Case study of impacts of entry of large-scale retail establishments on existing stores in Japan

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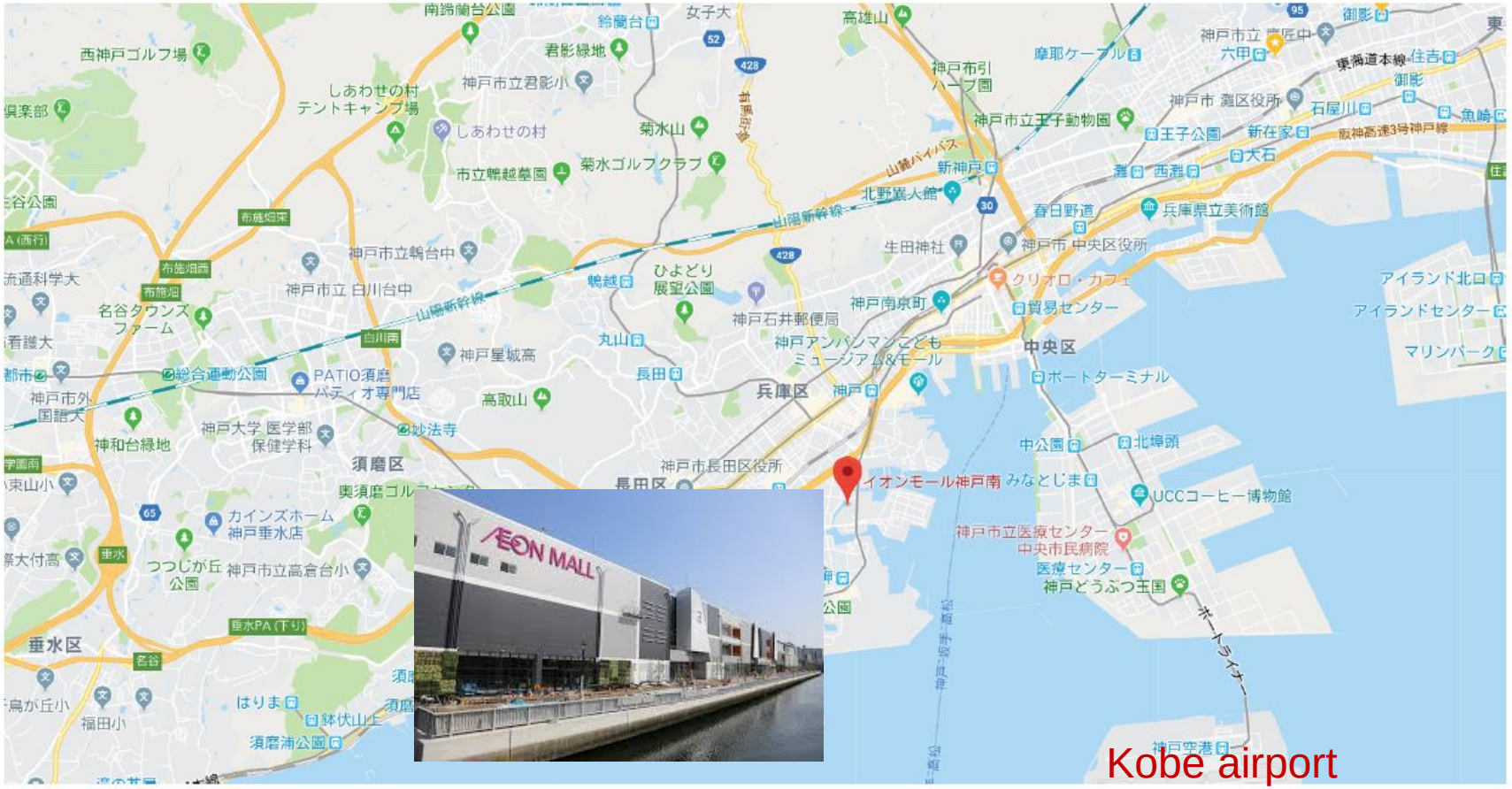
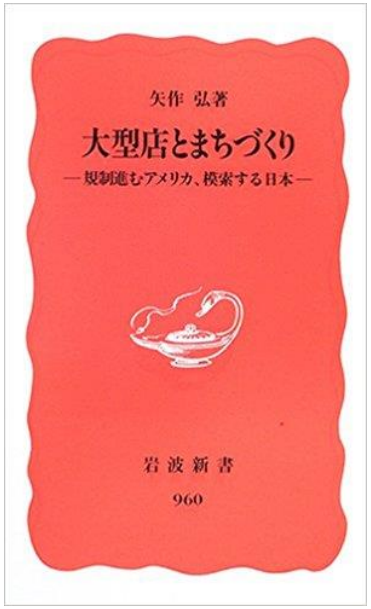
Kobe municipality invite a large-scale shopping center

