



**BITS Pilani**  
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# Introduction to Data Science

## Lessons in Data Visualization Design

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## Disclaimer and Acknowledgement



### Disclaimer

- The content for these slides has been obtained from books and various other source on the Internet
- I here by acknowledge all the contributors for their material and inputs.
- I have provided source information wherever necessary
- I have added and modified the content to suit the requirements of the course

# Lessons in Data Visualization Design

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## Agenda

- Scenario
- Step by Step Storytelling

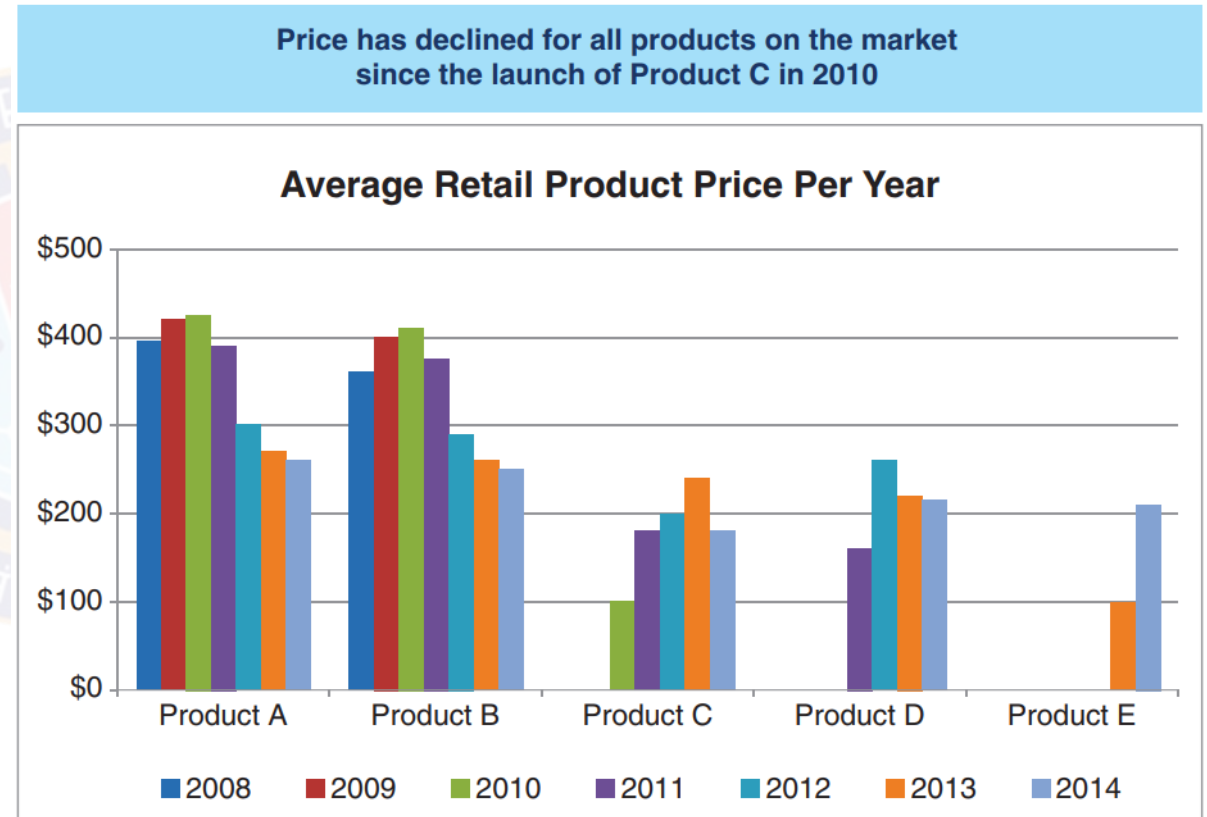


# Lessons in Data Visualization Design



## Scenario

- Start-up Company – Product Price Determination
  - Start-up developing a new consumer product
  - Need to price the product
  - Price variations of other similar products available
  - "Price has declined for all products on the market since the launch of Product C in 2010."





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## Lessons

- Understand the context
- Choose an appropriate display
- Eliminate clutter
- Draw attention where you want it
- Think like a designer
- Tell a story





## Lesson 1: Understand the Context

- Make sure to have a robust understanding of the context and what you need to communicate
  - **Who:** VP of product , primary decision maker in determining product price
    - Primary stakeholder and others
  - **What:** Understand how competitors' pricing has changed over time and recommend a price range
    - Trend analysis
  - **How:** With help of retail price over time for competitor products
    - Data of competitors' product pricing

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## Lessons

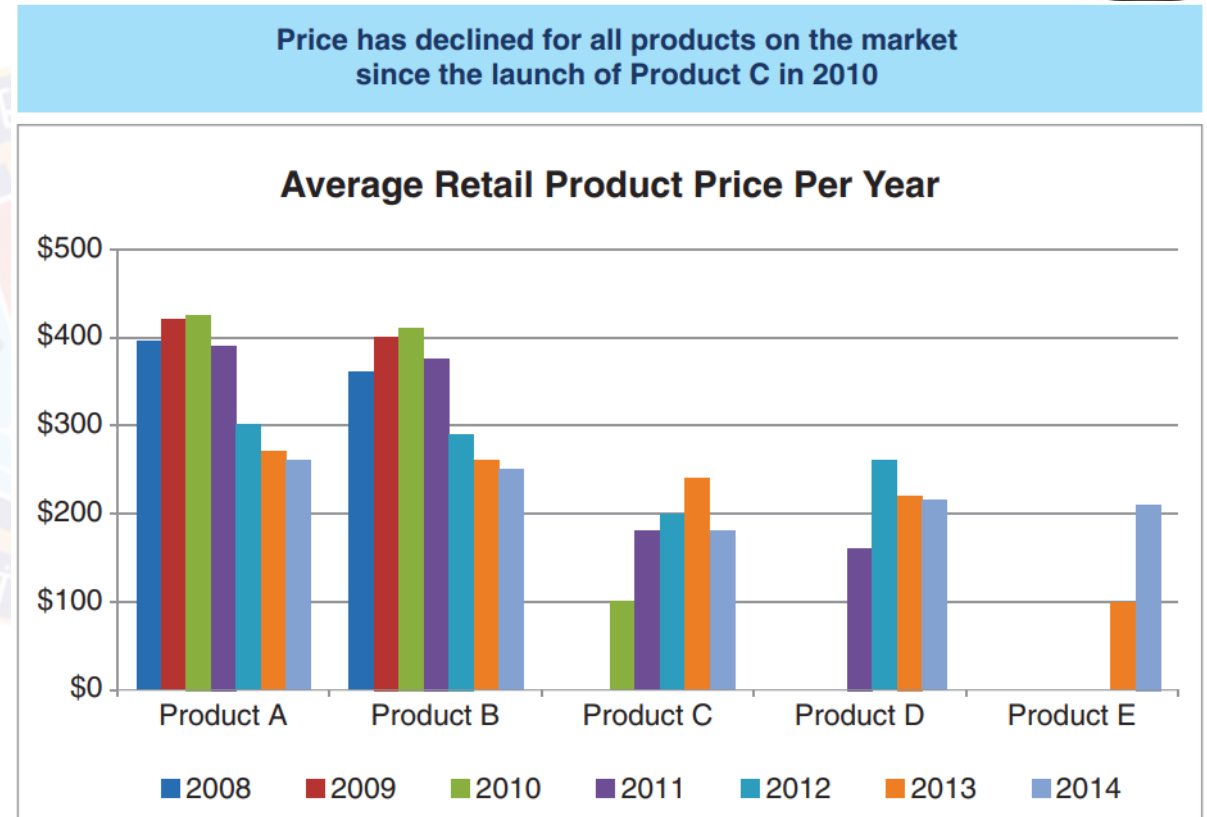
- Understand the context
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## Lesson 2: Choose an appropriate display

- Once we have the data, the challenge is to determine how best we can visualize data
- Objective: to show the trend in price over time
- Issue : Variance in colors across the bars
  - This distracts from our objective
  - Makes the exercise more difficult than necessary





