Study of the Impact of the Tobacco Plain Packaging Measure on Smoking Prevalence in Australia

Report of Dr. Tasneem Chipty

January 24, 2016

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I. Introduction

1. My name is Tasneem Chipty. I am a Managing Principal of Analysis Group, Inc., an economic and business consulting firm headquartered in the United States. I specialize in industrial organization – the study of how markets function, including the choices consumers make, the competitive interactions among firms, and the effect of regulation on marketplace behaviors. I also specialize in econometrics – the application of statistical methods, including regression models, to study empirically marketplace behaviors. I have served on the faculties of The Ohio State University, Brandeis University, and the Massachusetts Institute of Technology, where I taught courses in industrial organization, regulatory policy, and econometrics. I am the author or coauthor of several academic articles, published in peer-reviewed journals including the *American Economic Review* and the *Review of Economics and Statistics*, all of which use empirical methods to study consumer choice and firms' pricing decisions.

2. I have been a consultant to a variety of businesses and government agencies, including the Government of Australia, the United States Department of Justice, the United States Federal Communications Commission, and the Massachusetts Health Policy Commission. I have previously submitted testimony to the World Trade Organization, on behalf of Australia, in a series of trade disputes involving Australia's Tobacco Plain Packaging Act ("TPP Act"). As part of this work, I have studied the effects of tobacco control policies in Australia, including tobacco plain packaging, on smoking prevalence and consumption.

3. I received my Ph.D. in Economics from the Massachusetts Institute of Technology in 1993 and my B.A. degree in Economics and Mathematics from Wellesley College in 1989. A copy of my resume is attached as Appendix A. It describes my background, including education, publications, and testimony experience.

4. I have been retained by Australia's Department of Health to assess, in my capacity as an independent expert, the post-implementation evidence of the impact of plain packaging on smoking prevalence in Australia. For this purpose, I have been asked to analyze individual-level survey data, over the period January 2001 to September 2015, from Roy Morgan

Research, an independent entity that collects nationally representative information on the smoking behavior of Australians aged 14 and above.[1] These data, which span time periods both before and after plain packaging, enable me to study the early effects of plain packaging on smoking prevalence in Australia.[2]

5. I understand that the TPP Act involved replacing branded tobacco packaging with plain packaging. At the same time, Australia introduced updated and enlarged graphic health warnings on tobacco product packaging.[3] Given the timing of these changes, it is not possible to separately identify the effects of tobacco plain packaging from those of updated and enlarged graphic health warnings without making restrictive assumptions.[4] As such, my discussion of the effects of the TPP Act encompasses effects from both of these changes, to which I refer collectively as the 2012 packaging changes.

II. Summary of Opinions

6. Drawing on my training and experience as an economist and my statistical analysis of the Roy Morgan survey data, it is my opinion that the evidence is consistent with the conclusion that the TPP Act is having its intended effect. The evidence indicates clearly that the combination of plain packaging and updated and enlarged graphic health warnings is succeeding in reducing smoking prevalence. Specifically, I estimate a statistically significant decline in smoking prevalence of 0.55 percentage points over the post-implementation period, relative to what the prevalence would have been without the packaging changes. The 95 percent confidence interval around the estimated reduction in smoking prevalence is -0.095 to -1.01 percentage points. Because plain packaging is intended to deter smoking initiation, promote cessation, and deter relapse, the benefits of the packaging changes will likely grow over time.

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1 Roy Morgan Research, "Smoking Overview: Single Source," July 23, 2014 (hereinafter "RMSS Smoking Overview"), p. 2.

2 Smoking prevalence is measured using individual responses to a series of Roy Morgan survey questions asking respondents whether they now smoke factory-made cigarettes and whether they smoked any other tobacco products, like roll-your-own cigarettes, cigars, or a tobacco pipe, in the last month. See discussion in paragraph 19 below.

3 Competition and Consumer (Tobacco) Information Standard 2011, §§ 1.5 and 2.2, and Part 9, Division 4.

4 Separating the effects is complicated by the presence of an interaction effect – that is, one of the mechanisms through which plain packaging could reduce smoking is by increasing the effectiveness of graphic health warnings.

III. Timing and Objectives of Plain Packaging

7. The TPP Act went into effect nationally between October and December 2012. Manufacturers were required to manufacture only products in plain packaging by October 1, 2012, and retailers were required to sell only products in plain packaging by December 1, 2012.[5] Given the manufacturer mandate, many retailers were already stocking plain packs before December 1, 2012.[6] Thus, October and November 2012 were transition months, and the Australian market was fully converted to plain packs by December 2012.

8. As set forth in the TPP Act, its purpose was to improve public health by: (a) "discouraging people from taking up smoking, or using tobacco products" ("initiation"); (b) "encouraging people to give up smoking, and to stop using tobacco products" ("cessation"); (c) "discouraging people who have given up smoking, or who have stopped using tobacco products, from relapsing" ("relapse"); and (d) "reducing people's exposure to smoke from tobacco products."[7] Each of these targeted behaviors affects individuals' decision to smoke, and the benefits of preventing a person from smoking (or getting them to stop smoking) will be realized over the decades of that person's life.

9. Moreover, given the ways in which the TPP Act was intended to work, the policy's effects on overall smoking prevalence and tobacco consumption are likely to grow over time. This is because changes in initiation, cessation, and relapse affect only a subset of current and future smokers, and as such, their effects are slower to appear in population measures of smoking prevalence. To see this, consider a simple illustrative example in which immediately upon implementation, the policy both reduces youth initiation and increases youth cessation by 20 percent, holding everything else constant.[8] Given estimated rates of initiation and cessation based on actual data, these effects would only lead to a 0.07 percentage point decline in overall

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5 Tobacco Plain Packaging Act 2011, No. 148, §§ 2 and 31-39.

6 Consistent with this timing, there is ample evidence that many smokers in Australia were already smoking from a plain pack before December 2012. Melanie A. Wakefield, Linda Hayes, Sarah Durkin, and Ron Borland, "Introduction Effects of the Australian Plain Packaging Policy on Adult Smokers: a Cross-Sectional Study," *BMJ Open*, Vol. 3, 2013, pp. 1-4; and Michelle Scollo, Kylie Lindorff, Kerri Coomber, Megan Bayly, and Melanie Wakefield, "Standardised Packaging and New Enlarged Graphic Health Warnings for Tobacco Products in Australia – Legislative Requirements and Implementation of the Tobacco Plain Packaging Act 2011 and the Competition and Consumer (Tobacco) Information Standard, 2011," *Tobacco Control*, Vol. 24, 2015, pp. ii9-ii16 at ii14-ii15.

7 Tobacco Plain Packaging Act 2011, No. 148, § 3.

8 In this example, the only effect of the policy is to affect youth behavior. See Appendix B.

smoking prevalence one year after implementation and a larger decline of 0.18 percentage point in overall smoking prevalence three years out. These effects would be larger if the policy led to other changes like increases in adult cessation or increases in cigarette prices.

IV. Methodology: Before-After Regression Analysis of Smoking Prevalence

10. Smoking prevalence is the proportion of individuals in a population that smoke. If, for example, 17 people out of a group of 100 people smoke, smoking prevalence in the group is 17 percent (=17/100). In this case, one could say that there is a 17 percent probability that a person selected at random from the group of 100 people would be a smoker. A policy that discourages people from smoking would reduce smoking prevalence. A policy that reduces the number of smokers from 17 to 16 out of a group of 100 people could be described as reducing smoking prevalence (or equivalently as reducing the probability that a randomly selected individual from the group is a smoker) by one percentage point, from 17 percent to 16 percent.

11. To measure the effect of the packaging changes on smoking prevalence, I adopt a widely-used approach in policy analysis often referred to as "before-after" regression analysis. My analysis relates an individual's decision to smoke to a set of explanatory variables, including sociodemographic factors and controls for tobacco control policies (including the policies governing plain packaging and enlarged graphic health warnings) that are widely believed to influence individuals' decisions to smoke. There are two important features of this analysis. First, it disentangles the effects of multiple factors that may simultaneously be influencing the observed outcome. Second, it identifies the effect of the packaging changes by comparing smoking behavior before the policy to smoking behavior after. A finding that the packaging changes had a negative and statistically significant effect on smoking prevalence, controlling for changes in other factors, would provide support for the conclusion that the packaging changes are having their intended effect. Moreover, the estimation results can be used to determine what smoking prevalence would have been absent the packaging changes.

12. Regression analysis is well established in the academic literature and widely used by policymakers around the world to evaluate policy effects.[9] See Appendix C for a more detailed discussion of the multiple regression model and statistical inference.

V. Roy Morgan Data

13. My analysis relies on data from the Roy Morgan Single Source Survey ("RMSS") for the period January 2001 to September 2015. RMSS is a nationally representative, repeated cross-sectional survey that asks every month each of about 4,500 participants aged 14 and above a series of smoking-related questions, including whether the respondent smokes each of various different tobacco products (e.g., factory-made cigarettes, roll-your-own cigarettes, pipe, and cigars).[10] These data also contain a variety of demographic and socioeconomic information, including the respondent's age, gender, marital status, immigration status, educational level, employment status, income level, and state or territory of residence.

14. In selecting the time period to study, my analysis is guided by the basic principle that more data is better, unless there is good reason to exclude available data.[11] The sample design needs to satisfy two basic requirements. First, the before-period must be capable of serving as the basis for predicting what smoking prevalence would have been without the policy intervention. Second, the after-period must be capable of reflecting the impact of the policy intervention, if there is one.

15. With regard to the before-period, there are good reasons to rely on data beginning in January 2001. Over the first ten years of the sample period, the Australian market experienced a range of tobacco control policies, including the absence of the introduction of substantial

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[9] See, for example, Daniel L. Rubinfeld, "Reference Guide on Multiple Regression," *Reference Manual on Scientific Evidence*, Third Edition, Washington, D.C.: The National Academies Press, 2011, available at http://www.fjc.gov/public/pdf.nsf/lookup/SciMan3D01.pdf/$file/SciMan3D01.pdf, visited on October 25, 2015 (hereinafter "Reference Guide on Multiple Regression").

