Promoting energy efficient behaviour: An econometric analysis of the impact of information on household appliance composition regarding energy efficiency

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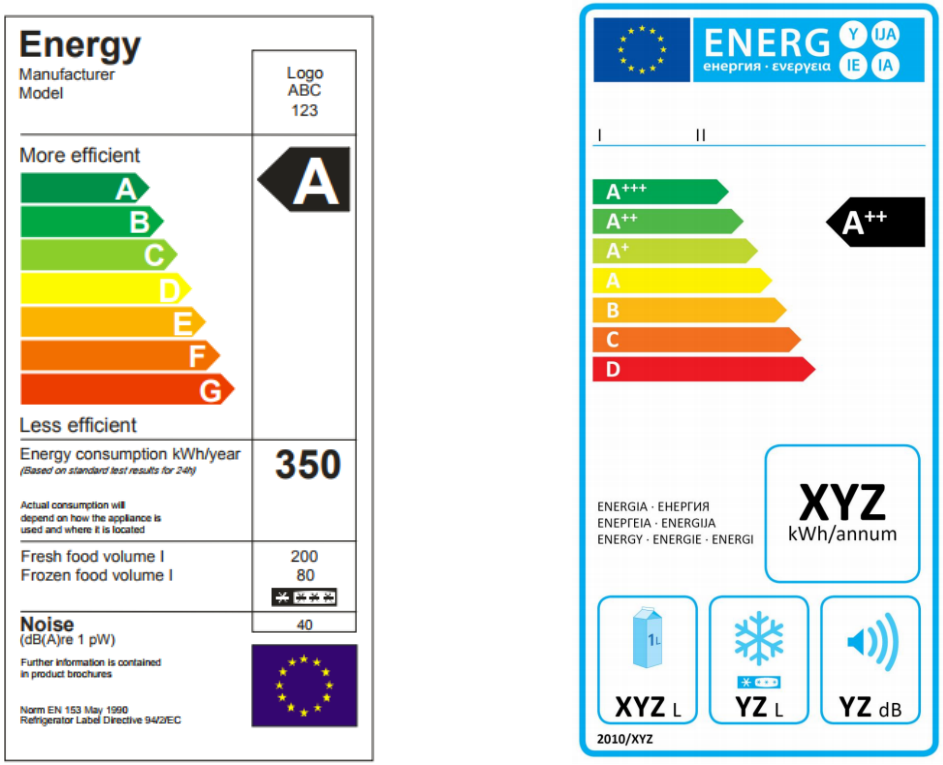
Primary interest

What is the long-run effect of a policy intervention regarding information?

- Case: **New labeling of energy appliances**.

  (Specifically cooling appliances)



(a) Label before change

(b) Label after change

Figure: Comparing energy labels

Data

- Data from GfK
- Monthly observations of the number of cooling appliances sold with different energy efficiency (danish)

