	18.9%	20.5%
2012	MN	21,400	8.0%	22.1%	5.3%	6.0%	31.8%	40.2%	28.8%	29.1%	41.1%	28.4%	44.7%	41.4%	19.1%	9.4%	21.3%	23.5%
2012	MS	11,550	2.3%	12.2%	5.4%	3.6%	31.1%	42.6%	30.5%	30.6%	37.3%	29.1%	40.8%	41.8%	29.2%	16.1%	23.3%	23.9%
2012	MO	24,799	7.0%	19.8%	5.6%	5.9%	31.5%	46.2%	25.8%	31.9%	39.8%	24.3%	42.1%	40.3%	21.7%	9.8%	26.5%	21.9%
2012	MT	4,146	2.7%	10.0%	4.7%	6.0%	42.1%	57.5%	35.3%	28.4%	32.0%	20.9%	33.7%	36.7%	23.2%	11.6%	26.3%	28.8%

American Financial Services Association

Year	State	# of Housing Units	% of Household with No Vehicle				% of Household with 1 Vehicle				% of Household with 2 Vehicles				% of Household with >2 Vehicles			
			Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White	Hispanic	Black	Asian	White
2012	NE	7,523	4.0%	12.7%	4.7%	4.8%	28.1%	45.4%	30.0%	29.5%	41.6%	31.3%	46.5%	40.4%	26.3%	10.5%	18.8%	25.3%
2012	NV	10,606	7.4%	19.0%	5.9%	7.2%	31.1%	41.0%	28.8%	38.7%	42.9%	27.4%	46.1%	36.9%	18.7%	12.7%	19.2%	17.2%
2012	NH	5,362	9.8%	12.7%	3.8%	5.5%	18.9%	31.3%	37.3%	31.1%	46.9%	46.1%	42.9%	42.7%	24.4%	9.9%	16.0%	20.7%
2012	NJ	33,037	21.1%	22.3%	7.7%	7.5%	34.3%	40.8%	31.3%	33.4%	31.6%	25.8%	42.4%	39.3%	13.0%	11.1%	18.6%	19.9%
2012	NM	7,720	5.5%	11.7%	2.7%	5.8%	31.2%	36.8%	27.5%	36.7%	38.0%	40.4%	43.4%	37.2%	25.3%	11.2%	26.3%	20.2%
2012	NY	74,151	49.0%	46.7%	40.6%	19.3%	28.8%	33.7%	31.8%	33.7%	14.8%	14.3%	20.2%	32.6%	7.4%	5.3%	7.4%	14.4%
2012	NC	39,120	7.0%	14.1%	3.8%	4.4%	30.9%	40.3%	29.9%	31.2%	40.1%	29.1%	44.6%	41.4%	22.1%	16.6%	21.6%	23.1%
2012	ND	2,949	1.3%	3.1%	33.5%	5.6%	21.2%	30.1%	33.7%	28.2%	58.5%	53.5%	18.1%	37.2%	19.0%	13.3%	14.7%	29.0%
2012	OH	47,763	10.2%	19.8%	7.6%	6.3%	34.5%	45.5%	32.2%	33.3%	38.5%	25.7%	42.3%	39.2%	16.8%	9.0%	17.8%	21.3%
2012	OK	14,455	3.9%	13.3%	5.9%	5.2%	30.4%	40.8%	25.3%	33.0%	43.3%	31.9%	43.1%	41.0%	22.3%	14.0%	25.7%	20.9%
2012	OR	15,684	7.9%	16.6%	8.9%	8.3%	27.7%	37.6%	29.6%	33.1%	42.0%	31.5%	42.8%	37.1%	22.3%	14.4%	18.7%	21.5%
2012	PA	50,980	20.4%	31.4%	12.6%	8.1%	36.7%	41.9%	34.1%	33.2%	31.7%	20.1%	38.3%	38.9%	11.3%	6.6%	15.0%	19.9%
2012	RI	4,281	17.1%	19.9%	8.9%	8.8%	46.9%	42.7%	37.9%	35.0%	26.2%	26.8%	37.2%	38.0%	9.8%	10.6%	16.0%	18.1%
2012	SC	19,128	6.2%	14.3%	2.7%	4.3%	29.4%	40.2%	25.0%	32.1%	46.8%	29.7%	45.7%	42.1%	17.5%	15.8%	26.7%	21.5%
2012	SD	3,333	2.4%	2.7%	6.6%	4.2%	27.4%	57.6%	20.7%	28.5%	48.6%	24.6%	52.2%	39.9%	21.7%	15.1%	20.5%	27.4%
2012	TN	26,107	3.2%	13.7%	5.3%	4.6%	27.9%	43.8%	28.8%	31.6%	44.2%	28.0%	43.6%	40.1%	24.6%	14.6%	22.2%	23.7%
2012	TX	92,834	6.1%	12.2%	4.3%	4.0%	32.1%	42.7%	29.1%	34.4%	40.0%	30.7%	46.9%	42.8%	21.9%	14.3%	19.7%	18.8%
2012	UT	9,167	4.6%	8.7%	6.2%	4.4%	27.3%	28.4%	31.8%	26.1%	36.4%	34.5%	37.3%	41.9%	31.6%	28.5%	24.7%	27.6%
2012	VT	2,669	14.9%	3.0%	7.5%	6.7%	35.4%	68.1%	39.0%	32.2%	38.4%	10.7%	36.4%	42.8%	11.3%	18.2%	17.0%	18.2%
2012	VA	31,905	5.6%	11.9%	4.0%	4.7%	26.1%	38.3%	23.7%	29.1%	42.8%	29.4%	45.3%	39.8%	25.6%	20.4%	27.0%	26.4%
2012	WA	27,191	4.9%	12.1%	6.9%	6.5%	29.5%	38.6%	30.0%	31.2%	39.4%	35.1%	40.2%	37.8%	26.3%	14.2%	22.9%	24.5%
2012	WV	7,737	15.7%	20.7%	3.5%	8.3%	28.9%	39.4%	22.8%	37.0%	45.0%	27.5%	41.5%	36.8%	10.4%	12.4%	32.2%	17.9%
2012	WI	23,476	8.2%	23.4%	6.9%	6.0%	29.8%	45.0%	33.4%	31.6%	41.7%	24.0%	39.9%	41.7%	20.3%	7.6%	19.8%	20.7%
2012	WY	2,359	4.8%	0.0%	6.2%	2.7%	27.1%	58.3%	37.5%	27.6%	31.6%	13.4%	36.0%	39.6%	36.4%	28.4%	20.3%	30.1%
2012	**National**	**1,207,725**	**11.2%**	**19.0%**	**10.2%**	**6.8%**	**31.4%**	**41.6%**	**29.2%**	**33.5%**	**37.1%**	**26.8%**	**40.1%**	**39.4%**	**20.4%**	**12.6%**	**20.6%**	**20.4%**

11.   APPENDIX D. BISG ASSUMPTIONS USED BY CHARLES RIVER ASSOCIATES FOR THIS STUDY

BISG Assumptions	
Issue	**CRA**
Geography	2010 Census
Level	Tract
Population	18+
Co-buyers	Yes
Missing / Invalid geography	No BISG
Surname	2000 Census
Probabilities > 1	subtract from all equally
Suppressed probabilities	allocate equally across missing
Not suppressed, sum probabilities > .99 and < 1.0	allocate equally across all
Not suppressed, one probability = .99 (all others = 0)	allocate .01 across 5 missing
Compound names	match on: 1) whole name, 2) left of hyphen, 3) right of hyphen. keep first match
Hyphenated names	match on: 1) whole name, 2) 1st compound, 3) 2nd compound. keep first match
No matches	average probability of names not listed as reported by Elliott, Marc et al (2009)
BISG	
Multiple BISG vectors due to buyer and cobuyer	continuous = select vector with single highest minority probability; threshold = if relevant probability in any vector exceeds threshold, consider threshold to be met
Tie breakers	waterfall

12.   APPENDIX E. RACE/ETHNICITY PROXIES: DIFFERENCES BETWEEN BISG CALCULATIONS: CRA V. CFPB

Recently, the CFPB disclosed for the first time the assumptions it makes to estimate the race/ethnicity associated with indirect auto applications and contracts.[141]   For purposes of this study, CRA estimated the race/ethnicity of such applications and contracts using the same method and publicly available data sources as the CFPB, except as noted below.

Last Name Race/Ethnicity Probabilities

The surname probabilities of surnames occurring 100 or more times from the 2000 census ("Surname List") is used by both the CFPB and CRA as the basis of the surname race/ethnicity probabilities.[142]   For many surnames, this data file does not provide a set of race/ethnicity probabilities that sum up to one. The CFPB makes only one type of data correction: it distributes the sum of the suppressed race/ethnicity probabilities evenly across all categories with missing non-zero race/ethnicity counts. To fill in missing probabilities due to confidentiality concerns, and to address the rounding to four decimals of precisions issue in the Surname List, CRA modifies the surname probabilities file as follows:

- If a surname had suppressed probabilities, and the probabilities sum to less than one, then we allocate the remaining probability equally across all redacted probabilities.

- If a surname had no suppressed probabilities, and the probabilities sum to less than one, but not to 0.99, then we allocate the remaining probability equally across all race/ethnicities (including to those with zero probability).

- If a surname had no suppressed probabilities, and had the probabilities sum up to 0.99, then we allocate the remaining 0.01 probability equally across all five race/ethnicities with zero probabilities.[143]

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[141]   *Op. Cit.*, CFPB, Summer 2014; available at http://www.consumerfinance.gov/reports/using-publicly-available-information-to-proxy-for-unidentified-race-and-ethnicity/; last accessed on 9/18/2014.

[142]   The file contains 151,671 surnames, and is available at http://www.census.gov/genealogy/www/data/2000surnames/index.html; last accessed on 3/30/2012.

[143]   These were cases when one race/ethnicity was equal to 0.99 and the other five groups were all equal to zero.

- If a surname had race/ethnicity probabilities totaling more than one, then CRA subtracts the surplus equally across all non-zero race/ethnicities probabilities.

Surname manipulation: The CFPB and CRA use similar, but not exactly the same surname data cleaning. The differences could be driven by the particulars of the data used and could result in exactly the same cleaned surnames. The CFPB removes **[ ] ' "** characters. Then it converts to space certain characters: **{ } \ ` , .** and any digit.  Then certain suffixes embedded into spaces are converted to space: **JR SR II III IV DDS MD PHD**.  Then single letters embedded in spaces are removed.  Then spaces are removed.  CRA removes certain characters: **' ` " * , . _ —** space and certain prefixes from the end of a last name (**JR SR I II III IV**) when they are preceded by a space or a comma.

The CFPB splits hyphenated last names into two names. The two name components are tried for matching with a surname in the Surname List only separately, but not combined. For hyphenated last names, CRA uses not only the two name components, but also the combined name.

The CFPB is using the surname probabilities in this order: the probabilities from the applicant before hyphen (if present), then the probabilities from the applicant after hyphen (if present), then probabilities from the co-applicant before hyphen (if present), then the probabilities from co-applicant after hyphen (if present). Only the first of these potential four names that can be matched to a name in the Surname List is used; all others are ignored. If no name or name component of a hyphenated name is matched to a name in the Surname List, no BISG probabilities are calculated. CRA calculates BISG probabilities separately for the applicant and the co-applicant (if present). For hyphenated surnames, we use the combined name (without hyphen) if that name exist in the Surname List. If it does not exist, we use the name before hyphen (if present). If that name component cannot be matched to a name in the Surname List, we use the name component after the hyphen (if present). If no name or name component exists in the Surname List, we use the probabilities of the names not listed in the Surname List as reported in Elliott, Marc N. et al (2009).[144] We adjust these probabilities proportionally to sum to one (the "average surname probabilities").[145]

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[144] On p. 73.

[145] After rounding each race/ethnicity category to four decimals, we changed the category with the largest probability so that the probabilities sum to one. The resulting probabilities were 69.38% for non-Hispanic white only, 11.12% for non-Hispanic black or African American only, 10.93% for Hispanics, 6.89% for non-Hispanic Asian only, and non-Hispanic Native Hawaiian and Other Pacific Islander only, 0.89% for non-Hispanic American Indian and Alaska Native only, and 0.79% for non-Hispanic two or more races.

Geography Race/Ethnicity Probabilities

Depending on the geocoding accuracy and the population in the geography level, the CFPB is using demographics at the census block group, census tract, and 5-digit zip code levels. CRA is using demographics only at the tract level. For the addresses identified by the geocoding provider as not sufficiently accurate (geocoded at the center of the state or the center of the U.S.), CRA does not create BISG probabilities.

In addition to specifically identified race categories, the respondents to the census may also identify as "Some Other Race". Most of those who selected "Some Other Race" also selected the Hispanic ethnicity. The CFPB "reallocate[s] the "Some Other Race" counts to each of the remaining six race and ethnicity categories." CRA does not use the "Some Other Race."

