
TRENDS IN SMOKING
HABITS AS A
CONSEQUENCE OF A BAN
ON VISIBLE DISPLAY OF
TOBACCO PRODUCTS

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ABOUT THE AUTHOR

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WORK EXPERIENCE

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| 2002-2007 | Doctoral Scholar, Department of Economics, Norwegian School of Economics and Business Administration |
| 2003-2004 | Period at Institut d'économie industrielle, University of Toulouse |
| 1997-2002 | Adviser/senior-consultant at the Norwegian Competition Authority |
| 1996-1997 | National Service in Forsvarets Overkommando |
| 1992-1996 | Master's Degree in Economics, Department of Economics, University of Oslo |
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ACADEMIC WORKS

- “Branding News with Political Opinion” (with Frode Steen)
- “Expected Sunk Costs and Entry”
- “The Making of Illegal Cartels”

1. INTRODUCTION

This report analyses the effects of state restrictions on visible displays of tobacco products on smoking habits among young smokers. This report uses figures from Iceland and provinces in Canada because these two countries have banned displays of tobacco at service counters. In both these countries, the proportion of young smokers was on a downward trend before the ban. The question is whether a ban on displays of tobacco at the service counter can be said to have any effect on sales and in particular sales to young people above and beyond the general downturn.

The data used came from Health Canada, Statistics Canada and Statistics Iceland. It contains information on the proportion of smokers. Measurable reductions in the proportion of young smokers are basically what is wanted from an anti-smoking initiative directed at young smokers. The data is therefore relevant, although more detailed data would allow a better analysis. We are not able, for example, to control for other factors such as the smokers' characteristics, socioeconomic background and other factors that could influence the decision to smoke.

The analysis of the data for Canada and Iceland does not support the idea that the bans have led to a reduction in the proportion of young smokers. Data from Australia does not appear to be available, and therefore no empirical analysis of this has been carried out. Two surveys involving schoolchildren in Australia show, however, that the proportion of young smokers is very similar to that in Canada and that the reduction in the proportion of young smokers began three years before the ban on displays of tobacco products was introduced in Victoria. Therefore, these reports do not support the idea that a ban on displays of tobacco products produces a reduction in the proportion of young smokers either.

2. CANADA

LEGAL BACKGROUND

According to the Canadian Council for Tobacco Control, several states have introduced regulations for so-called *power walls*.¹ *Power*

¹See the website <http://www.cctc.ca/cctc/EN/bandisplays/faq>

walls are tobacco products displayed behind or beside the counter in quantities that far exceed what is necessary to serve customers (ref. images below).

Several provinces have introduced or proposed bans on displays of tobacco. The table below shows which provinces have introduced a ban and when the ban was actually enforced. Of these, only Saskatchewan and Manitoba have had the ban long enough to make it worth analysing its effect.

Province/territory	Implementation of ban	Enforcement of ban
Saskatchewan	11 March 2001	19 January 2005 ²
Manitoba	1 January 2005 ³	15 August 2005
Nunavut	1 January 2004	19 January 2005
Prince Edward Island	1 June 2006	
Ontario	31 May 2006 ⁴	
Quebec	31 May 2008	
Northwest Territories		

The picture below illustrates what a *power wall* can look like before and after the ban. The picture illustrates that *power walls* are visually more dominant than Norwegian displays.

