**Web Appendix A1: Nielsen’s Claritas PRIZMTM Demographic Segments**

01. Upper Crust – The nation's most exclusive address, Upper Crust is the wealthiest lifestyle in America--a haven for empty-nesting couples over the age of 55. No segment has a higher concentration of residents earning over $100,000 a year and possessing a postgraduate degree. And none has a more opulent standard of living.

02. Blue Blood Estates – Blue Blood Estates is a family portrait of suburban wealth, a place of million-dollar homes and manicured lawns, high-end cars and exclusive private clubs. The nation's second-wealthiest lifestyle is characterized by married couples with children, graduate degrees, a significant percentage of Asian Americans, and six-figure incomes earned by business executives, managers, and professionals.

03. Movers & Shakers – Movers & Shakers is home to America's up-and-coming business class: a wealthy suburban world of dual-income couples who are highly educated, typically between the ages of 45 and 64, and without children. Given its high percentage of executives and white-collar professionals, there's a decided business bent to this segment: members of Movers & Shakers rank near the top for owning a small business and having a home office.

04. Young Digerati – Young Digerati are tech-savvy and live in fashionable neighborhoods on the urban fringe. Affluent, highly educated, and ethnically mixed, Young Digerati communities are typically filled with trendy apartments and condos, fitness clubs and clothing boutiques, casual restaurants and all types of bars--from juice to coffee to microbrew.

05. Country Squires – The wealthiest residents in exurban America live in Country Squires, an oasis for affluent Baby Boomers who've fled the city for the charms of small-town living. In their bucolic communities noted for their recently built homes on sprawling properties, the families of executives live in six-figure comfort. Country Squires enjoy country club sports like golf, tennis, and swimming, as well as skiing, boating, and biking.

06. Winner's Circle – Among the wealthy suburban lifestyles, Winner's Circle is the youngest, a collection of mostly 35- to 54-year-old couples with large families in new-money subdivisions. Surrounding their homes are the signs of upscale living: recreational parks, golf courses, and upscale malls. With a median income over $100,000, Winner's Circle residents are big spenders who like to travel, ski, go out to eat, shop at clothing boutiques, and take in a show.

07. Money & Brains – The residents of Money & Brains seem to have it all: high incomes, advanced degrees, and sophisticated tastes to match their credentials. Many of these city dwellers are married couples with few children who live in fashionable homes on small, manicured lots.

08. Executive Suites – Executive Suites consists of upper-middle-class singles and couples typically living just beyond the nation's beltways. Filled with significant numbers of Asian-Americans and college graduates--both groups are represented at nearly twice the national average--this segment is a haven for white-collar professionals drawn to comfortable homes and apartments within a manageable commute to downtown jobs, restaurants, and entertainment.

09. Big Fish, Small Pond – Older, upper-class, college-educated professionals, the members of Big Fish, Small Pond are often among the leading citizens of their small-town communities. These upscale, empty-nesting couples enjoy the trappings of success, including belonging to country clubs, maintaining large investment portfolios, and spending freely on computer technology.

10. Second City Elite – There's money to be found in the nation's smaller cities, and you're most likely to find it in Second City Elite. The residents of these satellite cities tend to be prosperous professionals who decorate their homes with multiple computers, large-screen TV sets, and an impressive collection of wines. With more than half holding college degrees, Second City Elite residents enjoy cultural activities--from reading books to attending theater and dance productions.

11. God's Country – When city dwellers and suburbanites began moving to the country in the 1970s, God's Country emerged as the most affluent of the nation's exurban lifestyles. Today, wealthier communities exist in the hinterlands, but God's Country remains a haven for upscale couples in spacious homes. Typically college educated Baby Boomers, these Americans try to maintain a balanced lifestyle between high-power jobs and laid-back leisure.

12. Brite Lites, Li'l City – Not all of America's chic sophisticates live in major metros. Brite Lights, Li'l City is a group of well-off, middle-aged couples settled in the nation's satellite cities. Residents of these typical DINK (double income, no kids) households have college educations, well-paying business and professional careers, and swank homes filled with the latest technology.

13. Upward Bound – More than any other segment, Upward Bound appears to be the home of those legendary Soccer Moms and Dads. In these small satellite cities, upscale families boast dual incomes, college degrees, and new split-levels and colonials. Residents of Upward Bound tend to be kid obsessed, with heavy purchases of computers, action figures, dolls, board games, bicycles, and camping equipment.

14. New Empty Nests – With their grown-up children recently out of the house, New Empty Nests is composed of upper-middle income older Americans who pursue active--and activist--lifestyles. Most residents are over 65 years old, but they show no interest in a rest-home retirement. This is the top-ranked segment for all-inclusive travel packages; the favorite destination is Europe.

15. Pools & Patios – Formed during the postwar Baby Boom, Pools & Patios has evolved from a segment of young suburban families to one for older, empty-nesting couples. In these stable neighborhoods graced with backyard pools and patios--a large proportion of homes were built in the 1950s and 1960s--residents work as white-collar managers and professionals, and are now at the top of their careers.

16. Bohemian Mix – A collection of mobile urbanites, Bohemian Mix represents the nation's most liberal lifestyles. Its residents are an ethnically diverse, progressive mix of young singles, couples, and families ranging from students to professionals. In their funky row houses and apartments, Bohemian Mixers are the early adopters who are quick to check out the latest movie, nightclub, laptop, and microbrew.

17. Beltway Boomers – The members of the postwar Baby Boom are all grown up. One segment of this huge cohort--college-educated, upper-middle-class, and home-owning--is found in Beltway Boomers. Like many of their peers who married late, these Boomers are still raising children in comfortable suburban subdivisions, and they're pursuing kid-centered lifestyles.

18. Kids & Cul-de-Sacs – Upper-middle-class, suburban, married couples with children--that's the skinny on Kids & Cul-de-Sacs, an enviable lifestyle of large families in recently built subdivisions. With a high rate of Hispanic and Asian Americans, this segment is a refuge for college-educated, white-collar professionals with administrative jobs and upper-middle-class incomes. Their nexus of education, affluence, and children translates into large outlays for child-centered products and services.