Kobe University



Why invite ?

1. “Increase of property tax”
2. “Increase of number of employees”
3. “Increase of shopping opportunity”



Competition of retail sector is “Zero-sum”

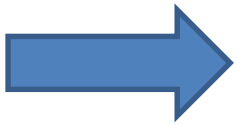
Bonanno and Goetz (2012) “WalMart and Local Economic Development A Survey”

…, evidence is found of both positive and negative effects, suggesting that we are still far from truly understanding the net effect of WalMart on local economies, let alone the overall consequences in the long run.

Limitation of case studies in Japan

- With small sample size.
- Focusing on one or a few districts.
- Finding is mixed (both negative and positive).
- Old. Most of them are conducted in 1980s.

- Matsuura and Motohashi (2006): Focused only on the short range impact with respect to time period (< 6 years) and space (< 1km).



We are still far from truly understanding the net effect

Revision of the “Act on the Measures by Large-Scale Retail Stores for Preservation” in 2006

- Large-scale retail establishments (floor space > 10000m^2) can newly enter only to:
  - (1) Commercial districts,
  - (2) Neighborhood commercial districts, and
  - (3) Quasi-industrial districts.
- In addition, Hyogo prefecture, (to which Kobe City belong to), has own policy (ordinance).

“Land use program to control and regulate the locations of large-scale retail stores”

大規模な集客施設の立地誘導・抑制に係る広域土地利用プログラム

Land use program (Ordinance) by Hyogo Prefecture

Hyogo Pref.

Floor size

床面積	広域商業ゾーン	準広域商業ゾーン	地域商業ゾーン	その他の地域
20,000㎡以上	立地可能	立地不可能	立地不可能	立地不可能
10,000㎡以上		立地可能		
6,000㎡以上			立地可能	

"*Land use program to control and regulate the locations of large-scale retail stores*"

大規模な集客施設の立地誘導・抑制に係る広域土地利用プログラム

Hirano and Okai (2016): 2008~2015 observed three cases of entry to the other zones

Objective

- Impact assessment of entry of large-scale retail establishments:
  - On exit
  - On sales of incumbents
  - By time periods and by size of entrants
- Evaluate the validity of UK type "Town Centre First" approach adopted in Hyogo.

  ⇒ Is it right direction ?

Data & Study area

- We examined the impacts of the entry of large-scale retail establishments on the sales and exits of existing local
  (1) clothing store or (2) grocery store
- Micro data from the “Japanese Census of Commerce”
- Study period: 1997, 2002, 2004, 2007, 2014
- Study area: Hyogo and Osaka prefectures

Definition of Large-scale retail establishments:
"Department stores and general merchandise supermarkets”
in the category of census of commerce, Japan.

Building panel dataset

- Attributes for each store:
  - Sales, Address, Number of employees, Opening year, Floor size, and Neighborhood environment
  - Neighborhood environment
    1. Commercial stock districts
    2. Office districts
    3. Residential districts
    4. Industrial districts
    5. Other districts

1-A: Around train station,
1-B: Urban center,
1-C : Hinterland of residential,
1-D: Roadside stores,
1-E: Others

Model:
Cobb–Douglas functional from

$$lnS_{it} = \alpha_l lnl_{it} + \alpha_k lnk_{it} + \alpha_p\, lnp_{it} + \beta_t + \gamma_i + \varepsilon_{it}.$$