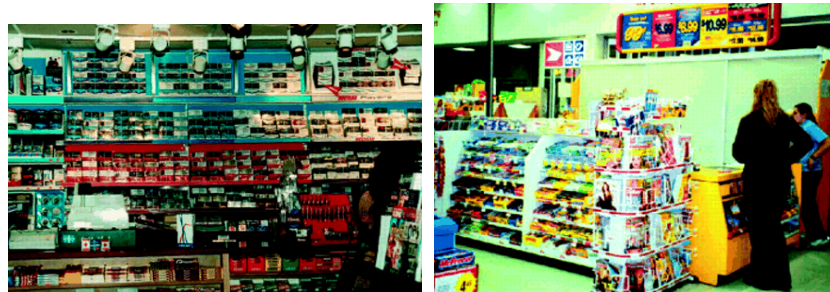


FIGURE 1: THE PICTURE ON THE LEFT SHOWS WHAT A *POWER WALL* LOOKED LIKE BEFORE THE BAN. THE PICTURE ON THE RIGHT SHOWS HOW CABINET DOORS CONCEAL THEIR CONTENTS AFTER THE BAN. SOURCE: GREAVES, "CANADA: DEMOLISHING THE POWER WALLS".

² The ban was upheld between 11 March 2001 and 3 October 2003. Between 3 October 2003 and 19 January 2005 the ban was not upheld, but around half of shops maintained the ban.

³ The law applies to shops with access to persons under age 18.

⁴ The ban is not complete, but restricts advertising around the point of sale. A complete ban will come on 31 May 2008.

DATA

Health Canada, Tobacco Control Programme has since 1999 carried out a survey of smoking habits: *Canadian Tobacco Use Monitoring Survey* (CTUMS). The survey was carried out by Statistics Canada for Health Canada and contains, among other things, data on the proportion of smokers in the lower age groups. Publicly available information from this survey is limited to the proportion of smokers, broken down into the following age classifications: persons over 15, age group 15-19, age group 20-24, age group 15-25 and persons over 25.⁵ Data is for 6-month periods and broken down to province level.⁶ We therefore have observations on the proportion of smokers in 10 provinces, of which 2 (Saskatchewan and Manitoba) introduced and enforced a ban for a limited part of the period 1999-2006.

The question is whether the changes in legislation when it comes to so-called *power walls* lead to a lower proportion of smokers among young people. It is therefore the age group 15-19 that is relevant and which is assessed in the following.

ANALYSIS

The number of young smokers showed a downward trend in Canada in the period 1999-2006 (see figure 2). The trend line shown declines by -0.84. As we have two observations per year this means that the proportion who smoke was reduced by 0.84 per cent over the six-month period.⁷-{-

⁵ It is possible that basic data may be made available by Health Canada. In that case it will probably be possible to carry out a more detailed empirical analysis.

⁶ The three territories are not included in the data, but none of them have a ban. This therefore means that we simply exclude these from the control group.

⁷ A 95% confidence interval for this estimate is a reduction of 1.00 per cent and an increase of 0.068 per cent over the six-month period.

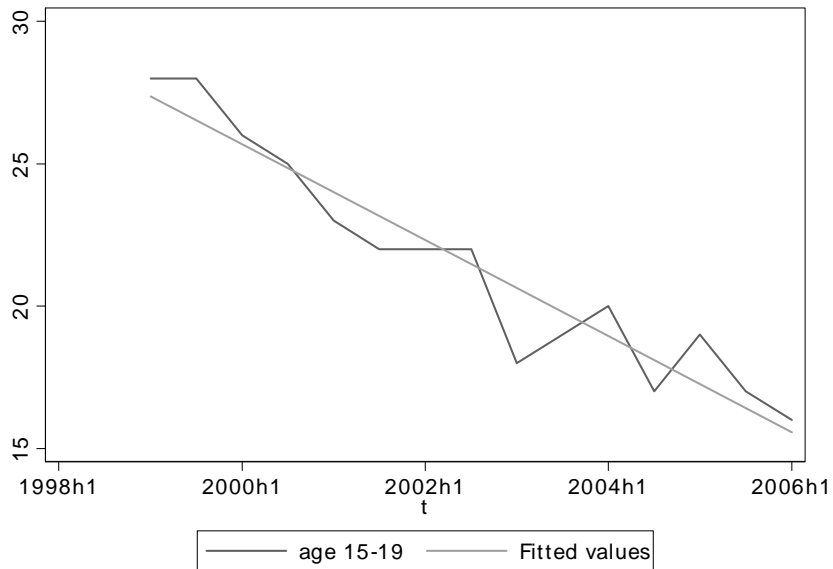


FIGURE 1: TRENDS IN USE OF TOBACCO FOR AGE GROUP 15-19, CANADA 1999-2006.