BISG Probabilities

The CFPB is estimating a single BISG race/ethnicity probabilities vector. It is not clear whether it uses the address of the co-applicant, if present and different than the address of the primary applicant.

CRA is estimating BISG race/ethnicity probabilities separately for the applicant and the co-applicant (if present).

When using a threshold to determine if an application belongs to a particular race/ethnicity group, CRA considers an application to be of a given race/ethnicity if the estimated BISG probability for that race/ethnicity is greater than or equal to the specified threshold (e.g. 80%) for either the applicant or the co-applicant. For example, if an application has an applicant with an estimated BISG probability of being Hispanic of 82% and a co-applicant with an estimated BISG probability of being African American of 85%, the application would be included both as a Hispanic application and as an African American application. Applications are assigned to be non-Hispanic white if the non-Hispanic white BISG probability of any applicant or co-applicant name on the application is greater than or equal to the specified threshold, and the application is not categorized as being made by a member of a minority race/ethnicity. For example, if an application has an applicant with an estimated probability of being non-Hispanic white of 85% and a co-applicant with an estimated probability of being Hispanic of 83%, we do not categorize the application as non-Hispanic white.

When there is a co-applicant, for continuous race/ethnicity probabilities, CRA selects the race/ethnicity BISG probabilities given by the surname (or surname component as identified above) of the applicant or co-applicant that has the highest minority probability. For example, suppose we have an application for which we estimated the BISG probabilities as follows:

- o set A for the applicant given by 20% Hispanic, 70% white, 5% black, 3% AI/AN, 0% API, 2% multi-races

- set B for the co-applicant given by 15% Hispanic, 50% white, 25% black, 3% AI/AN, 0% API, 2% multi-races.

The largest minority probability across these sets is 25% black (from set B). CRA would then use set B for the race and ethnicity probabilities of the application.

- If there are ties for the largest minority probability across different probabilities sets, CRA decides which set of BISG probabilities to use based on a "waterfall approach" in this order:

  - applicant   black
  - co-applicant   black
  - applicant   Hispanic
  - co-applicant   Hispanic
  - applicant   AI/AN
  - co-applicant   AI/AN
  - applicant   API
  - co-applicant   API
  - applicant   multi-races
  - co-applicant   multi-races.

13. APPENDIX F. BISG 2-WAY TABLES, "HEAT-MAPS"

Average African American BISG Probability by Surname and Tract Probability										
Surname Probability	Tract Probability									
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
0-10%	0.4%	2.3%	4.6%	7.3%	10.8%	15.4%	20.7%	29.3%	43.5%	71.4%
10-20%	3.8%	18.2%	30.4%	41.8%	52.4%	63.1%	72.6%	82.3%	90.0%	96.3%
20-30%	6.9%	29.1%	44.5%	56.8%	67.0%	75.8%	82.8%	89.4%	94.2%	97.9%
30-40%	10.7%	39.8%	56.4%	68.0%	76.5%	83.4%	88.5%	93.0%	96.2%	98.6%
40-50%	16.3%	50.8%	66.7%	76.5%	83.5%	88.5%	92.3%	95.3%	97.3%	99.0%
50-60%	22.1%	59.4%	74.0%	82.2%	87.6%	91.5%	94.1%	96.4%	98.0%	99.2%
60-70%	31.6%	69.8%	81.5%	88.0%	91.8%	94.2%	96.0%	97.5%	98.5%	99.3%
70-80%	44.2%	78.9%	87.6%	91.7%	94.4%	95.9%	97.1%	98.0%	98.7%	99.4%
80-90%	63.3%	87.4%	92.6%	95.1%	96.6%	97.4%	98.1%	98.6%	99.1%	99.5%
90-100%	80.6%	94.1%	96.6%	97.8%	98.5%	98.8%	99.2%	99.4%	99.5%	99.7%

Average Hispanic BISG Probability by Surname and Tract Probability										
Surname Probability	Tract Probability									
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
0-10%	0.3%	1.6%	3.0%	4.7%	7.2%	10.0%	14.6%	21.1%	34.2%	59.5%
10-20%	3.5%	12.3%	21.1%	29.5%	39.8%	48.0%	59.2%	69.3%	81.5%	93.8%
20-30%	6.8%	22.1%	34.5%	45.2%	56.3%	65.4%	74.3%	82.2%	89.5%	96.6%
30-40%	10.9%	30.4%	44.9%	56.0%	65.2%	74.0%	81.7%	86.7%	93.1%	97.7%
40-50%	15.8%	40.3%	55.4%	66.1%	74.4%	81.7%	87.1%	91.6%	95.6%	98.6%
50-60%	23.7%	51.2%	65.5%	75.2%	81.7%	87.1%	91.1%	94.0%	97.0%	99.1%
60-70%	31.9%	60.0%	73.2%	81.0%	86.4%	90.8%	94.1%	95.7%	97.8%	99.4%
70-80%	44.8%	72.0%	82.4%	88.0%	92.0%	94.2%	96.2%	97.4%	98.7%	99.6%
80-90%	62.5%	84.0%	90.6%	93.9%	95.9%	97.2%	98.2%	98.8%	99.4%	99.8%
90-100%	75.1%	91.5%	95.4%	97.1%	98.1%	98.7%	99.2%	99.5%	99.7%	99.9%

Source: CRA Contract Data

Average Asian BISG Probability by Surname and Tract Probability										
Surname Probability	Tract Probability									
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
0-10%	0.3%	2.2%	4.4%	7.2%	10.7%	14.8%	20.2%	27.7%	43.9%	.
10-20%	7.8%	30.6%	44.6%	54.3%	62.7%	70.2%	78.0%	84.4%	91.3%	.
20-30%	14.9%	45.1%	58.7%	67.7%	76.0%	81.6%	86.5%	91.0%	93.8%	.
30-40%	21.5%	63.0%	74.4%	81.7%	88.2%	91.4%	94.4%	96.0%	97.2%	.
40-50%	32.5%	67.9%	77.4%	83.1%	86.4%	87.8%	91.4%	94.5%	96.1%	.
50-60%	42.4%	76.8%	84.6%	88.0%	87.6%	91.0%	92.5%	94.5%	95.0%	.
60-70%	53.5%	83.9%	90.2%	92.8%	93.2%	95.0%	95.0%	96.7%	97.4%	.
70-80%	65.8%	88.2%	92.0%	93.5%	94.5%	95.6%	95.9%	96.9%	97.3%	.
80-90%	78.8%	93.7%	95.9%	96.8%	96.8%	97.2%	97.5%	98.1%	98.5%	.
90-100%	90.2%	97.8%	98.7%	99.1%	99.3%	99.5%	99.6%	99.7%	99.9%	.

Average Non-Hispanic White BISG Probability by Surname and Tract Probability										
Surname Probability	Tract Probability									
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
0-10%	0.1%	0.4%	0.8%	1.4%	2.1%	3.2%	4.8%	7.5%	13.0%	28.3%
10-20%	0.4%	1.2%	2.3%	3.9%	5.8%	8.7%	12.6%	19.1%	31.0%	55.3%
20-30%	0.7%	2.5%	4.8%	7.8%	11.1%	15.6%	22.2%	31.3%	46.8%	72.4%
30-40%	1.1%	4.1%	8.1%	11.7%	16.6%	22.4%	30.7%	41.8%	57.9%	81.1%
40-50%	1.5%	6.4%	11.8%	16.7%	23.6%	30.8%	40.5%	52.4%	68.6%	88.1%
50-60%	2.1%	9.2%	17.2%	23.3%	32.2%	40.7%	51.4%	62.7%	77.2%	92.1%
60-70%	3.1%	13.3%	23.7%	31.4%	41.5%	50.4%	60.9%	71.4%	83.4%	94.5%
70-80%	5.0%	20.0%	33.6%	42.6%	53.4%	61.9%	71.4%	79.9%	88.7%	96.3%
80-90%	9.9%	33.3%	49.6%	59.5%	69.1%	76.2%	82.8%	88.3%	93.5%	97.7%
90-100%	37.1%	66.3%	78.6%	84.9%	89.2%	92.2%	94.5%	96.2%	97.8%	99.1%

14.   APPENDIX G. BISG FALSE POSITIVES AND NEGATIVES BY TRACT, FICO, INCOME, AND LMI

Race/Ethnicity	BISG Threshold	BISG Errors by Geographic Tract										
		Geographic Tract Probability										
		0 - 10%	10 - 20%	20 - 30%	30 - 40%	40 - 50%	50 - 60%	60 - 70%	70 - 80%	80 - 90%	90 - 100%	Total
Not Identified by Proxy (False Negatives)												
African American	BISG ≥ 50%	94.4%	81.7%	57.4%	31.0%	18.5%	6.7%	2.5%	1.8%	1.6%	0.1%	51.8%
	BISG ≥ 80%	98.0%	95.7%	92.6%	86.2%	78.0%	56.3%	36.4%	18.0%	5.4%	1.0%	75.8%
Hispanic	BISG ≥ 50%	49.1%	29.2%	22.2%	20.0%	18.6%	14.7%	7.7%	5.3%	4.8%	0.9%	28.0%
	BISG ≥ 80%	81.6%	36.7%	25.6%	22.1%	20.2%	16.2%	18.1%	15.0%	12.2%	3.2%	41.4%
Asian	BISG ≥ 50%	50.8%	31.2%	28.6%	26.7%	7.8%	9.2%	12.9%	15.0%	0.0%	.	40.4%
	BISG ≥ 80%	62.1%	38.0%	32.9%	29.6%	26.6%	23.6%	22.6%	22.5%	0.0%	.	49.7%
Non-Hispanic White	BISG ≥ 50%	84.0%	61.4%	48.0%	41.5%	29.6%	15.7%	8.5%	3.6%	1.6%	0.6%	6.5%
	BISG ≥ 80%	98.4%	92.5%	81.4%	68.8%	60.0%	51.8%	43.1%	30.6%	10.0%	1.5%	22.3%
Wrongly Included (False Positives)												
African American	BISG ≥ 50%	38.2%	50.9%	55.1%	52.3%	51.0%	44.7%	40.2%	30.8%	21.4%	12.4%	43.6%
	BISG ≥ 80%	14.7%	21.9%	22.6%	26.6%	30.5%	27.5%	29.1%	24.4%	19.6%	11.5%	22.4%
Hispanic	BISG ≥ 50%	27.9%	20.1%	15.1%	14.1%	13.4%	10.6%	15.7%	13.5%	12.8%	10.6%	18.3%
	BISG ≥ 80%	22.6%	18.0%	13.5%	12.6%	11.6%	8.7%	6.2%	6.8%	7.4%	6.6%	13.2%
Asian	BISG ≥ 50%	24.0%	18.8%	14.6%	14.4%	25.0%	19.4%	17.6%	10.5%	16.7%	.	20.8%
	BISG ≥ 80%	17.3%	14.5%	11.9%	9.7%	8.9%	6.3%	2.0%	6.1%	9.1%	.	14.2%
Non-Hispanic White	BISG ≥ 50%	13.2%	17.7%	15.5%	14.9%	15.2%	15.7%	13.8%	11.1%	7.4%	4.0%	8.8%
	BISG ≥ 80%	13.3%	7.9%	9.0%	8.4%	8.4%	7.6%	7.2%	6.7%	6.2%	3.5%	5.6%

Source: HMDA enhanced with proprietary data

BISG Errors by FICO Score										
		FICO Score								
Race/Ethnicity	BISG Threshold	0 - 500	500 - 550	550 - 600	600 - 650	650 - 700	700 - 750	750 - 800	800 - 850	Total
Not Identified by Proxy (False Negatives)										
African American	BISG ≥ 50%	43.0%	46.8%	46.6%	46.8%	52.3%	56.5%	58.1%	58.7%	51.8%
	BISG ≥ 80%	69.6%	70.9%	71.4%	73.8%	77.0%	79.8%	79.5%	80.8%	75.8%
Hispanic	BISG ≥ 50%	38.9%	23.8%	28.9%	20.8%	24.3%	28.2%	32.8%	32.7%	28.0%
	BISG ≥ 80%	50.0%	33.8%	43.1%	31.3%	36.6%	42.8%	46.4%	48.3%	41.4%
Asian	BISG ≥ 50%	100.0%	60.0%	68.6%	56.5%	54.3%	46.4%	38.0%	38.9%	40.4%
	BISG ≥ 80%	100.0%	73.3%	77.1%	67.9%	66.1%	54.9%	47.9%	46.3%	49.7%
Non-Hispanic White	BISG ≥ 50%	7.8%	9.9%	8.9%	8.3%	8.1%	6.6%	5.8%	5.1%	6.5%
	BISG ≥ 80%	25.3%	28.7%	28.4%	26.4%	25.2%	23.0%	21.0%	19.6%	22.3%
Wrongly Included (False Positives)										
African American	BISG ≥ 50%	19.6%	26.9%	22.5%	25.1%	37.2%	46.7%	59.8%	64.7%	43.6%
	BISG ≥ 80%	11.1%	12.3%	12.4%	11.1%	18.9%	24.5%	33.5%	39.9%	22.4%
Hispanic	BISG ≥ 50%	21.4%	17.6%	14.1%	12.9%	16.2%	18.5%	21.3%	23.2%	18.3%
	BISG ≥ 80%	25.0%	13.1%	9.9%	10.0%	11.7%	13.7%	15.3%	16.3%	13.2%
Asian	BISG ≥ 50%	100.0%	14.3%	26.7%	30.2%	29.5%	24.3%	20.2%	21.5%	20.8%
	BISG ≥ 80%	100.0%	20.0%	27.3%	19.4%	19.2%	17.4%	14.6%	13.8%	14.2%
Non-Hispanic White	BISG ≥ 50%	22.4%	20.6%	21.5%	16.9%	12.7%	9.3%	6.4%	5.1%	8.8%
	BISG ≥ 80%	10.9%	10.5%	12.4%	9.8%	7.9%	6.2%	4.4%	3.4%	5.6%