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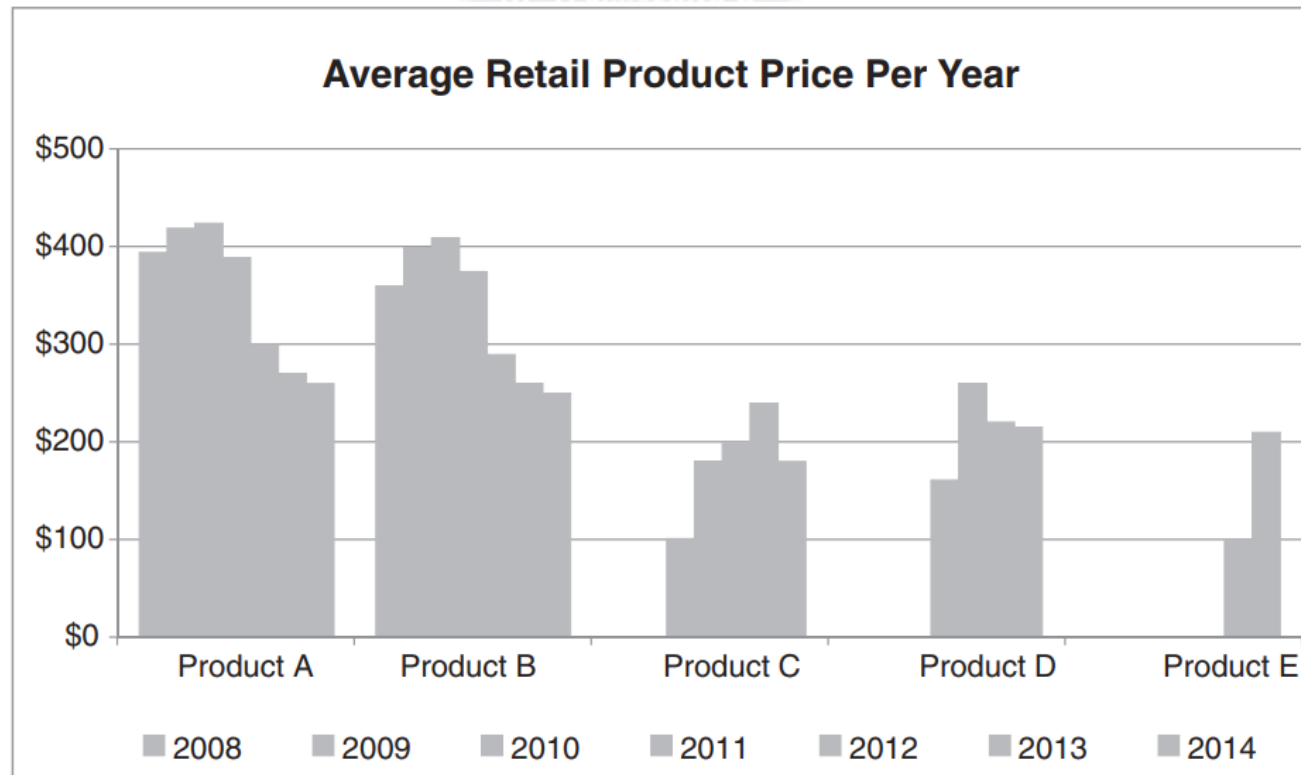
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## Lesson 2: Choose an appropriate display

- Remove variance in color

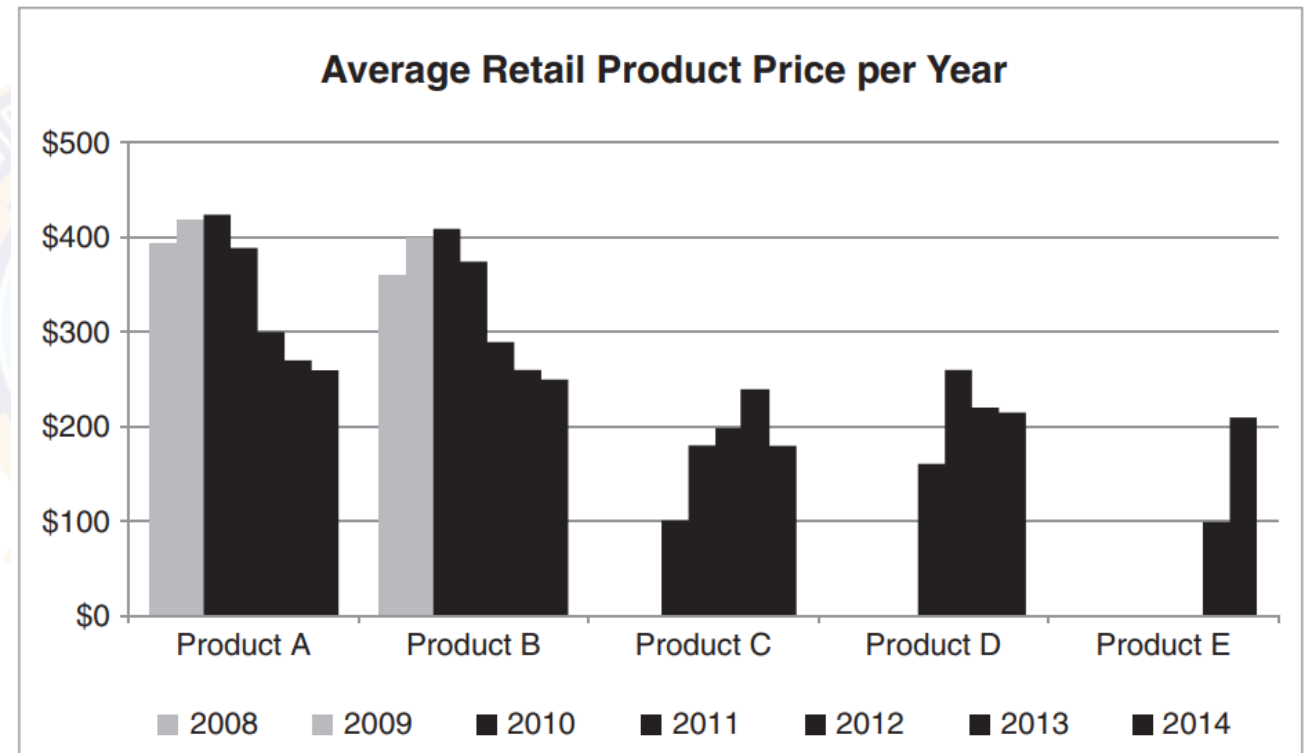


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## Lesson 2: Choose an appropriate display

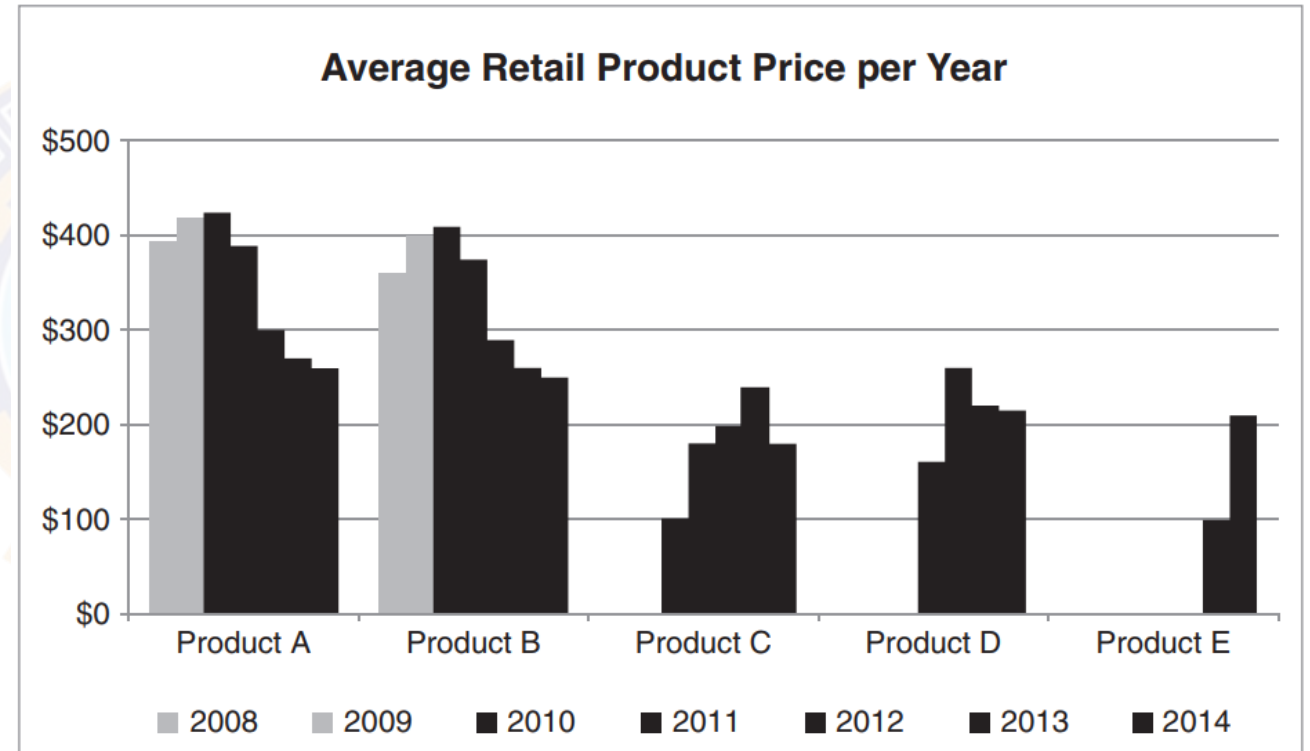
- The emphasis in the original headline was on what happened since Product C was launched in 2010
- Let's highlight the relevant pieces of data to make it easier to focus our attention there for a moment