With 15 observations, the model predicts that the total reduction should be approximately 12.6 per cent. The actual reduction is 12 per cent, from a proportion of 28 in 1999 to a proportion of 16 at the start of 2006.⁸

The reason for young people in Canada smoking less and less is not obvious, but explaining why does not form part of this study. We view the negative trend as fact. Moreover, Canada is not alone in seeing this trend. Australia has also seen a reduction from around 30% to around 18% during the period from 1999 to 2005.⁹

If a ban on the visible display of tobacco products leads to a lower proportion of smokers in the 15-19 age group, one would expect that the trend in the period after the ban would be at a lower level or fall more quickly. It is not sufficient to point out that there are fewer young smokers: As figure 3 shows, all the provinces in Canada have seen a falling proportion of smokers, but only Saskatchewan and Manitoba have a ban on the display of tobacco.

⁸ As the graphs show, there is some variation in the trend. The deviation between the actual observation and the linear trend cannot be explained by the model. In this case the trend explains approximately 86% of the variation.

⁹ See *Smoking behaviours of Australian secondary students in 2005*, p. 28 [http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/E1B70590AD4EF56DCA257225000EDCE9/\\$File/mono59.pdf](http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/E1B70590AD4EF56DCA257225000EDCE9/$File/mono59.pdf)

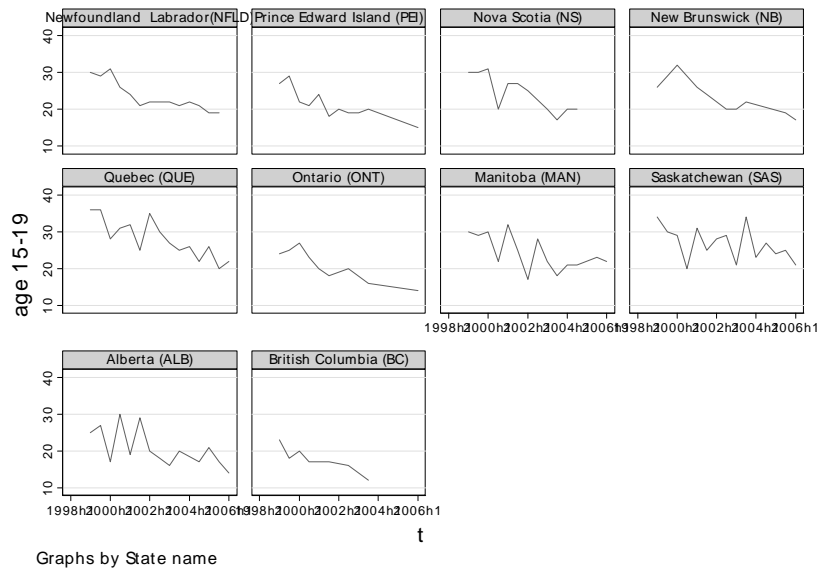


FIGURE 2: CHANGE IN THE PROPORTION OF PEOPLE SMOKING IN THE 15-19 AGE GROUP, CANADA 1999-2006.

It is possible to perform two types of analyses to analyse whether the ban has had an effect. Firstly, we can look at the trend before and after the ban in Saskatchewan. If the ban has an effect, the reduction in the proportion of smokers should change the trend or level. Secondly, we can look at the difference in the trend in the provinces with and without a ban. The advantage of looking at all the provinces is that we can see what changes provinces without a ban have experienced in the period during which Saskatchewan had a ban and thus control, for example, for the fact that the rate of change was different after 2002. The disadvantage is that this may also introduce errors if, for example, any of these provinces change the terms of sale or prices without these changes being controlled for.¹⁰

Figure 4 shows the trend for Saskatchewan. The shaded fields are the periods when the ban was enforced. The figure shows what can be proven statistically, that the periods with the ban do not differ from the periods without the ban.