Source: HMDA enhanced with proprietary data

					Income			
BISG Errors by Income								
Race/Ethnicity	BISG Threshold	$0 - $25,000	$25,000 - $50,000	$50,000 - $75,000	$75,000 - $100,000	$100,000 - $125,000	$125,000 - $150,000	> $150,000	Total
Not Identified by Proxy (False Negatives)									
African American	BISG ≥ 50%	29.6%	40.3%	50.1%	55.6%	59.1%	62.8%	65.5%	51.8%
	BISG ≥ 80%	55.6%	67.8%	75.3%	79.1%	80.1%	81.9%	83.4%	75.8%
Hispanic	BISG ≥ 50%	18.7%	22.3%	23.9%	30.7%	31.6%	36.2%	37.3%	28.0%
	BISG ≥ 80%	29.5%	32.6%	36.5%	44.1%	46.0%	48.3%	55.0%	41.4%
Asian	BISG ≥ 50%	44.0%	39.2%	41.9%	41.2%	36.2%	37.3%	34.1%	40.4%
	BISG ≥ 80%	53.6%	48.5%	50.8%	51.3%	45.7%	45.4%	43.4%	49.7%
Non-Hispanic White	BISG ≥ 50%	9.7%	7.9%	7.0%	6.1%	5.8%	5.8%	4.7%	6.5%
	BISG ≥ 80%	27.7%	25.1%	23.6%	21.7%	20.9%	20.3%	17.6%	22.3%
Wrongly Included (False Positives)									
African American	BISG ≥ 50%	35.7%	39.4%	45.3%	48.3%	48.9%	53.8%	56.5%	43.6%
	BISG ≥ 80%	17.9%	19.5%	23.9%	27.5%	26.0%	30.9%	33.1%	22.4%
Hispanic	BISG ≥ 50%	11.0%	14.5%	16.9%	20.4%	21.9%	25.4%	25.7%	18.3%
	BISG ≥ 80%	8.0%	10.4%	11.8%	14.9%	16.3%	18.4%	18.3%	13.2%
Asian	BISG ≥ 50%	20.9%	22.2%	20.7%	19.7%	20.2%	19.3%	20.8%	20.8%
	BISG ≥ 80%	12.1%	14.5%	14.1%	14.6%	14.8%	13.8%	14.2%	14.2%
Non-Hispanic White	BISG ≥ 50%	9.1%	8.6%	8.6%	8.2%	7.9%	7.8%	6.3%	8.8%
	BISG ≥ 80%	5.3%	5.4%	5.4%	5.2%	5.1%	5.4%	4.3%	5.6%

Source: HMDA enhanced with proprietary data

BISG Errors by Low-Moderate-Income Tract (LMI)						
		LMI				
Race/Ethnicity	BISG Threshold	Less than 50%	50% to 80%	80% to 120%	120% or More	Total
Not Identified by Proxy (False Negatives)						
African American	BISG ≥ 50%	9.4%	24.9%	51.3%	71.9%	51.8%
	BISG ≥ 80%	22.7%	54.1%	78.4%	90.3%	75.8%
Hispanic	BISG ≥ 50%	16.7%	20.5%	28.3%	31.0%	28.0%
	BISG ≥ 80%	24.7%	27.8%	41.6%	47.0%	41.4%
Asian	BISG ≥ 50%	33.3%	36.2%	44.3%	38.9%	40.4%
	BISG ≥ 80%	47.8%	46.3%	53.9%	47.8%	49.7%
Non-Hispanic White	BISG ≥ 50%	36.8%	16.6%	6.5%	4.0%	6.5%
	BISG ≥ 80%	63.9%	39.9%	22.9%	17.8%	22.3%
Wrongly Included (False Positives)						
African American	BISG ≥ 50%	41.3%	44.2%	43.3%	44.3%	43.6%
	BISG ≥ 80%	24.8%	25.4%	19.8%	19.1%	22.4%
Hispanic	BISG ≥ 50%	19.4%	16.4%	17.9%	19.5%	18.3%
	BISG ≥ 80%	11.6%	10.6%	13.3%	14.5%	13.2%
Asian	BISG ≥ 50%	16.5%	15.7%	20.2%	22.3%	20.8%
	BISG ≥ 80%	9.8%	10.4%	12.5%	16.1%	14.2%
Non-Hispanic White	BISG ≥ 50%	7.2%	8.8%	8.8%	8.8%	8.8%
	BISG ≥ 80%	4.1%	5.3%	5.4%	5.8%	5.6%

Source: HMDA enhanced with proprietary data

15.   APPENDIX H. CRA CONTRACT DATA VARIABLES

1   New/Used indicator
2   Term
3   Amount Financed
4   Finance charge (monthly payment * term – amount financed)
5   Total of payments
6   Contract rate
7   Monthly payment
8   Indicator that credit protection is on contract
9   Indicator that GAP is on contract
10   Indicator that extended service contract is on contract
11   Buyer Income
12   Indicator that Co-buyer is present on contract
13   Co-buyer income
14   Buyer FICO
15   Co-buyer FICO
16   Buyer age
17   Final Buy rate to dealer
18   Advance percentage (e.g. LTV)
19   Cash rebate amount
20   Dealer ID

16. APPENDIX I. CRA CONTRACT DATA DESCRIPTIVE STATISTICS

Credit Tranche	Characteristic	Count	Count with Data	Average	Minimum	1st Quar-tile	Median	3rd Quartile	Max
span	**CRA Contract Data - Summary Statistics**								
span	**New Vehicle Contracts - Entire Sample**								
All	Contract Amount ($)	5,494,614	5,494,421	26,153	1,000	19,311	24,859	31,655	250,000
	Term (Months)	5,494,614	5,481,864	64	12	60	66	72	84
	Buy Rate	5,494,614	5,461,743	3.79	0.00	1.76	2.90	4.65	26.99
	Contract Rate	5,494,614	5,483,308	4.46	0.00	1.90	3.74	5.95	27.99
	Dealer Reserve (BPS)	5,494,614	5,453,190	66	0	0	0	150	300
	Dealer Reserve ($)	5,494,614	5,441,354	541	0	0	0	1,008	20,550
	LTV (%)	5,494,614	5,220,279	88.39	0.03	73.00	92.00	106.72	298.00
	PTI (%)	5,494,614	4,374,153	8.38	0.06	4.78	7.44	11.07	99.98
	African American (%)	5,494,614	5,457,547	10.80%	0.00%	0.10%	1.09%	9.20%	100.00%
	Hispanic (%)	5,494,614	5,457,547	12.30%	0.00%	0.17%	0.58%	2.94%	100.00%
	Asian (%)	5,494,614	5,457,547	5.59%	0.00%	0.04%	0.18%	0.88%	99.98%
	Non-Hispanic White (%)	5,494,614	5,457,547	69.22%	0.00%	45.72%	88.61%	97.28%	100.00%
Credit Score ≥ 760	Contract Amount ($)	2,321,254	2,321,112	24,278	1,000	17,047	23,081	30,041	250,000
	Term (Months)	2,321,254	2,313,881	60	12	60	60	72	84
	Buy Rate	2,321,254	2,308,204	2.05	0.00	0.90	1.90	2.99	18.72
	Contract Rate	2,321,254	2,316,351	2.60	0.00	0.90	2.44	3.99	20.47
	Dealer Reserve (BPS)	2,321,254	2,308,168	55	0	0	0	104	300
	Dealer Reserve ($)	2,321,254	2,300,771	376	0	0	0	583	20,550
	LTV (%)	2,321,254	2,208,526	76.24	0.34	59.24	79.61	95.00	298.00
	PTI (%)	2,321,254	1,788,171	6.82	0.07	3.85	5.85	8.72	99.83

	African American (%)	2,321,254	2,307,361	7.21%	0.00%	0.08%	0.79%	5.68%	99.99%
	Hispanic (%)	2,321,254	2,307,361	6.90%	0.00%	0.15%	0.43%	1.67%	100.00%
	Asian (%)	2,321,254	2,307,361	5.93%	0.00%	0.05%	0.19%	0.90%	99.98%
	Non-Hispanic White (%)	2,321,254	2,307,361	78.13%	0.00%	73.78%	93.55%	98.07%	100.00%
720 ≤ Credit Score < 760	Contract Amount ($)	744,055	744,017	27,104	1,000	19,782	25,577	32,865	248,695
	Term (Months)	744,055	740,887	64	12	60	61	72	84
	Buy Rate	744,055	738,282	2.42	0.00	1.34	2.49	3.45	24.93
	Contract Rate	744,055	741,944	3.03	0.00	1.64	2.99	4.49	24.93
	Dealer Reserve (BPS)	744,055	738,269	61	0	0	0	130	300
	Dealer Reserve ($)	744,055	735,102	508	0	0	0	900	16,156
	LTV (%)	744,055	698,900	88.07	0.58	74.26	91.00	104.00	197.44
	PTI (%)	744,055	569,305	7.64	0.06	4.45	6.73	9.90	97.63
	African American (%)	744,055	739,172	8.99%	0.00%	0.09%	0.94%	7.47%	100.00%
	Hispanic (%)	744,055	739,172	12.39%	0.00%	0.18%	0.62%	3.15%	100.00%
	Asian (%)	744,055	739,172	7.46%	0.00%	0.05%	0.21%	1.17%	99.98%
	Non-Hispanic White (%)	744,055	739,172	69.09%	0.00%	45.82%	88.54%	97.19%	100.00%
680 ≤ Credit Score < 720	Contract Amount ($)	721,978	721,969	28,356	1,000	21,107	26,808	33,946	250,000
	Term (Months)	721,978	720,829	67	12	60	72	72	84
	Buy Rate	721,978	716,017	3.18	0.00	1.90	3.09	4.29	23.99
	Contract Rate	721,978	719,837	3.84	0.00	1.90	3.90	5.50	23.99
	Dealer Reserve (BPS)	721,978	715,979	67	0	0	0	150	297
	Dealer Reserve ($)	721,978	714,833	608	0	0	0	1,160	14,851
	LTV (%)	721,978	680,393	96.00	0.94	83.00	98.00	111.67	190.62
	PTI (%)	721,978	572,198	8.51	0.07	5.16	7.70	11.07	99.65
	African American (%)	721,978	717,695	11.03%	0.00%	0.10%	1.14%	9.80%	100.00%
	Hispanic (%)	721,978	717,695	16.14%	0.00%	0.20%	0.76%	5.07%	100.00%
	Asian (%)	721,978	717,695	6.46%	0.00%	0.05%	0.20%	1.05%	99.98%

	Non-Hispanic White (%)	721,978	717,695	64.18%	0.00%	24.98%	83.84%	96.44%	100.00%
640 ≤ Cred-it Score < 680	Contract Amount ($)	655,063	655,063	28,860	1,396	21,905	27,308	34,118	233,887
	Term (Months)	655,063	654,933	69	12	66	72	72	84
	Buy Rate	655,063	651,477	4.79	0.00	2.90	4.60	6.58	24.34
	Contract Rate	655,063	653,974	5.60	0.00	2.90	5.69	7.75	24.99
	Dealer Reserve (BPS)	655,063	651,115	81	0	0	50	152	300
	Dealer Reserve ($)	655,063	651,010	764	0	0	377	1,440	13,327
	LTV (%)	655,063	621,124	102.17	0.03	90.28	104.00	117.00	200.00
	PTI (%)	655,063	546,894	9.63	0.12	6.16	9.01	12.48	99.77
	African American (%)	655,063	651,183	14.00%	0.00%	0.13%	1.51%	14.32%	100.00%
	Hispanic (%)	655,063	651,183	18.24%	0.00%	0.21%	0.83%	6.90%	100.00%
	Asian (%)	655,063	651,183	4.64%	0.00%	0.04%	0.16%	0.79%	99.98%
	Non-Hispanic White (%)	655,063	651,183	60.84%	0.00%	15.92%	78.96%	95.76%	100.00%
600 ≤ Cred-it Score < 640	Contract Amount ($)	464,997	464,997	27,745	1,300	21,381	26,238	32,386	171,407
	Term (Months)	464,997	464,884	70	12	72	72	72	84
	Buy Rate	464,997	463,087	7.07	0.00	3.94	6.99	9.58	25.99
	Contract Rate	464,997	464,498	7.95	0.00	4.90	7.99	10.90	25.99
	Dealer Reserve (BPS)	464,997	461,721	87	0	0	74	200	291
	Dealer Reserve ($)	464,997	461,712	805	0	0	548	1,516	10,456
	LTV (%)	464,997	443,931	103.45	2.72	93.00	105.70	117.00	187.90
	PTI (%)	464,997	395,582	10.68	0.16	7.12	10.19	13.61	99.85
	African American (%)	464,997	460,903	16.97%	0.00%	0.15%	2.09%	20.53%	99.99%
	Hispanic (%)	464,997	460,903	18.73%	0.00%	0.21%	0.85%	7.36%	100.00%
	Asian (%)	464,997	460,903	3.48%	0.00%	0.04%	0.15%	0.66%	99.97%
	Non-Hispanic White (%)	464,997	460,903	58.42%	0.00%	12.33%	74.32%	94.98%	100.00%
	Contract Amount ($)	529,158	529,157	25,795	1,755	20,278	24,401	29,777	137,967
	Term (Months)	529,158	528,405	70	12	72	72	72	84

