商標権と企業価値の関係性の分析

（**Analysis of the Relationship Between Trademarks and Firm Value**）

鈴木康介

2025/ 3 / 1 (sat)

東京都立大学経営学研究科　2年

1. Introduction
2. Previous research on trademark rights
3. Data cleaning for trademark rights
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1.Introduction

1. Introduction

- Brands are valuable assets.[1]
  - Brands account for 10% to 20% of the business value of companies like Caterpillar and Accenture.
  - Brands account for over 60% of the business value of companies like Coca-Cola and Burberry.
- Higher perceived quality of the brand is positively associated with stock returns.[2]
- Higher brand value is significantly associated with market valuation.[3]
- Higher measured brand value is positively linked to expected excess returns.[4]

1. Aaker (2014)15–21, 2. Aaker and Jacobson (1994), 3. Barth et al. (1998),
4. Boustanifar and Kang (2024)

2. **Previous research on trademark rights**

2. Previous research on trademark rights

Elements of brand

①Name AMAZON(reg# 4409031)

②Color  (reg# 6021308)

③Logo  (reg# 2332340)

④Character  (reg# 4397232)

⑤Jingle 

(reg# 5984020)

⑥Style  (reg# 6774017)

⑦Package  (reg# 5384525)

Trademark right

Based on Ishii et al. (2013) and data from J-PlatPat.

2. Previous research on trademark rights

- A trademark is a combination of a mark and designated goods or services.
- Different goods or services have different trademark rights, even with the same mark.
- For example, the marks "Asahi" for the designated good "newspaper" and "Asahi" for the designated service "shoes" represent different trademarks.
- Goods and services are classified into 45 categories: Categories 1 to 34 are for goods, and Categories 35 to 45 are for services.[5]
- Trademark rights can be renewed every 10 years.

5 Japan Patent Office（2023b）

2. Previous research on trademark rights

- Trademark information is positively correlated with market value.[6]
- Brand assets (trademark information) reduce bankruptcy risk.[7]
- In Europe, greater trademark breadth is positively associated with higher IPO(Initial Public Offering) valuations.[8]
- In the U.S., firms with a higher number of registered trademarks experience a lower cost of equity capital.[9]

6.Ide and Takehara（2020）7.Ide and Takehara（2021）
8. Fisch et al. (2022) 9. Yang et al. (2023)

2. Previous research on trademark rights

Eq.(5) from Ide and Takehara (2020)

$$MB_{i,t} - 1 = \alpha + \beta_1 ROE_{i,t+1} + \beta_2 \frac{NT_{i,t}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t}$$

$MB_{i,t}$: Market-to-Book Ratio, $ROE_{i,t+1}$: Return on Equity,
$NT_{i,t}$: Number of Trademarks, $dNT_{i,t}$: Change in Number of Trademarks
$BV_{i,t}$: Book Value of Equity, $DY_{i,j,t}$:Year Dummy
Observation Period: 10 years from 2007 to 2016

Trademark data is provided by Kudo & Associates.
The observed target companies are unknown.

2. Previous research on trademark rights

Result of eq.(5) by Ide and Takehara(2020)

NTBV (Number of Trademarks / Book Value of Equity) positively affects the Market-to-Book Ratio, even when ROE is used as a control variable.

	Coef.	*p*-value
INTC	0.354	0.000
ROE	5.452	0.000
NTBV	25.442	0.000
R-sq.	0.350	

Fig.3: Ide and Takehara (2020)

3. **Data cleaning for trademark rights**

3. **Data cleaning for trademark rights**

Two trademark datasets were prepared for this study:

1. **Trademark Data Provided by National Institute of Science and Technology Policy (NISTEP)**
   - Cleaned data from January 2000 to December 2013.

2. **Trademark Data Provided by the Japan Patent Office (JPO)**
   - Not yet cleaned data from 1902 to December 2023.

This study used 10 years of data up to 2013, aligning with Ide and Takehara (2020).

3. **Data cleaning for trademark rights**

	Result of NISTEP's data		Result of eq. (5) by Ide and Takehara (2020)	
	Coef	**P-Value**	**Coef**	**P-Value**
Constant	-0.069	0.000	0.354	0.000
ROE	6.379	0.000	5.452	0.000
NTBV	35.665	0.000	25.442	0.001
R-Square	0.401		0.350	

$$MB_{i,t} - 1 = \alpha + \beta_1 ROE_{i,t+1} + \beta_2 \frac{NT_{i,t}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t}$$

Eq.(5) from Ide and Takehara (2020)

3. **Data cleaning for trademark rights**

Trademark Data Provided by the JPO (JPO's data)

- Not yet cleaned data from 1902 to December 2023.
- Contains 22 tables related to registered trademarks.

For examples

- **Right Holders Data**:
  - 5,369,073 records
  - 789,123 unique records
- **Trademark Data**:
  - 5,307,348 records

3. **Data cleaning for trademark rights**

- **Challenges with JPO's Data**
  - There are numerous typos and inconsistencies in the notation.
  - Trademark holders must pay a fee to JPO to correct those errors.
  - Fees are also required to transfer trademark rights.

- **Other Challenges**
  - Difficulty in selecting keys to merge with financial information databases.
  - The number of registered trademarks differs from the information published by JPO.