[10] To ensure a representative sample of the overall Australian population, Roy Morgan follows a rigorous sampling procedure that offers national geographic coverage and provides sample weights based on gender, age, geography, and household size. Weighting targets are sourced from the Labor Force Survey, a monthly publication of the Australian Bureau of Statistics containing population estimates by geography, age, and gender. See RMSS Smoking Overview, pp. 2, 3, and 6.

[11] See, for example, Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*, Fourth Edition, Mason, Ohio: South-Western, 2009, pp. 97-98. Moreover, as explained by Professor Rubinfeld, "As a general rule, the statistical significance of the magnitude of a regression coefficient increases as the sample size increases." (Reference Guide on Multiple Regression, p. 318.)

national tobacco control policies from January 2001 to February 2006,[12] the introduction of graphic health warnings on tobacco packaging in March 2006, and the 25 percent increase in the tobacco excise tax in April 2010. The mix of these experiences provides a reasonable basis for estimating what smoking prevalence would have been after December 2012 without the 2012 packaging changes.[13] With regard to the after-period, it is preferable to use the sample period ending in September 2015, especially given the mechanisms through which plain packaging is likely to work.

16. There are about 4,500 respondents each month, or 794,750 respondents in total, over the 177-month period from January 2001 to September 2015. There are 143 months of observational data *before* and 34 months of observational data *after* December 2012, when the packaging changes are fully implemented.

VI. Empirical Model

17. The empirical model is designed to identify the effect of the 2012 packaging changes on smoking prevalence. The dependent variable is the smoking status of each individual: it is an indicator variable that equals one if the individual is a smoker, and zero otherwise. The average of this variable across all individuals in a given month is an estimate of the smoking prevalence of the population in that month.

18. Smoking prevalence in Australia is determined by a complex array of factors, including a suite of tobacco control measures, the sociodemographic composition of the population, and cultural attitudes toward smoking.[14] To capture these effects, the explanatory variables include: (a) an indicator variable for the 2012 packaging changes; (b) indicator variables for other tobacco control policies; (c) a set of sociodemographic factors; and (d) a time

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[12] Over these years, there were a series of sub-national tobacco control policies that went into effect. *Tobacco in Australia: Facts and Issues*, Michelle Scollo and Margaret H. Winstanley, editors, Melbourne: Cancer Council Victoria, 2015 (hereinafter "Tobacco in Australia"), § A15.7, "Legislation to Ban Smoking in Public Places," available at http://www.tobaccoinaustralia.org.au/15-7-legislation, visited on January 24, 2016.

[13] Because tobacco control policies themselves can affect the trend in smoking prevalence, using a longer time period enables the estimation of a secular time trend, that is, a trend influenced by changes other than tobacco control policies. A shorter time period risks the possibility that the estimated trend will absorb some or all of the policy effects, including any effects associated with the 2012 packaging changes.

[14] See for example, Australia Bureau of Statistics, "Tobacco Smoking," 4338.0 - Profiles of Health in Australia, 2011-13, available at http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4338.0~2011-13~Main%20Features~Tobacco%20smoking~10008, visited on January 17, 2016 (hereinafter "Profiles of Health in Australia").

trend. To the extent economic theory and prior research have established relationships between these explanatory factors and smoking prevalence, they can be used to assess the reasonableness of my estimation results. In practice, one should have greater confidence in relying on predictions from a model that produces results that are consistent with theory and prior research. I describe each of these variables, including findings from prior research, in greater detail here.

A. Smoking Status

19. An individual's smoking status is determined using his or her response to a series of questions asking whether they now smoke or have smoked different tobacco products in the last month. Specifically, respondents are asked: "Do you now smoke factory-made cigarettes?" "In the last month have you smoked any roll-your-own cigarettes?" "In the last month have you smoked any cigars?" and "In the last month have you smoked a pipe?".[15] A respondent is described as a "smoker" if he or she gives an affirmative answer to any of these questions, and as a "non-smoker" otherwise (i.e., respondents who respond 'No' to all tobacco products are treated as non-smokers).

B. Policy Variables

20. The regression model controls for the introduction of various national tobacco control policies implemented by Australia over the time period studied. In principle, these policies should be associated with declines in smoking prevalence because they make smoking less desirable, by changing the attractiveness of the packaging and raising the price of smoking. There are five policy variables:

- An indicator variable for the introduction of graphic health warnings on cigarette packs in March 2006. The warnings consisted of a written message (e.g., "smoking causes lung cancer") and one of fourteen accompanying color images that were required to cover 30 percent of the front and 90 percent of the back of cigarette packaging, and 30 percent of the front and 50 percent of the back of pipe and loose tobacco packaging. These warnings replaced a smaller, text-based set of warnings dating back to 1995.[16]

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[15] RMSS Smoking Overview, p. 4.

[16] Tobacco in Australia, § A12.1.1, "History of Health Warnings in Australia," available at http://www.tobaccoinaustralia.org.au/a12-1-1-history-health-warnings, visited on January 15, 2016.

- A set of three indicator variables, one for each of the excise tax increases:[17] (a) the 25 percent increase in tobacco excise tax implemented on April 30, 2010; (b) the 12.5 percent increase in tobacco excise tax implemented on December 1, 2013; and (c) the 12.5 percent increase in tobacco excise tax implemented on September 1, 2014.[18]
- An indicator variable for the simultaneous introduction of both plain packaging and updated and enlarged graphic health warnings in 2012.[19] As I have explained above, manufacturers were required to switch to plain packages beginning October 1, 2012, and retailers were required to sell only products in plain packaging beginning December 1, 2012. Given the manufacturer mandate, many retailers were already stocking plain packs before December 1, 2012. Thus, October and November 2012 were transition months, and they belong neither in the before or after period. Thus, my preferred approach excludes the two months and measures the effect of the 2012 packaging changes using a December 2012 indicator variable. In other specifications, I retain October and November 2012 and explore alternative policy start dates.

21. Each indicator variable takes the value one for the months during which the policy was effective, and the value zero otherwise. The use of indicator variables to estimate policy effects is a methodology commonly adopted in the literature.[20] It allows the model to account for policy effects in a flexible way without imposing assumptions on how the effect of one policy compares with another policy. For example, the use of excise tax levels, instead of a series of excise tax indicator variables, imposes the assumption that the effect of tax increases on individuals' decision to smoke is proportional to the size of the tax increase.[21] To the extent that a particular tobacco control measure was effective, it should have reduced the probability that an

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17 Australian Government Department of Health, "Taxation: The History of Tobacco Excise Arrangements in Australia since 1901," May 20, 2014, available at http://www.health.gov.au/internet/main/publishing.nsf/content/tobacco-tax, visited on January 9, 2016 (hereinafter "Australia Taxation History").

18 The model does not control for the 12.5 percent increase in tobacco excise tax that was implemented on September 1, 2015 because the data sample contains only one month of data after this tax increase.

19 As explained above, graphic health warnings were further enlarged in 2012, together with the move to plain packs. As such, it is not possible to separately identify the effects of plain packaging from enlarged graphic health warnings without making restrictive assumptions.

20 See, for example, R.C. Hill, W.E. Griffith, and G.G. Judge, *Undergraduate Econometrics*, Second Edition, Hoboken, New Jersey: John Wiley & Sons, 2000, pp. 207-208.

21 Proportionality requires, for example, that the effect of a 25 percent tax increase on smoking prevalence is twice the effect of a 12.5 percent tax increase on smoking prevalence.

individual smokes or, equivalently, reduced smoking prevalence. A finding that the estimated effect associated with a particular tobacco control measure was negative and statistically different from zero would support that view.

C. Sociodemographic Characteristics

22. The regression model also controls for a set of demographic and socioeconomic characteristics available in the RMSS data that are believed to be predictive of whether or not Australians smoke. These variables include controls for:

- *Gender*. An indicator variable that equals one if the respondent is female, and zero otherwise. Prior research has shown that women are less likely to smoke than men.[22]
- *Marital status*. An indicator variable that equals one if the respondent is married, and zero otherwise. Prior research has shown that married people smoke less than unmarried people.[23]
- *Foreign-born status*. This is an indicator variable that equals one if the respondent is foreign-born, and zero otherwise. Prior research has shown that people born in countries other than Australia have different propensities to smoke than people born in Australia, possibly because of different attitudes towards smoking.[24]
- *Age*. A set of indicator variables reflecting the age group to which the respondent belongs. Prior research has indicated that older people smoke more than younger people, and that at some point, for sufficiently old people, the trend reverses.[25]

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[22] See, for example, Profiles of Health in Australia; Tobacco in Australia, § 1.3, "Prevalence of Smoking—Adults," available at http://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-3-prevalence-of-smoking-adults, visited on January 15, 2016.

[23] See, for example, Liane McDermott, Annette Dobson, and Neville Owen, "Determinants of Continuity and Change over 10 Years in Young Women's Smoking," *Addiction*, Vol. 104, 2009, pp. 478-487.

[24] See, for example, Tobacco in Australia, § 1.8, "Trends in Prevalence of Smoking by Country of Birth," available at http://www.tobaccoinaustralia.org.au/1-8-trends-in-prevalence-of-smoking-by-country-of-, visited on January 17, 2016.

[25] See, for example, Tobacco in Australia, § 1.4, "Prevalence of Smoking—Young Adults," available at http://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-4-prevalence-of-smoking-young-adults, visited on January 20, 2016; Tobacco in Australia, § 1.5, "Prevalence of Smoking—Middle Aged and Older Adults," available at http://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-5-prevalence-of-smoking-middle-aged-and-older-ad, visited on January 20, 2016; and Profiles of Health in Australia; and Pramod Adhikari and Amber Summerill, "Use of Tobacco," *1998 National Drug Strategy Household Survey: Detailed Findings*, 2000, Chapter 2, available at http://www.aihw.gov.au/publication-detail/?id=6442467215, visited on January 14, 2016.

