The Impact of Electronic Cigarette Sales on Cigarette Sales, 2007-2013

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Introduction

Use and awareness of e-cigarettes has doubled in recent years. E-cigarette availability has dramatically increased since their introduction in food, drug and mass (FDM) and convenience (CV) stores.

For FDM stores e-cigarettes were only sold in two Nielsen markets in the 1st quarter of 2011, by the 4th quarter they were sold in all Nielsen Markets.

For CV stores e-cigarettes were first available in the 3rd quarter of 2010, by the 2nd quarter of 2012 they were sold in all Nielsen Markets.

Recent empirical studies have found that using e-cigarettes is associated with quitting intentions1, quit attempts2, and reduced daily cigarette consumption. However, little is known about how aggregate sales of combustible cigarettes have been affected by the introduction of electronic cigarettes (e-cigarettes).

Aim

The aim of this study is to estimate how the sales of cigarettes was affected by the introduction of e-cigarettes.

We hypothesize that the entry of e-cigarettes would accelerate the decline in cigarette consumption in the U.S.

Method

Data:

- Quarterly per capita e-cigarette sales
- Quarterly per capita cigarette sales
- Average cigarette prices
- Average e-cigarette prices

Data Range: 2007 – 2013

Data Source:

- Store scanner data from Nielsen Markets:
  - 52 participating U.S. markets for food, drug and mass stores
  - 30 participating U.S. markets for convenience stores.

Models Used:

1. Fixed-Effects models

Per Capita Sales Volume of Cigarettes

\[ \beta \text{Per Capita Sales Volume of Cigarettes} = \beta_0 + \beta_1 \text{Avg. Price of Cigarettes} + \beta_2 \text{E-cig Entry Dummy} + \beta_3 \text{Year-Quarter} + \beta_4 \text{Market-Store} + \epsilon \]

2. First Difference models

\[ \Delta \text{Per Capita Sales Volume of Cigarettes} = \beta_0 + \beta_1 \text{Avg. Price of Cigarettes} + \beta_2 \text{E-cig Entry Dummy} + \beta_3 \text{Year-Quarter} + \beta_4 \text{Market-Store} + \epsilon \]

3. Models accounting for the cumulative impact of e-cigarette entry (interaction)

\[ \Delta \text{Per Capita Sales Volume of Cigarettes} = \beta_0 + \beta_1 \text{Avg. Price of Cigarettes} + \beta_2 \text{E-cig Entry Dummy} \times \text{Year-Quarter} + \beta_3 \text{Market-Store} + \epsilon \]

4. Instrumental Variable Model

\[ \text{Per Capita Sales Volume of Cigarettes} = \beta_0 + \beta_1 \text{Avg. Price of Cigarettes} + \beta_2 \text{E-cig Sales of E-cig} + \beta_3 \text{Number of E-cig Brands} + \beta_4 \text{Year-Quarter} + \beta_5 \text{Market-Store} + \epsilon \]

Results

The total impact of the entry of e-cigarettes on the change of cigarette consumption during our study period ranged from 0.5% to -3.5% of cigarette sales.

Conclusions

The results from our study suggest that the entry of e-cigarettes may reduce the sales of combustible cigarettes.

More data is needed to further assess the causal impact of e-cigarettes on combustible cigarette consumption.

Acknowledgments

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3. Main Measures and Summary Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Cigarette Price</th>
<th>Average E-Cigarette Price</th>
<th>Per Capita Cigarette Sales Volume</th>
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4. More data is needed to further assess the causal impact of e-cigarettes on combustible cigarette consumption.

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