3. **Data cleaning for trademark rights**

Garbling

```
select_df = namelist("花王")
print(select_df)
```

	name	number
0	花王株式会社	21912
96	花王石鹸株式会社	3270
2988	花王石?鹸?株式会社	173
7165	ニベア花王株式会社	73
35928	花王アトラス株式会社	16
72433	花王石?けん?株式会社	8
85791	株式会社東京花王園	7
96627	花王クエーカー株式会社	6
111608	花王ドロップ工業株式会社	5
584188	花王プロフェッショナル・サービス株式会社	1
608529	花王鹸株式会社	1
626156	花王石鹸株会社	1
728110	花王石鹸?株式会社	1

Typos

```
select_df = namelist("武田薬品")
print(select_df)
```

	name	number
27	武田薬品工業株式会社	9183
321341	武田薬品株式会社	2
390805	武田薬品工業株社	1
409722	武田薬品工業株式会社社	1

Inconsistent notation

```
strings_to_search = ["セブン", "イレブン"]
select_df = namelist(strings_to_search)
print(select_df)
```

	name	number
1204	株式会社セブン□イレブン・ジャパン	403
4866	株式会社セブン□イレブン・ジャパン	107
9150	株式会社セブン□イレブン・ジャパン	58
47636	株式会社セブン−イレブン・ジャパン	12
350564	株式会社セブン-イレブン・ジャパン	2
359878	株式会社セブン　ー　イレブン・ジャパン	2
608169	株式会社セブンーイレブン・ジャパン	1
683507	株式会社　セブンーイレブン・ジャパン	1

Extra spaces

```
strings_to_search = ["資", "生", "堂"]
select_df = namelist(strings_to_search)
print(select_df)
```

	name	number
11	株式会社資生堂	12923
56	株式会社□資生堂	5052
2606	資生堂プロフェッショナル株式会社	196
13240	株式会社ファイントゥデイ資生堂	41
54198	合資会社邑田資生堂	11
60651	株式会社エフティ資生堂	9
76746	株式会社　資　生　堂	8
83853	資生堂化工株式会社	7
141230	資生堂ホネケーキ工業株式会社	4
183983	資生堂開発株式会社	3
573764	合資会社更生堂薬局	1
762891	株　式　会　社　資　生　堂	1

3. **Data cleaning for trademark rights**

Before

```
# right_person_nameの値とその個数をカウント
df_name = df['right_person_name'].value_counts().reset_index()
df_name.columns = ['name', 'number']

# 結果の表示
print(df_name)
```

```
                                    name  number
0                                 花王株式会社   21912
1                              松下電器産業株式会社   20515
2                                 鐘紡株式会社   17555
3                                キヤノン株式会社   17284
4                                株式会社サンリオ   16982
...                                  ...     ...
789118                           株式会社ジョートー       1
789119                              浅野　由行       1
789120                              楊　卓程       1
789121                              島津　祐介       1
789122  フレキシ-ボグダーン　テクニク　ゲーエムベーハー　ウント　コンパニー　カーゲー       1

[789123 rows x 2 columns]
```

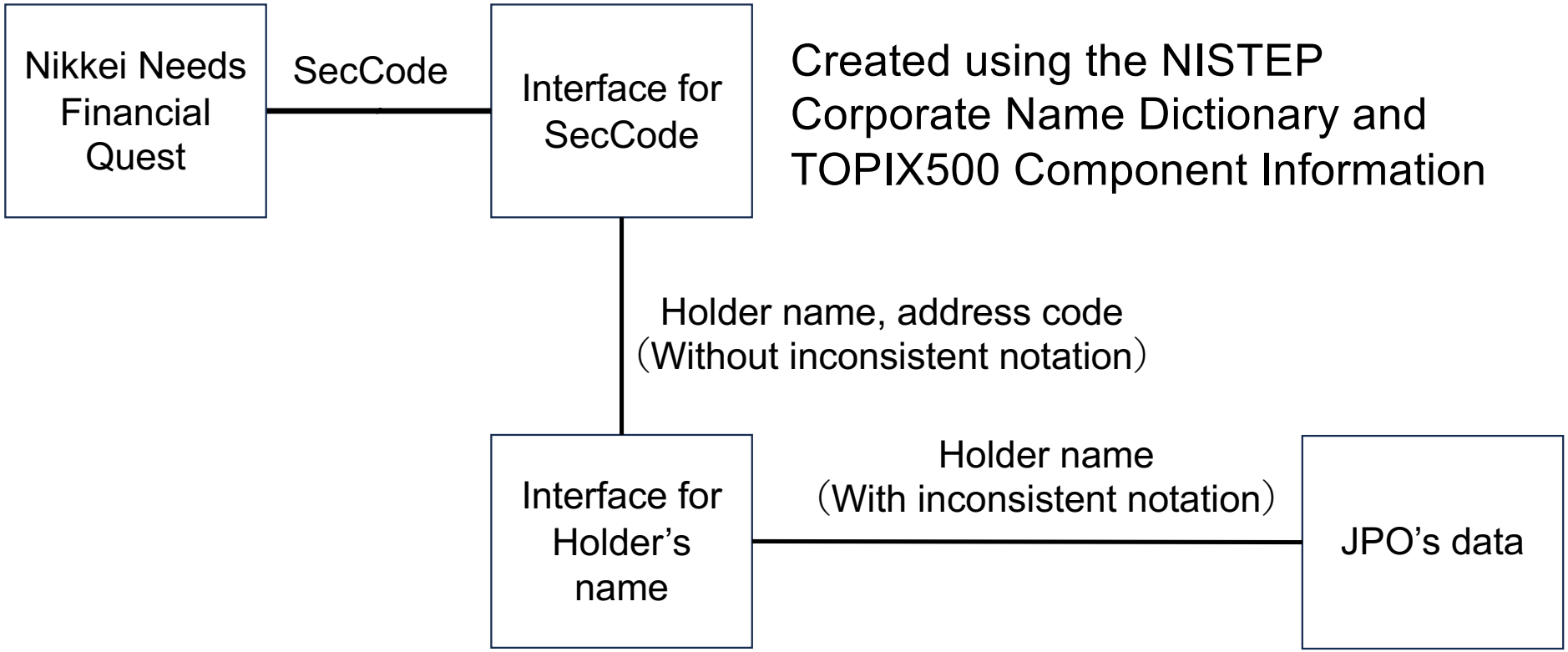
After

```
# right_person_nameの値とその個数をカウント
df_name = df['modified_right_person_name'].value_counts().reset_index()
df_name.columns = ['name', 'number']

# 結果の表示
print(df_name)
```

```
                                    name  number
0                                 花王株式会社   21913
1                              松下電器産業株式会社   20516
2                                株式会社資生堂   17984
3                                 鐘紡株式会社   17567
4                                キヤノン株式会社   17292
...                                  ...     ...
734829          ヒランデリアサルバドレナソシエダドアノニマ       1
734830               ミグエルベリドソシエダアノニマ       1
734831  オラクルオーティーシーサブシダイアリーエルエルシー       1
734832                          大町町商工会       1
734833                             竹内美幸       1

[734834 rows x 2 columns]
```