¹⁰ Changes in sales terms may, for example, be legal changes, or changes to taxes and charges. But changes in competition factors, for example, a merger, can also change prices.

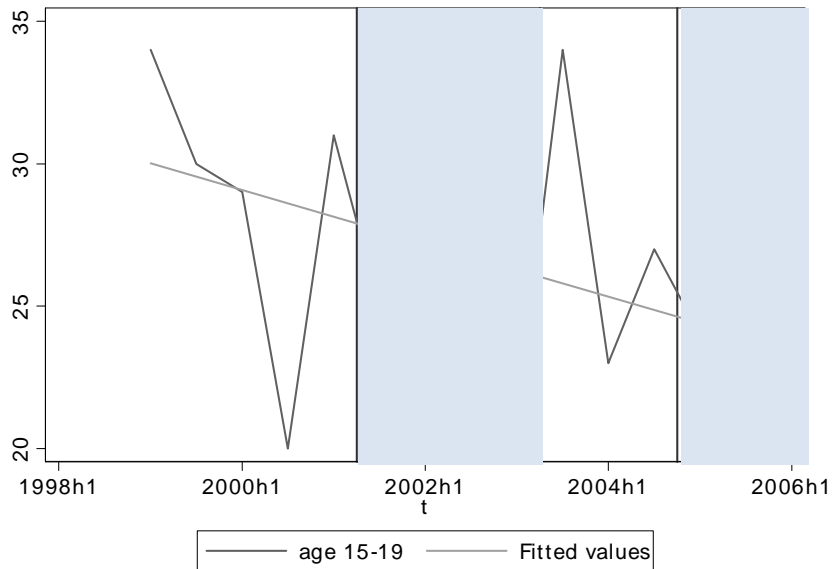


FIGURE 3: THE TREND IN SASKATCHEWAN, CANADA, HALF-YEAR DATA. THE SHADED PERIODS ARE THOSE WHEN THE BAN ON THE DISPLAY OF TOBACCO WERE ENFORCED.

In order to test if the trend or level has changed, we define three new variables. A trend variable is defined as zero for all periods before the ban and then increases by one per period. We define a variable as zero for the periods and provinces where there was no ban, and one for the periods the ban was in force, which means that the latter half of 2003 and all of 2004 are excluded for Saskatchewan. We also define a variable which includes 2004, as around half of the sales outlets continued to observe the ban during this period. While the trend variable will illustrate changes in the trend, these last two (binary) variables will illustrate changes at the points of intersection. This means that we allow the trend line to be moved up or down for the periods when the ban is in force.

The analysis uses multiple regression analysis. As we have defined the variables as deviations from the trend, the zero hypothesis has been selected according to the statistical method: We want to show that the ban has had an effect, and therefore set the zero hypothesis as the ban not having any effect. If the zero hypothesis can be rejected (statistically), we can be reasonably sure that we have a measurable effect.

The regression analysis of the trend in Saskatchewan before and after the ban shows what the figure indicates.¹¹ None of the change

¹¹ The zero hypothesis selected here is that the change in trend is identical to zero and the change in level is identical to zero. It is only possible to reject the zero hypothesis if the probability of it being true is small. We call the probability of the zero hypothesis being true the significance level. Normally, we would only reject the

variables is statistically significant and we cannot, therefore, reject the zero hypothesis that the ban has had no effect. This means that we cannot demonstrate any change in level or a change in trend during the period of the ban either. As Manitoba has also introduced a ban, it is interesting to expand the analysis to include this province. Figure 3 shows that there is some variation between the different provinces. We deal with this by assuming that the provinces have a different starting point or level.¹²

We use multiple regression analysis as above. Unlike the regression above, we now have some provinces that have not introduced a ban on the display of tobacco products. These provinces will be included to define the trend and to show that the trend in Canada after the ban flattens out.¹³ As above, variables for level changes and changes in trend are defined. These variables are, of course, only defined for the periods and provinces that have had a ban, so that any deviations from the trend can be shown.