19. Home Sweet Home – Widely scattered across the nation's suburbs, the residents of Home Sweet Home tend to be upper-middle-class married couples living in mid-sized homes without children. The adults in the segment, mostly under 55, have gone to college and hold professional and white-collar jobs. With their upper-middle-class incomes and small families, these folks have fashioned comfortable lifestyles, filling their homes with exercise equipment, TV sets, and pets.

20. Fast-Track Families – With their upscale incomes, numerous children, and spacious homes, Fast-Track Families are in their prime acquisition years. These middle-aged parents have the disposable income and educated sensibility to want the best for their children. They buy the latest technology with impunity: new computers, DVD players, home theater systems, and video games. They take advantage of their rustic locales by camping, boating, and fishing.

21. Gray Power – The steady rise of older, healthier Americans over the past decade has produced one important by-product: middle-class, mostly home-owning suburbanites who are aging in place rather than moving to retirement communities. Gray Power reflects this trend, a segment of older, midscale singles and couples who live in quiet comfort.

22. Young Influentials – Once known as the home of the nation's yuppies, Young Influentials reflects the fading glow of acquisitive yuppiedom. Today, the segment is a common address for middle-class singles and couples who are more preoccupied with balancing work and leisure pursuits and who live in apartment complexes surrounded by ball fields, health clubs, and casual-dining restaurants.

23. Greenbelt Sports – A segment of upscale exurban couples, Greenbelt Sports is known for its active lifestyle. Most of these older residents are married, college-educated, and own new homes. And few segments have higher rates for pursuing outdoor activities such as skiing, canoeing, backpacking, boating, and mountain biking.

24. Up-and-Comers – Up-and-Comers is a stopover for younger, upper-midscale singles before they marry, have families, and establish more deskbound lifestyles. Found in second-tier cities, these mobile adults, mostly age 25 to 44, include a disproportionate number of recent college graduates who are into athletic activities, the latest technology, and nightlife entertainment.

25. Country Casuals – There's a laid-back atmosphere in Country Casuals, a collection of older, upscale households that have started to empty-nest. Most households boast two earners who have well-paying management jobs or own small businesses. Today, these Baby-Boom couples have the disposable income to enjoy traveling, owning timeshares, and going out to eat.

26. The Cosmopolitans – Educated, upper-midscale, and ethnically diverse, The Cosmopolitans are urbane couples in America's fast-growing cities. Concentrated in a handful of metros--such as Las Vegas, Miami, and Albuquerque--these households feature older, empty-nesting homeowners. A vibrant social scene surrounds their older homes and apartments, and residents love the nightlife and enjoy leisure-intensive lifestyles.

27. Middleburg Managers – Middleburg Managers arose when empty nesters settled in satellite communities, which offered a lower cost of living and more relaxed pace. Today, segment residents tend to be middle class with solid white-collar jobs or comfortable retirements. In their older homes, they enjoy reading, playing musical instruments, indoor gardening, and refinishing furniture.

28. Traditional Times – Traditional Times is the kind of lifestyle where small-town couples nearing retirement are beginning to enjoy their first empty-nest years. Typically in their fifties and older, these upper-middle-class Americans pursue a kind of granola-and-grits lifestyle. On their coffee tables are magazines with titles like Country Living and Country Home. But they're big travelers, especially in recreational vehicles and campers.

29. American Dreams – American Dreams is a living example of how ethnically diverse the nation has become: just under half the residents are Hispanic, Asian, or African-American. In these multilingual neighborhoods, middle-aged immigrants and their children live in upper-middle-class comfort.

30. Suburban Sprawl – Suburban Sprawl is an unusual American lifestyle: a collection of midscale, older singles and couples living in the heart of suburbia. Typically members of the Baby Boom generation, they hold decent jobs, own older homes and condos, and pursue conservative versions of the American Dream. Among their favorite activities are jogging on treadmills and playing trivia games

31. Urban Achievers – Concentrated in the nation's port cities, Urban Achievers is often the first stop for up-and-coming immigrants from Asia, South America, and Europe. These young singles, couples, and families are typically college-educated and ethnically diverse: about a third are foreign-born, and even more speak a language other than English.

32. New Homesteaders – Young, upper-middle-class families seeking to escape suburban sprawl find refuge in New Homesteaders, a collection of small rustic townships filled with new ranches and Cape Cods. With decent-paying jobs in white and blue-collar industries, these dual-income couples have fashioned comfortable, child-centered lifestyles; their driveways are filled with campers and powerboats, their family rooms with PlayStations.

33. Big Sky Families – Scattered in placid towns across the American heartland, Big Sky Families is a segment of middle-aged rural families who have turned high school educations and blue-collar jobs into busy, upper-middle-class lifestyles. Residents enjoy baseball, basketball, and volleyball, as well as fishing, hunting, and horseback riding. To entertain their sprawling families, they buy virtually every piece of sporting equipment on the market.

34. White Picket Fences – Midpoint on the socioeconomic ladder, residents in White Picket Fences look a lot like the stereotypical American household of a generation ago: young, upper-middle-class, and married with children. But the current version is characterized by modest homes and ethnic diversity, including a large number of Hispanic and African-Americans households.

35. Boomtown Singles – Affordable housing, abundant entry-level jobs, and a thriving singles scene--all have given rise to the Boomtown Singles segment in fast-growing satellite cities. Single and working-class, these residents pursue active lifestyles amid sprawling apartment complexes, bars, convenience stores, and laundromats.

36. Blue-Chip Blues – Blue-Chip Blues is known as a comfortable lifestyle for ethnically-diverse, young, sprawling families with well-paying blue-collar and service jobs. The segment's aging neighborhoods feature compact, modestly priced homes surrounded by commercial centers that cater to child-filled households.