Credit Score < 600	Buy Rate	529,158	527,270	9.96	0.00	6.90	10.00	12.95	26.99
	Contract Rate	529,158	528,758	10.90	0.00	7.90	11.20	14.49	27.99
	Dealer Reserve (BPS)	529,158	520,742	81	0	0	24	200	299
	Dealer Reserve ($)	529,158	520,739	725	0	0	182	1,423	8,711
	LTV (%)	529,158	514,288	102.41	1.35	93.08	104.32	115.00	192.49
	PTI (%)	529,158	470,344	11.53	0.21	7.96	11.00	14.12	99.98
	African American (%)	529,158	523,339	19.53%	0.00%	0.19%	3.00%	27.20%	100.00%
	Hispanic (%)	529,158	523,339	17.44%	0.00%	0.21%	0.82%	5.82%	100.00%
	Asian (%)	529,158	523,339	2.47%	0.00%	0.04%	0.14%	0.57%	99.97%
	Non-Hispanic White (%)	529,158	523,339	57.93%	0.00%	13.15%	72.54%	94.55%	100.00%
Unknown / Invalid Credit Score	Contract Amount ($)	58,109	58,106	21,482	1,000	15,434	20,084	26,337	150,000
	Term (Months)	58,109	58,045	58	12	60	60	64	84
	Buy Rate	58,109	57,406	4.45	0.00	1.90	3.79	6.90	20.99
	Contract Rate	58,109	57,946	5.18	0.00	1.90	3.99	8.45	21.99
	Dealer Reserve (BPS)	58,109	57,196	70	0	0	0	166	289
	Dealer Reserve ($)	58,109	57,187	414	0	0	0	785	6,404
	LTV (%)	58,109	53,117	77.37	1.63	61.00	82.00	96.00	264.00
	PTI (%)	58,109	31,659	10.20	0.16	6.10	9.51	13.47	82.43
	African American (%)	58,109	57,894	10.36%	0.00%	0.13%	1.38%	8.96%	100.00%
	Hispanic (%)	58,109	57,894	14.03%	0.00%	0.22%	1.12%	6.45%	100.00%
	Asian (%)	58,109	57,894	13.13%	0.00%	0.08%	0.59%	5.72%	99.97%
	Non-Hispanic White (%)	58,109	57,894	60.33%	0.00%	18.33%	76.76%	94.54%	100.00%

	CRA Contract Data - Summary Statistics								
	New Vehicle Contracts - Dealer Reserve Sample (Excluding Subvented Contracts)								
Credit Tranche	Characteristic	Count	Count with Data	Average	Minimum	1st Quar-tile	Median	3rd Quar-tile	Max
All	Contract Amount ($)	3,269,485	3,269,485	25,525	1,000	18,877	24,454	31,116	249,269
	Term (Months)	3,269,485	3,269,485	66	12	60	72	72	84
	Buy Rate	3,269,485	3,269,485	4.98	0.04	2.74	3.74	5.89	26.99
	Contract Rate	3,269,485	3,269,485	6.07	0.04	3.60	4.99	7.29	27.99
	Dealer Reserve (BPS)	3,269,485	3,269,485	110	0	0	113	200	300
	Dealer Reserve ($)	3,269,485	3,269,485	900	0	0	782	1,473	20,550
	LTV (%)	3,269,485	3,118,715	87.90	0.34	71.24	92.00	108.00	264.00
	PTI (%)	3,269,485	2,718,476	8.56	0.07	4.97	7.71	11.34	99.85
	African American (%)	3,269,485	3,241,261	11.72%	0.00%	0.11%	1.24%	10.73%	100.00%
	Hispanic (%)	3,269,485	3,241,261	13.29%	0.00%	0.18%	0.61%	3.22%	100.00%
	Asian (%)	3,269,485	3,241,261	4.11%	0.00%	0.04%	0.15%	0.69%	99.98%
	Non-Hispanic White (%)	3,269,485	3,241,261	68.79%	0.00%	44.25%	88.04%	97.18%	100.00%
Credit Score ≥ 760	Contract Amount ($)	1,280,219	1,280,219	23,429	1,000	15,946	22,452	29,610	249,269
	Term (Months)	1,280,219	1,280,219	62	12	60	60	72	84
	Buy Rate	1,280,219	1,280,219	2.91	0.09	2.29	2.89	3.64	18.72
	Contract Rate	1,280,219	1,280,219	3.90	0.09	2.90	3.89	4.94	20.47
	Dealer Reserve (BPS)	1,280,219	1,280,219	99	0	0	100	190	300
	Dealer Reserve ($)	1,280,219	1,280,219	676	0	0	481	1,091	20,550
	LTV (%)	1,280,219	1,223,089	73.47	0.34	53.92	76.62	93.64	194.57
	PTI (%)	1,280,219	1,002,864	6.81	0.07	3.86	5.90	8.76	99.83
	African American (%)	1,280,219	1,269,931	7.90%	0.00%	0.08%	0.88%	6.61%	99.99%
	Hispanic (%)	1,280,219	1,269,931	7.16%	0.00%	0.15%	0.43%	1.65%	100.00%

	Asian (%)	1,280,219	1,269,931	3.83%	0.00%	0.04%	0.14%	0.62%	99.97%
	Non-Hispanic White (%)	1,280,219	1,269,931	79.29%	0.00%	75.52%	93.75%	98.12%	100.00%
720 ≤ Credit Score < 760	Contract Amount ($)	443,860	443,860	26,846	1,000	19,557	25,584	32,883	220,906
	Term (Months)	443,860	443,860	67	12	60	72	72	84
	Buy Rate	443,860	443,860	3.24	0.15	2.49	3.09	3.79	24.93
	Contract Rate	443,860	443,860	4.26	0.15	3.14	3.99	4.99	24.93
	Dealer Reserve (BPS)	443,860	443,860	101	0	0	100	190	300
	Dealer Reserve ($)	443,860	443,860	841	0	0	680	1,366	16,156
	LTV (%)	443,860	416,073	87.96	0.58	72.96	91.00	106.00	197.44
	PTI (%)	443,860	354,277	7.82	0.11	4.62	6.96	10.15	97.63
	African American (%)	443,860	440,737	9.92%	0.00%	0.10%	1.10%	8.86%	100.00%
	Hispanic (%)	443,860	440,737	13.41%	0.00%	0.18%	0.63%	3.34%	100.00%
	Asian (%)	443,860	440,737	5.09%	0.00%	0.04%	0.16%	0.78%	99.98%
	Non-Hispanic White (%)	443,860	440,737	69.53%	0.00%	48.16%	88.52%	97.16%	100.00%
680 ≤ Credit Score < 720	Contract Amount ($)	443,620	443,620	28,098	1,000	21,084	26,786	33,760	240,220
	Term (Months)	443,620	443,620	69	12	72	72	75	84
	Buy Rate	443,620	443,620	4.18	0.04	3.06	3.84	4.95	23.99
	Contract Rate	443,620	443,620	5.26	0.04	3.99	4.99	6.24	23.99
	Dealer Reserve (BPS)	443,620	443,620	108	0	5	115	200	297
	Dealer Reserve ($)	443,620	443,620	980	0	40	913	1,557	14,851
	LTV (%)	443,620	419,121	97.03	0.94	83.37	99.16	114.00	189.00
	PTI (%)	443,620	377,509	8.74	0.07	5.38	7.98	11.36	99.65
	African American (%)	443,620	441,067	11.98%	0.00%	0.11%	1.29%	11.33%	100.00%
	Hispanic (%)	443,620	441,067	17.38%	0.00%	0.21%	0.80%	5.93%	100.00%
	Asian (%)	443,620	441,067	4.72%	0.00%	0.04%	0.16%	0.79%	99.97%
	Non-Hispanic White (%)	443,620	441,067	63.76%	0.00%	23.82%	83.17%	96.31%	100.00%

640 ≤ Credit Score < 680	Contract Amount ($)	435,958	435,958	28,172	1,396	21,572	26,852	33,315	233,887
	Term (Months)	435,958	435,958	71	12	72	72	72	84
	Buy Rate	435,958	435,958	5.96	0.40	4.15	5.56	7.38	24.34
	Contract Rate	435,958	435,958	7.16	0.40	5.38	6.94	8.75	24.99
	Dealer Reserve (BPS)	435,958	435,958	120	0	50	150	200	300
	Dealer Reserve ($)	435,958	435,958	1,141	0	360	1,164	1,726	13,327
	LTV (%)	435,958	420,733	102.19	0.96	90.00	104.61	118.00	200.00
	PTI (%)	435,958	388,675	9.78	0.15	6.35	9.21	12.66	99.77
	African American (%)	435,958	432,981	14.52%	0.00%	0.13%	1.59%	15.29%	100.00%
	Hispanic (%)	435,958	432,981	18.91%	0.00%	0.21%	0.87%	7.74%	100.00%
	Asian (%)	435,958	432,981	4.02%	0.00%	0.04%	0.16%	0.73%	99.97%
	Non-Hispanic White (%)	435,958	432,981	60.26%	0.00%	14.52%	78.09%	95.59%	100.00%
600 ≤ Credit Score < 640	Contract Amount ($)	310,702	310,702	26,602	1,300	20,749	25,324	31,021	171,407
	Term (Months)	310,702	310,702	71	12	72	72	72	84
	Buy Rate	310,702	310,702	8.50	0.25	5.99	8.29	10.52	24.99
	Contract Rate	310,702	310,702	9.78	0.90	7.34	9.73	11.90	25.00
	Dealer Reserve (BPS)	310,702	310,702	129	0	65	150	200	291
	Dealer Reserve ($)	310,702	310,702	1,196	0	509	1,259	1,771	10,456
	LTV (%)	310,702	297,883	102.34	2.72	91.69	104.87	116.66	185.00
	PTI (%)	310,702	277,673	10.69	0.16	7.22	10.27	13.68	99.85
	African American (%)	310,702	307,006	17.32%	0.00%	0.16%	2.16%	21.29%	99.98%
	Hispanic (%)	310,702	307,006	19.45%	0.00%	0.22%	0.92%	8.73%	100.00%
	Asian (%)	310,702	307,006	3.60%	0.00%	0.04%	0.16%	0.70%	99.97%
	Non-Hispanic White (%)	310,702	307,006	57.20%	0.00%	10.40%	72.11%	94.52%	100.00%
	Contract Amount ($)	322,771	322,771	24,466	1,755	19,613	23,398	28,158	137,967
	Term (Months)	322,771	322,771	71	12	72	72	72	84