The results of the regression analysis are shown in table 1. As expected, the trend is negative and almost identical to the estimate of -0.84 we have for Canada as a whole.¹⁴ As relatively few people smoke before they are fifteen, the reduction in this age group probably means that fewer and fewer youngsters are starting to smoke. The question is whether part of this reduction can be ascribed to the ban in Saskatchewan and Manitoba. If this is the case, it will be shown by one or more of the variables *change trend*, *level change 1* and *level change 2*.

TABLE 1: REGRESSION ANALYSIS OF THE TREND IN THE PROPORTION OF SMOKERS

	Model 1	Model 2	Model 3	Model 4	Model 5
Trend	-0.76***	-0.83***	-0.79***	-0.81***	-0.83***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
change trend		0.58**			0.38

zero hypothesis at a significance level of 10%, i.e. when there is 10% (or less) probability of the zero hypothesis being correct.

¹² There are essentially two models for panel data. One model assumes the differences are fixed. The other assumes the differences are random. Which of these models you choose does not have a major impact on the results produced, but we present results here for random level.

¹³ In principle, it is possible that there is a break in the trend in the provinces that have not introduced a ban. A trend variable will, therefore, be defined for the period after the first half of 2001 for all provinces apart from Saskatchewan. The regression analysis shows that the break in trend is not significant. We therefore reject the hypothesis that the other provinces have had a lower trend than Saskatchewan in the period after the ban.

¹⁴ The estimate for Canada is based on the total for all provinces.

		(0.21)			(0.24)
level change 1			1.78		
			(1.45)		
level change 2				3.84	1.88
				(1.99)	(2.60)
point of intersection	87.18***	92.55***	89.50***	91.25***	92.61***
	(5.47)	(5.51)	(5.56)	(5.43)	(5.55)

THE TABLE SHOWS ROBUST STANDARD ERRORS IN BRACKETS.

The change in trend is positive and statistically significantly different from zero, but the reverse of what would be expected. A positive trend suggests that Saskatchewan has had a lower rate of change than the other provinces in the period after the ban.¹⁵ Therefore, even if the variable is statistically significant, this coefficient does not support the idea of the ban leading to a quicker reduction in the proportion of young smokers.

The other two variables are not significant and we cannot therefore reject the zero hypothesis that the period before and after the ban saw the same level. When we view the level change and the change in trend at the same time, the change in trend is no longer statistically significant. This may be a sign that there is no basis for viewing the ban as having had an effect *opposite* to that intended, and actually having increased the proportion of young smokers. None of the regression analyses performed for the proportion of young smokers therefore provides empirical support for the hypothesis that the ban on the display of tobacco products leads to a lower proportion of young smokers. However, this analysis has one weakness. If the ban on the display has led to lower prices in Saskatchewan and Manitoba, it is possible that more people are buying tobacco, and this may camouflage the effect of the ban.

PRICES

The consumer price index normally has a separate category for tobacco and alcohol. This is also the case for Canada. This index is shown below and illustrates the price trend for 200 cigarettes.

¹⁵ It is possible that this was an effect of Saskatchewan and Manitoba seeing a different trend from the rest of Canada. However, it is not possible to prove statistically that these provinces had a different trend from the other provinces.