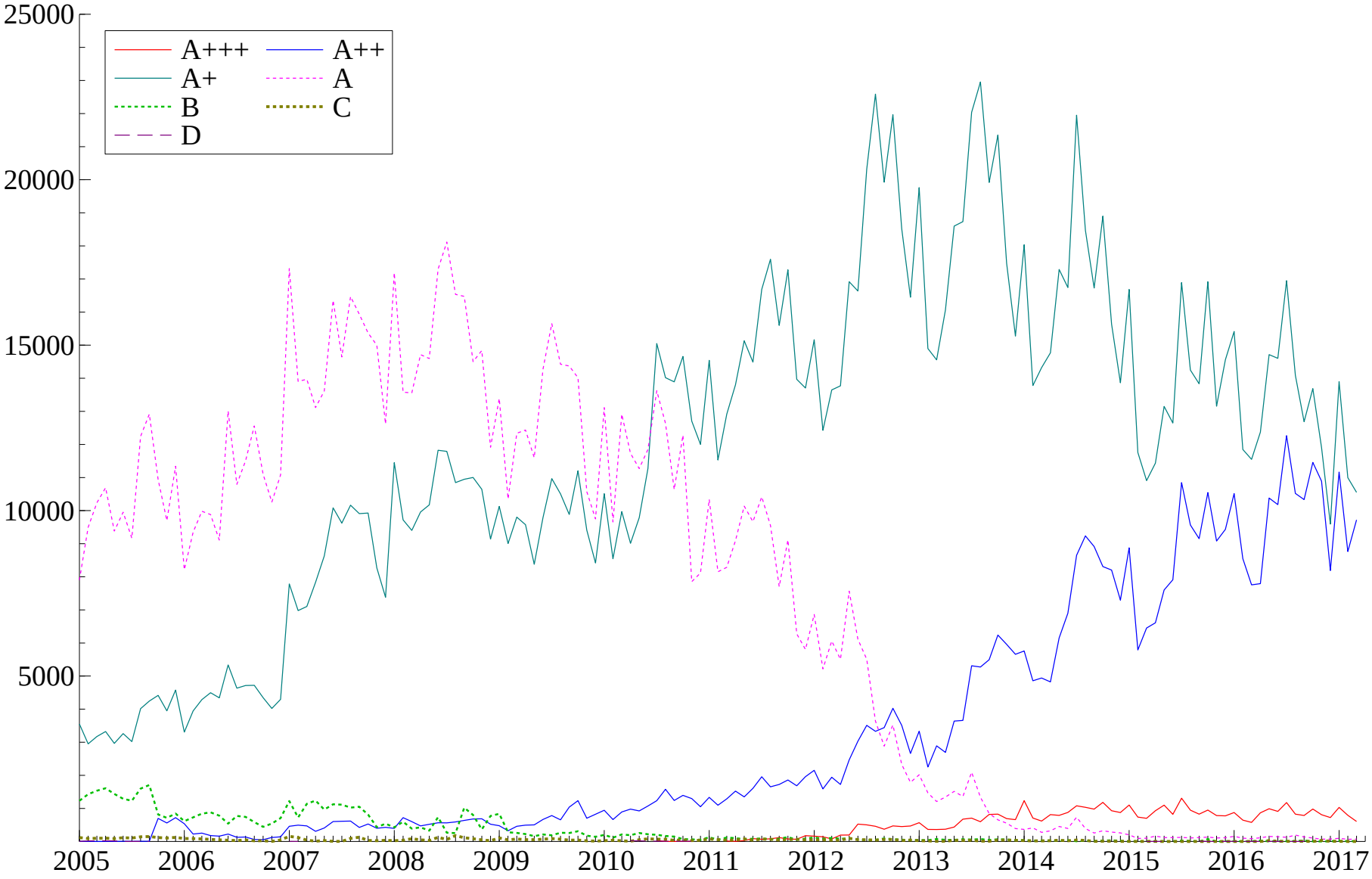


Figure: Number of cooling appliances sold in different EE classes.

Implementation of label-revision in Denmark

5 time periods are of particular interest in this analysis.

- **June 2010** Announcement 1 (*Annou1*): It was announced that the new energy efficiency label would be implemented and this would be done in two steps;
  - **November 30, 2011** Implementation 1 (*Impl1*): Requirement for the new label to be physically present in stores.
  - **March 30, 2012** Implementation 1 (*Impl1*): Requirement for the new label to be presented in printed commercial material.
- **March 2014** Announcement 2 (*Annou2*): It was announced that web-based retailers must also provide up-to-date energy efficiency labeling and certain additional information regarding energy efficiency starting:
  - **January 1, 2015** Implementation 2 (*Impl2*).