37. Mayberry-ville – Like the old Andy Griffith Show set in a quaint picturesque burg, Mayberry-ville harks back to an old-fashioned way of life. In these small towns, upper-middle-class couples like to fish and hunt during the day, and stay home and watch TV at night. With lucrative blue-collar jobs and moderately priced housing, residents use their discretionary cash to purchase boats, campers, motorcycles, and pickup trucks.

38. Simple Pleasures – With many of its residents over 65 years old, Simple Pleasures is mostly a retirement lifestyle: a neighborhood of lower-middle-class singles and couples living in modestly priced homes. Many are high school-educated seniors who held blue-collar jobs before their retirement. And a disproportionate number served in the military, so many residents are members of veterans clubs.

39. Domestic Duos – Domestic Duos represents a middle-class mix of mainly over-65 singles and married couples living in older suburban homes. With their high-school educations and fixed incomes, segment residents maintain an easy-going lifestyle. Residents like to socialize by going bowling, seeing a play, meeting at the local fraternal order, or going out to eat.

40. Close-In Couples – Close-In Couples is a group of predominantly older, ethnically diverse couples living in older homes in the urban neighborhoods of mid-sized metros. High school-educated and empty nesting, these mostly older residents typically live in older city neighborhoods, enjoying their retirements.

41. Sunset City Blues – Scattered throughout the older neighborhoods of small cities, Sunset City Blues is a segment of lower-middle-class singles and couples who have retired or are getting close to it. These empty-nesters tend to own their homes but have modest educations and incomes. They maintain a low-key lifestyle filled with newspapers and television by day, and family-style restaurants at night.

42. Red, White & Blues – The residents of Red, White & Blues typically live in exurban towns rapidly morphing into bedroom suburbs. Their streets feature new fast-food restaurants, and locals have recently celebrated the arrival of chains like Walmart, Radio Shack, and Payless Shoes. Middle-aged or older, with high school educations and midscale incomes, these folks are transitioning from blue-collar jobs to the service industry.

43. Heartlanders – America was once a land of small middle-class towns, which can still be found today among Heartlanders. This widespread segment consists of older couples with white-collar jobs living in sturdy, unpretentious homes. In these communities of small families and empty-nesting couples, Heartlanders residents pursue a rustic lifestyle where hunting and fishing remain prime leisure activities along with cooking, sewing, camping, and boating.

44. New Beginnings – Filled with young, single adults, New Beginnings is a magnet for adults in transition. Many of its residents are twentysomething singles and couples just starting out on their career paths--or starting over after recent divorces or company transfers. Ethnically diverse--with nearly half its residents Hispanic, Asian, or African-American--New Beginnings households tend to have the modest living standards typical of transient apartment dwellers.

45. Blue Highways – On maps, Blue Highways are often two-lane roads that wind through remote stretches of the American landscape. Among lifestyles, Blue Highways is the standout for midscale residents who live in isolated towns and farmsteads. Here, Boomer men like to hunt and fish, the women enjoy sewing and crafts, and everyone looks forward to going out to a country music concert.

46. Old Glories – The residents of Old Glories are the nation's downscale suburban retirees, Americans aging in place in older apartment complexes. Households in this racially-diverse segment often contain widows and widowers living on fixed incomes who tend to lead home-centered lifestyles. They're among the nation's most ardent television fans, watching game shows, soaps, talk shows, and news magazines at high rates.

47. City Startups – In City Startups, young to middle-aged, multi-ethnic singles have settled in neighborhoods filled with cheap apartments and a commercial base of cafés, bars, laundromats, and clubs that cater to twentysomethings. One of the youngest segments in America--with ten times as many college students as the national average--these neighborhoods feature low incomes and high concentrations of African-American and Hispanic households.

48. Young & Rustic – Young & Rustic is composed of middle-aged, restless singles. These folks tend to be lower-middle-income, high school-educated, and live in tiny apartments in the nation's exurban towns. With their service industry jobs and modest incomes, these folks still try to fashion fast-paced lifestyles centered on sports, cars, and dating.

49. American Classics – They may be older and retired, but the residents of American Classics are still living the American Dream of home ownership. Few segments rank higher in their percentage of home owners, and that fact alone reflects a more comfortable lifestyle for these predominantly white and African-American singles and couples with deep ties to their neighborhoods.

50. Kid Country, USA – Widely scattered throughout the nation's heartland, Kid Country, USA is a segment dominated by large families living in small towns. Ethnically diverse, these young, working-class households include homeowners, renters, and military personnel living in base housing; a little over a tenth of residents own mobile homes.

51. Shotguns & Pickups – The segment known as Shotguns & Pickups came by its moniker honestly: it scores near the top of all lifestyles for owning hunting rifles and pickup trucks. These Americans tend to be young, working-class couples with large families, living in small homes and manufactured housing. 20% of residents live in mobile homes, proportionally more than anywhere else in the nation.

52. Suburban Pioneers – Suburban Pioneers represents one of the nation's eclectic lifestyles, a mix of singles, recent divorcees, and single parents who have moved into older, inner-ring suburbs. They live in aging homes and garden-style apartment buildings, where the jobs are scarce and the money is tight. But what unites these residents--a diverse mix of Whites, Asians, Hispanics, and African-Americans--is a working-class sensibility and an appreciation for their off-the-beaten-track neighborhoods.

53. Mobility Blues – Mobility Blues is a segment of middle-age singles in working-class neighborhoods in America's satellite cities. Ethnically diverse, these transient Americans tend to have modest lifestyles due to their lower income jobs. Surveys show they excel in going to movies, playing basketball, and shooting pool.

54. Multi-Culti Mosaic – An immigrant gateway community, Multi-Culti Mosaic is the urban home for a mixed populace of Hispanic, Asian, and African-American singles and families. With nearly a quarter of the residents foreign born, this segment is a mecca for first-generation Americans who are striving to improve their lower-middle-class status.