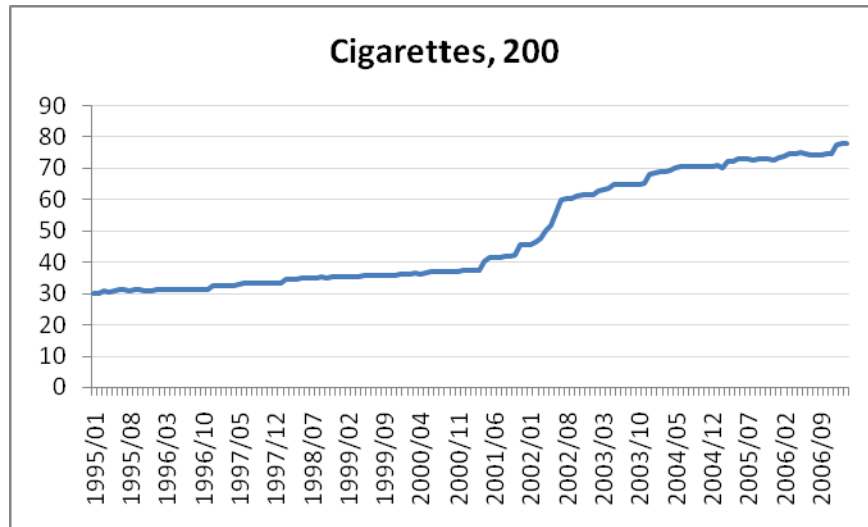


FIGURE 4: PRICE TREND FOR CIGARETTES IN CANADA

This index shows that the price of cigarettes has increased in Canada during this period, something that may itself lead to fewer smokers. This, therefore, may be an explanation for why the proportion of young smokers has seen a downward trend. Furthermore, if the prices in Saskatchewan and Manitoba have gone down, this may explain why we cannot pinpoint the effect of the ban.

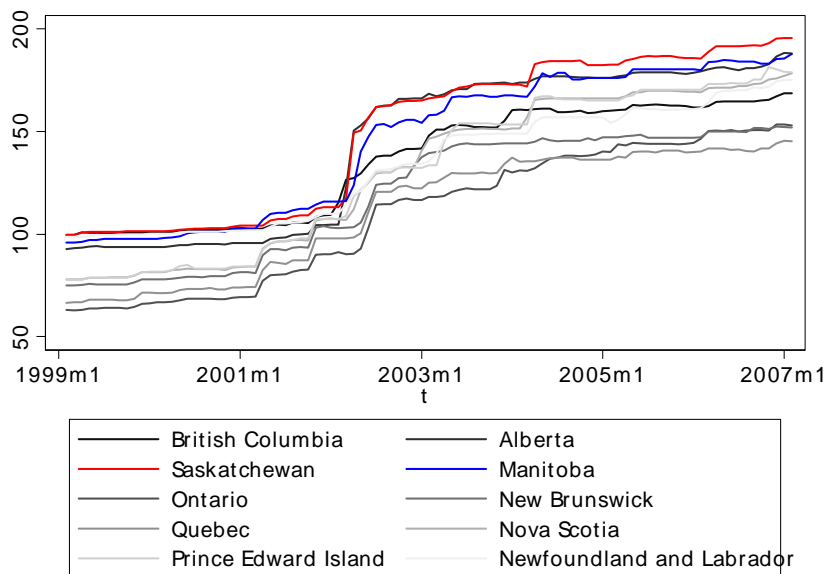


FIGURE 5: PRICE TREND FOR CIGARETTES, PROVINCE LEVEL

As figure 6 shows, the price trend has not differed particularly in the different provinces. The increase we see in mid 2002 is probably a result of Canada having increased the duty on tobacco.¹⁶ As the

¹⁶ <http://www.fin.gc.ca/news02/data/02-052-2e.html>

prices increased approximately the same amount in this period, there is little reason to believe that the lack of results in the regression analysis is the result of price changes in Saskatchewan and Manitoba.