Credit Score < 600	Buy Rate	322,771	322,771	11.79	0.90	9.05	11.49	14.50	26.99
	Contract Rate	322,771	322,771	13.09	0.90	10.54	12.95	15.85	27.99
	Dealer Reserve (BPS)	322,771	322,771	130	0	75	150	200	299
	Dealer Reserve ($)	322,771	322,771	1,169	0	543	1,207	1,743	8,711
	LTV (%)	322,771	312,655	100.40	1.35	90.98	103.00	113.74	177.00
	PTI (%)	322,771	295,709	11.35	0.21	7.86	10.89	14.12	99.83
	African American (%)	322,771	317,229	20.04%	0.00%	0.21%	3.28%	28.51%	99.98%
	Hispanic (%)	322,771	317,229	18.04%	0.00%	0.23%	0.92%	6.80%	100.00%
	Asian (%)	322,771	317,229	2.82%	0.00%	0.04%	0.16%	0.66%	99.97%
	Non-Hispanic White (%)	322,771	317,229	56.53%	0.00%	11.26%	69.76%	93.84%	100.00%
Unknown / Invalid Credit Score	Contract Amount ($)	32,355	32,355	19,643	1,000	13,780	18,750	23,990	150,000
	Term (Months)	32,355	32,355	60	12	60	60	72	84
	Buy Rate	32,355	32,355	6.33	0.40	3.84	6.04	8.25	20.99
	Contract Rate	32,355	32,355	7.57	0.99	4.85	7.29	9.99	21.99
	Dealer Reserve (BPS)	32,355	32,355	124	0	0	150	200	289
	Dealer Reserve ($)	32,355	32,355	732	0	0	638	1,214	6,404
	LTV (%)	32,355	29,161	73.53	1.63	53.00	78.00	95.00	264.00
	PTI (%)	32,355	21,769	10.58	0.17	6.63	9.96	13.82	82.43
	African American (%)	32,355	32,310	10.76%	0.00%	0.10%	1.16%	9.11%	100.00%
	Hispanic (%)	32,355	32,310	16.00%	0.00%	0.19%	0.98%	7.42%	99.99%
	Asian (%)	32,355	32,310	11.99%	0.00%	0.05%	0.33%	3.81%	99.96%
	Non-Hispanic White (%)	32,355	32,310	59.11%	0.00%	12.59%	75.57%	95.28%	99.99%

Credit Tranche	Characteristic	Count	Count with Data	Average	Minimum	1st Quartile	Median	3rd Quartile	Max
	CRA Contract Data - Summary Statistics								
	Used Vehicle Contracts - Entire Sample								
All	Contract Amount ($)	2,720,283	2,720,264	19,041	1,032	13,965	17,803	22,844	249,999
	Term (Months)	2,720,283	2,703,001	65	12	60	72	72	84
	Buy Rate	2,720,283	2,684,402	8.43	0.00	3.67	7.14	12.34	37.79
	Contract Rate	2,720,283	2,718,426	9.74	0.00	4.84	8.69	14.00	49.95
	Dealer Reserve (BPS)	2,720,283	2,670,445	117	0	0	150	200	300
	Dealer Reserve ($)	2,720,283	2,666,060	730	0	0	694	1,167	15,504
	LTV (%)	2,720,283	2,533,222	107.37	1.23	95.00	111.00	123.44	276.00
	PTI (%)	2,720,283	2,422,714	8.76	0.05	5.26	8.03	11.52	99.42
	African American (%)	2,720,283	2,672,951	15.56%	0.00%	0.15%	1.77%	16.74%	100.00%
	Hispanic (%)	2,720,283	2,672,951	14.41%	0.00%	0.18%	0.66%	3.83%	100.00%
	Asian (%)	2,720,283	2,672,951	2.97%	0.00%	0.04%	0.15%	0.66%	99.97%
	Non-Hispanic White (%)	2,720,283	2,672,951	64.92%	0.00%	29.20%	84.01%	96.67%	100.00%
Credit Score ≥ 760	Contract Amount ($)	496,880	496,864	19,166	1,050	13,181	17,758	23,382	249,999
	Term (Months)	496,880	494,029	61	12	60	60	72	84
	Buy Rate	496,880	493,309	2.96	0.00	1.92	2.89	3.54	24.99
	Contract Rate	496,880	496,378	3.79	0.00	2.59	3.50	4.84	24.99
	Dealer Reserve (BPS)	496,880	493,277	83	0	0	60	155	299
	Dealer Reserve ($)	496,880	490,431	447	0	0	228	793	12,421
	LTV (%)	496,880	458,035	94.17	1.23	76.93	96.00	112.61	236.70
	PTI (%)	496,880	404,383	6.26	0.05	3.64	5.44	7.99	97.62
	African American (%)	496,880	488,384	8.83%	0.00%	0.10%	1.00%	7.23%	100.00%
	Hispanic (%)	496,880	488,384	8.55%	0.00%	0.16%	0.48%	1.99%	100.00%
	Asian (%)	496,880	488,384	3.54%	0.00%	0.04%	0.17%	0.75%	99.97%

	Non-Hispanic White (%)	496,880	488,384	77.30%	0.00%	71.30%	92.89%	97.96%	100.00%
720 ≤ Credit Score < 760	Contract Amount ($)	260,708	260,707	19,964	1,564	14,054	18,556	24,292	248,864
	Term (Months)	260,708	259,628	64	12	60	66	72	84
	Buy Rate	260,708	258,838	3.84	0.00	2.65	3.44	4.58	24.99
	Contract Rate	260,708	260,447	4.83	0.00	3.09	4.54	5.90	25.80
	Dealer Reserve (BPS)	260,708	258,742	100	0	0	101	190	300
	Dealer Reserve ($)	260,708	257,667	584	0	0	482	992	11,055
	LTV (%)	260,708	236,348	102.29	5.97	87.21	104.00	119.60	275.00
	PTI (%)	260,708	215,423	6.99	0.11	4.07	6.15	9.06	94.61
	African American (%)	260,708	256,366	10.82%	0.00%	0.12%	1.20%	9.39%	100.00%
	Hispanic (%)	260,708	256,366	13.44%	0.00%	0.18%	0.66%	3.59%	100.00%
	Asian (%)	260,708	256,366	4.24%	0.00%	0.04%	0.18%	0.87%	99.97%
	Non-Hispanic White (%)	260,708	256,366	69.49%	0.00%	47.04%	88.49%	97.19%	100.00%
680 ≤ Credit Score < 720	Contract Amount ($)	346,356	346,356	20,204	1,032	14,486	18,866	24,537	234,613
	Term (Months)	346,356	345,892	66	12	60	72	72	84
	Buy Rate	346,356	344,230	5.31	0.00	3.50	4.84	6.45	24.99
	Contract Rate	346,356	346,011	6.43	0.00	4.49	5.99	7.89	25.00
	Dealer Reserve (BPS)	346,356	343,977	112	0	0	146	200	289
	Dealer Reserve ($)	346,356	343,552	696	0	0	659	1,123	15,504
	LTV (%)	346,356	312,955	107.75	6.99	94.02	110.00	124.00	226.83
	PTI (%)	346,356	297,935	7.73	0.11	4.64	6.95	10.05	94.74
	African American (%)	346,356	341,605	12.99%	0.00%	0.12%	1.34%	12.10%	99.99%
	Hispanic (%)	346,356	341,605	15.94%	0.00%	0.19%	0.73%	4.87%	99.99%
	Asian (%)	346,356	341,605	3.73%	0.00%	0.04%	0.16%	0.77%	99.97%
	Non-Hispanic White (%)	346,356	341,605	65.26%	0.00%	29.35%	84.84%	96.78%	100.00%
640 ≤ Credit Score	Contract Amount ($)	460,286	460,286	19,865	1,483	14,587	18,620	23,978	162,346
	Term (Months)	460,286	459,976	67	12	60	72	72	84

< 680	Buy Rate	460,286	458,275	7.80	0.00	5.39	7.35	9.53	24.99
	Contract Rate	460,286	459,992	9.11	0.00	6.65	8.75	11.05	25.99
	Dealer Reserve (BPS)	460,286	456,778	129	0	68	150	200	295
	Dealer Reserve ($)	460,286	456,746	830	0	291	829	1,248	13,015
	LTV (%)	460,286	425,001	111.72	1.47	100.00	114.62	126.00	216.10
	PTI (%)	460,286	419,782	8.70	0.11	5.46	8.04	11.29	99.02
	African American (%)	460,286	454,334	15.87%	0.00%	0.15%	1.79%	17.53%	100.00%
	Hispanic (%)	460,286	454,334	16.50%	0.00%	0.18%	0.71%	5.03%	100.00%
	Asian (%)	460,286	454,334	2.83%	0.00%	0.03%	0.14%	0.63%	99.97%
	Non-Hispanic White (%)	460,286	454,334	62.64%	0.00%	21.63%	81.20%	96.34%	100.00%
600 ≤ Credit Score < 640	Contract Amount ($)	449,681	449,681	18,862	1,100	14,284	17,780	22,426	149,602
	Term (Months)	449,681	448,519	67	12	60	72	72	75
	Buy Rate	449,681	447,455	11.01	0.00	8.10	10.69	13.75	26.46
	Contract Rate	449,681	449,482	12.46	0.00	9.58	12.29	15.30	27.00
	Dealer Reserve (BPS)	449,681	443,997	138	0	100	152	200	300
	Dealer Reserve ($)	449,681	443,995	888	0	419	892	1,307	8,898
	LTV (%)	449,681	423,613	112.71	1.38	102.06	115.62	125.00	206.83
	PTI (%)	449,681	420,441	9.87	0.18	6.45	9.30	12.67	99.36
	African American (%)	449,681	440,726	18.91%	0.00%	0.19%	2.59%	25.14%	100.00%
	Hispanic (%)	449,681	440,726	16.15%	0.00%	0.18%	0.71%	4.79%	100.00%
	Asian (%)	449,681	440,726	2.40%	0.00%	0.03%	0.14%	0.58%	99.97%
	Non-Hispanic White (%)	449,681	440,726	60.27%	0.00%	17.24%	76.90%	95.69%	100.00%
Credit Score < 600	Contract Amount ($)	674,168	674,167	17,830	1,107	13,896	16,997	20,929	103,021
	Term (Months)	674,168	663,399	67	12	60	72	72	84
	Buy Rate	674,168	662,460	14.64	0.00	11.53	14.70	17.90	34.79
	Contract Rate	674,168	673,933	16.09	0.00	13.19	16.24	18.90	34.79
	Dealer Reserve (BPS)	674,168	655,095	131	0	90	150	200	297

	Dealer Reserve ($)	674,168	655,092	843	0	329	807	1,279	7,444
	LTV (%)	674,168	652,926	112.19	3.36	102.64	115.00	124.00	240.00
	PTI (%)	674,168	638,910	10.70	0.16	7.29	10.16	13.34	99.42
	African American (%)	674,168	659,541	21.30%	0.00%	0.23%	3.49%	32.31%	100.00%
	Hispanic (%)	674,168	659,541	15.23%	0.00%	0.19%	0.72%	4.31%	100.00%
	Asian (%)	674,168	659,541	2.03%	0.00%	0.04%	0.14%	0.56%	99.97%
	Non-Hispanic White (%)	674,168	659,541	59.05%	0.00%	16.27%	74.03%	95.18%	100.00%
Unknown / Invalid Credit Score	Contract Amount ($)	32,204	32,203	13,159	1,064	8,613	12,050	16,363	225,576
	Term (Months)	32,204	31,558	53	12	42	54	60	75
	Buy Rate	32,204	19,835	7.51	0.00	4.09	7.29	9.70	37.79
	Contract Rate	32,204	32,183	15.26	0.00	7.99	12.79	22.99	49.95
	Dealer Reserve (BPS)	32,204	18,579	127	0	0	150	200	289
	Dealer Reserve ($)	32,204	18,577	579	0	0	545	960	4,094
	LTV (%)	32,204	24,344	102.62	8.28	84.00	104.18	123.00	276.00
	PTI (%)	32,204	25,840	9.78	0.21	6.49	9.29	12.46	71.11
	African American (%)	32,204	31,995	14.48%	0.00%	0.10%	1.13%	13.05%	99.95%
	Hispanic (%)	32,204	31,995	24.78%	0.00%	0.28%	1.52%	40.93%	99.99%
	Asian (%)	32,204	31,995	5.24%	0.00%	0.05%	0.24%	1.35%	99.90%
	Non-Hispanic White (%)	32,204	31,995	53.49%	0.00%	5.30%	66.12%	93.95%	100.00%

CRA Contract Data - Summary Statistics									
Used Vehicle Contracts - Dealer Reserve Sample (Excluding Subvented Contracts)									
Credit Tranche	Characteristic	Count	Count with Data	Average	Minimum	1st Quartile	Median	3rd Quartile	Max
All	Contract Amount ($)	2,381,579	2,381,579	18,753	1,032	13,859	17,620	22,522	249,305
	Term (Months)	2,381,579	2,381,579	66	12	60	72	72	84
	Buy Rate	2,381,579	2,381,579	9.06	0.02	4.12	8.23	13.00	37.79
	Contract Rate	2,381,579	2,381,579	10.37	0.64	5.49	9.69	14.60	37.79
	Dealer Reserve (BPS)	2,381,579	2,381,579	132	0	76	150	200	300
	Dealer Reserve ($)	2,381,579	2,381,579	817	0	322	789	1,225	15,504
	LTV (%)	2,381,579	2,212,266	109.10	1.47	97.25	112.55	124.00	255.00
	PTI (%)	2,381,579	2,275,715	8.82	0.05	5.31	8.09	11.59	99.42
	African American (%)	2,381,579	2,338,684	16.35%	0.00%	0.16%	1.97%	18.61%	100.00%
	Hispanic (%)	2,381,579	2,338,684	14.65%	0.00%	0.18%	0.65%	3.87%	100.00%
	Asian (%)	2,381,579	2,338,684	2.84%	0.00%	0.04%	0.14%	0.62%	99.97%
	Non-Hispanic White (%)	2,381,579	2,338,684	64.00%	0.00%	26.47%	82.74%	96.51%	100.00%
Credit Score ≥ 760	Contract Amount ($)	378,838	378,838	18,510	1,050	12,828	17,354	22,830	249,305
	Term (Months)	378,838	378,838	62	12	60	60	72	84
	Buy Rate	378,838	378,838	3.08	0.28	1.99	2.90	3.64	24.99
	Contract Rate	378,838	378,838	4.16	0.64	2.90	3.99	4.99	24.99
	Dealer Reserve (BPS)	378,838	378,838	108	0	0	115	190	299
	Dealer Reserve ($)	378,838	378,838	579	0	0	497	933	12,421
	LTV (%)	378,838	341,350	96.78	2.40	79.59	99.00	115.00	236.70
	PTI (%)	378,838	361,709	6.19	0.05	3.61	5.40	7.92	97.62
	African American (%)	378,838	371,840	9.68%	0.00%	0.11%	1.15%	8.45%	99.96%
	Hispanic (%)	378,838	371,840	9.12%	0.00%	0.16%	0.47%	2.00%	100.00%
	Asian (%)	378,838	371,840	3.42%	0.00%	0.04%	0.15%	0.66%	99.97%