55. Golden Ponds – Golden Ponds is mostly a retirement lifestyle, dominated by downscale singles and couples over 65 years old. Found in small bucolic towns around the country, these high school-educated seniors live in small apartments on less than $35,000 a year; more than one in five reside in a nursing home. For these elderly residents, daily life is often a succession of sedentary activities such as reading, watching TV, playing bingo, and doing craft projects.

56. Crossroads Villagers – With a population of white-collar couples and families, Crossroads Villagers is a classic rural lifestyle. Residents are high school-educated, with downscale incomes and modest housing; one-fifth live in mobile homes. And there's an air of self-reliance in these households as Crossroads Villagers help put food on the table through fishing, gardening, and hunting.

57. Old Milltowns – America's once-thriving mining and manufacturing towns have aged--as have the residents in Old Milltowns communities. Today, the majority of residents are retired singles and couples, living on downscale incomes in pre-1960 homes and apartments. For leisure, they enjoy gardening, sewing, socializing at veterans’ clubs, or eating out at casual restaurants.

58. Back Country Folks – Strewn among remote farm communities across the nation, Back Country Folks are a long way away from economic paradise. The residents tend to be poor, over 65 years old, and living in older, modest-sized homes and manufactured housing. Typically, life in this segment is a throwback to an earlier era when farming dominated the American landscape.

59. Urban Elders – For Urban Elders--a segment located in the downtown neighborhoods of such metros as New York, Chicago, Las Vegas, and Miami--life is often an economic struggle. These communities have high concentrations of Hispanics and African-Americans and tend to be downscale, with singles living in older apartment rentals

60. Park Bench Seniors – Park Bench Seniors are typically retired singles living in the racially diverse neighborhoods of the nation's satellite cities. With modest educations and incomes, these residents maintain low-key, sedentary lifestyles. Theirs is one of the top-ranked segments for TV viewing, especially daytime soaps and game shows.

61. City Roots – Found in urban neighborhoods, City Roots is a segment of downscale retirees, typically living in older homes and duplexes they've owned for years. In these ethnically diverse neighborhoods--nearly 50 percent are African-American or Hispanic--residents are often widows or widowers living on fixed incomes and maintaining low-key lifestyles.

62. Hometown Retired – These racially diverse seniors tend to live in aging homes--40% were built before 1958--and typically get by on social security and pensions. Because most never made it beyond high school and spent their working lives at blue-collar jobs, their retirements are extremely modest. These second-city dwellers spend their days on crafts and watching daytime TV.

63. Family Thrifts – The small-city cousins of inner-city districts, Family Thrifts contain young, ethnically diverse parents who have lots of children and work entry-level service jobs. In these apartment-filled neighborhoods, visitors find the streets jam-packed with babies and toddlers, tricycles and basketball hoops, Suzukis and Kias.

64. Bedrock America – Bedrock America consists of economically challenged families in small, isolated towns located throughout the nation's heartland. With modest educations, sprawling families, and service jobs, many of these residents struggle to make ends meet. One in five live in mobile homes. One in four haven't finished high school. Rich in scenery, Bedrock America is a haven for fishing, hunting, hiking, and camping.

65. Big City Blues – With a population that's more than 40 percent Latino, Big City Blues has one of the highest concentration of Hispanic-Americans in the nation. But it's also the multi-ethnic address for low-income Asian and African-American households occupying older inner-city apartments. Concentrated in a handful of major metros, these middle-aged singles and single-parent families face enormous challenges: low incomes, uncertain jobs, and modest educations.

66. Low-Rise Living – The most economically challenged urban segment, Low-Rise Living is known as a transient world for middle-aged, ethnically diverse singles and single parents. Typically, the commercial base of Mom-and-Pop stores is struggling and in need of a renaissance.

**Web Appendix A2: Type and Source of Service Failure**

|  |  |  |
| --- | --- | --- |
|  | **Service Failure Type** | **N** |
| Failure Type 1 | Late Deliveries | 5,516 |
| Failure Type 2 | Missed Deliveries | 1,158 |
| Failure Type 3 | Damaged or Wet Newspapers | 147 |
| Failure Type 4 | Delivery in the Wrong Location | 116 |
| Failure Type 5 | Continued Delivery After a Temporary Stop was Requested | 50 |
| Failure Type 6 | Issues with the Delivery of an Ancillary Product Requested Along with the Newspaper | 36 |
| Failure Type 7 | Delivery Issues After a Restart Request Following a Temporary Stop | 24 |
| Failure Type 8 | Delivery of Wrong Newspaper | 21 |
| Failure Type 9 | Wrong Delivery, Missed Delivery or Damaged Delivery of the Back Issue of the Newspaper | 17 |
| Failure Type 10 | Property Damage During Delivery | 4 |

|  |  |
| --- | --- |
| **Service Failure Source** | **N** |
| District 1 | 1,789 |
| District 2 | 1,760 |
| District 3 | 1,404 |
| District 4 | 1,128 |
| District 5 | 302 |
| District 6 | 201 |
| District 7 | 165 |
| District 8 | 126 |
| District 9 | 81 |
| District 10 | 70 |
| District 11 | 44 |
| District 12 | 13 |
| District 13 | 6 |

*Note*: Districts renamed for confidentiality purposes.