The number of records decreased from 789,123 to 734,834 (a reduction of 54,289 records).

3. **Data cleaning for trademark rights**



3. **Data cleaning for trademark rights**

	Result of JPO's data		Result of eq. (5) by Ide and Takehara (2020)	
	Coef	**P-Value**	**Coef**	**P-Value**
Constant	0.926	0.091	0.354	0.000
ROE	6.385	0.000	5.452	0.000
NTBV	8.425	0.019	25.442	0.001
R-Square	0.397		0.350	

$$MB_{i,t} - 1 = \alpha + \beta_1 ROE_{i,t+1} + \beta_2 \frac{NT_{i,t}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t}$$

Eq.(5) from Ide and Takehara(2020)

3. **Data cleaning for trademark rights**

Reasons for Differences in Coefficients

1.Differences in Target Firms

- This study analyzes 457 non-financial TOPIX500 firms.
- Ide and Takehara (2020) focus on firms with many trademarks.

2.Differences in Trademark Distribution

- This study has a narrower range of trademarks with less variation.
- The distribution of trademark data in Ide and Takehara (2020) is broader and significantly influenced by outliers.

4. **Analysis of trademark rights on corporate value**

4. Analysis of trademark rights on corporate value

$NT_{i,t}$ is decomposed as follows.

$$NT_{i,t} = NT_{i,t-1} + dNT_{i,t}$$

$$NT_{i,t} = NT_{i,t-2} + dNT_{i,t} + dNT_{i,t-1}$$

$$NT_{i,t} = NT_{i,t-3} + dNT_{i,t} + dNT_{i,t-1} + dNT_{i,t-2}$$

4. Analysis of trademark rights on corporate value

Analysis of the relationship registration timing and MB

$$MB_{i,t} = \alpha + \beta_1 ROE_{i,t} + \beta_2 \frac{NT_{i,t}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.4)$$

$$MB_{i,t} = \cdots + \beta_2 \frac{NT_{i,t-1}}{BV_{i,t}} + \beta_3 \frac{dNT_{i,t}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.5)$$

$$MB_{i,t} = \cdots + \beta_2 \frac{NT_{i,t-2}}{BV_{i,t}} + \beta_3 \frac{dNT_{i,t}}{BV_{i,t}} + \beta_4 \frac{dNT_{i,t-1}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.6)$$

$$MB_{i,t} = \cdots + \beta_2 \frac{NT_{i,t-3}}{BV_{i,t}} + \beta_3 \frac{dNT_{i,t}}{BV_{i,t}} + \beta_4 \frac{dNT_{i,t-1}}{BV_{i,t}} + \beta_5 \frac{dNT_{i,t-2}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.7)$$

$MB_{i,t}$: Market-to-Book Ratio, $ROE_{i,t}$: Return on Equity, $NT_{i,t}$: Number of Trademarks, $dNT_{i,t}$ Change in the Number of Trademarks, $BV_{i,t}$: Book Value of Equity, $DY_{i,j,t}$:Year Dummy

Observation Period: 10 years from 2004 to 2013

4. Analysis of trademark rights on corporate value

	eq.(4.4)		eq.(4.5)		eq.(4.6)		eq.(4.7)	
	Coef	P-Value	Coef	P-Value	Coef	P-Value	Coef	P-Value
ROE	5.845	0.000	5.832	0.000	5.826	0.000	5.817	0.000
NTBV	15.810	0.000						
NTBV_1			15.548	0.000				
NTBV_2					14.411	0.000		
NTBV_3							12.875	0.000
dNTBV			**345.879**	0.000	**172.049**	0.000	128.993	0.075
dNTBV_1					**233.891**	0.000	84.745	0.227
dNTBV_2							257.175	0.000

Clustered standard errors are used, where **bold red text indicates 1% significance** and **bold text indicates 5% significance**.