- *Education.* A set of indicator variables reflecting the education level of the respondent. Prior research has shown that more educated people smoke less.[26]

- *Work Status*. A set of indicator variables reflecting whether the respondent works full time, works part time, is unemployed, has home duties, or does not work. Prior research has indicated that employed people smoke less than people who are not employed.[27]

- *Income.* A set of indicator variables reflecting the income bracket of the respondent. Prior research has shown that economically disadvantaged smoke more, meaning that higher income people smoke less.[28]

- *State/Territory.* A set of indicator variables reflecting the state or territory in which the respondent lived at the time of the survey. These variables control for the possibility that different norms and influences, including regional tobacco control policies, lead to different smoking prevalence across regions.

D. Time Trend

23. The regression model also includes a linear time trend that captures the effects of both a societal trend, created in part by the influence of historical tobacco control policies, and other factors that are otherwise unmeasured. To the extent there is a societal trend causing a decline in smoking prevalence or important omitted factors that vary over time, failure to include a time trend will falsely credit the packaging changes for the decline in prevalence that would have otherwise occurred anyway. It is important to recognize, however, that if they are working, the 2012 packaging changes themselves will influence the trend line. In this case, some of the policy effect will be credited to the time trend, and the estimated effect of the packaging changes beyond trend will tend to understate the policy effect.

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[26] See, for example, Mohammad Siahpush and Ron Borland, "Socio-Demographic Variations in Smoking Status Among Australian Aged ≥18: Multivariate Results from the 1995 National Health Survey," *Australian and New Zealand Journal of Public Health*, 2001, Vol. 25(5), pp. 438-442; and Tobacco in Australia, § 1.7, "Trends in the Prevalence of Smoking by Socio-Economic Status," available at http://www.tobaccoinaustralia.org.au/1-7-trends-in-the-prevalence-of-smoking-by-socioec, visited on January 15, 2016.

[27] See, for example, Australian Institute of Health and Welfare, "National Drug Strategy - Household Survey - Detailed Report," 2013, available at http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129549848, visited on January 15, 2016; and Trends in Australia, "Trends in the Prevalence of Smoking by Socio-Economic Status," Chapter 1.7, available at http://www.tobaccoinaustralia.org.au/1-7-trends-in-the-prevalence-of-smoking-by-socioec, visited on January 15, 2016.

[28] *Id*.

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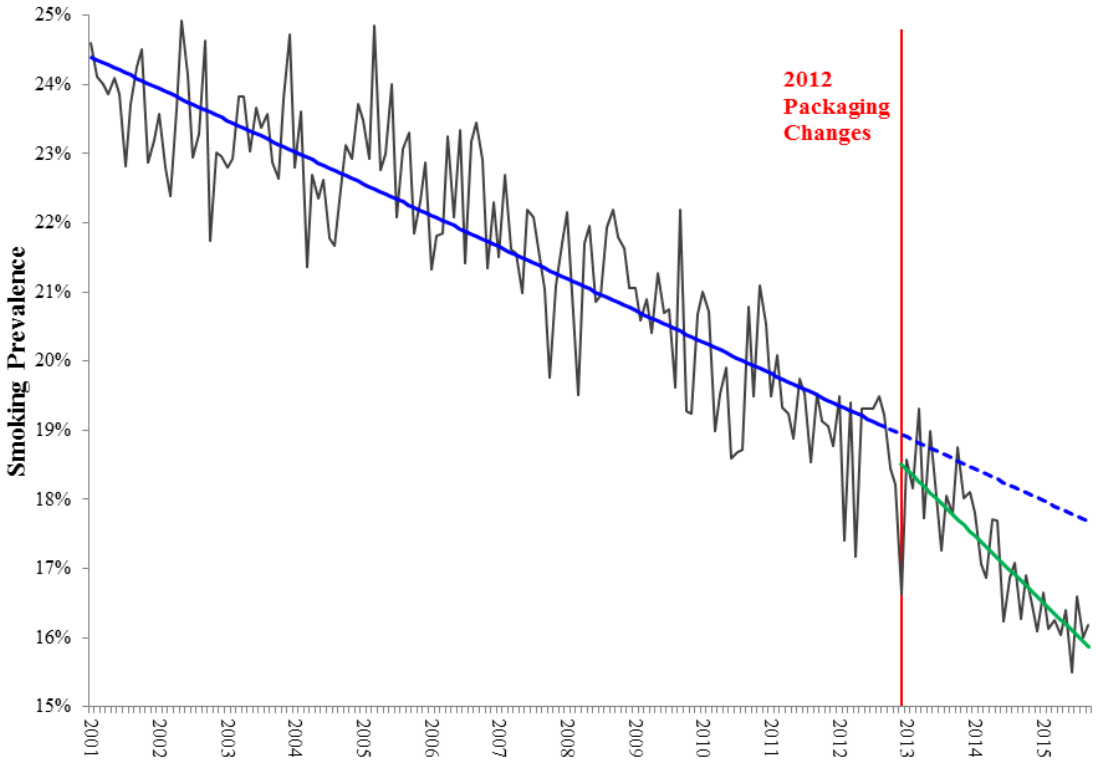
24. The regression model allows the estimation of the impact of each of the factors on an individual's probability of smoking and, as such, on population-wide smoking prevalence. The regression estimates can be used to predict what smoking prevalence would have been without the 2012 packaging changes. In this way, the analysis can shed light on whether and the extent to which the policies have had their intended effect.

VII. Descriptive Statistics

25. Figure 1 below presents a plot of the monthly overall smoking prevalence rate observed in the RMSS data, with two separate trend lines for the before and after periods. As seen in this chart, there has been an overall decline in smoking prevalence in Australia for the past fifteen years. There is also some indication that this decline in prevalence has accelerated in recent years.

Figure 1: Overall Smoking Prevalence



Note: Data are weighted using the population weights in the RMSS data.

Source: RMSS data (January 2001 – September 2015).

26. Table 1 presents the same information through a different lens. Specifically, Column (1) shows average smoking prevalence in the full sample, from January 2001 to September 2015. To provide more recent context, Columns (2) and (3) show average smoking prevalence in a symmetric 34-month period before and after the 2012 packaging changes, excluding October and November 2012, for reasons I explain above. As seen in this table, smoking prevalence declined by 2.2 percentage points, from an average of 19.4 percent in the 34 months before September 2012 to 17.2 percent in the 34 months after December 2012. One can use the predictions of the regression model to evaluate how much of this decline is due to the 2012 packaging changes.

Table 1: Average Smoking Prevalence, Before and After the Packaging Changes

Variable	**Full Period Jan 01-Sept 15**	**Before: Dec 09-Sept 12**	**After: Dec 12-Sept 15**	**Percentage Point Change**
	(1)	**(2)**	**(3)**	**(3) – (2)**
Smoking	20.6 %	19.4 %	17.2 %	-2.2***

Note: Average calculated using the sample weights provided by RMSS. Asterisks ***, **, and * indicate that the difference between the before and after periods is statistically significant at the 1, 5, and 10 percent level, respectively.

Source: RMSS Data (January 2001 – September 2015).

27. Table 2 presents the sociodemographic factors included in the model using the same approach: it shows average values in the full sample, from January 2001 to September 2015, and it shows changes over a symmetric 34-month window before and after the December 2012 packaging changes. Over this period, there are fewer married people in Australia. There are more people born outside of Australia. The population is aging, as seen by the higher fraction of people over age 65. Fewer people are employed full time, and people are more affluent. Thus, determining the extent to which the packaging changes have caused smoking prevalence to decline requires controlling for changes in the sociodemographic factors (and other policy changes), because some of these changes can also cause reductions in smoking prevalence and some can mask them.

Table 2: Mean Values of Demographic Variables, Before and After the Packaging Changes

Variable	Full Period Jan 01-Sept 15	Before: Dec 09-Sept 12	After: Dec 12-Sept 15	Percentage Points Change
	(1)	(2)	(3)	(3) – (2)
Female	50.7 %	50.6 %	50.7 %	0.0
Married	71.5 %	71.4 %	71.1 %	-0.3
Foreign Born	27.2 %	28.8 %	29.6 %	0.8***
Age				
14-24	18.5 %	18.4 %	17.6 %	-0.8***
25-64	65.4 %	64.9 %	64.5 %	-0.3
Over 65	16.1 %	16.7 %	17.8 %	1.1***
Education				
Tertiary	43.0 %	45.9 %	50.6 %	4.7***
Less than High School	38.3 %	35.1 %	30.5 %	-4.6***
Work Status				
Employed Full Time	40.0 %	40.4 %	39.2 %	-1.2***
Income				
Less than $45,000	70.0 %	65.1 %	62.6 %	-2.5***
$45,000-$100,000	23.6 %	26.7 %	27.4 %	0.6***
More than $100,000	6.3 %	8.1 %	10.0 %	1.9***

Note: Averages calculated using the sample weights provided by RMSS. Notice that, due to rounding, calculations based on displayed precision may not replicate the numbers presented. Asterisks ***, **, and * indicate that the difference between the before and after periods is statistically significant at the 1, 5, and 10 percent level, respectively. For ease of display the categorical variables have been aggregated, but they are available with much more precision than shown. Specifically: (a) the Age variable is available for 12 segments (age 14-17, age 18-19, age in 4 year increments from 20 to 64, and age over 64); (b) the Education variable is available for 4 segments (Tertiary, High School, Grade 10/11/Trade, Less Education); (c) the Work Status variable is available for 5 segments (Employed Full Time, Employed Part Time, Unemployed, Home Duties, Other/No Work); and the Income variable is available for 19 segments (income < $6,000, income between $6,000 and under $10,000, increments of $5,000 up to $50,000, increments of $10,000 up to $130,000, and over $130,000). The regression analysis uses the more disaggregated categorical variable descriptions. A complete list of the variables included in the regression analysis is presented in Appendix D.