Sales (Yen), # of employees Floor size (m^2) Fixed effects Error

i : Store, t : Year

Take time differences

- a: (after entry), b: (before entry)
- $\ln(S_{ia}/S_{ib})$

$$= \alpha_l \ln\left(\frac{l_{ia}}{l_{ib}}\right) + \alpha_k \ln\left(\frac{k_{ia}}{k_{ib}}\right) + \alpha_p \ln\left(\frac{p_{ia}}{p_{ib}}\right) +$$

$$\underbrace{(\beta_a - \beta_b)}_{\tilde{\beta}} + \underbrace{(\varepsilon_{ia} - \varepsilon_{ib})}_{\tilde{\varepsilon}_{1i}} + \cancel{(\gamma_{ia} - \gamma_{ib})}.$$

Time invariant store level factor is removed

$$\tilde{\varepsilon}_{1i} \sim N(0, \sigma_1^2)$$

p_{it}: Controlling self-selection

- A large-scale shopping store may self-select a location:
  - With larger demand potential (i.e., population)
  - With smaller competition (i.e., rivals)

- We need to control such effects.
- Or, entry effect will become positive by capturing the sales increase by population growth.

Nakamura and Takatsuka (2009)
"Retail potential":

- $p_{it} = \sum_{j=1}^{J} \left[\frac{N_{jt}/d_{ji}}{\sum_{r=1}^{J} n_{rt}/d_{rj}} \right]$.

Population potential

Spatial competition

N_{jt}: Population of (around) 1km^2 grid j ($j = 1, \ldots, J$)

d_{ji}: Distance between shop i and grid j

n_{rt}: Number of rivals (i.e., grocery or clothing) at grid r ($r = 1, \ldots, J$)

d_{rj}: Distance between grid r and grid j

"Retail potential":

Population potential discounted by the degree of spatial competition

中村・高塚(2009): 都市の空間構造と小売り販売額の分布
ーNEG ポテンシャルモデルによる分析ー, RIETI.

DID model

- $$\ln\left(S_{ia}/S_{ib}\right) = \tilde{\beta} + \alpha_l \ln\left(\frac{l_{ia}}{l_{ib}}\right) + \alpha_k \ln\left(\frac{k_{ia}}{k_{ib}}\right) + \alpha_p \ln\left(\frac{p_{ia}}{p_{ib}}\right) + \sum_{\omega=1}^{W} \alpha_\omega (entry_{i\omega}) + \tilde{\varepsilon}_{1i}.$$

- $entry_{i\omega}$: Takes 1 if distance from shop *i* to an entrant is within distance band ω
- Distance bands ：< 500m, 500~1000m, 1000~2000m, 2000~5000m, 5000~10000m, 10000~20000m, and 20000m≧ (baseline)
  - $\alpha_\omega > 0$: Substitutive (i.e., entry is associated with the increase of sales of the existing stores)
  - $\alpha_\omega < 0$: Complementary (i.e., entry is associated with the decrease of sales of the existing stores)

Considering sample selection

- In this model, only samples observed both before and after period (i.e., those did not exit between this period) is used.

- Missing not at random.

→ Sample selection bias

Finally, the model we estimate

- Sales model:
  - $\ln\left(S_{ia}/S_{ib}\right) = \tilde{\beta} + \alpha_l \ln\left(\frac{l_{ia}}{l_{ib}}\right) + \alpha_k \ln\left(\frac{k_{ia}}{k_{ib}}\right) + \alpha_p \ln\left(\frac{p_{ia}}{p_{ib}}\right) + \sum_{\omega=1}^{W} \alpha_\omega (entry_{i\omega}) + \tilde{\varepsilon}_{1i}.$
- Survival model:
  - $y_i = \ddot{\beta} + \ddot{\alpha}_l \; l_{ib} + \ddot{\alpha}_k \; k_{ib} + \ddot{\alpha}_p \; p_{ib} + \sum_{\omega=1}^{W} \ddot{\alpha}_\omega \; (entry_{i\omega}) + \ddot{\varepsilon}_{2i}.$

(Survive: 1; Exit: 0)

$$\begin{bmatrix} \tilde{\varepsilon}_{1i} \\ \ddot{\varepsilon}_{2i} \end{bmatrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \rho\sigma_1 \\ \rho\sigma_1 & 1 \end{pmatrix}\right].$$

Estimation results

- Short term：
  - 02～04 (3)，04～07 (4)
- Medium term：
  - 97~02 (6)，97~04 (8)，02～07 (6)
- Long term：
  - 97~07 (11)，02～14 (11)，04～14 (13)，97～14 (18)

(.) denotes period.