**Web Appendix A3: Robustness of the Key Results without Residual Centering**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Model 1** | | **Model 2** | |
|  | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq |
| Intercept | 15.912 | .064 | 14.494 | .000 |
| RecoveryIncentive | -1.567 | .000 | -1.493 | .000 |
| RecoveryIncentive\*FullPriceReminder | .062 | .040 | .063 | .030 |
| RecoveryIncentive\*RenewalIncentive | .005 | .000 | .005 | .000 |
| RecoveryIncentive\*TemporalDistance | .062 | .000 | .056 | .000 |
| RecoveryIncentive\*PromotionalIntensity | -.099 | .030 | -.094 | .032 |
| RecoveryIncentive\*PersonalizedAcquisition | .054 | .021 | .053 | .020 |
| RecoveryIncentive\*RelationshipLength | .000 | .758 | .000 | .852 |
| FullPriceReminder | -2.032 | .000 | -2.025 | .000 |
| RenewalIncentive | .133 | .000 | .131 | .000 |
| TemporalDistance | -.993 | .000 | -.913 | .000 |
| PromotionalIntensity | .036 | .937 | .011 | .980 |
| PersonalizedAcquisition | -.976 | .000 | -.966 | .000 |
| RelationshipLength | .000 | .900 | .000 | .836 |
| ServiceFreqPresent | .004 | .845 | .005 | .823 |
| ServiceFreqRenewal | -.072 | .001 | -.071 | .001 |
| ServiceFreqPrevious | .092 | .000 | .090 | .000 |
| RenewalDuration | -.543 | .000 | -.537 | .000 |
| Mature | 5.833 | .034 | 4.320 | .042 |
| Family | 4.557 | .092 | 3.064 | .137 |
| Urban | .637 | .614 | .634 | .613 |
| Suburban | 14.554 | .939 | NA\* | NA\* |
| Country | -8.069 | .966 | NA\* | NA\* |
| ThreatBefore | .775 | .000 | .766 | .000 |
| CPI | .255 | .000 | .253 | .000 |
| TrendScore | .001 | .616 | .001 | .628 |
| MonthTrend | -.062 | .001 | -.062 | .001 |
| PRIZM Segments Fixed Effects | ✓ | | ✓ | |
| Failure Type Fixed Effects | ✓ | | ✓ | |
| Failure Source Fixed Effects | ✓ | | ✓ | |
| Control Function Residuals | ✓ | | ✓ | |
| Inverse Mills Ratios | ✓ | | ✓ | |
| Firth’s Bias Correction |  | | ✓ | |
| AIC | 5,341 | | 4,971 | |
| -2 Log Likelihood Ratio | 5,121 | | 4,751 | |
| N | 6,919 | | 6,919 | |

*Note*: \* NA – The SAS procedure could not estimate these values due to issues with quasi-complete separation between these variables and the fixed effects.

**Web Appendix A4: Robustness of the Key Results with Firth’s Penalized Likelihood**

|  |  |  |
| --- | --- | --- |
|  | Estimate | Pr > ChiSq |
| Intercept | 8.135 | .002 |
| RecoveryIncentive | -.811 | .000 |
| RecoveryIncentive\*FullPriceReminder | .063 | .029 |
| RecoveryIncentive\*RenewalIncentive | .005 | .000 |
| RecoveryIncentive\*TemporalDistance | .056 | .000 |
| RecoveryIncentive\*PromotionalIntensity | -.094 | .033 |
| RecoveryIncentive\*PersonalizedAcquisition | .053 | .020 |
| RecoveryIncentive\*RelationshipLength | .000 | .851 |
| FullPriceReminder | -1.490 | .000 |
| RenewalIncentive | .170 | .000 |
| TemporalDistance | -.408 | .000 |
| PersonalizedAcquisition | -.505 | .000 |
| PromotionalIntensity | -.732 | .001 |
| RelationshipLength | .000 | .402 |
| ServiceFreqPresent | .005 | .824 |
| ServiceFreqRenewal | -.071 | .001 |
| ServiceFreqPrevious | .090 | .000 |
| RenewalDuration | -.537 | .000 |
| Mature | 4.325 | .042 |
| Family | 3.068 | .137 |
| Urban | .635 | .613 |
| Suburban | NA\* | NA\* |
| Country | NA\* | NA\* |
| ThreatBefore | .766 | .000 |
| CPI | .253 | .000 |
| TrendScore | .001 | .627 |
| MonthTrend | -.062 | .001 |
| PRIZM Segments Fixed Effects | ✓ | |
| Failure Type Fixed Effects | ✓ | |
| Failure Source Fixed Effects | ✓ | |
| Control Function Residuals | ✓ | |
| Inverse Mills Ratios | ✓ | |
| Firth’s Bias Correction | ✓ | |
| AIC | 4,971 | |
| -2 Log Likelihood Ratio | 4,751 | |
| N | 6,919 | |

*Note*: \* NA – The SAS procedure could not estimate these values due to issues with quasi-complete separation between these variables and the fixed effects.

**Web Appendix A5: Robustness of the Key Results with Zip Code Fixed Effects**

|  |  |  |
| --- | --- | --- |
|  | Estimate | Pr > ChiSq |
| Intercept | 12.863 | .602 |
| RecoveryIncentive | -.864 | .000 |
| RecoveryIncentive\*FullPriceReminder | .069 | .024 |
| RecoveryIncentive\*RenewalIncentive | .005 | .000 |
| RecoveryIncentive\*TemporalDistance | .058 | .000 |
| RecoveryIncentive\*PromotionalIntensity | -.091 | .063 |
| RecoveryIncentive\*PersonalizedAcquisition | .056 | .020 |
| RecoveryIncentive\*RelationshipLength | .000 | .638 |
| FullPriceReminder | -1.502 | .000 |
| RenewalIncentive | .176 | .000 |
| TemporalDistance | -.443 | .000 |
| PromotionalIntensity | -.767 | .002 |
| PersonalizedAcquisition | -.545 | .000 |
| RelationshipLength | .000 | .850 |
| ServiceFreqPresent | .010 | .638 |
| ServiceFreqRenewal | -.076 | .001 |
| ServiceFreqPrevious | .091 | .000 |
| RenewalDuration | -.551 | .000 |
| Mature | 5.909 | .071 |
| Family | 4.528 | .163 |
| Urban | 1.989 | .214 |
| Suburban | 14.196 | .941 |
| Country | -7.330 | .969 |
| ThreatBefore | .710 | .000 |
| CPI | .251 | .001 |
| TrendScore | .001 | .612 |
| MonthTrend | -.067 | .001 |
| PRIZM Segments Fixed Effects | ✓ | |
| Failure Type Fixed Effects | ✓ | |
| Failure Source Effects | ✓ | |
| Zip Code Fixed Fixed Effects | ✓ | |
| Control Function Residuals | ✓ | |
| Inverse Mills Ratios | ✓ | |
| AIC | 5,458 | |
| -2 Log Likelihood Ratio | 4,876 | |
| N | 6,919 | |