Source: RMSS Data (January 2001 – September 2015).

VIII. Regression Results

28. Table 3 presents a summary of the regression results. For conciseness, the table shows the estimated "coefficient" of only the 2012 packaging changes (e.g., -0.0237), along with p-values (e.g., 0.017) that describe the significance level at which the estimated coefficients are

statistically different from zero.[29] A negative coefficient estimate indicates that the policy has reduced smoking prevalence. For the other explanatory variables or groups of variables, the table indicates whether each of their estimated effects is statistically significant at conventional thresholds (displayed by asterisks). The full set of results, including all coefficient estimates, is shown in Appendix D.

29. The table columns present results associated with different constructions of the before and after periods. As previously explained, because October and November are transition months in which some smokers had plain packs while others did not, those months do not properly belong in either the before or the after period. Column (1) presents the results of clean before and after periods by excluding October and November 2012 from the analysis. As a robustness check, Columns (2) to (4) present results based on the December, November, and October policy start dates, using data from the entire sample period. These alternative analyses retain data from the months of October and November 2012, and include them in either the after-period or the before-period, though neither belongs completely in the one or the other.

30. The results show that the 2012 packaging changes are associated with a statistically significant decline in smoking prevalence in all constructions of the before and after periods. All of the estimated coefficients are *negative* and *statistically different from zero* at the 2.9 percent significance level or lower. The estimated coefficient in the preferred model, shown in Column (1), is -0.0237, and it is statistically significant at the 1.7 percent significance level. These results support the conclusion that the 2012 packaging changes have reduced smoking prevalence beyond trend, over the period December 2012 to September 2015, relative to what prevalence would have been otherwise.

[29] The p-value is the minimum significance level at which the estimated coefficient is statistically different from zero. For example, a coefficient with a p-value value of 0.10 is statistically different from zero at the 10 percent significance level. Similarly, a coefficient with a p-value of 0.017 is statistically different from zero at the 1.7 percent significance level. There is no bright line in deciding when something is statistically different from zero. As a general matter, the smaller the p-value, the more confident one can be that the true parameter is different from zero. As a practical matter, many economists begin to recognize statistical significance for p-values less than 0.10.

Table 3: Summary Estimation Results Using Individual-Level RMSS Data, January 2001 to September 2015

	Start Date for Packaging Changes:			
	Dec 2012, Excluding Oct and Nov 2012	Dec 2012	Nov 2012	Oct 2012
	(1)	(2)	(3)	(4)
2012 Packaging Changes	-0.0237** (0.017)	-0.0215** (0.029)	-0.0232** (0.016)	-0.0239** (0.011)
Excise Tax 2010	YES***	YES***	YES***	YES***
Excise Tax 2013	YES*	YES*	YES*	YES*
Excise Tax 2014	YES*	YES*	YES*	YES*
GHW 2006	YES	YES	YES	YES
Time Trend	YES*	YES*	YES**	YES*
Female	YES***	YES***	YES***	YES***
Married	YES***	YES***	YES***	YES***
Foreign	YES***	YES***	YES***	YES***
Age Groups	YES***	YES***	YES***	YES***
Education Groups	YES***	YES***	YES***	YES***
Work Status	YES***	YES***	YES***	YES***
Income Groups	YES***	YES***	YES***	YES***
State/Territory Indicators	YES***	YES***	YES***	YES***
Constant	YES***	YES***	YES***	YES***
Observations	786,518	794,750	794,750	794,750

Notes: P-values are reported in parentheses. Asterisks ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level, respectively. "YES" indicates that the variable or group of variables is included in the regression model.

Source: RMSS Data (January 2001 - September 2015).

31. To interpret the magnitude of the estimated effect of the 2012 packaging changes, I translated the estimated coefficients shown in Table 3 to reflect the implied percentage point reduction in smoking prevalence attributable to the packaging changes.[30] These calculations are

[30] The translation is required because the coefficient estimates are derived from a probit model. In the probit model, the *sign* of the effect of an explanatory variable (such as the indicator variable for the 2012 packaging changes) is determined solely by the *sign* of its coefficient. However, the *magnitude* of the effect on the change in smoking prevalence – controlling for all other explanatory variables – depends on a complicated function of *all* explanatory variables included in the regression model. D.N. Gujarati, *Basic Econometrics*, Fourth Edition, New York, New York: McGraw Hill, 2004 (hereinafter "Gujarati (2004)"), pp. 613-614; and J.M. Woolridge, *Econometric Analysis of Cross Section and Panel Data*, Cambridge, Massachusetts: MIT Press, 2002 (hereinafter Woolridge (2002)"), pp. 458-459.

shown in Table 4. For this purpose, I compare the model's prediction of average smoking prevalence during the post-policy period (December 2012 to September 2015) in the actual world with the 2012 packaging changes *to* the model's prediction of average smoking prevalence during the post-policy period in a counterfactual world without packaging changes.[31] In each instance, smoking prevalence is calculated as the average of the predicted smoking probabilities across all individuals in the post-policy period.

Table 4: Predicted Effects of the 2012 Packaging Changes on Smoking Prevalence, December 2012 to September 2015

	Start Date for Packaging Changes:			
	Dec 2012, Excluding Oct and Nov 2012	**Dec 2012**	**Nov 2012**	**Oct 2012**
	(1)	**(2)**	**(3)**	**(4)**
Smoking Prevalence *With Packaging Changes*	17.21%	17.21%	17.21%	17.21%
Smoking Prevalence *Without Packaging Changes*	17.77%	17.71%	17.75%	17.77%
Change	-0.55	-0.50	-0.54	-0.56
P-value	0.02	0.03	0.02	0.01
95% Confidence Interval	[-1.01; -0.095]	[-0.954; -0.050]	[-0.984; -0.099]	[-0.992; -0.126]

Note: Due to rounding, calculations based on displayed precision may not replicate the numbers presented.

Source: Table 3.

32. My discussion focuses on the predicted effects associated with the estimation results of Column (1) of Table 3, with estimated coefficient of -0.0237. As seen in Tables 1 and 4, actual and predicted smoking prevalence in the post-implementation period are about 17.21 percent. The model predicts that smoking prevalence in the counterfactual world without the

[31] To calculate the former, I use the model estimates to predict smoking probabilities for all individuals in the post-policy sample, given actual tobacco control policies (including the 2012 packaging changes), sociodemographic mix of the Australian population, and general trend. To calculate the latter, I do the same except that I set the indicator variable for the 2012 packaging changes to zero. The effect of this change in the 2012 packaging change indicator is to undo the effect of the packaging changes.

2012 packaging changes would have been about 17.77 percent. Thus, the model indicates that the effect of the 2012 packaging changes has been to reduce smoking prevalence by approximately 0.55 percentage points, the difference between predicted actual and predicted counterfactual prevalence estimates.[32] The 95 percent confidence interval around this estimate ranges from -1.01 percentage points to -0.095 percentage points, indicating high confidence that my estimated impact of the 2012 packaging changes is statistically different from zero.

33. Put differently, as shown in Table 1 smoking prevalence in Australia declined from an average of 19.4 percent in the 34 months before the 2012 packaging changes to an average of 17.2 percent in the 34 months after the 2012 packaging changes. Without the 2012 packaging changes, the model predicts that smoking prevalence would have still declined, but only to 17.77 percent. Thus, the packaging changes should be credited with about 0.55 percentage points (or about 25 percent) of the 2.2 percentage points of actual decline over this period. Similar effects are seen across all of the specifications shown in Table 4.

34. A detailed look at the full set of results (presented in Appendix D) shows that the vast majority of other explanatory variables included in the regression model are statistically significant and have the expected signs, meaning that the estimated effects are directionally consistent with prior research. For example, excise tax policies are all associated with declines in smoking prevalence. The largest tax effect, both in terms of magnitude and statistical significance, is associated with the tax increase in April 2010, which was the first and largest excise tax increase during this period. In addition, as expected, the model finds that: (a) married people are less likely to smoke than unmarried people; (b) employed people are less likely to smoke than unemployed people; and (c) educated people are less likely to smoke than uneducated people. Each of these effects is statistically significant at conventional thresholds. The model is not able to measure a statistically significant effect of the 2006 graphic health warnings.[33]

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[32] Note, the difference between 0.55 percentage points and 0.56 percentage points, based on a difference between 17.77 percent and 17.21 percent, is due to rounding. The actual difference is 0.55 percentage points.

[33] This inability to measure an effect is despite the fact that smoking prevalence appears to have declined relatively rapidly in the neighborhood of the policy change, as seen in Figure 1. However, as I have explained, the inclusion of a trend line can mask policy effects. In this case, the policy effect may be entirely absorbed in the trend line, in which case it would be impossible to separately estimate the policy effect and the trend.

35. Finally, to probe the robustness of the empirical finding that the 2012 packaging changes are associated with a statistically significant reduction in smoking prevalence, I explored various alternative model specifications, including:

- *Controlling for seasonality:* The literature suggests that smoking behavior varies over the course of the year due to factors such as weather and the holidays.[34] Compared to other smoking metrics such as consumption, however, I expect that smoking prevalence is less likely to be affected by seasonality because of the addictive nature of smoking. It is unlikely for smokers to switch back and forth between smoking and not smoking from month to month. Nonetheless, I control for seasonality by introducing a set of calendar month indicators to the regression model.

- *Replacing the tax policy indicator variables with excise tax amount:* As discussed previously, the use of a series of indicator variables instead of a continuous excise tax variable is a more flexible way to account for the effect of price increases on smoking prevalence without imposing the assumption that the effect of tax increases on smoking prevalence is proportional to the size of the tax increase. If the proportionality assumption holds, estimating the more restrictive model with a single variable for tax amounts may improve the precision of the estimated coefficients.[35]

- *Aggregating demographic groups*: Allowing more disaggregated demographic groups is a flexible way to account for the effect of sociodemographic characteristics on smoking prevalence, without imposing any assumption on the effects across different demographic groups (e.g., the "less than 5,000" income category versus the "5,000 to 10,000" income category). To the extent that smoking prevalence is similar across certain demographic groups, aggregating these demographic groups could improve the precision of the estimated coefficients.