Example

Impacts on clothing stores

（全体，1997～2002）

Survival model

存続・撤退	Estimate	Std. error	t value	Pr(> t)	
(Intercept)	0.5035	0.04831	10.421	< 2e-16	***
labor	-0.003034	0.001027	-2.953	0.00314	**
space	-0.00008023	0.00004675	-1.716	0.08614	.
potential	-0.000503	0.00009333	-5.389	7.09E-08	***
less than 00500m	-0.03549	0.1016	-0.349	0.72694	
less than 01000m	-0.1475	0.05877	-2.509	0.0121	*
less than 02000m	-0.1277	0.05693	-2.243	0.02488	*
less than 05000m	-0.1773	0.05394	-3.287	0.00101	**
less than 10000m	-0.2119	0.05276	-4.016	0.0000593	***
less than 20000m	-0.1513	0.05142	-2.943	0.00325	**
n	27960				

Sales model

売り上げ	Estimate	Std. error	t value	Pr(> t)	
(Intercept)	-0.9064	0.10963	-8.268	< 2e-16	***
log(labor change)	0.31092	0.0147	21.152	< 2e-16	***
log(space change)	0.1196	0.01117	10.703	< 2e-16	***
log(potential change)	0.73522	0.63548	1.157	0.24729	
less than 00500m	-0.09041	0.0945	-0.957	0.338683	
less than 01000m	-0.08969	0.05087	-1.763	0.077896	.
less than 02000m	-0.18242	0.04766	-3.827	0.00013	***
less than 05000m	-0.15283	0.04471	-3.418	0.000631	***
less than 10000m	-0.15985	0.04635	-3.449	0.000563	***
less than 20000m	-0.11141	0.04627	-2.408	0.016035	*
n'	15427				
sigma	1.021754	0.008708	117.33	<2e-16	***
rho	0.754843	0.0077	98.04	<2e-16	***

Majority impacts: On clothing stores

Impacts on survival of existing stores

		after			
		2002	2004	2007	2014
before	1997	Exit	—	Exit	Exit
	2002		Exit	Exit	Exit
	2004			Exit	Exit
	2007				Exit

Impacts on sales of existing stores

		after			
		2002	2004	2007	2014
before	1997	Decrease	— or Decrease	—	Increase
	2002		—	Increase	Increase
	2004			Increase	Increase
	2007				—

Impacts on survival of existing stores located around train stations

		after			
		2002	2004	2007	2014
before	1997	—	Exit	Exit	Exit
	2002		—	Exit	Exit
	2004			—	Exit
	2007				Exit

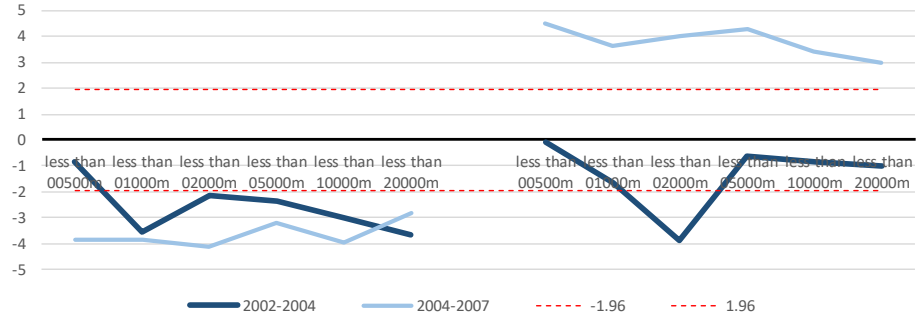
Impacts on sales of existing stores located around train stations

		after			
		2002	2004	2007	2014
before	1997	—	—	—	Increase
	2002		—	—	Increase
	2004			—	—
	2007				—