**Web Appendix A6: Robustness of the Key Results with Recovery Discount as a Percentage of Newspaper Price**

|  |  |  |
| --- | --- | --- |
|  | Estimate | Pr > ChiSq |
| Intercept | 16.776 | .051 |
| RecoveryIncentivePercent | -1.065 | .000 |
| RecoveryIncentivePercent\*FullPriceReminder | .038 | .061 |
| RecoveryIncentivePercent\*RenewalIncentive | .003 | .000 |
| RecoveryIncentivePercent\*TemporalDistance | .050 | .000 |
| RecoveryIncentivePercent\*PromotionalIntensity | -.063 | .040 |
| RecoveryIncentivePercent\*PersonalizedAcquisition | .034 | .029 |
| RecoveryIncentivePercent\*RelationshipLength | .000 | .798 |
| FullPriceReminder | -1.672 | .000 |
| RenewalIncentive | .116 | .000 |
| TemporalDistance | -.926 | .000 |
| PromotionalIntensity | .222 | .518 |
| PersonalizedAcquisition | -.757 | .000 |
| RelationshipLength | .000 | .844 |
| ServiceFreqPresent | .019 | .369 |
| ServiceFreqRenewal | -.064 | .003 |
| ServiceFreqPrevious | .077 | .000 |
| RenewalDuration | -.472 | .000 |
| Mature | 4.787 | .096 |
| Family | 3.905 | .173 |
| Urban | .523 | .681 |
| Suburban | 14.675 | .939 |
| Country | -8.898 | .963 |
| ThreatBefore | .658 | .000 |
| CPI | .223 | .001 |
| TrendScore | .001 | .535 |
| MonthTrend | -.065 | .000 |
| PRIZM Segments Fixed Effects | ✓ | |
| Failure Type Fixed Effects | ✓ | |
| Failure Source Fixed Effects | ✓ | |
| Control Function Residuals | ✓ | |
| Inverse Mills Ratios | ✓ | |
| Firth’s Bias Correction | ✓ | |
| AIC | 5,340 | |
| -2 Log Likelihood Ratio | 5,120 | |
| N | 6,919 | |

**Web Appendix A7: The Effect of Failure Type and Failure Source on Recovery Incentives and Renewal Likelihood**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Table 4 in the Paper** | | | | | | **Table 5 in the Paper** | | | |
|  | **Model 1** | | **Model 2** | | **Model 3** | | **Model 1** | | **Model 2** | |
|  | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq |
| Failure Type 1 | -1.649 | .803 | -1.594 | .815 | -1.685 | .803 | .077 | .829 | 1.626 | .281 |
| Failure Type 2 | -1.353 | .838 | -1.660 | .807 | -1.775 | .792 | .307 | .304 | .610 | .628 |
| Failure Type 3 | -1.325 | .842 | -1.147 | .866 | -.988 | .884 | -.205 | .483 | 1.248 | .310 |
| Failure Type 4 | -1.526 | .818 | -1.048 | .878 | -.807 | .905 | .212 | .741 | -.757 | .779 |
| Failure Type 5 | -2.160 | .745 | -2.078 | .760 | -2.468 | .715 | .279 | .798 | -6.884 | .133 |
| Failure Type 6 | -1.123 | .866 | -.553 | .935 | -.085 | .990 | .334 | .520 | -4.455 | .041 |
| Failure Type 7 | -1.478 | .824 | -1.246 | .855 | -1.109 | .870 | .212 | .650 | -2.873 | .145 |
| Failure Type 8 | -1.108 | .868 | -1.422 | .835 | -1.414 | .835 | -.071 | .898 | -3.784 | .105 |
| Failure Type 9 | 4.724 | .849 | 4.498 | .860 | 3.895 | .876 | .376 | .366 | 1.265 | .469 |
| District 1 | 8.664 | .844 | 8.454 | .855 | 9.407 | .836 | 1.216 | .518 | .462 | .953 |
| District 2 | -.851 | .817 | -1.086 | .778 | -1.386 | .715 | 1.011 | .591 | 2.188 | .782 |
| District 3 | -.843 | .818 | -1.042 | .786 | -1.313 | .729 | 1.463 | .442 | -.372 | .963 |
| District 4 | -1.068 | .771 | -1.114 | .772 | -1.402 | .712 | 2.213 | .247 | .727 | .928 |
| District 5 | -1.090 | .766 | -1.075 | .780 | -1.374 | .718 | .655 | .738 | -.464 | .955 |
| District 6 | -.671 | .855 | -1.044 | .786 | -1.296 | .733 | 2.630 | .185 | .406 | .961 |
| District 7 | -.252 | .946 | -.253 | .948 | -.093 | .981 | 1.702 | .403 | -.356 | .967 |
| District 8 | -1.199 | .747 | -.660 | .865 | -.780 | .839 | -.428 | .835 | -4.361 | .613 |
| District 9 | -.024 | .995 | .318 | .934 | .903 | .813 | 1.402 | .504 | .369 | .967 |
| District 10 | -.457 | .901 | -.387 | .920 | -.312 | .935 | -.254 | .872 | -11.199 | .093 |
| District 11 | -.935 | .800 | -.624 | .871 | -.577 | .880 | -.086 | .787 | .293 | .827 |
| District 12 | -.553 | .880 | -.605 | .875 | -.693 | .855 | .048 | .870 | .684 | .578 |

*Note*: Failure Type 10 and District 13 are omitted because they are treated as reference categories in the regression models.