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[34] See, for example, D. Momperousse, C.D. Delveno, and M.J. Lewis, "Exploring the Seasonality of Cigarette-Smoking Behaviour," *Tobacco Control*, Vol. 16(1), 2007, pp. 69-70.

[35] The more restrictive model would produce biased parameter estimates if the imposed assumption does not hold. In this case, statistical testing cannot reject the restriction that the effect of tax increases on smoking prevalence is proportional to the size of the tax increase.

- *Alternative statistical model:* Both probit and logit models are widely used in the academic literature when the dependent variable is a binary variable.[36] The two models differ in the assumption regarding the distribution of the disturbance or error term. Estimation of a logit model, instead of a probit model, therefore tests the sensitivity of my findings with respect to the distributional assumption of the disturbance term.

For each of the alternative model specifications, I find that 2012 packaging changes are associated with a statistically significant reduction in smoking prevalence. Thus, my conclusions are unchanged.

IX. Conclusion

36. The evidence shows that 2012 packaging changes are succeeding in reducing smoking prevalence beyond trend. In terms of order of magnitude, smoking prevalence is 0.55 percentage points lower over the period December 2012 to September 2015 than it would have been without the packaging changes. For reasons I have explained, this effect is likely understated and is expected to grow over time. This evidence supports the conclusion that the TPP Act is having its intended effect.

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Tasneem Chipty, Ph.D.
January 24, 2016

[36] Woolridge (2002), pp. 453-461; and Gujarati (2004), pp. 595-615.

Appendix A – Curriculum Vitae

Tasneem Chipty

Managing Principal

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Boston, MA 02199

Dr. Chipty is an expert in industrial organization, antitrust economics, and econometrics. She has advised clients on a range of competitive issues and has provided economic and econometric analyses of the impact of firms' conduct on market outcomes and the effects of government policies on consumer behavior. Dr. Chipty has studied numerous industries, including airlines, broadcast and satellite radio, cable and satellite television, healthcare, newspapers, pharmaceuticals, pulp and paper, sports, and tobacco. Dr. Chipty has submitted testimony, been deposed, and testified at trial in several litigation matters. She has appeared before the Federal Trade Commission, the Department of Justice, the World Trade Organization, the Canadian Mergers Bureau, the U.S. Copyright Board, and the Canadian Copyright Board. She is co-editor of forthcoming next edition of the American Bar Association's book *Proving Antitrust Damages*. She has published academic research on the strategic use of vertical integration for market foreclosure, the role of firm size and network effects on bilateral business negotiations, and the effects of regulations on firm behavior. Prior to joining Analysis Group, Dr. Chipty was a Vice President at Charles River Associates. She has served on the faculties of the Ohio State University, Brandeis University, and MIT, where she taught courses in antitrust and regulation, industrial organization, and econometrics. Dr. Chipty received her Ph.D. in economics from the Massachusetts Institute of Technology and her undergraduate degree in economics and mathematics from Wellesley College.

EDUCATION

Ph.D.	Economics, Massachusetts Institute of Technology
B.A.	Mathematics and Economics, with honors, Wellesley College

PROFESSIONAL EXPERIENCE

2010 – Present	Analysis Group, Inc. Boston, MA Managing Principal
1999 – 2010	Charles River Associates, Inc. Boston, MA Vice President (2005-2010) Principal (2002-2005) Senior Associate (1999-2002)
2005	Massachusetts Institute of Technology, Boston, MA Visiting Associate Professor of Economics
1997 – 1999	Brandeis University, Graduate School of International Economics and Finance, Waltham, MA Visiting Assistant Professor of Economics
1995	Osaka University, Osaka, Japan Visiting Foreign Scholar

1993 – 1999 Ohio State University, Columbus, OH
Assistant Professor of Economics

TESTIMONY EXPERIENCE

- In the Matter of: Statement of Proposed Royalties to be Collected for the Retransmission of Distant Television Signals, In Canada, for the Years 2014 to 2018, before the Canadian Copyright Board. Submitted testimony on October 2, 2015 and testified at trial on January 25-26, 2016, on behalf of Bell Canada, Cogeco Cable Inc., Rogers Communications Inc, Shaw Communications Inc., Videotron G.P., and Telus Communications Company. Attorneys: Fasken Martineau DuMoulin, LLP (Jay Kerr-Wilson).
- Challenges to Australia's Tobacco Plain Packaging Act, on behalf of Australia, in the World Trade Organization. Submitted testimony on March 9, 2015, May 31, 2015, September 14, 2015, October 26, 2015, December 8, 2015, and February 1, 2016.
- Caroline Behrend et al. v. Comcast Corporation et al., Civil Action No. 03-6604 in the United States District Court for the Eastern District of Pennsylvania. Submitted testimony on April 10, 2009, on May 6, 2009, on May 11, 2009, on August 21, 2009, September 18, 2009, May 22, 2012, and January 15, 2014; testified at deposition on May 22, 2009; testified at a class recertification hearing on October 26, 2009, on behalf of Comcast Corporation. Attorneys: Kasowitz Benson Torres & Freidman (Michael Shuster and Sheron Korpus) and Davis Polk (David Toscano and Arthur Burke).
- American Broadcasting Company Inc., et. al. v. Aereo, 12 Civ. 1543, in United States District Court in the Southern District of New York. Submitted testimony on December 20, 2013 on behalf of Aereo. Attorney: Fish and Richardson (David Hosp).
- DISH Network LLC. f/k/a Echostar Satellite LLC v. ESPN, Inc., and ESPN Classic, Inc., No. 09 CIV 6875 (JGK) (FM), in United States District Court in the Southern District of New York. Submitted testimony on July 29, 2011; testified at deposition on November 22, 2011; testified at deposition in January 2013; testified at trial February 2013 on behalf of DISH Network. Attorneys: Flemming Zulack Williamson Zauderer LLP (Dean Nyciper) and Simpson Thatcher (Barry Ostrager and Mary Kay Vyskocil).
- Echostar Satellite LLC v. ESPN, Inc., ESPN Classic, Inc., ABC Cable Networks Group, Inc., Soapnet L.L.C., and International Family Entertainment Inc., Index 08-600282 in the Supreme Court of the State of New York County of New York. Testified at deposition on June 23, 2011, on behalf of Echostar Satellite LLC. Attorneys: Flemming Zulack Williamson Zauderer LLP (Dean Nyciper).
- Casitas Municipal Water District v. United States, Case No. 05-168L in the United States Court of Federal Claims. Submitted testimony on February 25, 2010 and February 8, 2007, testified at deposition on March 10, 2010, testified at trial on October 28, 2010 on behalf of the United States. U.S. Justice Department (James Gette and Barrett Atwood).
- Royalties To Be Collected By CSI and SOCAN For the Reproduction and the Communication to the Public by Online Music Services, In Canada, of Musical or Dramaticaomusical Works, for the years 2007 to 2010, before the Canadian Copyright Board. Submitted testimony on April 29, 2010 and on June 9, 2010, and testified at trial on June 28-9, 2010, on behalf of Apple Inc., Bell Canada Enterprises Inc., Rogers Communications Inc., Telus Communications Company, and Videotron Ltd. Attorneys: Goodmans LLP for Apple Inc. (Michael Koch); and Fasken Martineau DuMoulin, LLP for the rest (Jay Kerr-Wilson).
- United States of America v. Daily Gazette Company and MediaNews Group, Inc., Civil Action No. 2:07-0329 in the United States District Court Southern District of West Virginia. Submitted testimony on September 1, 2009, on behalf of the United States. U.S. Justice Department (John Reed, Mark Merva and Norm Familant).

- In re. ASARCO LLC, et al., Case No. 05-21207 in the United States Bankruptcy Court for the Southern District of Texas, Corpus Christi Division. Submitted testimony on August 1, 2008 and testified at deposition on August 7, 2008, on behalf of Ready Mix USA, LLC. Attorneys: Baker, Donelson, Bearman, Caldwell & Berkowitz P.C. (Gary Shockley).
- SOCAN Tariff No. 16 – Royalties To Be Collected By SOCAN For the Public Performance or the Communication to the Public by Telecommunication, In Canada, of Musical or Dramaticaomusical Works, for the years 2007 to 2009, before the Canadian Copyright Board. Submitted testimony on November 30, 2007 and testified at trial in January 2008, on behalf of a consortium of Canadian background music users, including Bell ExpressVu, Chum Satellite Services, and DMX Canada. Attorneys: Fasken Martineau DuMoulin, LLP (Jay Kerr-Wilson and Aidan O'Neill).
- In the Matter of Digital Performance Right in Sound Recordings and Ephemeral Recordings for a New Subscription Service, CRB Proceeding 2005-5, before the U.S. Copyright Board. Submitted testimony on October 30, 2006 and July 24, 2007; testified at deposition on May 8, 2007; and testified at trial in June 2007, on behalf of Sirius Satellite Radio and XM Satellite Radio. Attorneys: Wiley Rein, LLP for Sirius (Bruce Joseph) and Weil, Gotshal & Manges for XM (Ralph Miller).