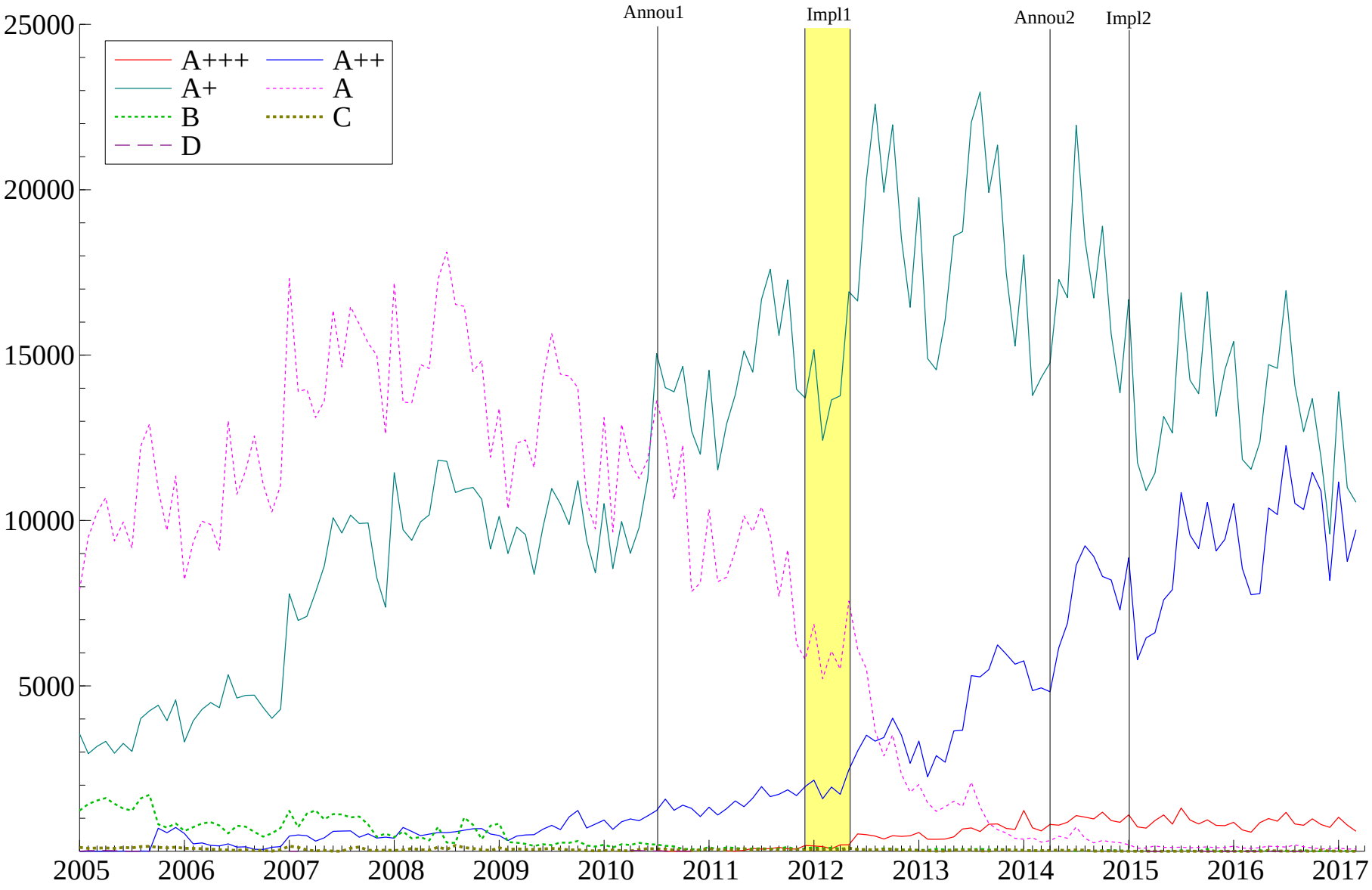


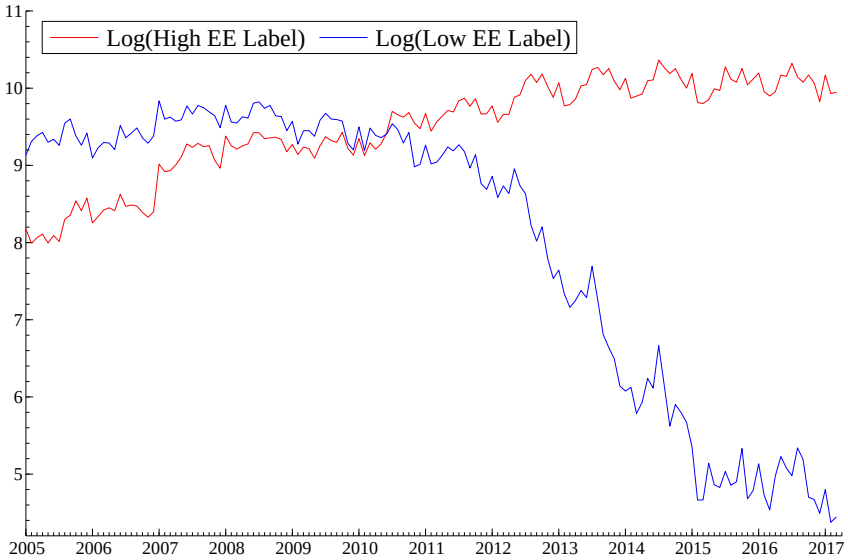
Figure: Number of cooling appliances sold in different EE classes.