**Web Appendix A8: Accounting for Potential Endogeneity in FullPriceReminder and PersonalizedAcquisition Variables**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | First Stage | | Second Stage | | First Stage | | Second Stage | |
|  | DV = FullPrice  Reminder | | DV = Conversion | | DV = Personalized  Acquisition | | DV = Conversion | |
|  | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq | Estimate | Pr > ChiSq |
| Intercept | 1.552 | .386 | 10.394 | .227 | 2.005 | .261 | 13.398 | .116 |
| ValueScore | .136 | .000 |  |  | .294 | .000 |  |  |
| RecoveryIncentive |  |  | -.851 | .000 |  |  | -.963 | .000 |
| RecoveryIncentive \* FullPriceReminder |  |  | .062 | .039 |  |  | .062 | .039 |
| RecoveryIncentive \*RenewalIncentive |  |  | .005 | .000 |  |  | .005 | .000 |
| RecoveryIncentive \*TemporalDistance |  |  | .063 | .000 |  |  | .067 | .000 |
| RecoveryIncentive \*PromotionalIntensity |  |  | -.099 | .031 |  |  | -.092 | .042 |
| RecoveryIncentive \*PersonalizedAcquisition |  |  | .053 | .022 |  |  | .052 | .026 |
| RecoveryIncentive \*RelationshipLength |  |  | .000 | .739 |  |  | .000 | .771 |
| FullPriceReminder |  |  | -1.496 | .000 |  |  | -1.405 | .000 |
| RenewalIncentive |  |  | .178 | .000 |  |  | .208 | .000 |
| TemporalDistance |  |  | -.435 | .000 |  |  | -.443 | .000 |
| PromotionalIntensity | -.484 | .000 | -.678 | .007 | -.109 | .360 | -.848 | .000 |
| PersonalizedAcquisition | .113 | .100 | -.535 | .000 |  |  | -.529 | .000 |
| RelationshipLength | .000 | .000 | .000 | .260 |  |  | .000 | .806 |
| ServiceFreqPresent |  |  | .004 | .837 |  |  | .007 | .748 |
| ServiceFreqRenewal |  |  | -.074 | .001 |  |  | -.088 | .000 |
| ServiceFreqPrevious |  |  | .092 | .000 |  |  | .094 | .000 |
| RenewalDuration |  |  | -.555 | .000 |  |  | -.610 | .000 |
| Mature | 1.607 | .490 | 5.795 | .035 | -1.138 | .546 | 6.686 | .014 |
| Family | -.383 | .841 | 4.645 | .084 | .150 | .940 | 4.750 | .072 |
| Urban | 1.333 | .447 | .501 | .695 | -.706 | .601 | .957 | .450 |
| Suburban | -1.645 | .649 | 14.657 | .939 | .904 | .774 | 14.328 | .940 |
| Country | -1.624 | .505 | -7.791 | .968 | -2.047 | .411 | -7.208 | .970 |
| ThreatBefore | -.315 | .000 | .847 | .000 |  |  | .864 | .000 |
| CPI | -.260 | .000 | .300 | .002 | -.013 | .779 | .255 | .000 |
| TrendScore | -.005 | .002 | .002 | .434 | -.003 | .098 | .002 | .432 |
| MonthTrend | .031 | .007 | -.071 | .002 | .034 | .002 | -.099 | .000 |
| PRIZM Segments Fixed Effects | ✓ | | ✓ | | ✓ | | ✓ | |
| Failure Type Fixed Effects | ✓ | | ✓ | | ✓ | | ✓ | |
| Failure Source Fixed Effects | ✓ | | ✓ | | ✓ | | ✓ | |
| Control Function Residuals |  | | ✓ | |  | | ✓ | |
| Inverse Mills Ratios |  | | ✓ | |  | | ✓ | |
| AIC | 6,824 | | 5,343 | | 7,707 | | 5,337 | |
| -2 Log Likelihood Ratio | 6,630 | | 5,121 | | 7,527 | | 5,115 | |
| N | 6,919 | | 6,919 | | 6,919 | | 6,919 | |

**Web Appendix A9: Optimizing Firm Recovery Incentives following Subscriber Threats to Quit**

***Normative Model***

To enhance the managerial use of our conceptual model, we propose an optimization framework. Our optimizer is a mathematical program that builds on the calibrated marketing-mix response model from Equation 1 in the paper to determine which promotions maximize profit following a service failure. Our optimizer aims to help firms determine whether they could select better discount depths at the time of subscriber threats to leave (T) and renewal (R), conditional on the probability of conversion. The following set of equations parsimoniously captures this objective:

|  |  |
| --- | --- |
|  | (1) |

s.t.

|  |  |
| --- | --- |
|  | (2) |
|  | (3) |
| , | (4) |

where Ci indicates whether (1) or not (0) subscriber *i* will renew her subscription. PT and PR are the price per week offered at the time of the threat and renewal. SFiT and SFiR are the observed service frequency selected by the subscriber i at the time of the threat and renewal.UCiT and UCiR are the unit costs associated with printing and delivering the newspaper at the time of the threat and renewal. SDiT and SDiR are the service duration remaining at the time of the threat and service duration selected by the subscriber at the time of renewal, respectively.

When subscribers threaten to quit, the firm can offer up to two economic incentives to motivate them to stay. The incentives constitute our optimizer’s decision variables. Specifically, the firm must decide the recovery incentive at the time of the threat (RDiT) and renewal incentive at the time of renewal (RDiR). The optimizer helps the firm identify the optimal values of these variables at which the gross profit from each subscriber in Equation 1 is maximized. Each subscriber’s gross profit is the sum of profits from the subscription following the threat (i.e., ) and renewal (i.e., ). If the subscriber does not renew (i.e., Ci = 0), the firm realizes profits only from the remainder of the subscription following the threat.

Equations 2 and 3 use the calibrated marketing-mix response model[[1]](#footnote-1) to predict a subscriber’s renewal probability conditional on the selected values of the two recovery instruments (i.e., RDiT and RDiR) and other service and subscriber characteristics. We convert the odds ratio in Equation 1 to predicted probabilities using and classify all probabilities above .75 as high for conversion (i.e., Ci = 1) and below .75 as low (i.e., Ci = 0). Note the cut-off of .75 is stricter than the standard cutoff of .50 for each individual.