MERGERS AND ACQUISITIONS AND OTHER GOVERNMENT INVESTIGATIONS

Dr. Chipty has extensive experience evaluating the competitive effects of proposed transactions and has advised clients at various stages of their deals, including strategic advice in identifying targets, assistance with agency review, and analyses for post-merger contestations. She has employed economic and econometric tools to evaluate issues of market definition, critical loss analysis, direct evidence of unilateral effects, and efficiencies. She has studied the likelihood of temporary or permanent foreclosure, as part of a raising rivals cost strategy. In addition, she has assessed regulatory structures and their associated effect on competition. Examples of Dr. Chipty's work in this area include:

- Expert for the U.S. Department of Justice in its review of the One Main-Spring Leaf merger. U.S. Department of Justice, 2015 (Stephanie Fleming and Nicholas Hill).
- Coauthored a white paper, on behalf of Aeromexico, evaluating the competitive effects of airport slot allocation governing air traffic to and from Mexico City Airport, submitted to Mexico's competition authority 2015 (joint with Professor Robert Pindyck).
- Expert for Olin Corporation in its acquisition of Dow Chemical's cholor-alkali business unit, before the Federal Trade Commission, 2014-2015. Attorneys: Baker Botts (William Henry and Thomas Dillickrath).
- Expert for the Mergers Bureau of Canada in its review of Post Media's acquisition of Sun Media. Attorneys: Canadian Mergers Bureau (Steve Sansom and Nicholas Janota).
- Assisted the U.S. Department of Justice in its challenge of American Express's use of merchant restraints. Attorneys: U.S. Department of Justice (Craig Conrath and John Read).
- Advised the Massachusetts Health Policy Commission on the likely competitive impact of Partners HealthCare System's proposed acquisition of Hallmark Health System, including submitting a written statement in the HPC's Cost and Market Impact Review of the transaction, 2014. Attorneys: HPC (Karen Tseng and Kate Scarborough).
- Advised the Massachusetts Health Policy Commission on the likely competitive impact of Partners HealthCare System's proposed acquisition of South Shore Hospital, including submitting a written statement in the HPC's Cost and Market Impact Review of the transaction, 2013-2014. Attorneys: HPC (Karen Tseng and Kate Scarborough).
- Assisted Saint Alphonsus Medical Center to evaluate the competitive effects of St. Luke's Health

System's acquisition of Saltzer Medical Group, in Nampa, Idaho, 2012-2013. Attorneys: Honigman, Miller, Schwartz and Cohn (David Ettinger).

- Assisted Arris Group in its acquisition of Motorola Home business unit from Google, before the Department of Justice, 2013. Attorneys: Hogan Lovells (Logan Breed) and Troutman Sanders (Daniel Anziska).
- Coauthored a white paper, on behalf of Televisa, evaluating the competitive impact in the mobile telephone marketplace of Televisa's proposed acquisition of 50% of GSF Telecom Holdings, S.A.P.I. de C.V., which owns 100% of Grupo Iusacell, S.A. de C.V. (joint with Almudena Arcelus and David Sosa). Submitted to Mexico's competition authority, Federal Commission of Economic Competition, 2012.
- Conducted analyses and presented before staff of the FTC, in an investigation of two joint venture partners involving allegations of potentially anticompetitive conduct, 2011-2012. Attorneys: Baker Botts (Thomas Dillickrath and William Henry).
- Authored a white paper analyzing the likely effects of Steward Healthcare's acquisition of Morton Hospital, in the greater Boston area, submitted to the State Attorney General's office, June 14, 2011. Attorneys: Edwards Angell Palmer & Dodge (Patricia Sullivan).
- Evaluated the likely effects of the Southwest Airlines-Airtran merger, on behalf of the United States, Winter 2011. Attorneys: U.S. Justice Department (Michael Billiel and Oliver Richard).
- Coauthored a white paper, on behalf of Time Warner Cable, analyzing brinkmanship tactics and broadcast retransmission consent rules established by the 1992 Cable Act, submitted to the Federal Communications Commission (joint with Prof. Steven Salop, Dr. Martino DeStefano, Dr. Serge Moresi, and Dr. John Woodbury), June 3, 2010.
- Authored Federal Communication Commission Media Study #5, on behalf of the Commission, as part of it periodic review of the media ownership rules, analyzing the effects of ownership structure in broadcast radio, on program variety and advertiser and listener welfare, released June 2007.
- Coauthored a white paper analyzing bidding behavior and the potential competitive effects of the merger of Alcatel and Lucent, submitted to the Department of Justice (joint with Drs. Andrew Dick and Stanley Besen), April 28, 2006. Attorneys: Skadden, Arps, Slate Meagher & Flom LLP (James Keyte and Neal Stoll).
- Conducted and presented analysis before the Federal Trade Commission on behalf of Barr Pharmaceuticals regarding its acquisition of a hormone contraceptive product (joint with Prof. Steven Salop), Fall 2005. Attorneys: Kirkland & Ellis LLP (Mark Kovner).
- Conducted an analysis of efficiencies on behalf of Time Warner and Comcast, in their joint bid for Adelphia Communications (joint with Dr. Stanley Besen). Attorneys: Paul Weiss Rifkind Wharton & Garrison, LLP (Joseph Simons).
- Assisted NorthShore University HealthSystem (formerly Evanston Northwestern Health Corporation) with the Federal Trade Commission's post-merger investigation of the 2000 merger of Evanston Hospital and Highland Park Hospital. Attorneys: Winston & Strawn LLP (Michael Sibarium).

OTHER CONSULTING EXPERIENCE, BY TOPICAL AREA

Dr. Chipty has also provided consultation to litigation clients on matters some of which eventually settled, and she has provided business guidance to clients for strategic planning. Examples of Dr. Chipty's work in this area include:

Tobacco

- Assisted the Department of Justice, in United States v. Philip Morris et al., Civil Action No. 99- 2486, a RICO case against the major tobacco manufacturers and associations involving allegations of conspiracy to suppress information and to suppress innovation. Attorneys: U.S. Department of Justice (Steve Brody, Renee Brooker, and James Gette).
- Assisted Appalachian Oil Company, in R.J. Reynolds Tobacco Company v. Market Basket Food Stores, Inc., et al., Civil Action No. 5:05-CV-253. Attorneys: Baker, Donelson, Bearman, Caldwell & Berkowitz P.C. (Gary Shockley).
- Assisted Star Scientific, in Star Scientific, Inc. v. R.J. Reynolds Tobacco Company, Case No. AW 01-CV-1504 and AW 02-CV-2504. Attorneys: Crowell and Moring (Richard MacMillan and Kathryn Kirmayer).

Pharmaceutical and Health Care

- Advised the working groups of the Advanced Market Commitment ("AMC"), an initiative of the Gates Foundation to pilot the first AMC for the pneumococcus vaccine. The goal of this AMC is to provide appropriate market-based incentives to induce capacity investments by the major pharmaceutical companies for manufacturing sufficient vaccines for low-income countries.
- Assisted a pharmaceutical manufacturer against Medicaid reimbursement, fraud, and unfair trade practices claims brought by numerous State Attorneys General. Attorneys: O'Melveny & Meyers LLP (Steve Brody and Brian Anderson) and Baker Botts LLP (Richard Josephson).
- Advised Regional Urology, in Willis-Knighton Health System and Health Plus of Louisiana, Inc. v. Regional Urology LLC, et al., Civil No. CV02-1094-S. Attorneys: Breazeale Sachse & Wilson, LLP (Claude Reynaud).

Media and Sports

- Assisted the YES Television Network in evaluating the value to the network of carriage rights for certain New Jersey Nets games, for contract renegotiation and possible arbitration. Attorneys: Boies Schiller & Flexner, LLP (Robert Dwyer).
- Assisted the Monte Carlo Tennis Tournament, in a dispute with the ATP Tour, alleging abuse of market power. Attorneys: Sidley Austin LLP (Alan Unger).
- Assisted a team of the National Football League, in a dispute with a cable operator, alleging vertical foreclosure. Attorneys: Boies Schiller & Flexner, LLP (Robert Dwyer).
- Assisted Major League Baseball in Major League Baseball Properties, Inc. v. Salvino, involving a challenge to the league's use of centralized trademark licensing. Attorneys: Foley & Lardner LLP (Jim Mckeown).
- Advised HBO on reasonable fees for music performance rights in their negotiation with BMI. Attorney: Cravath, Swaine & Moore LLP (Kenneth Lee).
- Advised XM Satellite Radio on reasonable fees for music performance rights for business negotiations. Attorneys: Shaw Pittman LLP (Cynthia Greer).

ECONOMETRICS AND STATISTICS

Dr. Chipty is an expert in the area of statistics and econometrics and has been successful at using econometric arguments both to construct affirmative arguments in litigation as well as to evaluate the use

of econometrics by opposing experts. Many of the projects described above used econometric analysis. Other examples of Dr. Chipty's work in this area are described below:

- Submitted a white paper to the European Commission, DG Competition Bureau, on behalf of the European Liner Affairs Association, analyzing the impact of shipping conferences on carriers' ability to collude on prices (joint with Professor Fiona Scott Morton and Mr. Nils Von Hinten-Reed).
- Developed analyses and drafted a report on behalf of defendants in the In Re: Monosodium Glutamate Litigation in support of a defendants' motion to dismiss plaintiff's expert testimony based upon improper use of econometrics. Attorneys: Dorsey & Whitney LLP (Michael Lindsay) and Haynes & Boone LLP (Ronald Breaux).
- Used advanced statistical techniques along with a large volume of administrative data, on behalf of United Parcel Service, to evaluate the Postal Service's expert testimony on variable costs. Attorneys: Piper & Marbury LLP (John McKeever).
- Evaluated and criticized the econometric testimony of a defendants' expert, on behalf of a generic pharmaceuticals firm alleging vertical foreclosure and unlawful delay of entry. Attorneys: Solomon Zauderer (Colin Underwood).

TRISTATE RESEARCH PARTNERSHIP

Dr. Chipty was a member of the research team from 1997-1999 in this Department of Health and Human Resources funded collaboration that included the states of Massachusetts, Alabama, and Florida. Dr. Chipty worked with state governments to design research experiments, develop econometric models, and process large administrative databases, in an effort to understand the structure, administration, and impact of minimum standards regulations.