Approach

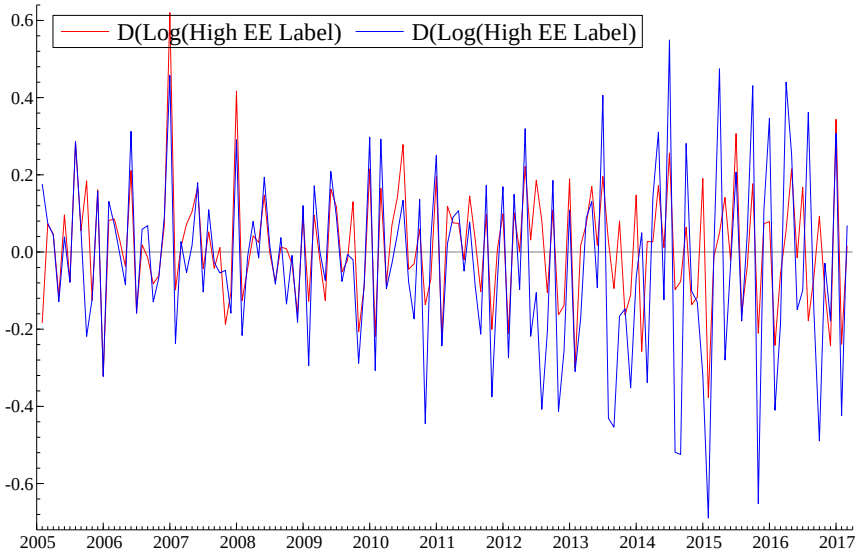
In order to get a clearer hypothesis we aggregate the data.

- We expect classes that were not explicitly represented in the label to increase in numbers and the rest to decrease. (As a side note this simplifies our analysis).

Furthermore, to stabilize the variance we log transform the data.