## Lesson 2: Choose an appropriate display

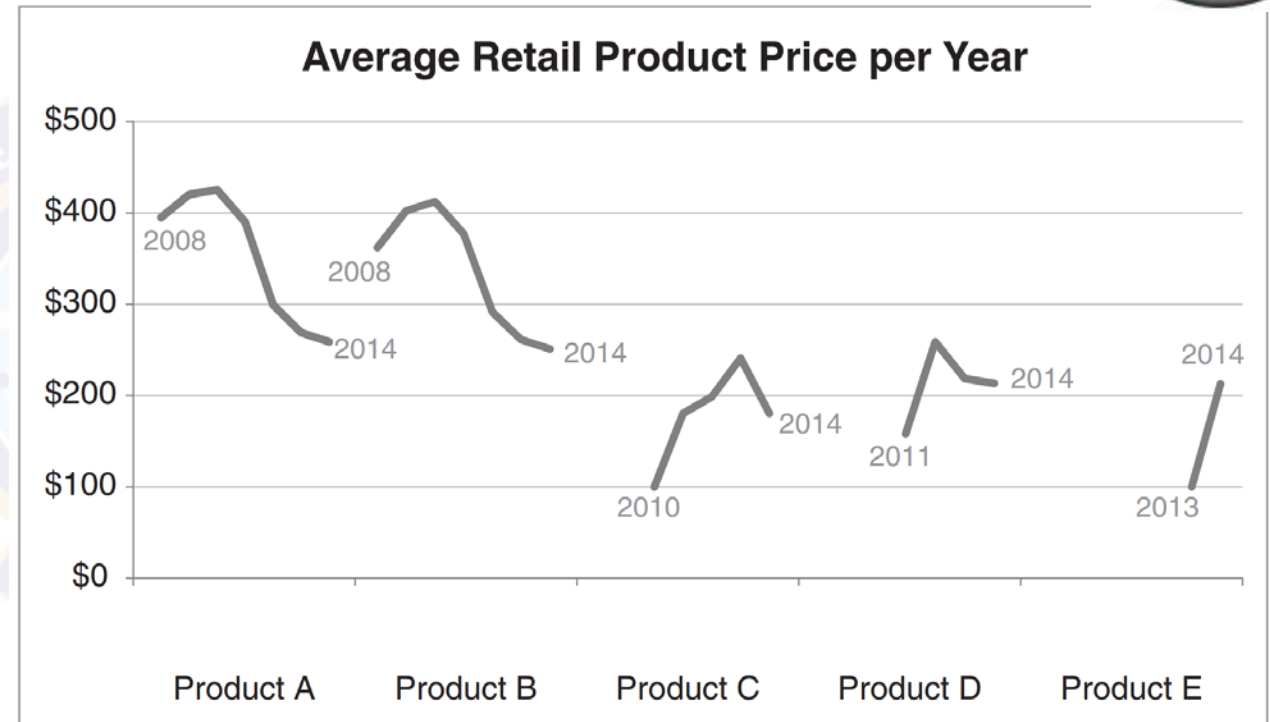
- There are declines in the average retail price for Products A and B after 2010
- But this is not true for the products that were launched later
- We need to change the headline from the original visual to reflect this when we tell our comprehensive story





## Lesson 2: Choose an appropriate display

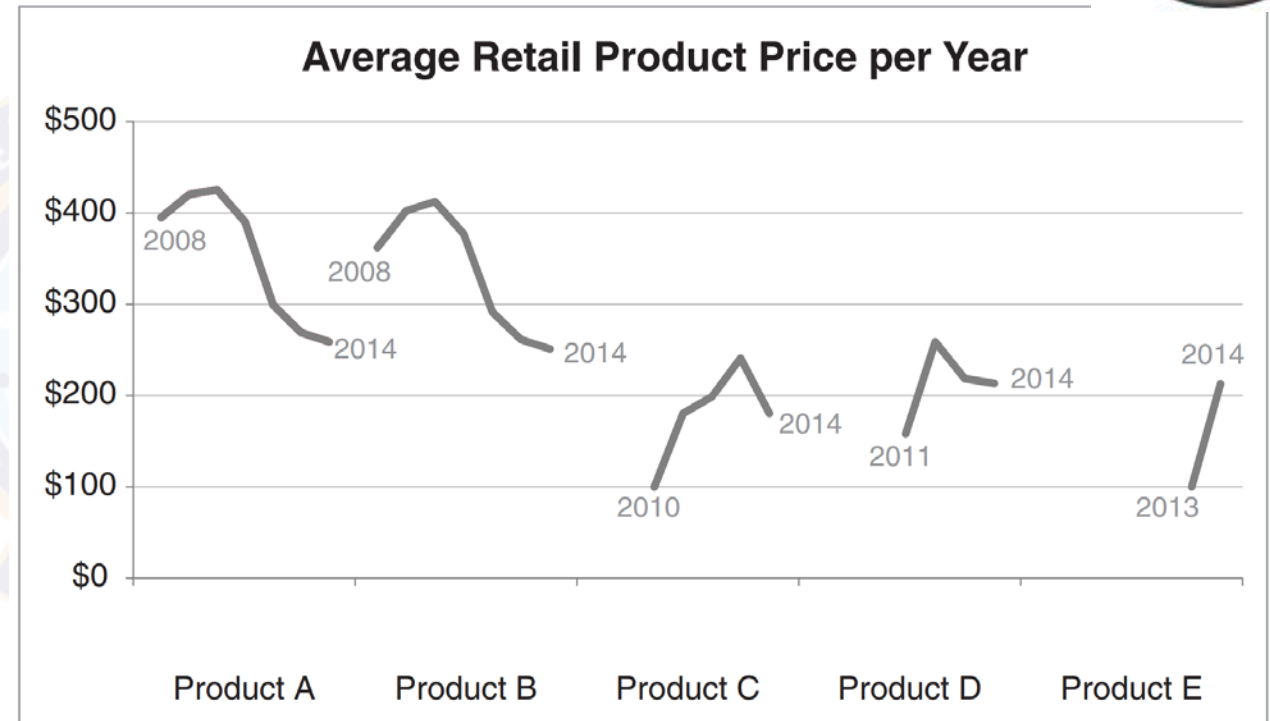
- Since we are interested in the trend over time, we should try a line graph instead of a bar chart
- We eliminate the stairstep view that bars create





## Lesson 2: Choose an appropriate display

- We can see what's happening over time more clearly for one product at a time
- But it is hard to compare the products at a given point in time to one another

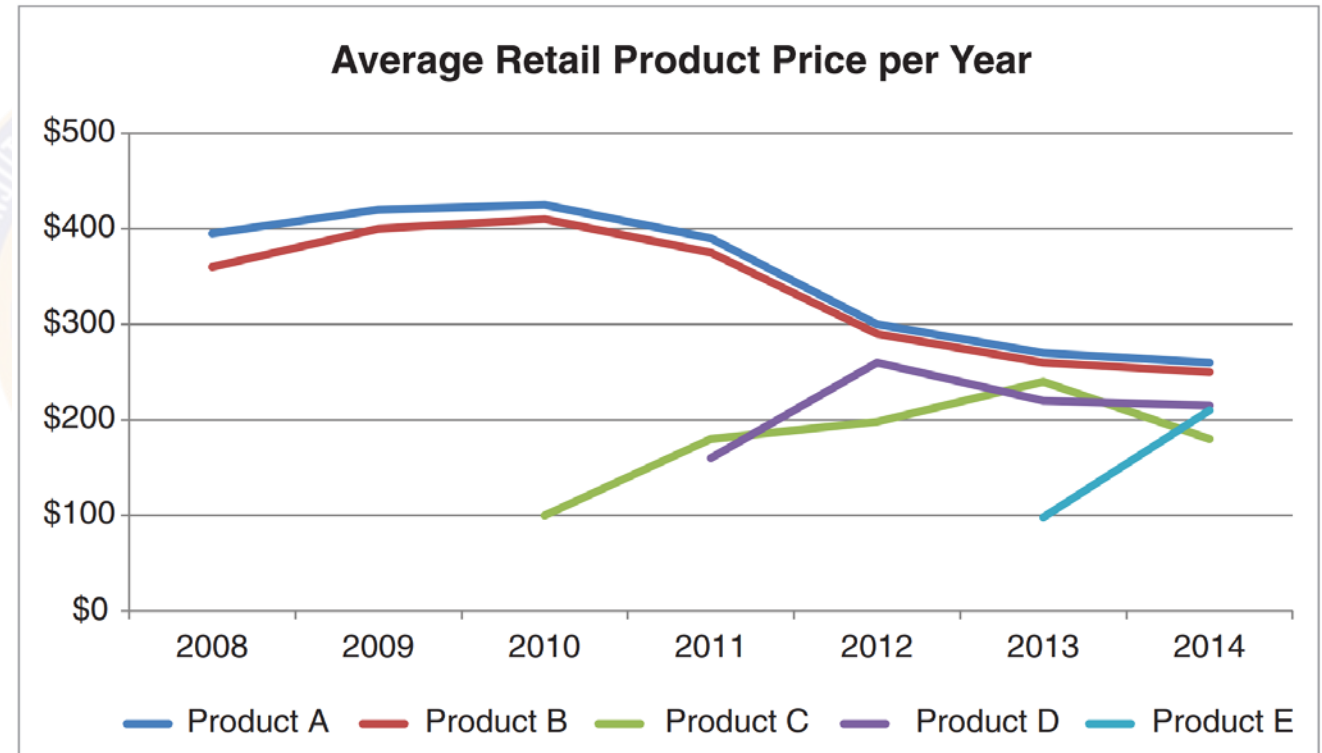






## Lesson 2: Choose an appropriate display

- Graphing all of the lines against the same x-axis allows us to compare across products
- This also reduces the clutter and redundancy of the multiple year labels