- "The Black-White Wage Gap in the Deep South: Location, Location, Location?" (with Ann Dryden Witte), Working Paper 98-03, Tri-State Child Care Research Partnership, Miami, FL.
- "Employment Patterns of Workers Receiving Subsidized Child Care: A Study of Eight Counties in Alabama," (with Ann Dryden Witte), Available from Margie Curry, Executive Director, Childcare Resources, 1904 First Ave. North, Birmingham, AL 35203-4006.
- "Parents Receiving Subsidized Child Care: A Study of Alabama's Labor Force," (with Ann Dryden Witte), Working Paper 98-01, Tri-State Child Care Research Partnership, Miami, FL.
- "Employment of Parents Receiving Subsidized Child Care in Dade County, Florida," (with Harriet Griesinger and Ann Dryden Witte), Working Paper 98-03, Department of Economics, Wellesley College, Wellesley MA 02481.

SELECTED PAPERS AND PRESENTATIONS

Published Articles

"US: Economics" (with Michael Chapman), Global Competition Review, The Antitrust Review of the Americas 2016, available at: http://globalcompetitionreview.com/reviews/74/sections/275/chapters/2983/us-economics/.

"Economists' Perspective on the Efficiency Defense in Provider Consolidations: What Works, What Doesn't Work, and What We Still Don't Know," American Health Lawyer's Association Connections Magazine, September 2015.

"Competitor Collaborations in Health Care: Understanding the Proposed ACO Antitrust Review Process," CPI Antitrust Chronicle, May 2011 (1).

"Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry," American Economic Review, Vol. 91, No. 3, June 2001, pp. 428-453.

"The Role of Buyer Size in Bilateral Bargaining: A Study of the Cable Television Industry" (with Christopher Snyder), Review of Economics and Statistics, May 1999, 81(2): 326-340.

"Economic Effects of Quality Regulations in the Daycare Industry," American Economic Review, Vol. 85, No. 2, May 1995, pp. 419-424.

"Horizontal Integration for Bargaining Power: Evidence from the Cable Television Industry," Journal of Economics and Management Strategy, Vol. 4, No. 2, Summer 1995, pp. 375-397.

"A Marginal Cost Transfer Pricing Methodology," Tax Notes, Nov. 26, 1990 (with Ann Dryden Witte, Wellesley College and NBER).

Book Reviews

The Antitrust Source, October 2007, Book Review of Michael D. Whinston, Lectures on Antitrust Economics (Cambridge, MIT Press, 2006).

The Journal of Economic Literature, June 1992, Vol. XXX, No. 2, Book Review of Frank Cowell, Cheating the Government (with Ann Dryden Witte, Wellesley College and NBER) (Cambridge, MIT Press, 1990).

Working Papers

"In a Race Against the Clock: Auctioneer Strategies and Selling Mechanisms in Live Outcry Auctions," 2014 (with Lucia Dunn and Stephen Cosslett, the Ohio State University).

"Efficient Estimation Via Moment Restrictions," (with Whitney K. Newey).

"Antidumping and Countervailing Orders: A Study of the Market for Corrosion-Resistant Steel," (with Brian L. Palmer).

"Firms' Responses to Minimum Standards Regulations: An Empirical Investigation" (with Ann Dryden Witte), NBER Working Paper # 6104.

"Effects of Information Provision in a Vertically Differentiated Market" (with Ann Dryden Witte), NBER Working Paper # 6493.

"Unintended Consequences? Welfare Reform and the Working Poor" (with Ann Dryden Witte, Magaly Queralt, and Harriet Griesinger), NBER Working Paper # 6798.

Invited Presentations

ABA Webinar: "Sports Leagues Claims After 5 Years After American Needle," 2015.

NYSBA Antitrust Class Action Program: "Comcast v. Behrend: Interpretation and Application of Comcast to Damages Issues in Class Certification," 2015.

AHLA Annual Meetings: "Antitrust and Provider Mergers and Affiliations: Competition vs. More Affordable Care?" 2015.

AHLA Webinar: “Antitrust Implications and Lessons Learned from the Ninth Circuit Decision in St. Luke’s,” 2015.

ABA Webinar: “St. Lukes: State and Federal Enforcement in Non-Reportable Program,” 2015.

NYC Bar Antitrust and Healthcare Program, 2015.

NYSBA Antitrust Law Section Annual Meetings: “Efficiencies: The Cheshire Cat of Merger Analysis,” 2014.

NYC Bar Antitrust & Trade Regulation Committee: “Approaches to Antitrust Damages,” 2014.

PROFESSIONAL SERVICE

Service to the American Bar Association

Co-editor of the ABA’s 3rd edition of Proving Antitrust Damages, 2013-.
Vice Chair of the Antitrust Practice Group of the American Health Lawyers Association, 2014-2016.
Advisory board of the Pricing Conduct Committee, 2011-2012.
Editorial comments on a chapter of the ABA’s Price Discrimination Handbook, 2011.
Plaintiffs’ expert at the ABA Mock Trial involving the issue of resale price maintenance, 2008.
Editorial comments on a chapter of the ABA’s book on Market Definition, 2008.
Contribution to the ABA’s Econometrics Legal, Practical, and Technical Issues, 2005.

MEMBERSHIPS

American Bar Association
American Economic Association

HONORS

National Science Foundation Fellowship, 1989-1992
Phi Beta Kappa, 1988

Appendix B – Masking of Root Behavior Changes in Smoking Prevalence

37. In this appendix, I provide an illustrative example of how overall prevalence can mask large effects on root behaviors such as initiation and cessation. To the extent possible, my calculation is calibrated to reflect smoking trends in 2010 – the last year before the TPP Act in which National Drug Strategy Household Survey ("NDSHS") data from the Australian Institute of Health and Welfare ("AIHW") are available – but the actual numbers are simply a tool to demonstrate the principle at work.

38. My illustrative example, as presented in Table B1 below, is constructed by considering the prevalence of daily smoking among two subgroups of the Australian population – individuals between ages 14 and 24 (youths and young adults) and individuals over age 25 (adults). I use the NDSHS data to calculate youth and young adult initiation, cessation, and daily smoking prevalence rates. For each age group, I obtain population size from the Australian Bureau of Statistics ("ABS"). I then calculate the number of daily smokers in the base year ("Year 0") for each age by multiplying the daily smoking prevalence rate from the NDSHS data and the population size from the ABS data. Finally, I calculate the number of smokers in each age group in each of the three following years, Years 1 to 3 by applying the cessation rate to the stock of smokers and initiation rate to the stock of non-smokers in the previous year.

39. Now suppose that a policy introduced in the base year reduces the initiation rate of youths and young adults by 20 percent (from 1.0 percent to 0.8 percent) and increases their cessation rate by 20 percent (from 7.6 percent to 9.2 percent), but has no other effects on other demographic subgroups. In other words, as a result of the policy, assume that fewer youths and young adults take up smoking, and more of them quit smoking. Under these assumptions, I can then re-calculate the number of smokers in each of the three following years based on the initiation and cessation rates under the policy. Comparison of the smoking prevalence rates with and without the policy shows that the policy would have reduced overall daily smoking prevalence by 0.07, 0.13, and 0.18 percentage points one year, two years, and three years after the implementation of the policy, respectively.

Table B1: Illustrative Calculation of the Policy Effect on Smoking Prevalence

	Without Policy			With Policy			Policy Effect on Overall Prevalence
	Age 14-24	**Age 25+**	**Overall**	**Age 14-24**	**Age 25+**	**Overall**	
Targeted Metrics							
Annual Initiation	1.0%	-		0.8%	-		
Annual Cessation	7.6%	6.1%		9.2%	6.1%		
Year 0							
Total Population	3,345 K	14,768 K	**18,113 K**	3,345 K	14,768 K	**18,113 K**	
Smokers	390 K	2,358 K	**2,748 K**	390 K	2,358 K	**2,748 K**	
Prevalence	11.66%	15.96%	**15.17%**	11.66%	15.96%	**15.17%**	
Year 1							
Smokers	390 K	2,215 K	**2,605 K**	378 K	2,215 K	**2,593 K**	
Prevalence	11.66%	15.00%	**14.38%**	11.31%	15.00%	**14.31%**	**-0.07%**
Year 2							
Smokers	390 K	2,080 K	**2,471 K**	368 K	2,080 K	**2,448 K**	
Prevalence	11.66%	14.09%	**13.64%**	10.99%	14.09%	**13.52%**	**-0.13%**
Year 3							
Smokers	390 K	1,954 K	**2,345 K**	358 K	1,954 K	**2,312 K**	
Prevalence	11.67%	13.23%	**12.94%**	10.70%	13.23%	**12.77%**	**-0.18%**

Note: Due to rounding, calculations based on displayed precision may not replicate exactly the numbers presented.

Sources: ABS, Australian Demographic Statistics, June 2014, Table 59, "Estimated Resident Population By Single Year Of Age Australia"; and AIHW, NDSHS Data (2010 and 2013).

Appendix C – Multiple Regression Model

40. A regression model relates a dependent variable, the outcome of interest, to a set of factors that can potentially explain the observed outcome.[37] Statisticians typically use *y* to represent the dependent variable and *x* to represent explanatory variables. In the case of multiple regression, the explanatory variables are commonly distinguished using subscripts (e.g., x_1 and x_2).The dependent variable is often expressed as a linear combination of the explanatory variables plus a disturbance or error term: $y_{it} = \beta_0 + \beta_1 x_{1,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}$, where *i* denotes the individual respondent and *t* denotes the month in which the individual was surveyed. In this equation, the β_k's are referred to as "parameters" or "coefficients." These parameters quantify the effect that a change in the associated explanatory variable has on the dependent variable and provide a measure of how much the individual factor matters, controlling for the other factors.[38] The effect of one explanatory variable on the dependent variable is measured as the partial effect of that variable, accounting for the correlation between that variable and all the variables that also may potentially affect the dependent variable.[39] In this way, the regression arithmetic uniquely organizes the information and influence of the explanatory variables. Finally, the regression model accounts for omitted factors through the disturbance term. More generally, the disturbance or error term, (denoted ε) reflects the fact that no model can perfectly predict the dependent variable.[40]

41. The model parameters are estimated using a well-known statistical technique known as probit estimation that accounts for the binary nature of the dependent variable (in this case, smoking status).[41] Here the dependent variable measures whether or not the respondent smokes: (a) it takes the value zero if the respondent is not a smoker; and (b) it takes the value one if the respondent is a smoker. The estimation procedure also produces standard errors associated

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[37] Reference Guide on Multiple Regression, pp. 181-182.