Finally, when setting lower bounds on the amount and duration of promotions, our partner firm wished to give discounts of at least 2% at the time of a threat and renewal (i.e., and ). We incorporate these bounds in Equation 4.

***Model Estimation Technique***

The proposed optimizer presents a complex, multidimensional nonlinear combinatorial problem for firms in terms of managing recovery incentives. Conditional on the renewal probability predicted by the marketing-mix model, the firm must simultaneously determine RDiT and RDiR. Assuming a firm could offer a discount depth between 2% and 100% (i.e., 98 \* 100 = 9,800 possibilities), the total number of possible alternatives is more than 96 million *per subscriber* (9,800 \* 9,800). Employing a brute force technique, where the program validates each alternative per subscriber, can be time intensive and computationally expensive. We therefore resort to heuristic techniques shown to constrain the problem space by applying well-defined rules (Belloni et al. 2008). Specifically, we adopt a genetic algorithm (GA) to solve the problem. Our choice of GA is motivated by its superior ability to converge on global optimum solutions under nonlinear constraints and a multidimensional parameter space (Venkatesan, Krishnan, and Kumar 2004). Moreover, GA is widely accessible to firm managers through Excel Solver.

GA primarily involves three operations: reproduction, crossover, and mutation. While reproduction ensures certain characteristics from a generation of solutions are copied to the next, crossover ensures offspring are randomly paired to produce a new generation. Finally, mutation ensures the algorithm does not become stuck in local optima by randomly altering the solution and resulting in a non-sequential alternative search, which increases the probability of reaching global optima.

***Optimization Results***

*Setting initial values.* We use regression weights from the calibrated model in Equation 2 to predict the renewal probability for each subscriber. Per our partner firm’s practice, we set the lower bounds of the discount depth to 2%. We set the price per newspaper issue at $2.75. Using the firm’s internal accounting statements, we inferred the firm spent about 75% of revenues per issue on printing and distribution. Therefore, we set UCiT and UCiR to $2.06 (= .75 \* $2.75). To avoid overfitting, we exclude the first 30 instances of subscriber threats from our estimation sample and use them for holdout predictions.

*Establishing the baseline.* To establish the baseline for comparing optimizer solutions, we compute gross profits from observed data using Equation 2 for each subscriber in the holdout sample. We then compare the observed discounts and gross profits with the optimizer’s optimum values to determine whether the firm over- or underspent on recovery incentives (Table 6a).

*Evaluating profits under different models*. In Model 1, the optimizer is tasked with finding the optimum values of RDiT and RDiR given Equations 1 to 5. We compute the percentage deviation from the optimum values using the formula:

|  |  |
| --- | --- |
| , | (6) |

where indicates the optimum values of recovery and renewal discounts and represents the corresponding baseline value. Model 1 shows the firm under and overspent on incentives, resulting in less than optimum gross profits. Specifically, the firm underspent by about 9% on recovery incentives, and overspent by about 145% on renewal incentives. This overspending resulted in approximately 20% less gross profits than optimum.

Model 2 simulates service frequency as an additional recovery instrument at the time of a subscriber threat. When subscribers threaten to quit, the firm may also choose to increase service frequency (SFiT) from the observed rate (SFiT(observed)) as a means to remedy service failure. We thus add constraints to Model 1:

|  |  |
| --- | --- |
|  | (7) |
| . | (8) |

Equation 8 ensures frequency is capped at the maximum number of service days in a week. The results of Model 2 indicate the firm could reduce spending on recovery instruments while achieving a higher retention level. When we allow for upselling at the time of a subscriber threat, we find the firm could do so by undercutting spending on recovery incentives by about 64% and on renewal incentives by about 147%. The resulting savings would translate into an increase in gross profits by about 28%.

Model 3 simulates service frequency as an additional recovery instrument at the time of renewal. Similar to Model 2, we allow the firm to increase service frequency from the observed rate in the renewal promotion, adding the same constraints in Model 2 to Model 3.

The results of Model 3 indicate the firm can significantly reduce spending on recovery instruments while increasing gross profits and retention. When we allow for upselling at the time of renewal, we observe the firm overspent on recovery incentives by about 11% and on renewal incentives by about 175%, which resulted in approximately 25% less in gross profits than optimum. Thus, using our proposed algorithm, the firm could avoid overspending when launching recovery efforts and achieve significant increases in gross profits.

Last, it may be worthwhile to compare average lifts in profitability for the low and high levels of each moderator in our holdout sample. While all categories demonstrate a positive lift in profitability, we observe considerable heterogeneity within each moderator across low and high moderators (see Table 6b for details).

**REFERENCES**

Belloni, Alexandre, Robert Freund, Matthew Selove, and Duncan Simester (2008), “Optimizing Product Line Designs: Efficient Methods and Comparisons, *Management Science*, 54 (9), 1544-52.

Venkatesan, Rajkumar, Trichy V. Krishnan, and V. Kumar (2004), “Evolutionary Estimation of Macro-Level Diffusion Models Using Genetic Algorithms: An Alternative to Nonlinear Least Squares,” *Marketing Science*, 23 (3), 451-64.

1. It is worthwhile to note that we drop RenewalDuration from the model because RenewalDuration has been residual centered using recovery and renewal discounts, which happen to be the decision variables in our optimizer. Our framework could be modified to simultaneously residual center RenewalDuration, estimate the parameters of the predictive model (Equation 2) and then run the proposed optimizer to determine optimal level of recovery and renewal discounts. It is also important to note that equation 2 does not include fixed effects, control function residuals and inverse mills ratios for two reasons. First, majority of the fixed effects are not statistically significant and therefore, added very little explanatory power. Second, in predictive models, predictive accuracy takes precedence over directionality and significance of individual variables. Therefore, we drop IMRs and control function residuals. Our model can be easily adapted to include certain fixed effects if deemed necessary by the practitioners. [↑](#footnote-ref-1)