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## Lesson 3: Eliminate clutter

- De-emphasize the chart title
  - Title need not attract as much attention as it does when written in bold black.
- Remove chart border and gridlines
  - They take up space and distract us from the data
- Push the x- and y-axis lines and labels to the background
  - They shouldn't compete visually with the data.
  - Modify the x-axis tick marks so they align with the data points.
- Remove variance in colors between lines
- Label the lines directly
  - This eliminates the work of going back and forth between the legend and the data

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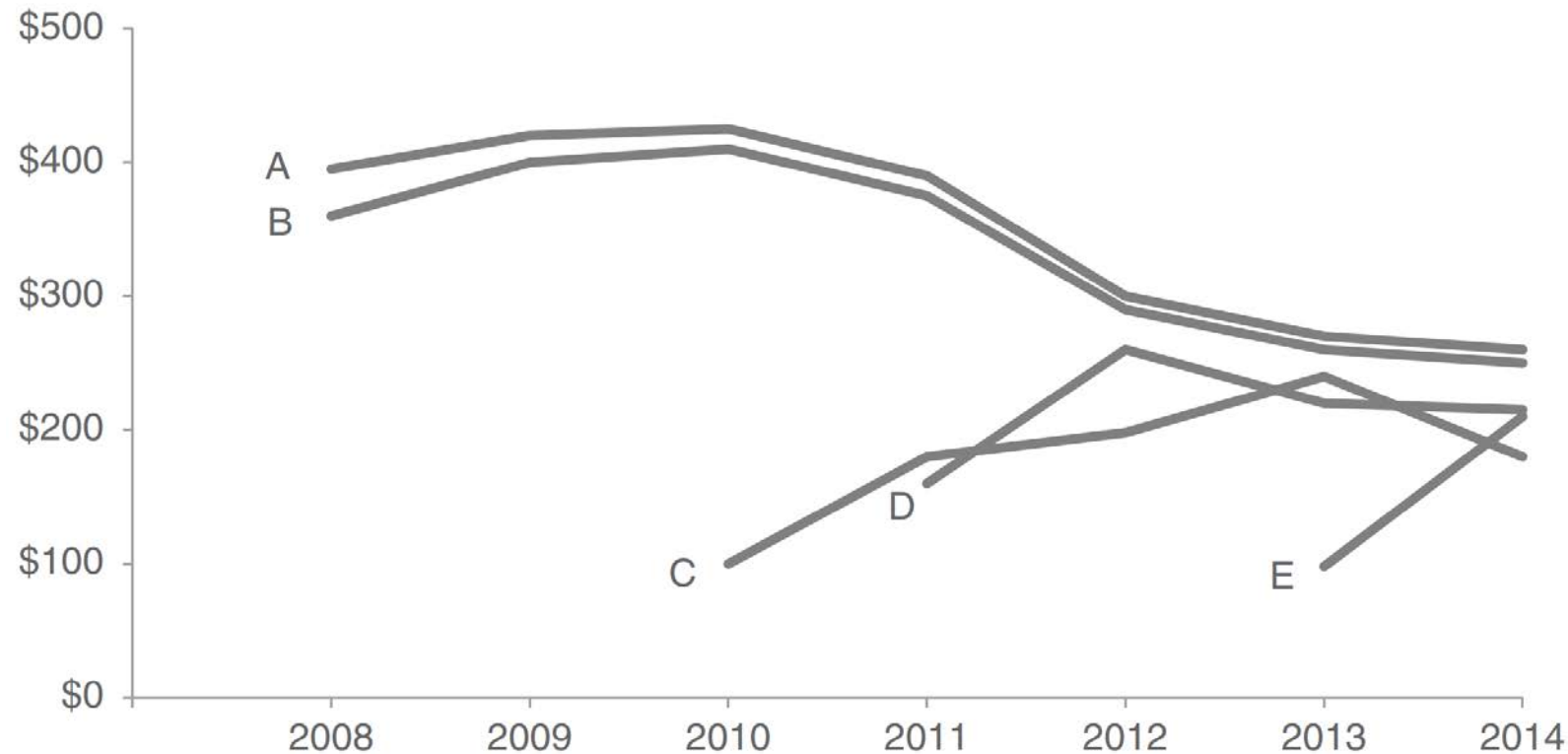
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## Lesson 3: Eliminate clutter

Average Retail Product Price per Year



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## Lessons

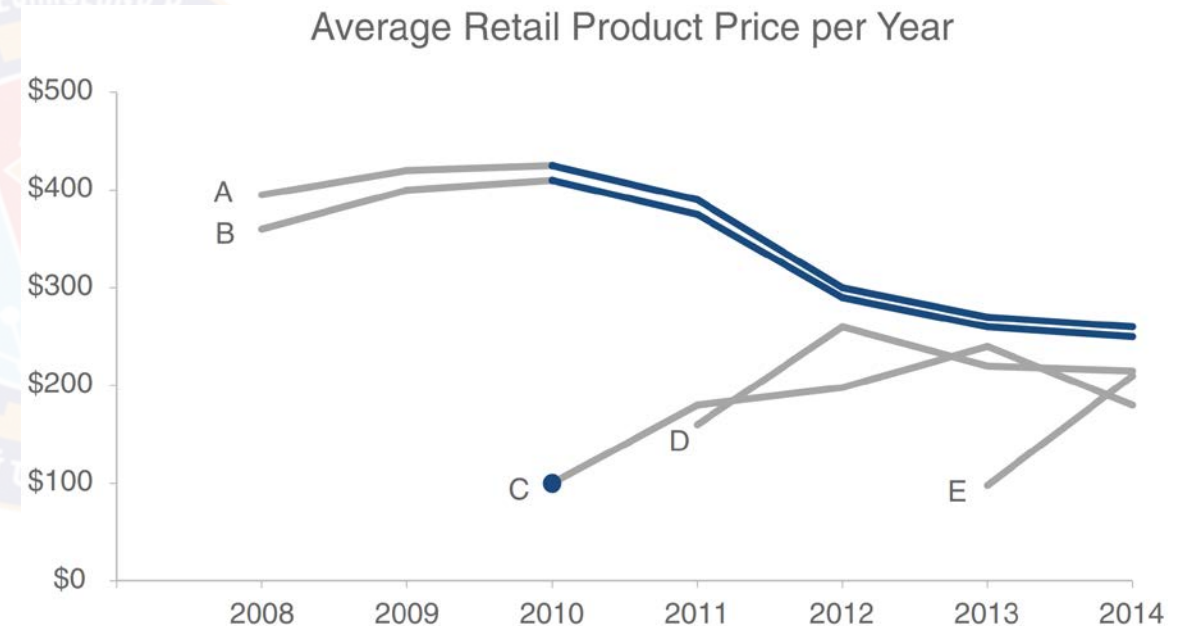
- Understand the context
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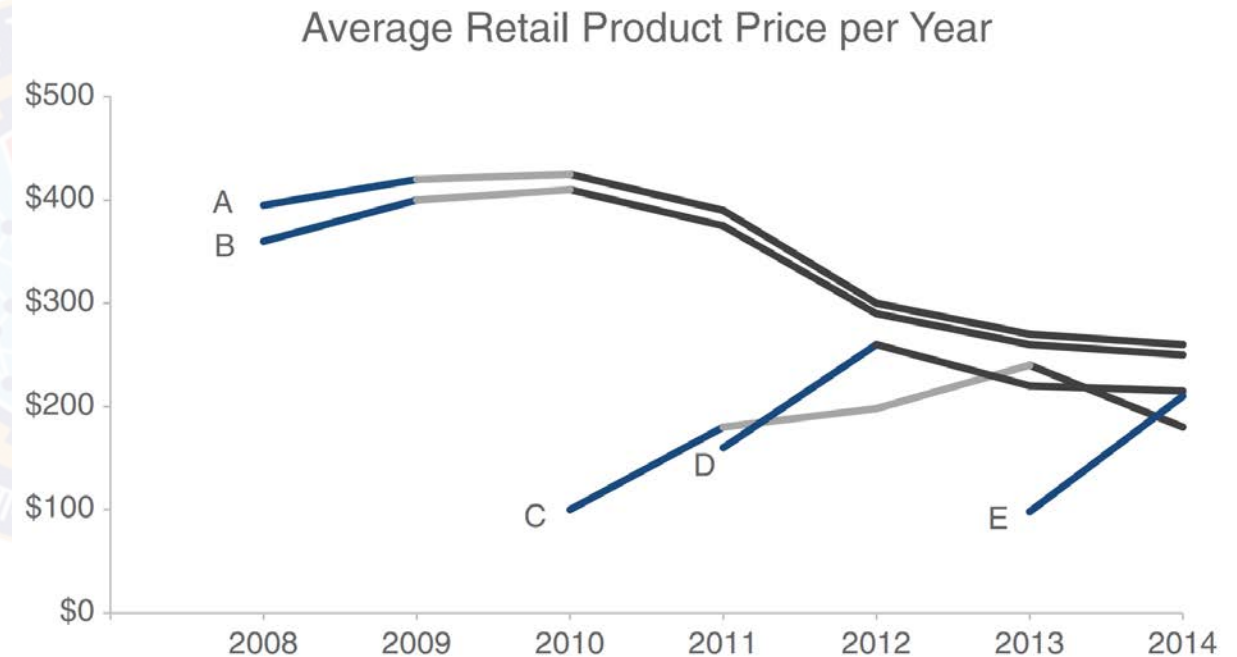
## Lesson 4: Draw attention where you want it