[38] *Id.*, p. 225.

[39] The regression model may have trouble disentangling the effects of the two highly correlated explanatory variables since they contain redundant information. (Reference Guide on Multiple Regression, p.197; Gujarati (2004), pp. 341-345).

[40] Reference Guide on Multiple Regression, p. 222.

[41] Wooldridge (2002), pp. 453-461; and Gujarati (2004), pp. 595-615.

with each of the estimated parameters. Standard errors measure the precision of the estimate and form the basis for hypothesis testing. In particular, one can use the parameter estimates in conjunction with the standard errors to determine p-values for the estimated coefficient. A p-value is the minimum significance level at which the estimated coefficient is statistically different from zero.

42. A finding that the estimated effect of the 2012 packaging changes is *negative* and associated with a relatively small p-value would lead to the conclusion that the 2012 packaging changes are associated with a statistically significant reduction in the probability of smoking. There is no bright line in deciding when something is statistically different from zero (i.e., whether one should insist on a particular minimum significance level). An estimate with a p-value of 0.05 is statistically different from zero at the five-percent significance level. Similarly, an estimate with a p-value of 0.06 is statistically significant at the six-percent significance level. As a general matter, the smaller the p-value, the more confident one can be that the true parameter is different from zero.

Appendix D – Full Estimation Results

	Start Date for Packaging Changes:			
	Dec 2012, Excluding Oct and Nov 2012	**Dec 2012**	**Nov 2012**	**Oct 2012**
	(1)	**(2)**	**(3)**	**(4)**
2012 Packaging Changes	-0.0237** (0.017)	-0.0215** (0.029)	-0.0232** (0.016)	-0.0239** (0.011)
Excise Tax 2010	-0.0344*** (0.000)	-0.0350*** (0.000)	-0.0347*** (0.000)	-0.0343*** (0.000)
Excise Tax 2013	-0.0218* (0.084)	-0.0215* (0.087)	-0.0212* (0.087)	-0.0215* (0.078)
Excise Tax 2014	-0.0222* (0.076)	-0.0220* (0.079)	-0.0221* (0.077)	-0.0222* (0.076)
GHW 2006	0.0023 (0.801)	0.0036 (0.691)	0.0027 (0.759)	0.0022 (0.804)
Time Trend	-0.0003* (0.052)	-0.0003** (0.034)	-0.0003** (0.045)	-0.0003* (0.053)
Female	-0.141*** (0.000)	-0.142*** (0.000)	-0.142*** (0.000)	-0.142*** (0.000)
Married	-0.167*** (0.000)	-0.167*** (0.000)	-0.167*** (0.000)	-0.167*** (0.000)
Foreign	-0.0752*** (0.000)	-0.0751*** (0.000)	-0.0751*** (0.000)	-0.0751*** (0.000)
Age Groups (Reference Category: 14 -17)				
18-19	0.714*** (0.000)	0.715*** (0.000)	0.715*** (0.000)	0.715*** (0.000)
20-24	0.991*** (0.000)	0.991*** (0.000)	0.991*** (0.000)	0.991*** (0.000)
25-29	1.096*** (0.000)	1.097*** (0.000)	1.097*** (0.000)	1.097*** (0.000)
30-34	1.083*** (0.000)	1.084*** (0.000)	1.084*** (0.000)	1.085*** (0.000)
35-39	1.050*** (0.000)	1.052*** (0.000)	1.052*** (0.000)	1.052*** (0.000)

	Start Date for Packaging Changes:			
	Dec 2012, Excluding Oct and Nov 2012	**Dec 2012**	**Nov 2012**	**Oct 2012**
	(1)	**(2)**	**(3)**	**(4)**
40-44	1.027*** (0.000)	1.029*** (0.000)	1.029*** (0.000)	1.030*** (0.000)
45-49	0.962*** (0.000)	0.964*** (0.000)	0.964*** (0.000)	0.964*** (0.000)
50-54	0.870*** (0.000)	0.872*** (0.000)	0.873*** (0.000)	0.873*** (0.000)
55-59	0.733*** (0.000)	0.736*** (0.000)	0.736*** (0.000)	0.736*** (0.000)
60-64	0.534*** (0.000)	0.536*** (0.000)	0.536*** (0.000)	0.536*** (0.000)
Over 65	0.0379*** (0.010)	0.0408*** (0.005)	0.0409*** (0.005)	0.0409*** (0.005)
Educational Groups (Reference Category: Tertiary Education)				
High School	0.365*** (0.000)	0.364*** (0.000)	0.364*** (0.000)	0.364*** (0.000)
Year 10/11/Trade	0.579*** (0.000)	0.580*** (0.000)	0.580*** (0.000)	0.580*** (0.000)
Less Education	0.538*** (0.000)	0.539*** (0.000)	0.539*** (0.000)	0.539*** (0.000)
Job Status (Reference Category: Employed Full Time)				
Employed Part Time	-0.0493*** (0.000)	-0.0493*** (0.000)	-0.0493*** (0.000)	-0.0493*** (0.000)
Unemployed	0.463*** (0.000)	0.463*** (0.000)	0.463*** (0.000)	0.463*** (0.000)
Home Duties	0.239*** (0.000)	0.242*** (0.000)	0.242*** (0.000)	0.242*** (0.000)
Other / Doesn't Work	0.139*** (0.000)	0.140*** (0.000)	0.140*** (0.000)	0.140*** (0.000)
Income Groups (Reference Category: Less than $6,000)				
$6,000-$9,999	0.338*** (0.000)	0.337*** (0.000)	0.337*** (0.000)	0.337*** (0.000)

	Start Date for Packaging Changes:			
	Dec 2012, Excluding Oct and Nov 2012	**Dec 2012**	**Nov 2012**	**Oct 2012**
	(1)	**(2)**	**(3)**	**(4)**
$10,000-$14,999	0.435*** (0.000)	0.435*** (0.000)	0.435*** (0.000)	0.435*** (0.000)
$15,000-$19,999	0.456*** (0.000)	0.456*** (0.000)	0.456*** (0.000)	0.456*** (0.000)
$20,000-$24,999	0.438*** (0.000)	0.438*** (0.000)	0.438*** (0.000)	0.438*** (0.000)
$25,000-$29,999	0.430*** (0.000)	0.430*** (0.000)	0.430*** (0.000)	0.430*** (0.000)
$30,000-$34,999	0.424*** (0.000)	0.424*** (0.000)	0.424*** (0.000)	0.424*** (0.000)
$35,000-$39,999	0.410*** (0.000)	0.412*** (0.000)	0.412*** (0.000)	0.412*** (0.000)
$40,000-$44,999	0.404*** (0.000)	0.406*** (0.000)	0.406*** (0.000)	0.406*** (0.000)
$45,000-$49,999	0.385*** (0.000)	0.387*** (0.000)	0.387*** (0.000)	0.387*** (0.000)
$50,000-$59,999	0.329*** (0.000)	0.331*** (0.000)	0.331*** (0.000)	0.331*** (0.000)
$60,000-69,999	0.303*** (0.000)	0.306*** (0.000)	0.306*** (0.000)	0.306*** (0.000)
$70,000-$79,999	0.261*** (0.000)	0.261*** (0.000)	0.261*** (0.000)	0.261*** (0.000)
$80,000-$89,999	0.211*** (0.000)	0.210*** (0.000)	0.210*** (0.000)	0.210*** (0.000)
$90,000-$99,999	0.207*** (0.000)	0.207*** (0.000)	0.207*** (0.000)	0.207*** (0.000)
$100,000-$109,999	0.192*** (0.000)	0.187*** (0.000)	0.187*** (0.000)	0.187*** (0.000)
$110,000-$119,999	0.175*** (0.000)	0.178*** (0.000)	0.178*** (0.000)	0.178*** (0.000)

	Start Date for Packaging Changes:			
	Dec 2012, Excluding Oct and Nov 2012	**Dec 2012**	**Nov 2012**	**Oct 2012**
	(1)	**(2)**	**(3)**	**(4)**
$120,000-$129,999	0.164*** (0.000)	0.163*** (0.000)	0.163*** (0.000)	0.163*** (0.000)
$130,000 or more	0.123*** (0.000)	0.120*** (0.000)	0.120*** (0.000)	0.120*** (0.000)
State/Territory (Reference Category: Victoria)				
New South Wales	-0.0356*** (0.000)	-0.0349*** (0.000)	-0.0349*** (0.000)	-0.0349*** (0.000)
Queensland	0.0281*** (0.000)	0.0277*** (0.000)	0.0277*** (0.000)	0.0277*** (0.000)
South Australia	-0.0042 (0.597)	-0.0045 (0.571)	-0.0045 (0.571)	-0.0045 (0.570)
West Australia	-0.0124 (0.102)	-0.0126* (0.096)	-0.0126* (0.096)	-0.0126* (0.096)
Tasmania	0.0342*** (0.001)	0.0349*** (0.001)	0.0348*** (0.001)	0.0348*** (0.001)
Constant	-1.893*** (0.000)	-1.884*** (0.000)	-1.892*** (0.000)	-1.896*** (0.000)
Observations	786,518	794,750	794,750	794,750
Pseudo R-squared	0.091	0.091	0.091	0.091

Notes: P-values are reported in parentheses. Asterisks ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level, respectively.

Source: RMSS Data (January 2001 - September 2015).