CONCLUSION, CANADA

The analysis of the proportion of young smokers in Canada shows that the ban has not led to any reduction in the proportion of young smokers over and above what is to be expected relative to the trend in the individual province and in Canada in general. The analysis does not support, therefore, the idea of the ban having any effect on the proportion of young smokers. The trend in prices does not form a basis for believing that the lack of results in the regression analysis is due to price changes in Saskatchewan and Manitoba. The analysis therefore does not support the hypothesis that a ban on the display of tobacco products reduces the proportion of young smokers.

3. ICELAND

LEGAL BACKGROUND

Iceland was the first country in the world to introduce a complete legal ban on displaying tobacco products in shops. This happened in August 2001.

DATA

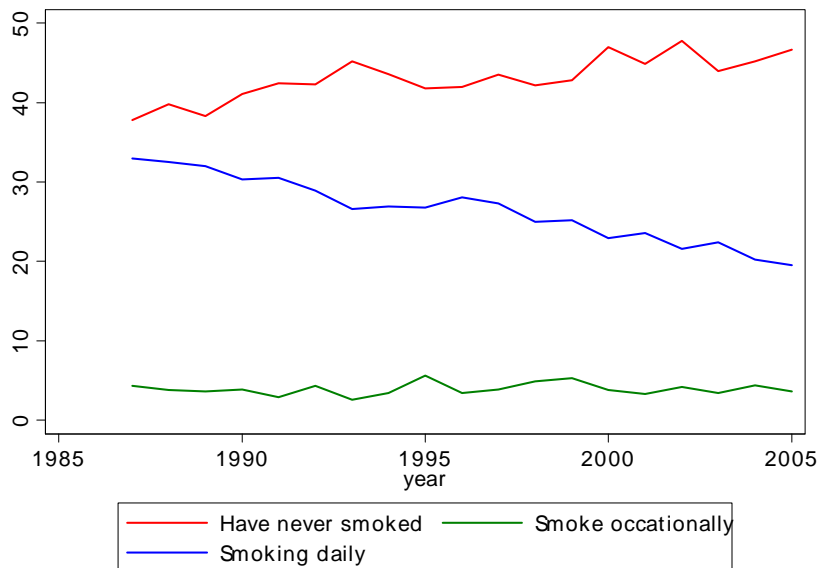
The data for Iceland was collected and presented by Statistics Iceland.¹⁷ The data is less detailed than for Canada. It only relates to the 15-79 age group and the data covers all of Iceland. The data has been broken down into the following categories: the proportion that have never smoked, the proportion that stopped more than a year ago, the proportion that stopped less than one year ago, the proportion that smoke once in a while and the proportion that smoke daily.

ANALYSIS

¹⁷ <http://www.statice.is/uploads/files/LH06/L061717.xls>

The proportion of people over 15 years of age who have never smoked increases every year of a new generation. At the same time, there are a certain number of elderly non-smokers who are dying. Of course, it is possible for a non-smoker to become a smoker, but a smoker can never subsequently become someone who has not smoked. That is why, when the proportion of people who have never smoked increases, this means that the new generations have a lower likelihood of starting to smoke. One way of testing the effect of the ban is, therefore, to look at one-off changes and trend changes in the proportion who have never smoked. The trend is shown in the diagram below.

We adopt the same procedures as for Canada and define variables for changes in trend and level. As the change took place in August 2001, we have taken 2002 as the first year when the change can be traced. The table below shows the results of the regression analysis.



The trend in the proportion of people who have never smoked is positive and statistically significantly different from zero at 1% level. The proportion increases by 0.43 per cent per year. This probably means that fewer and fewer young people are starting to smoke.