- Initial headline
  - "Price has declined for all products on the market since the launch of Product C in 2010."
- However, in reality
  - "After the launch of Product C in 2010, average retail price of existing products declined."



## Lesson 4: Draw attention where you want it

- "With the launch of a new product, initially the average retail price increases, followed by a decline."



## Lesson 4: Draw attention where you want it

- "As of 2014, retail prices vary between \$180 (Product C) and \$260 (Product A) with an average retail price of \$223."



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## Lesson 5: Think like a designer

- This lesson is about accessibility and Aesthetics
- Make the visual accessible with text
  - Use simpler text in the graph title
  - Capitalize only the first word to make it easier to comprehend and quicker to read
  - Add axis titles to both the vertical and horizontal axes.
- Align elements to improve aesthetics
  - The center alignment of the graph title leaves it hanging in space and doesn't align it with any other elements
  - Align the graph title to upper-left-corner
  - Align the y-axis title vertically with the uppermost label
  - Align the x-axis title horizontally with the leftmost label
  - Ensures that your audience sees how to interpret what they are looking at before they get to the actual data



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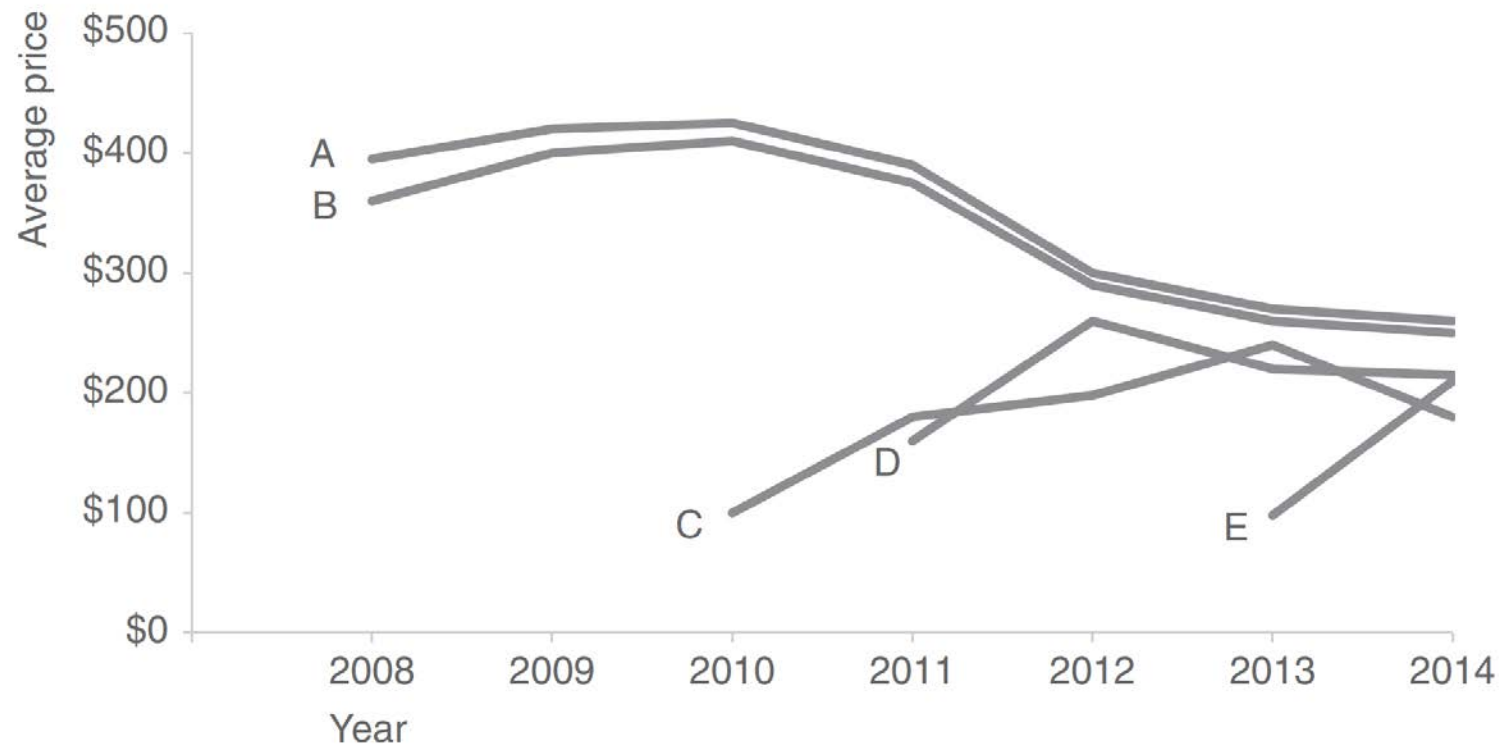
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## Lesson 5: Think like a designer

Retail price over time



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## Lesson 6: Tell a Story

- Finally, it is time to think about how we can use the visual we've created as a foundation to walk our audience through the story in the way that we want them to experience it.
- Imagine we have five minutes in a live presentation setting under the agenda topic:
  - "Competitive Landscape—Pricing."

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## Lesson 6: Tell a Story

In the next 5 minutes...

### OUR GOAL:

- 1 Understand **how prices have changed over time** in the competitive landscape.
- 2 Use this knowledge to **inform the pricing of our product**.

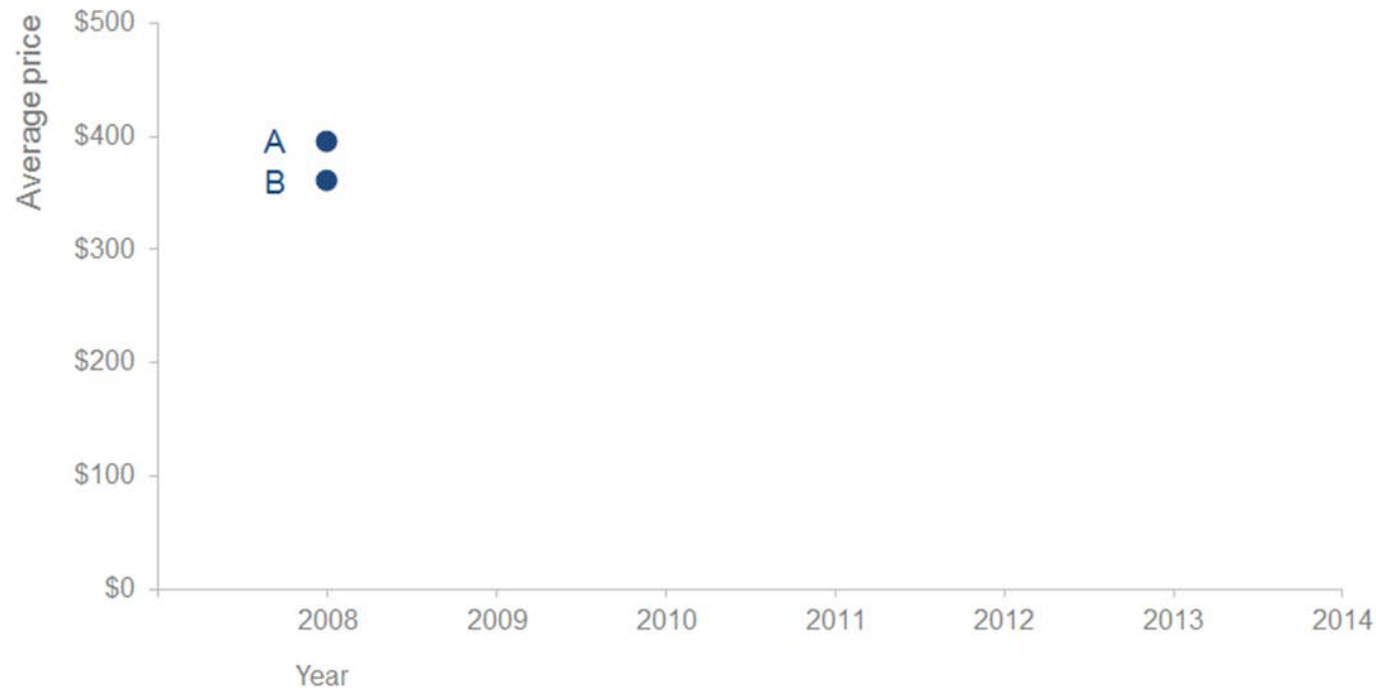
We will end with a **specific recommendation**.



