

# Contents

<b>1. Introduction</b>	<b>1</b>
1.1. Motivation . . . . .	1
1.2. Objectives . . . . .	3
1.2.1. General objective . . . . .	3
1.2.2. Specific objectives . . . . .	3
1.3. Scope of the study . . . . .	3
<b>2. Literature review</b>	<b>4</b>
<b>3. Empirical context and data description</b>	<b>10</b>
3.1. Positioning data . . . . .	10
3.2. Sales data . . . . .	14
<b>4. Descriptive analysis</b>	<b>19</b>
4.1. Modeling sales . . . . .	19
4.2. Results . . . . .	21
<b>5. Estimation of the effects of shelf position on sales using a quasi-experimental approach</b>	<b>26</b>
5.1. Quasi-experimental design . . . . .	26
5.2. Identification of treatment and control units . . . . .	28
5.3. Difference-in-Difference analysis . . . . .	31
<b>6. Conclusion</b>	<b>37</b>
<b>Bibliography</b>	<b>39</b>
<b>Appendix A. Preprocessing and data cleaning</b>	<b>41</b>
<b>Appendix B. Data description</b>	<b>42</b>
<b>Appendix C. Vendor's market description</b>	<b>43</b>
<b>Appendix D. Descriptive analysis</b>	<b>44</b>
<b>Appendix E. Changepoint detection method: PELT and CROPS algorithms</b>	<b>46</b>
<b>Appendix F. Difference in difference individual analysis</b>	<b>50</b>

# Tables

2.1.	Shelf management research. . . . .	9
3.1.	Positioning data. . . . .	12
3.2.	Sales data. . . . .	14
3.3.	Category description. . . . .	15
4.1.	Descriptive analysis results. . . . .	24
5.1.	Type of changes summary. . . . .	31
5.2.	DID metrics. . . . .	33
5.3.	DID analysis results. . . . .	35
5.4.	DID analysis results by product type . . . . .	36
C.1.	Market description. . . . .	43
D.1.	Descriptive analysis results: product type comparison. . . . .	45
F.1.	DID previous results. . . . .	51

# Illustrations

3.1.	Digital photograph and processed images. . . . .	11
3.2.	Example of a robot's path inside a store. . . . .	12
3.3.	Map of shelf position in store A. . . . .	13
3.4.	Map of shelf position in store B. . . . .	14
3.5.	Monthly sales by store. . . . .	15
3.6.	Sales against horizontal position by product category. . . . .	16
3.7.	Sales against vertical position by product category. . . . .	17
4.1.	Regression results. . . . .	23
5.1.	Sharp change in vertical shelf position. . . . .	29
5.2.	Vertical position, unitary sales and price of a selected unit. . . . .	30
B.1.	Category sales by store. . . . .	42
E.1.	Tested penalties. . . . .	48
E.2.	PELT and CROPS methodology. . . . .	49