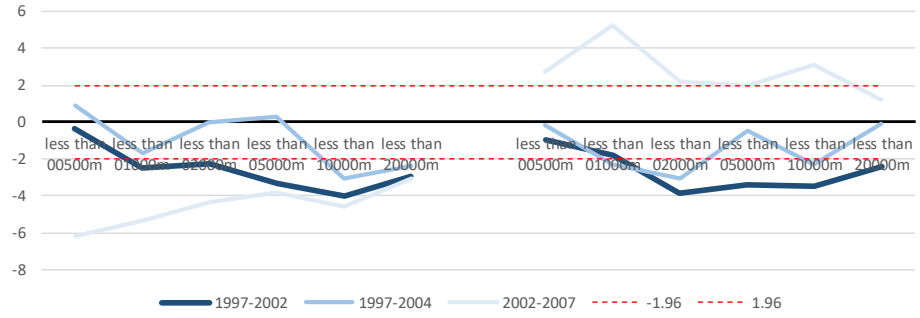
Impacts: On clothing stores by distance bands

Left (On exit); Right (On sales); All

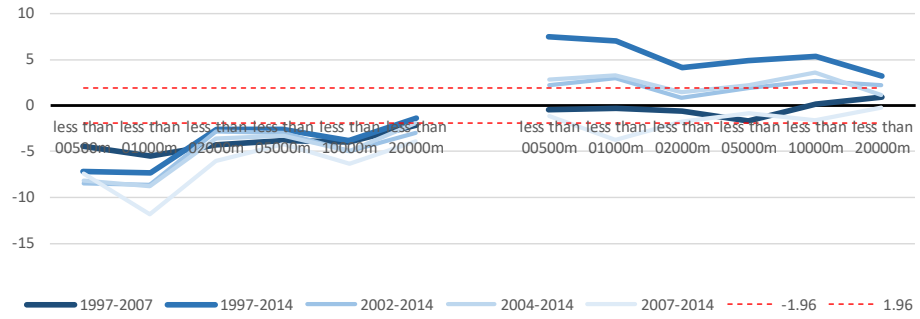
Short term



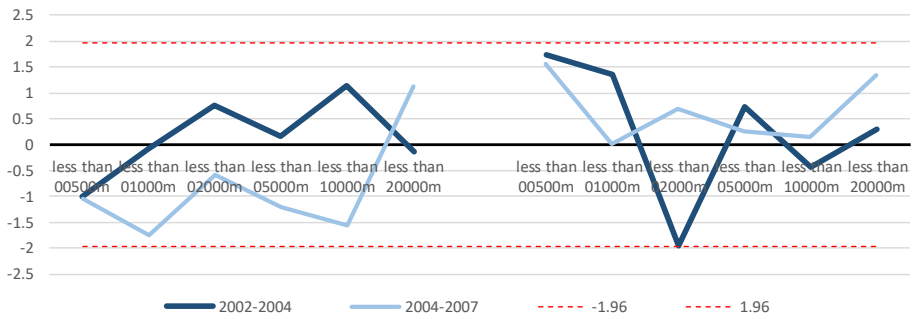
Middle term

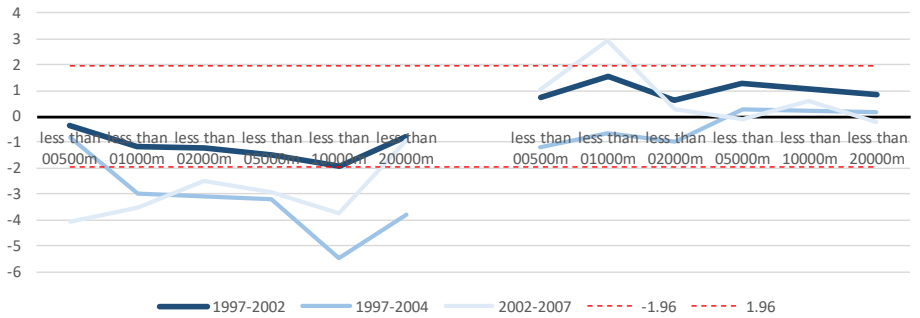


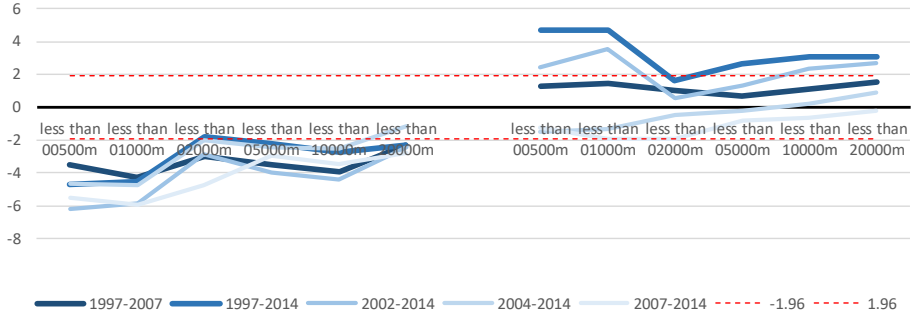
Long term



Left (On exit); Right (ON sales); Around station







Majority impacts: On grocery stores

Impacts on survival of existing stores

		after			
		2002	2004	2007	2014
before	1997	—	Exit	—	—
	2002		Exit	—	Survive
	2004			—	—
	2007				—

Impacts on sales of existing stores

		after			
		2002	2004	2007	2014