## Lesson 6: Tell a Story

Products A and B were launched in 2008 at price points of **\$360+**

Retail price over time





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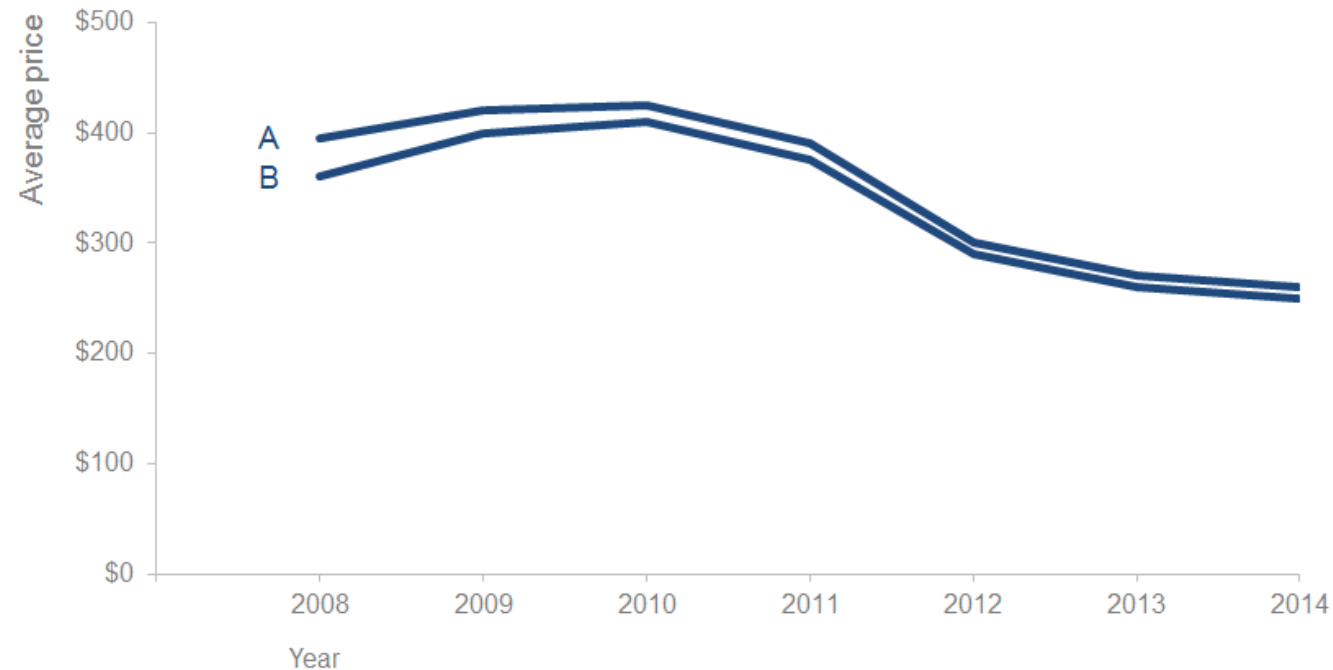
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## Lesson 6: Tell a Story

They have been priced similarly over time, with B consistently slightly lower than A

Retail price over time



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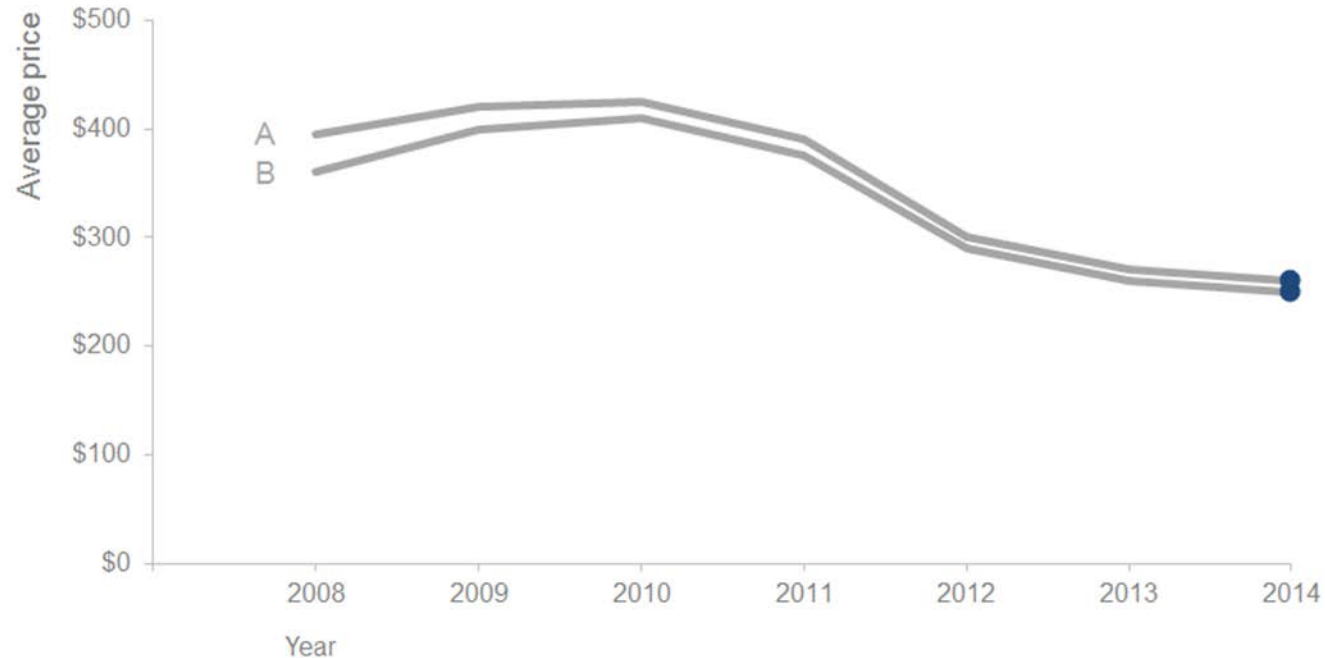
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## Lesson 6: Tell a Story

In 2014, Products A and B were priced at **\$260** and **\$250**, respectively

Retail price over time



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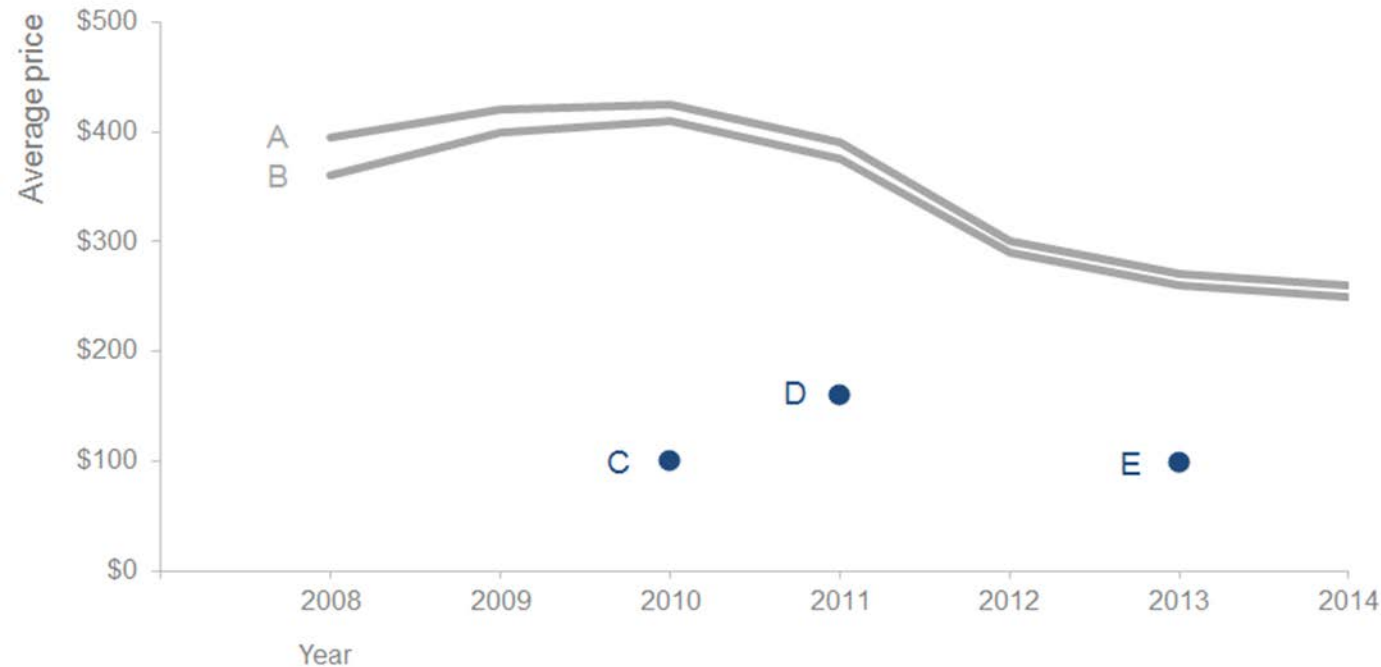
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## Lesson 6: Tell a Story