	Non-Hispanic White (%)	378,838	371,840	76.00%	0.00%	68.01%	92.22%	97.85%	100.00%
720 ≤ Credit Score < 760	Contract Amount ($)	211,072	211,072	19,449	1,564	13,709	18,201	23,870	199,563
	Term (Months)	211,072	211,072	65	12	60	72	72	84
	Buy Rate	211,072	211,072	4.01	0.02	2.79	3.53	4.83	24.99
	Contract Rate	211,072	211,072	5.23	0.90	3.84	4.99	6.24	25.80
	Dealer Reserve (BPS)	211,072	211,072	122	0	33	150	200	300
	Dealer Reserve ($)	211,072	211,072	713	0	132	668	1,097	11,055
	LTV (%)	211,072	187,435	104.56	5.97	90.00	107.00	121.88	255.00
	PTI (%)	211,072	198,204	6.96	0.11	4.05	6.12	9.03	94.61
	African American (%)	211,072	207,655	11.51%	0.00%	0.13%	1.32%	10.49%	100.00%
	Hispanic (%)	211,072	207,655	13.98%	0.00%	0.18%	0.64%	3.69%	100.00%
	Asian (%)	211,072	207,655	4.15%	0.00%	0.04%	0.17%	0.79%	99.97%
	Non-Hispanic White (%)	211,072	207,655	68.34%	0.00%	42.50%	87.57%	97.07%	100.00%
680 ≤ Credit Score < 720	Contract Amount ($)	292,541	292,541	19,774	1,032	14,148	18,513	24,072	234,613
	Term (Months)	292,541	292,541	66	12	60	72	72	84
	Buy Rate	292,541	292,541	5.60	0.90	3.74	5.09	6.89	24.99
	Contract Rate	292,541	292,541	6.91	0.90	4.99	6.49	8.30	25.00
	Dealer Reserve (BPS)	292,541	292,541	132	0	76	150	200	289
	Dealer Reserve ($)	292,541	292,541	818	0	340	794	1,203	15,504
	LTV (%)	292,541	260,070	109.72	6.99	97.00	112.01	125.63	226.83
	PTI (%)	292,541	276,759	7.74	0.11	4.65	6.95	10.06	94.74
	African American (%)	292,541	288,759	13.59%	0.00%	0.13%	1.43%	13.23%	99.99%
	Hispanic (%)	292,541	288,759	16.27%	0.00%	0.18%	0.70%	4.93%	99.99%
	Asian (%)	292,541	288,759	3.61%	0.00%	0.04%	0.15%	0.71%	99.97%
	Non-Hispanic White (%)	292,541	288,759	64.46%	0.00%	26.31%	83.97%	96.71%	100.00%
640 ≤ Credit Score	Contract Amount ($)	418,409	418,409	19,622	1,483	14,407	18,420	23,700	162,346
	Term (Months)	418,409	418,409	67	12	60	72	72	84

< 680	Buy Rate	418,409	418,409	8.10	0.90	5.68	7.69	9.80	24.99
	Contract Rate	418,409	418,409	9.51	0.90	7.05	8.99	11.35	25.99
	Dealer Reserve (BPS)	418,409	418,409	141	0	100	150	200	295
	Dealer Reserve ($)	418,409	418,409	906	0	483	896	1,290	13,015
	LTV (%)	418,409	385,139	112.78	1.47	101.52	115.81	127.00	216.10
	PTI (%)	418,409	398,430	8.73	0.11	5.49	8.07	11.33	99.02
	African American (%)	418,409	412,961	16.25%	0.00%	0.16%	1.86%	18.39%	100.00%
	Hispanic (%)	418,409	412,961	16.52%	0.00%	0.18%	0.69%	4.96%	100.00%
	Asian (%)	418,409	412,961	2.78%	0.00%	0.03%	0.14%	0.60%	99.97%
	Non-Hispanic White (%)	418,409	412,961	62.29%	0.00%	20.73%	80.70%	96.31%	100.00%
600 ≤ Credit Score < 640	Contract Amount ($)	423,678	423,678	18,704	1,100	14,193	17,661	22,215	149,602
	Term (Months)	423,678	423,678	67	12	60	72	72	75
	Buy Rate	423,678	423,678	11.35	0.90	8.49	10.99	13.95	26.46
	Contract Rate	423,678	423,678	12.80	0.90	9.92	12.50	15.50	27.00
	Dealer Reserve (BPS)	423,678	423,678	145	0	100	152	200	300
	Dealer Reserve ($)	423,678	423,678	931	0	509	929	1,328	8,898
	LTV (%)	423,678	401,353	113.28	8.63	103.00	116.00	125.42	206.83
	PTI (%)	423,678	405,268	9.91	0.18	6.49	9.34	12.71	99.36
	African American (%)	423,678	414,907	19.21%	0.00%	0.19%	2.69%	26.03%	100.00%
	Hispanic (%)	423,678	414,907	16.06%	0.00%	0.18%	0.70%	4.72%	100.00%
	Asian (%)	423,678	414,907	2.37%	0.00%	0.03%	0.13%	0.57%	99.97%
	Non-Hispanic White (%)	423,678	414,907	60.09%	0.00%	17.04%	76.46%	95.64%	100.00%
Credit Score < 600	Contract Amount ($)	641,148	641,148	17,753	1,107	13,836	16,930	20,851	103,021
	Term (Months)	641,148	641,148	67	12	60	72	72	84
	Buy Rate	641,148	641,148	14.95	1.79	11.90	14.93	17.99	34.79
	Contract Rate	641,148	641,148	16.29	1.79	13.39	16.32	18.95	34.79
	Dealer Reserve (BPS)	641,148	641,148	134	0	100	150	200	297

	Dealer Reserve ($)	641,148	641,148	862	0	377	825	1,289	7,444
	LTV (%)	641,148	627,533	112.33	3.36	103.00	115.00	124.00	240.00
	PTI (%)	641,148	623,108	10.73	0.17	7.33	10.20	13.37	99.42
	African American (%)	641,148	626,700	21.41%	0.00%	0.23%	3.55%	32.64%	100.00%
	Hispanic (%)	641,148	626,700	15.13%	0.00%	0.19%	0.71%	4.24%	99.99%
	Asian (%)	641,148	626,700	1.99%	0.00%	0.04%	0.14%	0.55%	99.97%
	Non-Hispanic White (%)	641,148	626,700	59.06%	0.00%	16.39%	74.01%	95.17%	100.00%
Unknown / Invalid Credit Score	Contract Amount ($)	15,893	15,893	15,336	1,064	10,946	14,690	18,577	225,576
	Term (Months)	15,893	15,893	59	12	60	60	72	75
	Buy Rate	15,893	15,893	8.32	1.49	5.19	8.34	10.04	37.79
	Contract Rate	15,893	15,893	9.80	1.49	6.84	9.84	11.95	37.79
	Dealer Reserve (BPS)	15,893	15,893	148	0	100	188	220	289
	Dealer Reserve ($)	15,893	15,893	677	0	256	668	1,026	4,094
	LTV (%)	15,893	9,386	84.86	8.28	68.49	89.00	100.00	180.02
	PTI (%)	15,893	12,237	9.93	0.41	6.44	9.37	12.79	71.11
	African American (%)	15,893	15,862	13.57%	0.00%	0.15%	1.45%	12.63%	99.95%
	Hispanic (%)	15,893	15,862	18.66%	0.00%	0.22%	1.08%	9.44%	99.99%
	Asian (%)	15,893	15,862	6.13%	0.00%	0.05%	0.23%	1.60%	99.89%
	Non-Hispanic White (%)	15,893	15,862	59.53%	0.00%	13.92%	76.67%	95.46%	99.99%

17.   APPENDIX J. DEALER RESERVE REGRESSION RESULTS

Level of Dealer Reserve as Measured in BPS						
All Non-Subvented Contracts						
Model	Minority Group	Proxied Count	Average BISG %	Coeff.	P-Value	Adjusted R-Squared
No Controls	African American	5,579,687	13.66%	16.93	0.00	0.0034
	Hispanic	5,579,687	13.86%	9.38	0.00	0.0034
	Asian	5,579,687	3.58%	13.40	0.00	0.0034
Broad Credit Tranche	African American	5,579,687	13.66%	5.42	0.00	0.0273
	Hispanic	5,579,687	13.86%	1.76	0.00	0.0273
	Asian	5,579,687	3.58%	13.97	0.00	0.0273
Narrow Credit Tranche	African American	5,579,687	13.66%	4.45	0.00	0.0313
	Hispanic	5,579,687	13.86%	1.37	0.00	0.0313
	Asian	5,579,687	3.58%	14.49	0.00	0.0313
State	African American	5,579,687	13.66%	20.91	0.00	0.0164
	Hispanic	5,579,687	13.86%	12.58	0.00	0.0164
	Asian	5,579,687	3.58%	15.16	0.00	0.0164
MSA	African American	5,579,687	13.66%	19.78	0.00	0.0258
	Hispanic	5,579,687	13.86%	13.13	0.00	0.0258
	Asian	5,579,687	3.58%	9.92	0.00	0.0258
LMI Categories	African American	5,579,687	13.66%	12.81	0.00	0.0045
	Hispanic	5,579,687	13.86%	7.05	0.00	0.0045
	Asian	5,579,687	3.58%	13.03	0.00	0.0045
Broad Credit Tranche + MSA	African American	5,579,687	13.66%	7.82	0.00	0.0483
	Hispanic	5,579,687	13.86%	5.57	0.00	0.0483
	Asian	5,579,687	3.58%	10.12	0.00	0.0483
Broad Credit Tranche + MSA + New/Used + Term	African American	5,579,687	13.66%	7.94	0.00	0.0574
	Hispanic	5,579,687	13.86%	6.16	0.00	0.0574
	Asian	5,579,687	3.58%	9.23	0.00	0.0574

Source: CRA Contract Data

American Financial Services Association

Level of Dealer Reserve as Measured in Basis Points						
Excluding Contracts with no Dealer Reserve						
Model	Minority Group	Proxied Count	Average BISG %	Coeff.	P-Value	Adjusted R-Squared
No Controls	African American	4,286,984	14.13%	7.86	0.00	0.0023
	Hispanic	4,286,984	14.04%	6.25	0.00	0.0023
	Asian	4,286,984	3.63%	11.56	0.00	0.0023
Broad Credit Tranche	African American	4,286,984	14.13%	3.03	0.00	0.0123
	Hispanic	4,286,984	14.04%	3.37	0.00	0.0123
	Asian	4,286,984	3.63%	12.01	0.00	0.0123
Narrow Credit Tranche	African American	4,286,984	14.13%	2.52	0.00	0.0160
	Hispanic	4,286,984	14.04%	3.25	0.00	0.0160
	Asian	4,286,984	3.63%	12.48	0.00	0.0160
State	African American	4,286,984	14.13%	9.47	0.00	0.0101
	Hispanic	4,286,984	14.04%	7.36	0.00	0.0101
	Asian	4,286,984	3.63%	12.39	0.00	0.0101
MSA	African American	4,286,984	14.13%	8.38	0.00	0.0171
	Hispanic	4,286,984	14.04%	7.57	0.00	0.0171
	Asian	4,286,984	3.63%	9.05	0.00	0.0171
LMI Categories	African American	4,286,984	14.13%	5.92	0.00	0.0027
	Hispanic	4,286,984	14.04%	5.13	0.00	0.0027
	Asian	4,286,984	3.63%	11.33	0.00	0.0027
Broad Credit Tranche + MSA	African American	4,286,984	14.13%	3.16	0.00	0.0271
	Hispanic	4,286,984	14.04%	4.52	0.00	0.0271
	Asian	4,286,984	3.63%	9.29	0.00	0.0271
Broad Credit Tranche + MSA + New/Used + Term	African American	4,286,984	14.13%	5.18	0.00	0.0636
	Hispanic	4,286,984	14.04%	6.36	0.00	0.0636
	Asian	4,286,984	3.63%	5.52	0.00	0.0636