4. Analysis of trademark rights on corporate value

Analysis of nonlinear effect of trademark

$$MB_{i,t} = \alpha + \beta_1 ROE_{i,t} + \beta_2 \frac{NT_{i,t-1}}{BV_{i,t}} + \beta_3 \left(\frac{dNT_{i,t}}{BV_{i,t}}\right)^2 + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.10)$$

$$MB_{i,t} = \alpha + \beta_1 ROE_{i,t} + \beta_2 \frac{NT_{i,t-2}}{BV_{i,t}} + \beta_3 \left(\frac{dNT_{i,t}}{BV_{i,t}}\right)^2 + \beta_4 \left(\frac{dNT_{i,t-1}}{BV_{i,t}}\right)^2 + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.11)$$

$$MB_{i,t} = \alpha + \beta_1 ROE_{i,t} + \beta_2 \frac{NT_{i,t-3}}{BV_{i,t}} + \beta_3 \left(\frac{dNT_{i,t}}{BV_{i,t}}\right)^2 + \beta_4 \left(\frac{dNT_{i,t-1}}{BV_{i,t}}\right)^2 + \beta_5 \frac{NT_{i,t-2}}{BV_{i,t}} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.12)$$

$MB_{i,t}$: Market-to-Book Ratio, $ROE_{i,t}$: Return on Equity,

$NT_{i,t}$: Number of Trademarks, $dNT_{i,t}$ Change in the Number of Trademarks

$BV_{i,t}$: Book Value of Equity, $DY_{i,j,t}$:Year Dummy

Observation Period: 10 years from 2004 to 2013

4. Analysis of trademark rights on corporate value

	eq.(4.10)		eq.(4.11)		eq.(4.12)	
	Coef	P-Value	Coef	P-Value	Coef	P-Value
ROE	5.897	0.000	5.880	0.000	5.753	0.000
NTBV						
NTBV_1	−6.848	0.172				
NTBV_2			−17.194	0.001		
NTBV_3					−20.849	0.000
$dNTBV^2$	**$6.001*10^5$**	0.000	**$4.943*10^5$**	0.000	**$5.025*10^5$**	0.000
$dNTBV\_1^2$			**$3.256*10^5$**	0.000	**$5.190*10^5$**	0.000
dNTBV_2					**433.161**	0.000

Clustered standard errors are used, where **bold red text indicates 1% significance** and **bold text indicates 5% significance**.

4. Analysis of trademark rights on corporate value

We evaluate four dependent variables; ROE, Margin, Turnover, Leverage.

$$Y_{i,t} = \alpha + \beta_1 \ln MV_{i,t} + \beta_2 BM_{i,t} + \beta_3 DR_{i,t} + \beta_4 FDR + \beta_5 Age_{i,t} + \beta_6\, NTBV_{i,t} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.13)$$

$$Y_{i,t} = \cdots + \beta_6\, NTBV_{i,t-1} + \beta_7\, dNTBV_{i,t} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.14)$$

$$Y_{i,t} = \cdots + \beta_6\, NTBV_{i,t-2} + \beta_7\, dNTBV_{i,t} + \beta_8\, dNTBV_{i,t-1} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.15)$$

$$Y_{i,t} = \cdots + \beta_6\, NTBV_{i,t-3} + \beta_7\, dNTBV_{i,t} + \beta_8\, dNTBV_{i,t-1} + \beta_9\, dNTBV_{i,t-2} + \sum_{j=1}^{9} \gamma_j DY_{i,j,t} + \epsilon_{i,t} \quad (4.16)$$

$ROE_{i,t}$: Return of Equity, ln $MV_{i,t}$: Logarithm of Market Capitalization, $BM_{i,t}$: Book-to-Market Ratio,

$DR_{i,t}$: Debt Ratio, FDR : Foreign Dependency Rati, $BV_{i,t}$: Firm Maturity, $NT_{i,t}$: Number of Trademarks,

$dNT_{i,t}$ Change in the Number of Trademarks, $DY_{i,j,t}$:Year Dummy Observation Period: 10 years from 2004 to 2013

4. Analysis of trademark rights on corporate value

Result for ROE

	eq.(4.13)		eq.(4.14)		eq.(4.15)		eq.(4.16)	
	Coef	**P-Value**	**Coef**	**P-Value**	**Coef**	**P-Value**	**Coef**	**P-Value**
NTBV	**−1.246**	0.000						
NTBV_1			**−1.218**	0.001				
NTBV_2					**−1.165**	0.001		
NTBV_3							**−1.154**	0.001
dNTBV			0.863	0.849	9.133	0.148	9.404	0.141
dNTBV_1					11.782	0.047	−10.669	0.119
dNTBV_2							−2.612	0.656

Clustered standard errors are used, where **bold text indicates 5% significance**.

4. Analysis of trademark rights on corporate value

Result for Margin (Net Profit Margin)

	eq.(4.13)		eq.(4.14)		eq.(4.15)		eq.(4.16)	
	Coef	**P-Value**	**Coef**	**P-Value**	**Coef**	**P-Value**	**Coef**	**P-Value**
NTBV	**−122.712**	0.000						
NTBV_1			**−112.689**	0.000				
NTBV_2					−106.639	0.000		
NTBV_3							−104.304	0.000
dNTBV			532.690	0.066	854.471	0.034	838.124	0.040
dNTBV_1					−493.189	0.191	−556.237	0.203
dNTBV_2							47.470	0.899

Clustered standard errors are used, where **bold red text indicates 1% significance** and **bold text indicates 5% significance** and red text indicates 10% significance.

4. Analysis of trademark rights on corporate value

Result for Turnover (Total asset turnover ratio)

	eq.(4.13)		eq.(4.14)		eq.(4.15)		eq.(4.16)	
	Coef	P-Value	Coef	P-Value	Coef	P-Value	Coef	P-Value
NTBV	**14.233**	0.000						
NTBV_1			**13.348**	0.000				
NTBV_2					**12.823**	0.000		
NTBV_3							**12.698**	0.000
dNTBV			−43.298	0.130	−32.582	0.412	−28.524	0.478
dNTBV_1					−6.014	0.872	8.399	0.845
dNTBV_2							−16.979	0.645

Clustered standard errors are used, where **bold text indicates 5% significance**.