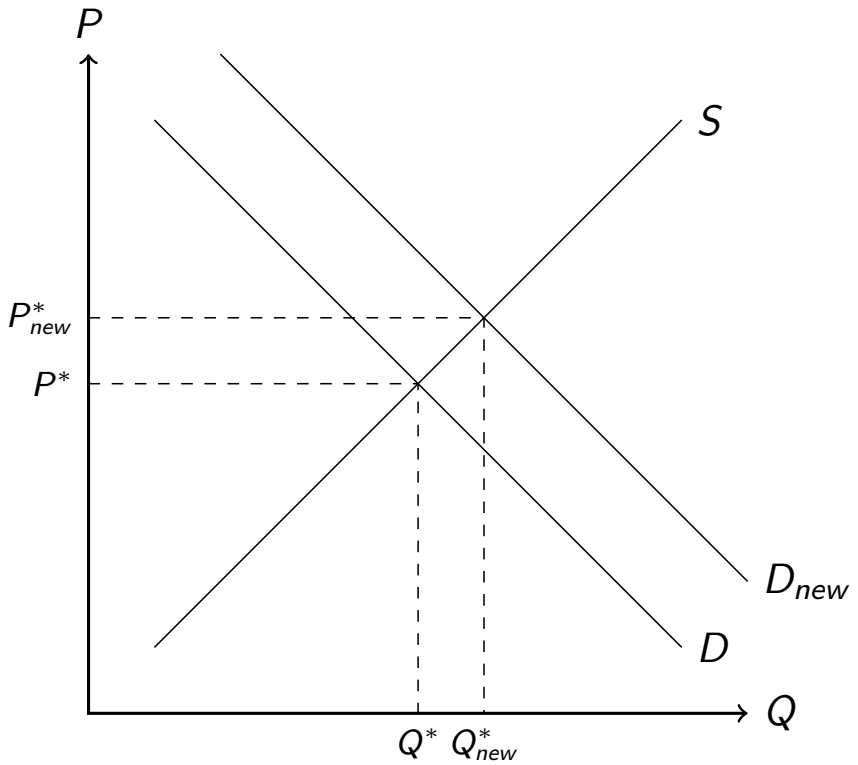
(a) Data in levels



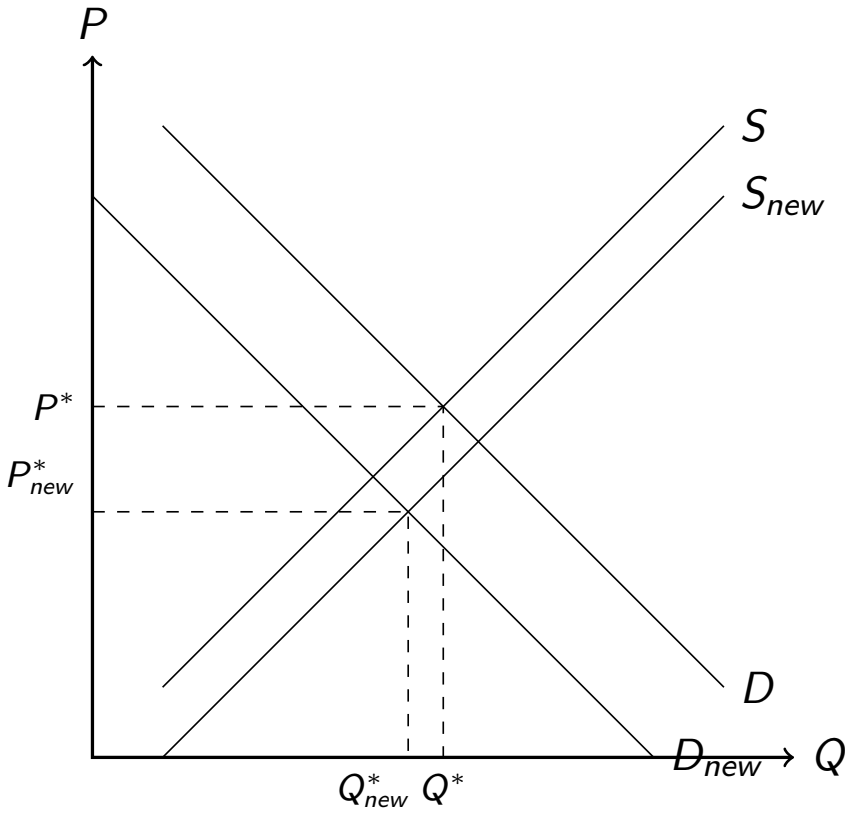
(b) Data in first differences

Figure: Aggregated data in logs

Hypothesis



(a) High EE appliances



(b) Low EE appliances

What is the long-run effect on Q? (...not what caused it!)

- Identification

Method

We address this question by estimating a VAR model, where we allow for cointegration.

- A vectorized model: We expect that the is a relation between the variables in the data.
- Autoregressive: We expect dynamic effects to be present.

Does there exist one or more linear combination of the data processes that is stationary?
$\rightarrow$ These are interpreted as equilibria. Thus, we are examining shifts in these relations caused by the policy interventions.

The policy interventions are included as level-shift dummies in the model [...0, 0, 0, 0, 0, 1, 1, 1, 1...].

Results I

As it turns out there are two "cointegrating" relationships.
$\rightarrow$ the processes are separately stationary conditional on breaks and trends.

Stationary VAR model.

Results II: Long-run relation for high EE

The *announcement* of the new label has a significant impact on the long run demand of high EE appliances.
$\rightarrow$ **54% increase**.

The *implementation* of the new label has a significant impact on the long run demand of high EE appliances.
$\rightarrow$ **43% increase**.

None of the other policy interventions that we are interested in are significant.

Results III: Long-run relation for low EE

The *announcement* of the new label has **not** had a significant impact on the long run demand of low EE appliances.

The *implementation* of the new label has a significant impact on the long run demand of low EE appliances.
$\rightarrow$ **77% decrease**.

The *implementation* of the new label on internet sales has a significant impact on the long run demand of low EE appliances.
$\rightarrow$ **38% decrease**.

Take away

Quantitative impact

- Instead of looking at averages before and after (2 periods) we look at data in higher frequency to identify impacts related to specific periods.

Thank you