Source: CRA Contract Data

Dealer Reserve Base Model Output (BPS)							
		All			Non-Hispanic White		
Control	Comparison Group	Coeff.	T-Stat	P-Value	Coeff.	T-Stat	P-Value
720 ≤ Credit Score < 760	Credit Score ≥ 760	7.1	56.63	0.00	5.3	34.40	0.00
620 ≤ Credit Score < 720		25.8	293.02	0.00	22.5	202.12	0.00
Credit Score < 620		33.1	334.33	0.00	35.7	270.24	0.00
Unknown Credit Score		29.1	68.76	0.00	21.9	36.96	0.00
Constant		101.0	1479.42	0.00	101.1	1260.14	0.00
Adjusted R-Squared				0.05			0.05
Number of Contracts				5,579,687			3,201,529

		African American			Hispanic		
Control	Comparison Group	Coeff.	T-Stat	P-Value	Coeff.	T-Stat	P-Value
720 ≤ Credit Score < 760	Credit Score ≥ 760	11.2	14.14	0.00	9.7	22.91	0.00
620 ≤ Credit Score < 720		29.2	51.52	0.00	27.0	83.80	0.00
Credit Score < 620		21.7	37.95	0.00	27.5	78.78	0.00
Unknown Credit Score		36.3	18.99	0.00	46.7	39.89	0.00
Constant		110.7	210.84	0.00	101.1	353.59	0.00
Adjusted R-Squared				0.03			0.05
Number of Contracts				284,925			624,256

		Asian		
Control	Comparison Group	Coeff.	T-Stat	P-Value
720 ≤ Credit Score < 760	Credit Score ≥ 760	9.4	11.91	0.00
620 ≤ Credit Score < 720		24.5	38.31	0.00
Credit Score < 620		34.3	38.90	0.00
Unknown Credit Score		26.6	15.24	0.00
Constant		111.9	241.16	0.00
Adjusted R-Squared				0.04
Number of Contracts				112,374

Note: The model also controls for the MSA or state when not in an MSA.

Dealer Reserve Full Model Output (BPS)						
		All			Non-Hispanic White		
Control	Comparison Group	Coeff.	T-Stat	P-Value	Coeff.	T-Stat	P-Value
720 ≤ Credit Score < 760	Credit Score ≥ 760	7.7	61.09	0.00	5.9	37.61	0.00
620 ≤ Credit Score < 720		25.9	275.89	0.00	22.5	189.41	0.00
Credit Score < 620		30.7	287.19	0.00	33.5	234.42	0.00
Unknown Credit Score		27.1	64.25	0.00	20.2	34.23	0.00
New	Used	-13.1	-177.49	0.00	-11.7	-118.30	0.00
Term ≤ 60 Months	Term > 60 Months	10.0	122.80	0.00	9.1	87.14	0.00
Constant		105.6	1070.15	0.00	105.0	847.61	0.00
Adjusted R-Squared				0.06			0.06
Number of Contracts				5,579,687			3,201,529

		African American			Hispanic		
Control	Comparison Group	Coeff.	T-Stat	P-Value	Coeff.	T-Stat	P-Value
720 ≤ Credit Score < 760	Credit Score ≥ 760	12.1	15.32	0.00	10.8	25.54	0.00
620 ≤ Credit Score < 720		29.6	51.57	0.00	27.1	83.61	0.00
Credit Score < 620		20.3	34.84	0.00	24.7	69.54	0.00
Unknown Credit Score		34.4	18.16	0.00	41.6	35.89	0.00
New	Used	-10.8	-35.47	0.00	-15.6	-71.70	0.00
Term ≤ 60 Months	Term > 60 Months	12.0	28.89	0.00	15.0	54.62	0.00
Constant		113.3	196.50	0.00	106.9	315.25	0.00
Adjusted R-Squared				0.04			0.06
Number of Contracts				284,925			624,256

		Asian					
Control	Comparison Group	Coeff.	T-Stat	P-Value			
720 ≤ Credit Score < 760	Credit Score ≥ 760	9.1	11.47	0.00			
620 ≤ Credit Score < 720		23.7	35.79	0.00			
Credit Score < 620		32.0	34.53	0.00			
Unknown Credit Score		26.2	15.08	0.00			
New	Used	-15.6	-26.21	0.00			
Term ≤ 60 Months	Term > 60 Months	6.2	11.42	0.00			
Constant		120.1	154.67	0.00	Note: The model also		
Adjusted R-Squared				0.04	controls for MSA or state		
Number of Contracts				112,374	when not in an MSA.		

18.   APPENDIX K. COST/BENEFIT SCENARIO RESULTS

Summary of Effect of Changing to Flat Rates by Race and Ethnicity Scenario 1 - Spread Dealer Reserve Across All Buy Rates by New/Used and Finance Company						Among those Lowered		Among those Raised	
Group	Count of Group Contracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
All Contracts									
All	5,651,064	55.0	45.0	0.5	$0	-66.0	-$476	81.8	$581
AA	762,257	57.9	42.1	-3.5	-$32	-64.3	-$494	80.2	$606
Hispanic	773,185	57.4	42.6	-2.6	-$12	-66.5	-$510	83.5	$658
Asian	199,724	56.9	43.1	-6.5	-$44	-74.5	-$492	83.3	$548
NHW	3,726,370	53.7	46.3	2.5	$12	-65.7	-$462	81.7	$563
Contracts with a Dealer Reserve									
All	4,342,994	71.5	28.5	-34.7	-$244	-66.0	-$476	44.1	$339
AA	605,980	72.9	27.1	-35.2	-$267	-64.3	-$494	43.2	$343
Hispanic	602,088	73.7	26.3	-37.0	-$278	-66.5	-$510	45.8	$373
Asian	155,729	73.0	27.0	-41.5	-$270	-74.5	-$492	47.6	$331
NHW	2,830,657	70.7	29.3	-33.6	-$229	-65.7	-$462	43.8	$334
Contracts without a Dealer Reserve									
All	1,308,070	0.0	100	117.3	$810	.	.	117.3	$810
AA	156,278	0.0	100	119.2	$882	.	.	119.2	$882
Hispanic	171,097	0.0	100	118.4	$923	.	.	118.4	$923
Asian	43,995	0.0	100	117.4	$756	.	.	117.4	$756
NHW	895,713	0.0	100	116.6	$776	.	.	116.6	$776

Source: CRA Contract Data
[1]Assumes no contracts prepay

Credit Tier	Count of Group Contracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Among those Lowered		Among those Raised	
						Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
Summary of Effect of Changing to Flat Rates by Tier									
Scenario 1 - Spread Dealer Reserve Across All Buy Rates by New/Used and Finance Company									
All Contracts									
All	5,651,064	55.0	45.0	0.5	$0	-66.0	-$476	81.8	$581
CS ≥ 760	1,659,057	44.6	55.4	15.4	$88	-71.0	-$450	84.9	$520
720 ≤ CS < 760	654,932	49.8	50.2	8.3	$64	-66.5	-$484	82.6	$608
680 ≤ CS < 720	736,161	57.1	42.9	-1.9	-$6	-63.5	-$489	80.1	$639
640 ≤ CS < 680	854,367	65.0	35.0	-13.5	-$95	-62.8	-$491	78.3	$642
00 ≤ CS < 640	734,380	66.1	33.9	-15.9	-$112	-64.8	-$489	79.4	$624
CS < 600	963,919	57.1	42.9	-2.8	-$16	-64.3	-$469	78.9	$587
Missing or Invalid CS	48,248	61.4	38.6	-16.3	-$99	-83.1	-$445	89.8	$449
Contracts with a Dealer Reserve									
All	4,342,994	71.5	28.5	-34.7	-$244	-66.0	-$476	44.1	$339
CS ≥ 760	1,140,942	64.8	35.2	-29.9	-$181	-71.0	-$450	45.7	$315
720 ≤ CS < 760	478,568	68.2	31.8	-31.2	-$215	-66.5	-$484	44.7	$363
680 ≤ CS < 720	573,485	73.3	26.7	-35.0	-$259	-63.5	-$489	43.5	$375
640 ≤ CS < 680	704,298	78.9	21.1	-40.9	-$312	-62.8	-$491	40.7	$357
00 ≤ CS < 640	614,560	79.0	21.0	-42.4	-$315	-64.8	-$489	41.5	$338
CS < 600	794,731	69.2	30.8	-30.7	-$222	-64.3	-$469	44.8	$334
Missing or Invalid CS	36,410	81.3	18.7	-58.6	-$312	-83.1	-$445	47.7	$269
Contracts without a Dealer Reserve									
All	1,308,070	0.0	100.0	117.3	$810	.	.	117.3	$810
CS ≥ 760	518,115	0.0	100.0	115.3	$679	.	.	115.3	$679
720 ≤ CS < 760	176,364	0.0	100.0	115.2	$820	.	.	115.2	$820
680 ≤ CS < 720	162,676	0.0	100.0	114.5	$887	.	.	114.5	$887
640 ≤ CS < 680	150,069	0.0	100.0	115.4	$925	.	.	115.4	$925
00 ≤ CS < 640	119,820	0.0	100.0	120.2	$932	.	.	120.2	$932
CS < 600	169,188	0.0	100.0	128.3	$954	.	.	128.3	$954
Missing or Invalid CS	11,838	0.0	100.0	114.0	$553	.	.	114.0	$553

Source: CRA Contract Data
[1]Assumes no contracts prepay

Group	Count of Group Con-tracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Among those Lowered Avg Chg in Rate (bps)	Among those Lowered Avg Chg in $$ Paid[1]	Among those Raised Avg Chg in Rate (bps)	Among those Raised Avg Chg in $$ Paid[1]
Summary of Effect of Changing to Flat Rates by Race and Ethnicity **Scenario 2 - Spread Dealer Reserve Across All Buy Rates by New/Used, Credit Tranche, and Finance Company**									
All Contracts									
All	5,651,064	55.9	44.1	-0.4	$0	-64.0	-$456	80.1	$576
AA	762,257	58.1	41.9	-1.9	-$13	-60.7	-$461	79.8	$610
Hispanic	773,185	57.4	42.6	-0.5	$9	-62.8	-$478	83.5	$664
Asian	199,724	57.9	42.1	-8.7	-$50	-73.5	-$478	80.4	$536
NHW	3,726,370	54.9	45.1	0.5	$4	-64.3	-$448	79.5	$555
Contracts with a Dealer Reserve									
All	4,342,994	72.7	27.3	-34.6	-$238	-64.0	-$456	43.6	$342
AA	605,980	73.1	26.9	-32.7	-$243	-60.7	-$461	43.4	$351
Hispanic	602,088	73.7	26.3	-34.2	-$252	-62.8	-$478	46.1	$381
Asian	155,729	74.2	25.8	-42.8	-$271	-73.5	-$478	45.5	$324
NHW	2,830,657	72.3	27.7	-34.6	-$231	-64.3	-$448	43.1	$334
Contracts without a Dealer Reserve									
All	1,308,070	0.0	100.0	113.3	$789	.	.	113.3	$789
AA	156,278	0.0	100.0	117.7	$879	.	.	117.7	$879
Hispanic	171,097	0.0	100.0	118.1	$926	.	.	118.1	$926
Asian	43,995	0.0	100.0	112.2	$730	.	.	112.2	$730
NHW	895,713	0.0	100.0	111.4	$748	.	.	111.4	$748