4. Analysis of trademark rights on corporate value

Result for Leverage (Financial leverage)

	eq.(4.13)		eq.(4.14)		eq.(4.15)		eq.(4.16)	
	Coef	P-Value	Coef	P-Value	Coef	P-Value	Coef	P-Value
NTBV	0.372	0.764						
NTBV_1			−0.021	0.986				
NTBV_2					0.113	0.927		
NTBV_3							0.113	0.926
dNTBV			−37.690	0.016	-19.967	0.360	-23.676	0.283
dNTBV_1					-23.133	0.258	-37.174	0.116
dNTBV_2							24.150	0.233

5. Conclusion

- dNTBV may have a positive impact on MB.
- dNTBV_1 may have a positive impact on MB.
- These results may indicate a non-linear effect.
- dNTBV may have a positive impact on Margin.
- These findings support the notion that newly registered trademarks hold value.

5. Conclusion (future works)

1. Improving data cleaning and matching accuracy.
2. Examining time-series effects.
3. Investigating the impact of trademark classifications and the number of classifications.
4. Analyzing the impact of trademarks by industry.
5. Evaluating the qualitative aspects of trademarks.
6. Exploring the relationship with other intellectual property rights.

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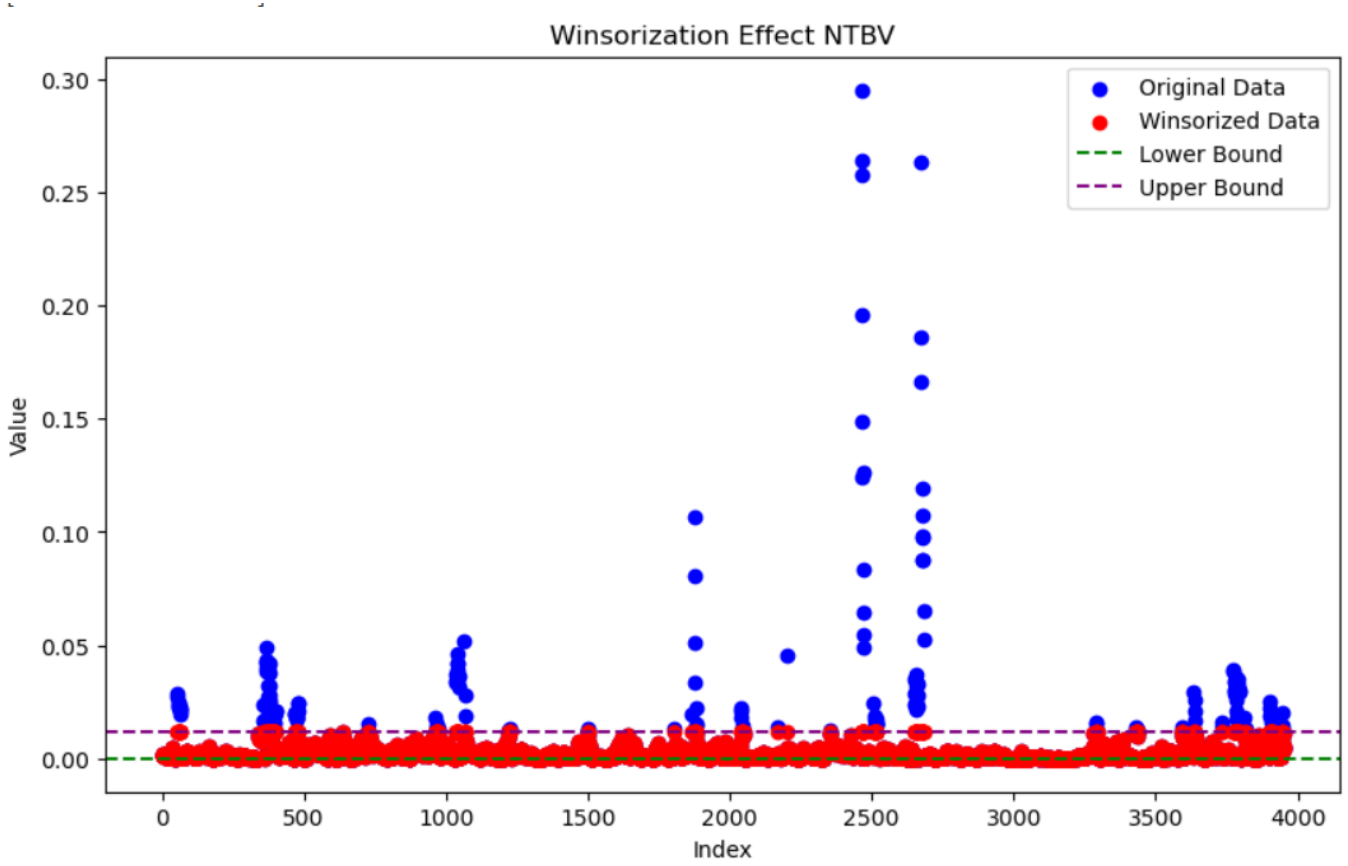
——— (2023b)「類似商品・役務審査基準〔国際分類第 12-2024 版対応〕」.