Products C, D, and E were each introduced later  
at **much lower price points...**

Retail price over time



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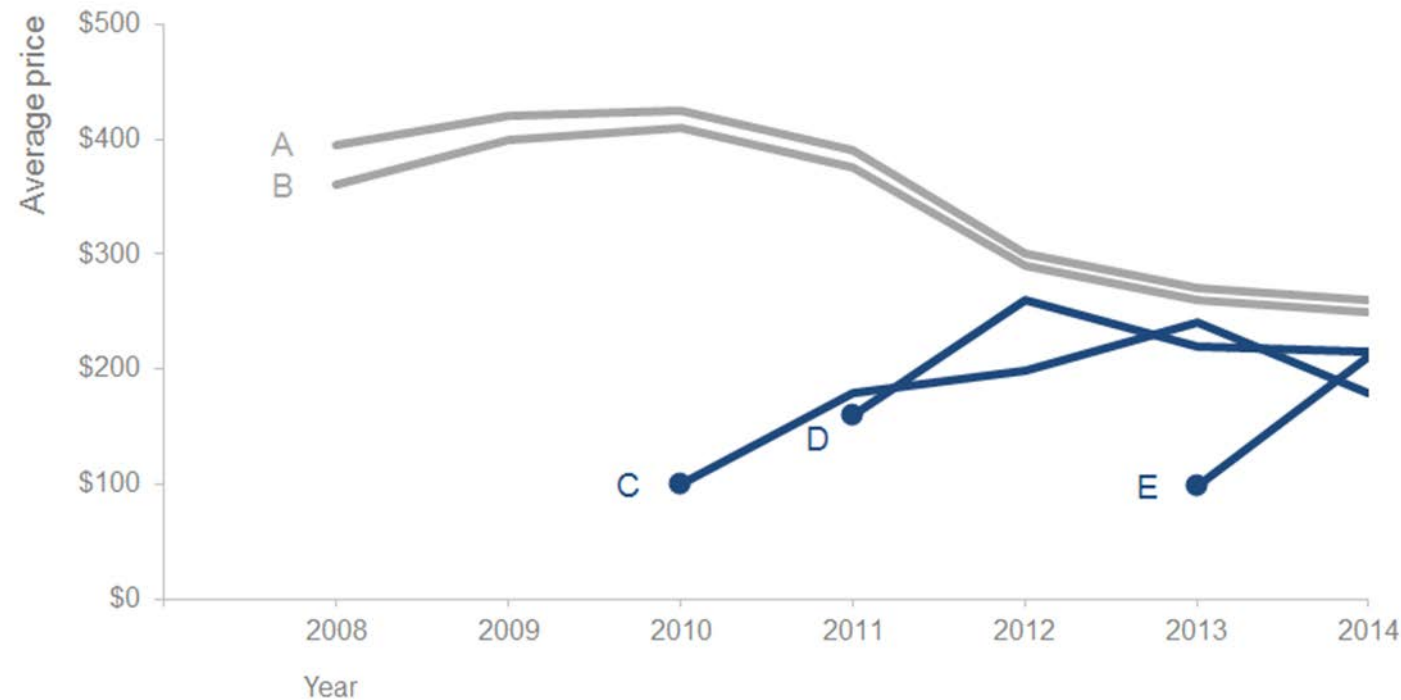
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## Lesson 6: Tell a Story

...but all have **increased in price** since their respective launches

Retail price over time



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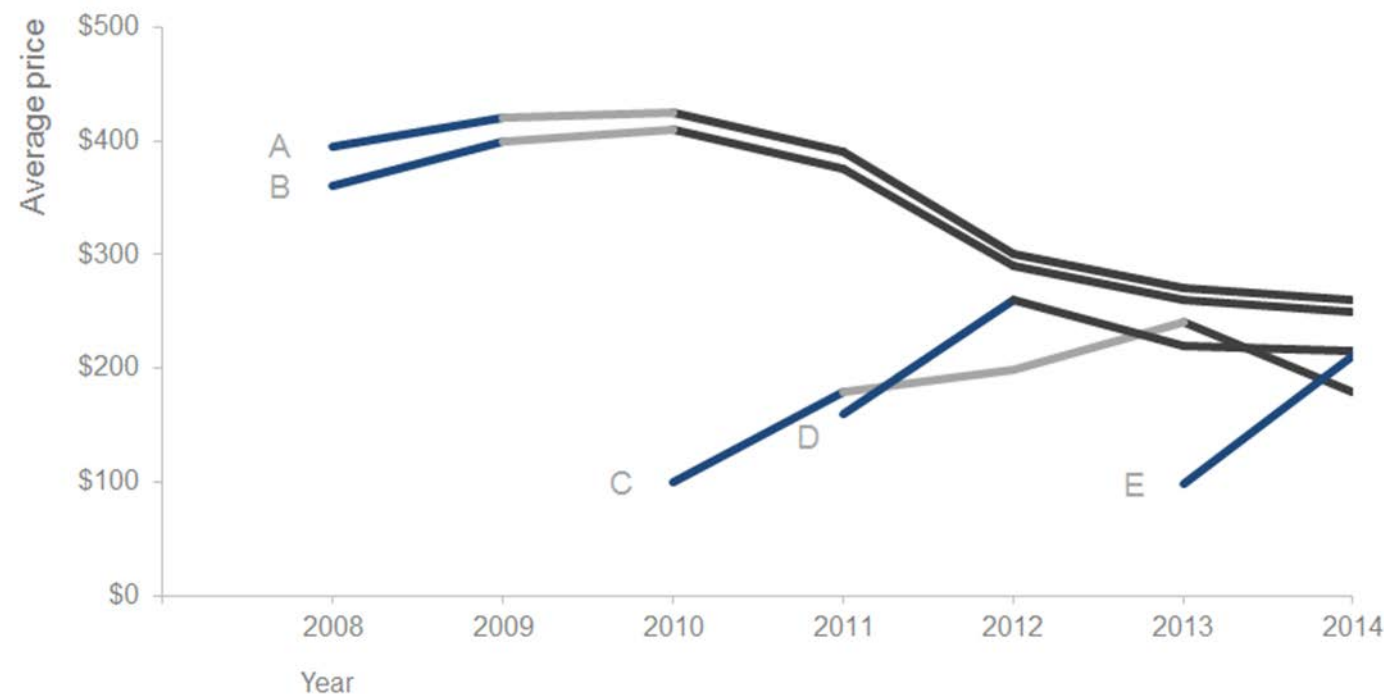
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## Lesson 6: Tell a Story

In fact, with the launch of a new product in this space, we tend to see an **initial price increase**, followed by a **decrease** over time

Retail price over time



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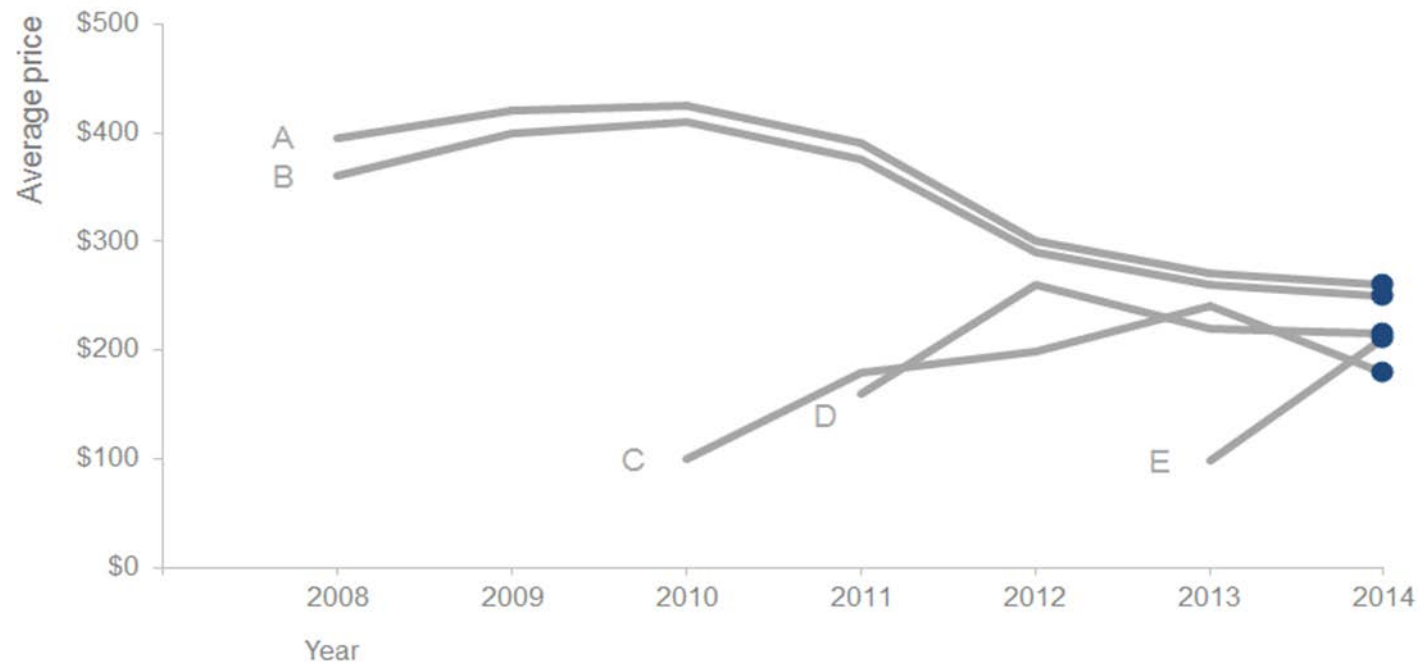
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## Lesson 6: Tell a Story