Source: CRA Contract Data
[1]Assumes no contracts prepay

						Among those Lowered		Among those Raised	
Summary of Effect of Changing to Flat Rates by Tier									
Scenario 2 - Spread Dealer Reserve Across All Buy Rates by New/Used, Credit Tranche, and Finance Company									
Credit Tier	Count of Group Con-tracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
All Contracts									
All	5,651,064	55.9	44.1	-0.4	$0	-64.0	-$456	80.1	$576
CS ≥ 760	1,659,057	49.3	50.7	1.8	$0	-76.5	-$487	77.9	$473
720 ≤ CS < 760	654,932	51.9	48.1	0.0	$0	-71.8	-$526	77.3	$567
680 ≤ CS < 720	736,161	56.8	43.2	-0.8	$0	-62.2	-$483	80.1	$636
640 ≤ CS < 680	854,367	62.8	37.2	-1.6	$0	-52.6	-$411	84.5	$694
600 ≤ CS < 640	734,380	64.0	36.0	-2.0	$0	-52.7	-$392	88.3	$698
CS < 600	963,919	56.6	43.4	-1.8	$0	-62.5	-$448	77.2	$584
Missing or Invalid CS	48,248	59.4	40.6	2.1	$0	-66.5	-$353	102.4	$517
Contracts with a Dealer Reserve									
All	4,342,994	72.7	27.3	-34.6	-$238	-64.0	-$456	43.6	$342
CS ≥ 760	1,140,942	71.7	28.3	-43.0	-$267	-76.5	-$487	41.7	$290
720 ≤ CS < 760	478,568	71.0	29.0	-39.3	-$278	-71.8	-$526	40.3	$327
680 ≤ CS < 720	573,485	72.9	27.1	-33.7	-$253	-62.2	-$483	43.1	$368
640 ≤ CS < 680	704,298	76.2	23.8	-29.1	-$217	-52.6	-$411	46.3	$402
600 ≤ CS < 640	614,560	76.5	23.5	-28.7	-$205	-52.7	-$392	49.7	$406
CS < 600	794,731	68.6	31.4	-29.6	-$206	-62.5	-$448	42.3	$324
Missing or Invalid CS	36,410	78.7	21.3	-39.9	-$208	-66.5	-$353	58.3	$330
Contracts without a Dealer Reserve									
All	1,308,070	0.0	100	113.3	$789	.	.	113.3	$789
CS ≥ 760	518,115	0.0	100	100.5	$587	.	.	100.5	$587
720 ≤ CS < 760	176,364	0.0	100	106.6	$755	.	.	106.6	$755
680 ≤ CS < 720	162,676	0.0	100	115.3	$891	.	.	115.3	$891
640 ≤ CS < 680	150,069	0.0	100	127.2	$1,020	.	.	127.2	$1,020
600 ≤ CS < 640	119,820	0.0	100	134.7	$1,050	.	.	134.7	$1,050
CS < 600	169,188	0.0	100	128.8	$966	.	.	128.8	$966
Missing or Invalid CS	11,838	0.0	100	131.3	$639	.	.	131.3	$639

Source: CRA Contract Data
[1]Assumes no contracts prepay

					Among those Lowered		Among those Raised	
Group	Count of Group Contracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]

Summary of Effect of Changing to Flat Rates by Race and Ethnicity
Scenario 3 - Spread Dealer Reserve Across Buy Rates with Dealer Reserves by New/Used and Finance Company

Group	Count of Group Contracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
All Contracts									
All	5,651,064	47.5	29.4	-1.9	$0	-41.7	-$291	60.8	$470
AA	762,257	51.4	28.1	-2.8	-$11	-38.8	-$290	61.2	$490
Hispanic	773,185	50.8	27.0	-3.4	-$13	-40.1	-$300	63.0	$517
Asian	199,724	49.0	29.0	-4.8	-$20	-48.1	-$308	64.7	$454
NHW	3,726,370	45.8	30.2	-1.3	$6	-42.4	-$289	60.0	$459
Contracts with a Dealer Reserve									
All	4,342,994	61.8	38.2	-2.5	$0	-41.7	-$291	60.8	$470
AA	605,980	64.7	35.3	-3.5	-$14	-38.8	-$290	61.2	$490
Hispanic	602,088	65.3	34.7	-4.3	-$17	-40.1	-$300	63.0	$517
Asian	155,729	62.9	37.1	-6.2	-$25	-48.1	-$308	64.7	$454
NHW	2,830,657	60.3	39.7	-1.7	$8	-42.4	-$289	60.0	$459
Contracts without a Dealer Reserve									
All	1,308,070	0.0	0.0	0.0	$0	.	.	.	.
AA	156,278	0.0	0.0	0.0	$0	.	.	.	.
Hispanic	171,097	0.0	0.0	0.0	$0	.	.	.	.
Asian	43,995	0.0	0.0	0.0	$0	.	.	.	.
NHW	895,713	0.0	0.0	0.0	$0	.	.	.	.

Source: CRA Contract Data
[1]Assumes no contracts prepay

| | | | | Avg Chg in Rate (bps) | Avg Chg in $$ Paid[1] | Among those Lowered | | Among those Raised | |
Credit Tier	Count of Group Contracts	% Down	% Up			Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
Summary of Effect of Changing to Flat Rates by Tier Scenario 3 - Spread Dealer Reserve Across Buy Rates with Dealer Reserves by New/Used, and Finance Company									
All Contracts									
All	5,651,064	47.5	29.4	-1.9	$0	-41.7	-$291	60.8	$470
CS ≥ 760	1,659,057	34.9	33.9	3.2	$36	-50.8	-$311	61.9	$428
720 ≤ CS < 760	654,932	40.5	32.6	2.0	$36	-43.9	-$308	60.5	$492
680 ≤ CS < 720	736,161	48.5	29.4	-1.9	$7	-39.3	-$293	58.2	$506
640 ≤ CS < 680	854,367	57.9	24.6	-7.9	-$43	-37.0	-$282	55.1	$487
600 ≤ CS < 640	734,380	60.7	23.0	-9.5	-$58	-37.9	-$278	58.9	$483
CS < 600	963,919	53.3	29.2	-1.7	-$6	-39.4	-$281	66.0	$494
Missing or Invalid CS	48,248	56.6	18.8	-16.7	-$79	-51.9	-$269	67.2	$386
Contracts with a Dealer Reserve									
All	4,342,994	61.8	38.2	-2.5	$0	-41.7	-$291	60.8	$470
CS ≥ 760	1,140,942	50.8	49.2	4.7	$53	-50.8	-$311	61.9	$428
720 ≤ CS < 760	478,568	55.4	44.6	2.7	$49	-43.9	-$308	60.5	$492
680 ≤ CS < 720	573,485	62.2	37.8	-2.4	$9	-39.3	-$293	58.2	$506
640 ≤ CS < 680	704,298	70.2	29.8	-9.6	-$53	-37.0	-$282	55.1	$487
600 ≤ CS < 640	614,560	72.5	27.5	-11.3	-$69	-37.9	-$278	58.9	$483
CS < 600	794,731	64.6	35.4	-2.1	-$7	-39.4	-$281	66.0	$494
Missing or Invalid CS	36,410	75.0	25.0	-22.2	-$105	-51.9	-$269	67.2	$386
Contracts without a Dealer Reserve									
All	1,308,070	0.0	0.0	0.0	$0	.	.	.	.
CS ≥ 760	518,115	0.0	0.0	0.0	$0	.	.	.	.
720 ≤ CS < 760	176,364	0.0	0.0	0.0	$0	.	.	.	.
680 ≤ CS < 720	162,676	0.0	0.0	0.0	$0	.	.	.	.
640 ≤ CS < 680	150,069	0.0	0.0	0.0	$0	.	.	.	.
600 ≤ CS < 640	119,820	0.0	0.0	0.0	$0	.	.	.	.
CS < 600	169,188	0.0	0.0	0.0	$0	.	.	.	.
Missing or Invalid CS	11,838	0.0	0.0	0.0	$0	.	.	.	.

Source: CRA Contract Data
[1]Assumes no contracts prepay

Summary of Effect of Changing to Flat Rates by Race and Ethnicity Scenario 4 - Spread Dealer Reserve Across Buy Rates with Dealer Reserves by New/Used, Credit Tier, and Finance Company								
					Among those Lowered		Among those Raised	
Group	Count of Group Contracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
All Contracts								
All	5,651,064	48.5	28.3	-2.2	$0	-40.0	-$276	60.7	$474
AA	762,257	51.9	27.6	-1.9	-$2	-36.3	-$268	61.2	$495
Hispanic	773,185	51.3	26.5	-2.4	-$3	-37.4	-$277	63.5	$524
Asian	199,724	50.7	27.3	-6.1	-$24	-46.7	-$294	64.4	$457
NHW	3,726,370	47.1	28.9	-2.0	$3	-41.1	-$277	59.9	$461
Contracts with a Dealer Reserve								
All	4,342,994	63.1	36.9	-2.9	$0	-40.0	-$276	60.7	$474
AA	605,980	65.3	34.7	-2.4	-$3	-36.3	-$268	61.2	$495
Hispanic	602,088	65.9	34.1	-3.0	-$4	-37.4	-$277	63.5	$524
Asian	155,729	65.0	35.0	-7.8	-$31	-46.7	-$294	64.4	$457
NHW	2,830,657	62.0	38.0	-2.7	$3	-41.1	-$277	59.9	$461
Contracts without a Dealer Reserve								
All	1,308,070	0.0	0.0	0.0	$0	.	.	.	.
AA	156,278	0.0	0.0	0.0	$0	.	.	.	.
Hispanic	171,097	0.0	0.0	0.0	$0	.	.	.	.
Asian	43,995	0.0	0.0	0.0	$0	.	.	.	.
NHW	895,713	0.0	0.0	0.0	$0	.	.	.	.

Source: CRA Contract Data
[1]Assumes no contracts prepay

Credit Tier	Count of Group Contracts	% Down	% Up	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Among those Lowered		Among those Raised	
						Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]	Avg Chg in Rate (bps)	Avg Chg in $$ Paid[1]
Summary of Effect of Changing to Flat Rates by Tier **Scenario 4 - Spread Dealer Reserve Across Buy Rates with Dealer Reserves by New/Used, Credit Tier, and Finance Company**									
All Contracts									
All	5,651,064	48.5	28.3	-2.2	$0	-40.0	-$276	60.7	$474
CS ≥ 760	1,659,057	38.5	30.3	-2.2	$0	-53.1	-$327	59.9	$415
720 ≤ CS < 760	654,932	42.6	30.5	-2.4	$0	-47.3	-$338	58.3	$472
680 ≤ CS < 720	736,161	49.5	28.4	-2.3	$0	-38.5	-$292	59.0	$509
640 ≤ CS < 680	854,367	57.1	25.3	-2.5	$0	-30.7	-$231	59.3	$522
600 ≤ CS < 640	734,380	59.7	24.0	-2.4	$0	-30.0	-$213	64.4	$531
CS < 600	963,919	53.0	29.5	-1.6	$0	-38.4	-$269	63.7	$483
Missing or Invalid CS	48,248	50.1	25.3	-2.9	$0	-38.7	-$192	65.0	$379
Contracts with a Dealer Reserve									
All	4,342,994	63.1	36.9	-2.9	$0	-40.0	-$276	60.7	$474
CS ≥ 760	1,140,942	55.9	44.1	-3.3	$0	-53.1	-$327	59.9	$415
720 ≤ CS < 760	478,568	58.3	41.7	-3.3	$0	-47.3	-$338	58.3	$472
680 ≤ CS < 720	573,485	63.6	36.4	-3.0	$0	-38.5	-$292	59.0	$509
640 ≤ CS < 680	704,298	69.3	30.7	-3.1	$0	-30.7	-$231	59.3	$522
600 ≤ CS < 640	614,560	71.3	28.7	-2.9	$0	-30.0	-$213	64.4	$531
CS < 600	794,731	64.2	35.8	-1.9	$0	-38.4	-$269	63.7	$483
Missing or Invalid CS	36,410	66.3	33.6	-3.8	$0	-38.7	-$192	65.0	$379
Contracts without a Dealer Reserve									
All	1,308,070	0.0	0.0	0.0	$0	.	.	.	.
CS ≥ 760	518,115	0.0	0.0	0.0	$0	.	.	.	.
720 ≤ CS < 760	176,364	0.0	0.0	0.0	$0	.	.	.	.
680 ≤ CS < 720	162,676	0.0	0.0	0.0	$0	.	.	.	.
640 ≤ CS < 680	150,069	0.0	0.0	0.0	$0	.	.	.	.
600 ≤ CS < 640	119,820	0.0	0.0	0.0	$0	.	.	.	.
CS < 600	169,188	0.0	0.0	0.0	$0	.	.	.	.
Missing or Invalid CS	11,838	0.0	0.0	0.0	$0	.	.	.	.

Source: CRA Contract Data
[1]Assumes no contracts prepay

19.   APPENDIX L. CHARTS AND TABLES

Executive Summary

Study

Table 1. 2013 Automotive Finance Market Shares

Table 2. Count of Financial Institutions for dealer assignment of contracts

Table 3. Population 18 and Tract 0050.02, Washington, DC

Table 4. Race/Ethnicity Probabilities for Surname "Johnson"

Table 5. National Household Vehicle Ownership by Race/Ethnicity

Table 6. Household Population Shares compared to financed vehicle purchase rates

Table 7. BISG Calculation Example

Table 8. Comparison of Proxy Approaches at identifying Race/Ethnicity

Table 9. Accuracy of Estimate using a Continuous BISG methodology

Table 10. Replica of CFPB White Paper Table #10

Table 11. Comparison of Estimated *Raw* APR Disparities using Actual vs Proxied Race / Ethnicity

Chart 1. New and Used Vehicle Sales by Year 1990-2013

Chart 2. Seasonality of New Vehicle Sales 2005-2009

Chart 3. Auto Finance Market Competitiveness

Chart 4. Auto ABS 1986-2013

Chart 5. Distribution of Census Bureau Surnames by Race/Ethnicity Probabilities

Chart 6. Count of African American Consumers Implied by BISG Continuous Methodology

Chart 7. Distribution of Dealer Reserve in CRA Contract Data

Chart 8. Steps for Analyzing Dealer Reserve Disparities

20.   APPENDIX M. REFERENCES

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