Number of trademark rights

	This study	Ide and Takehara(2020)
Average	545	810
Standard deviation	924	1241
Min	0	5
25%	55	129
Medium	202	382
75%	591	892
Max	10658	11643

NT/BV


Winsorization Effect NTBV
Original Data
Winsorized Data
Lower Bound
Upper Bound
Value
Index
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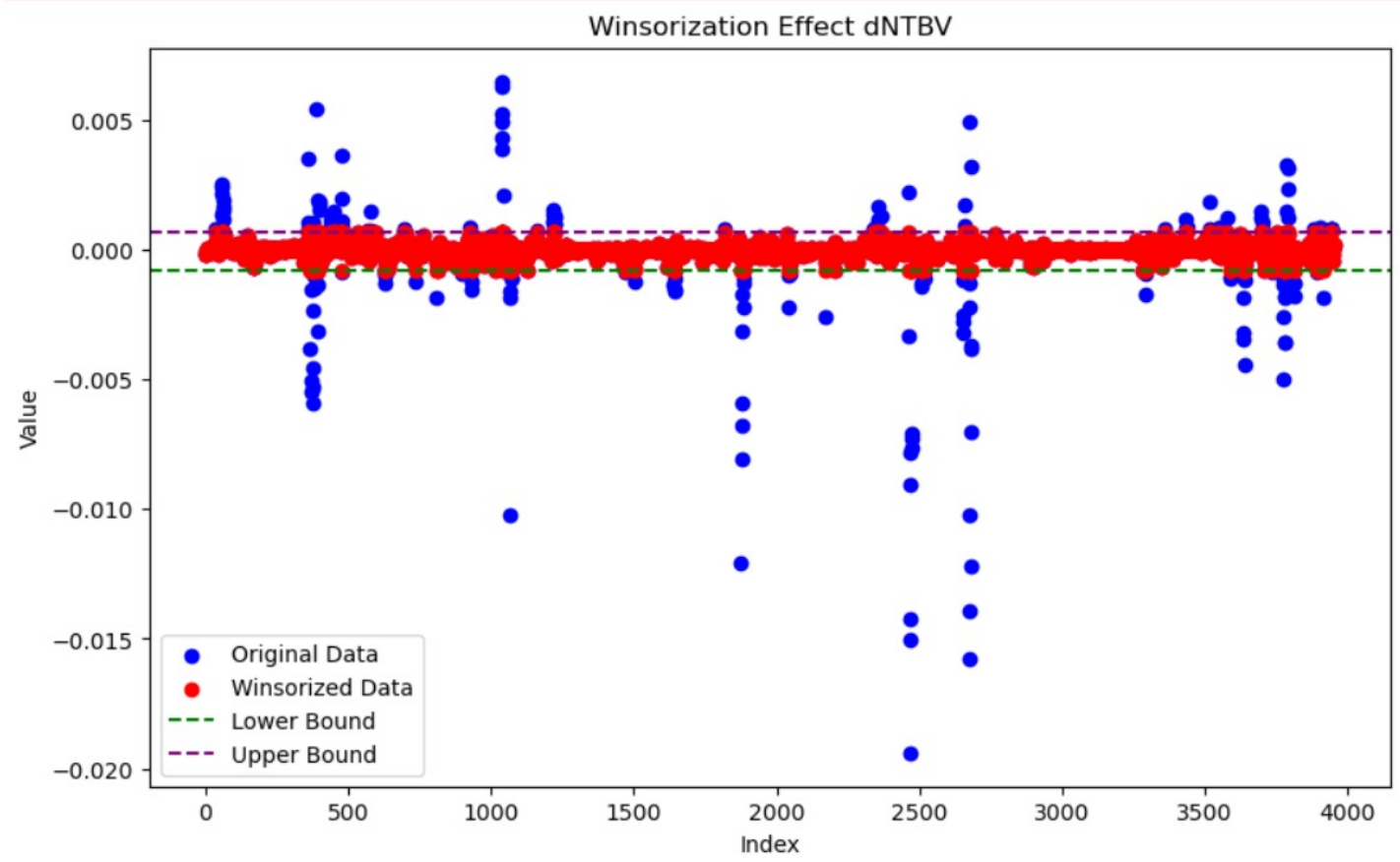
0.25
0.20
0.15
0.10
0.05
0.00
0
500
1000
1500
2000
2500
3000
3500
4000