	Model 1	Model 2	Model 3	Model 4
Trend	0.40*** (0.06)	0.44*** (0.09)	0.41*** (0.09)	0.43*** (0.09)
trend change		-0.32 (0.34)		-0.64 (0.69)
level change			-0.32 (1.38)	1.16 (2.32)
point of	-749.72***	-838.98***	-783.62***	-805.85***

intersection				
	(125.61)	(176.73)	(181.67)	(185.67)
R ²	0.67	0.68	0.67	0.68

As above, the trend is not particularly interesting. The question is whether we can prove that the ban leads to a change in the trend or level, or a combination of the two. However, as the table above shows, none of the change variables are statistically significantly different from zero. The analysis does not support, therefore, the idea of the period after 2001 being different from the period before 2001. At this aggregated level, the available data does not support the claim that the introduction of a ban has led to a change in the proportion of people who have never smoked.

4. AUSTRALIA

There does not seem to be any publicly available data on smoking among young people in Australia. However, the Australian authorities have published two reports on the subject: *Smoking behaviours of Australian secondary students in 2005* and *Victorian Secondary school students' use of licit and illicit substances in 2005*.¹⁸ These reports are based on a survey carried out every three years since 1984.

In Australia, the age limit for cigarettes was 16 until 1994. In 1994, this was raised to 18. In 2002, Victoria introduced a ban on advertising and limits on the display of tobacco products. The question is whether it is likely that this legislative change led to fewer young people starting to smoke.¹⁹-{-

The report on smokers in Victoria (pages 71 and 72) shows that there has been a clear reduction in the proportion of people smoking since 1999. The reduction seems, therefore, to have started three years before the legislation restricting product advertising and product display came into force. Therefore, it is difficult to ascribe the reduction to this legislation. The reduction seems to have continued at the same pace until 2005.

¹⁸ Australian Government Department of Health and Aging (2006): *Smoking behaviours of Australian secondary students*. [http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/E1B70590AD4EF56DCA257225000EDCE9/\\$File/mono59.pdf](http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/E1B70590AD4EF56DCA257225000EDCE9/$File/mono59.pdf)

Victorian Department of Human Services (2006): *Victorian secondary school students' use of licit and illicit substances in 2005*. http://www.health.vic.gov.au/drugservices/downloads/assad_part1a.pdf

¹⁹ For one reason or another, neither of the two published reports mentions the Victoria legislation regarding the display of products. Neither of the reports, therefore, contains analyses of the effects of the Victoria legislation.

The reduction in Victoria can be compared with the reduction in Australia as a whole. Page 27 of the report on smoking in Australia reports a similar reduction. Both reports show the numbers for the 12-15 age group and the 16-17 age group, and so are comparable. It appears that the reduction in Victoria is almost identical to the reduction in Australia as a whole, i.e. a reduction from around 17% to around 7% for the 12-15 age group and a reduction from around 30% to around 18% for the 16-17 age group.

The reduction in the proportion of young smokers in Victoria seems to have started three years before the ban was introduced in 2002, and the reduction seems to be the same as for the rest of Australia. In the light of this, it is difficult to view the ban as having reduced the proportion of young smokers in Victoria.

5. CONCLUSION

Iceland, Canada (Saskatchewan and Manitoba) and Australia (Victoria) have introduced a ban on the display of tobacco products. In all these countries, there is a clear trend reduction in the proportion of young smokers both before and after the ban. We have not tried to explain this trend, as this question does not have any relevance to the question of whether the ban on the display of tobacco products leads to a reduction in the number of young smokers.

In order for it to be possible to ascribe any effect on the proportion of young smokers to the ban, either the level or trend would need to change during the period the ban was in place. Neither in Canada nor Iceland can it be statistically proven that there were significant deviations from the trend in the periods when the ban was in place. The reports from Australia and Victoria in Australia deal with smoking among young people, but none of them mention or analyse Victoria's ban on the display of tobacco products. The numbers reported also show that there has been a reduction in the proportion of young smokers in Australia and in Victoria, and that this reduction seems to have started three years before the ban in Victoria, i.e. in 1999. In light of the available data and the analyses performed on this, it is not possible to demonstrate that a ban on the display of tobacco products has any effect on the proportion of young smokers.