As of 2014, retail prices have converged, with an **average retail price of \$223**, ranging from a low of \$180 (C) to a high of \$260 (A)

Retail price over time



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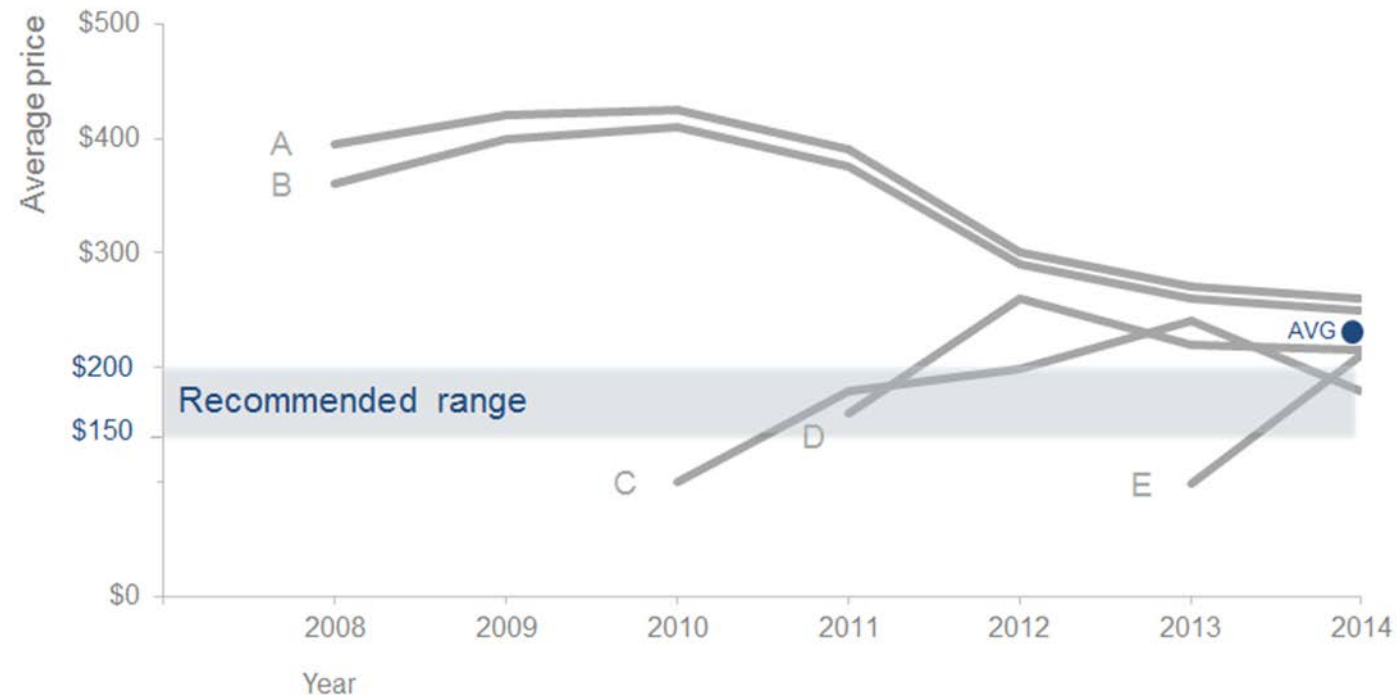
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## Lesson 6: Tell a Story

To be competitive, we recommend introducing our product *below* the \$223 average price point in the **\$150-\$200 range**

Retail price over time





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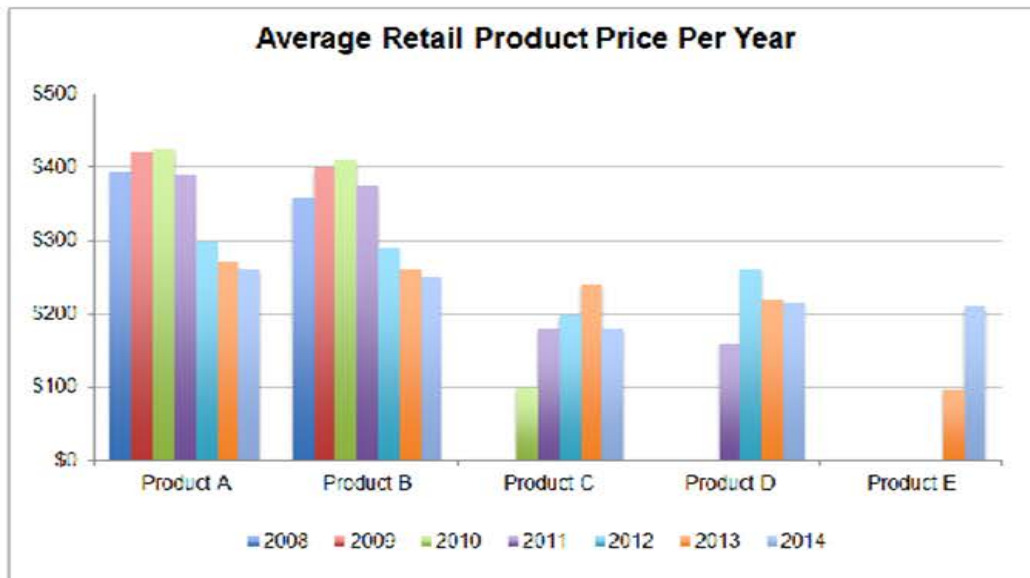
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## Before & After

### BEFORE

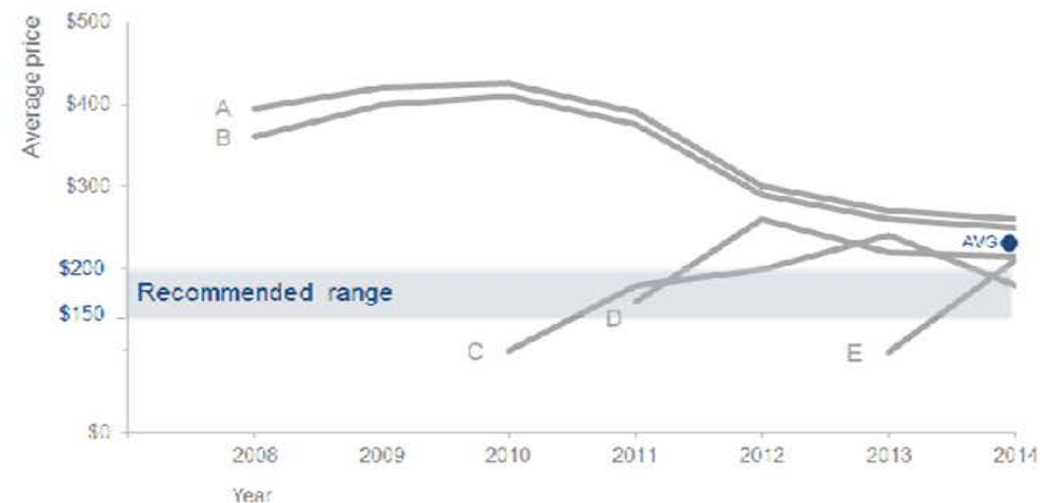
Price has declined for all products on the market since the launch of Product C in 2010



### AFTER

To be competitive, we recommend introducing our product *below* the \$223 average price point in the **\$150-\$200 range**

Retail price over time



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## Recap

- Lessons
  - ✓ Understand the context
  - ✓ Choose an appropriate display
  - ✓ Eliminate clutter
  - ✓ Draw attention where you want it
  - ✓ Think like a designer
  - ✓ Tell a story

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**Thank You!**