dNT/BV


Winsorization Effect dNTBV
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0.000
−0.005
−0.010
−0.015
−0.020
Value
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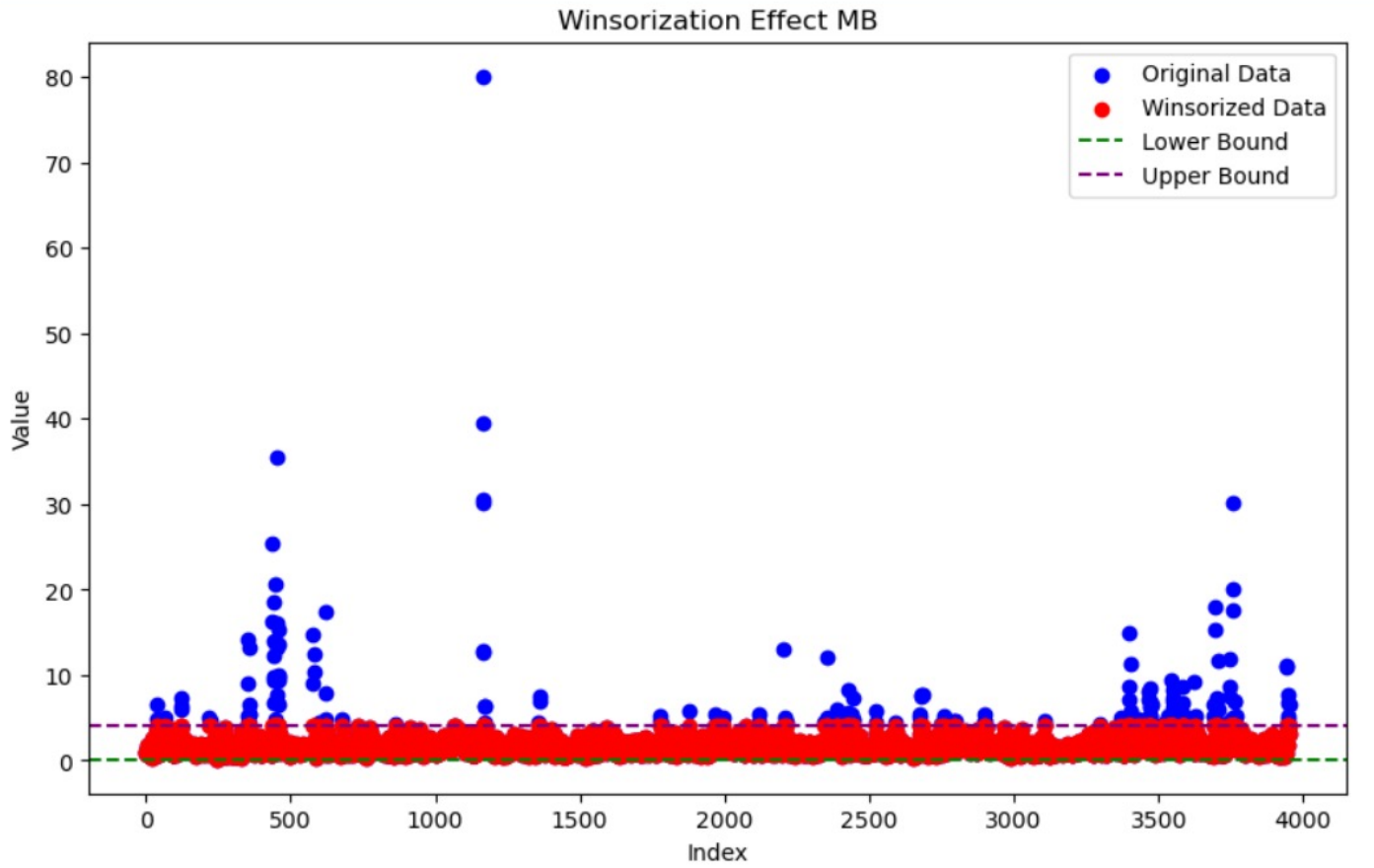
500
1000
1500
2000
2500
3000
3500
4000
Index
Original Data
Winsorized Data
Lower Bound
Upper Bound

MB


Winsorization Effect MB
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Winsorized Data
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Upper Bound
Value
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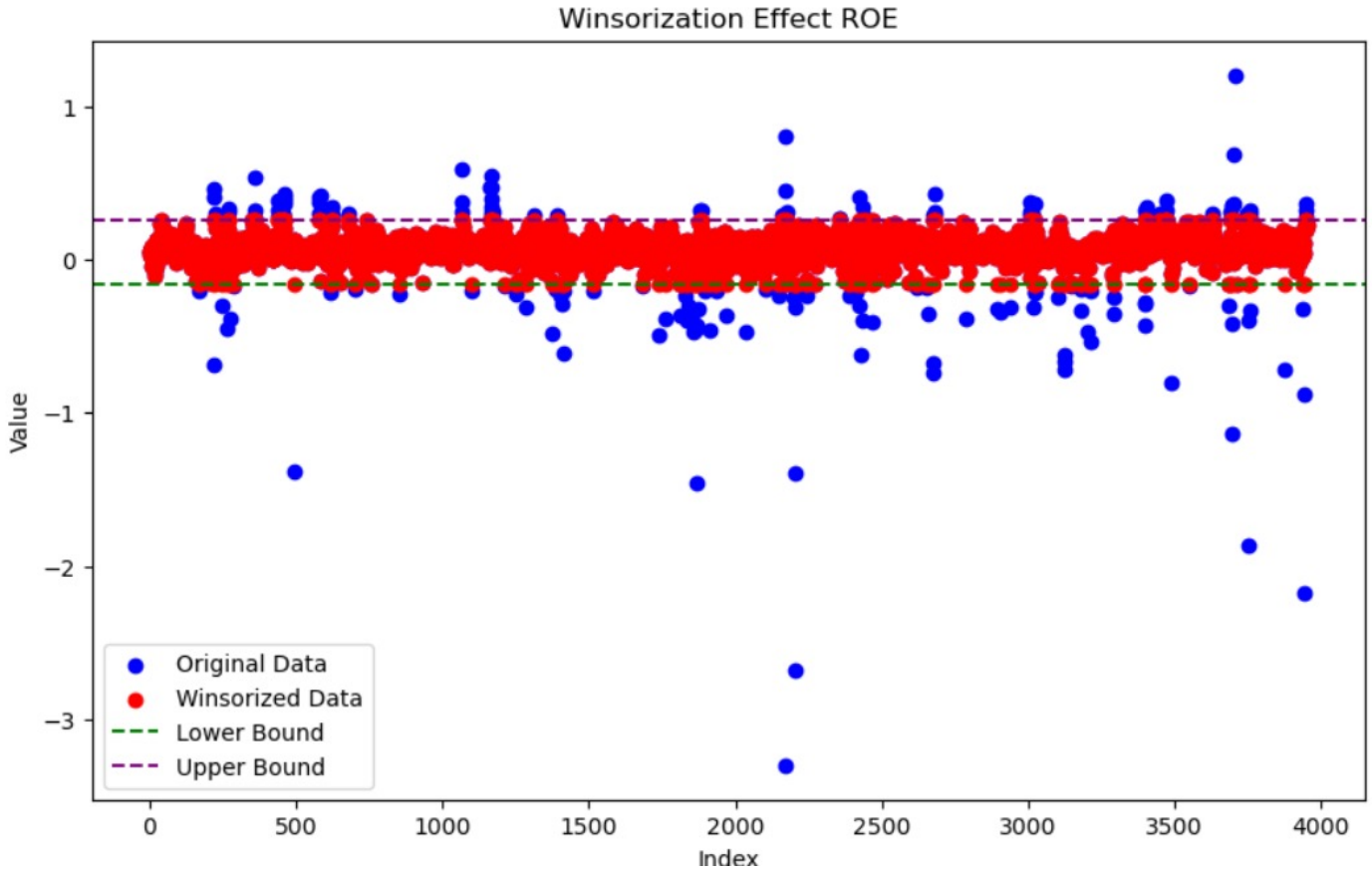
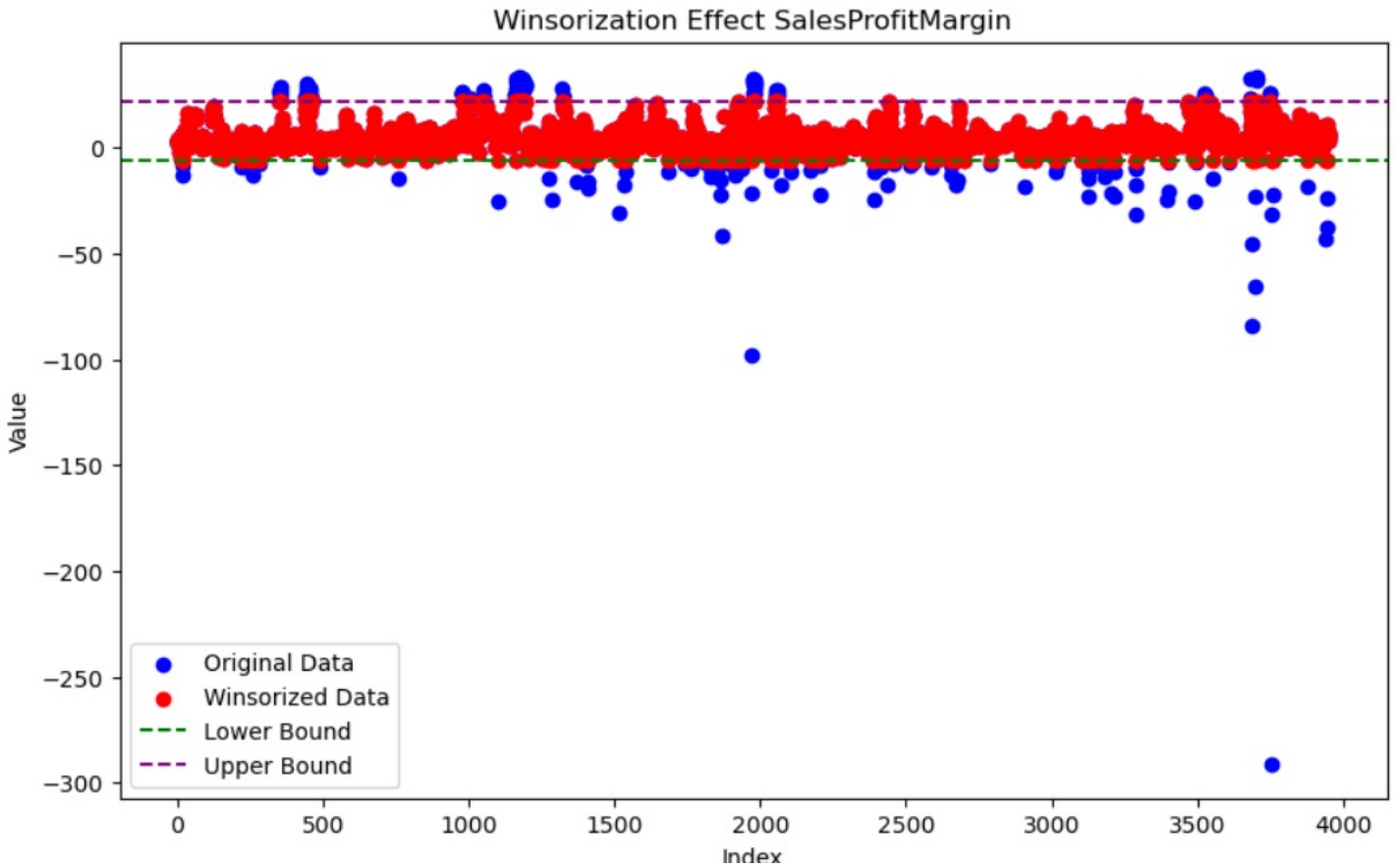
3500
4000

Return of Equity



Sales profit margin



参考：仮説１の検証案

- 商標権は、10年ごとに更新する。更新する商標権は価値があると考えられる。
- 先行文献では、更新されている商標権を有名商標としている。
- 商標権を以下のように２つに分けて分析することが考えられる。
  1. １回以上更新された商標権と、10年以内に登録された商標権
  2. ２回以上更新された商標権と、20年以内に登録された商標権