before	1997	—	— or Increase	— or Increase	—
	2002		—	—	—
	2004			—	— or Decrease
	2007				—

Impacts on survival of existing stores located around train stations

		after			
		2002	2004	2007	2014
before	1997	—	Exit	— or Exit	—
	2002		—	—	—
	2004			—	—
	2007				—

Impacts on sales of existing stores located around train stations

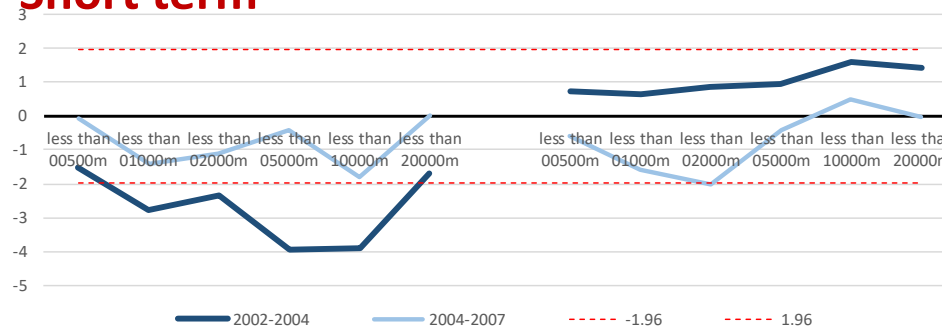
		after			
		2002	2004	2007	2014
before	1997	—	—	Increase	Increase
	2002		—	—	—
	2004			—	—
	2007				Increase

Impacts: On grocery stores by distance bands

Left (On exit); Right (On sales); All

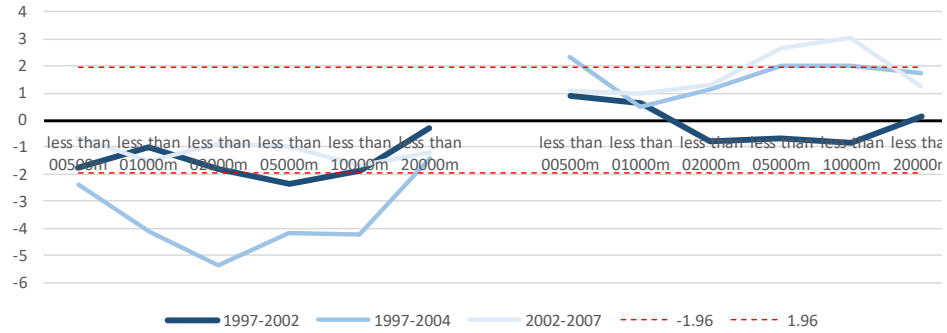
Short term

全体・食料品・短期



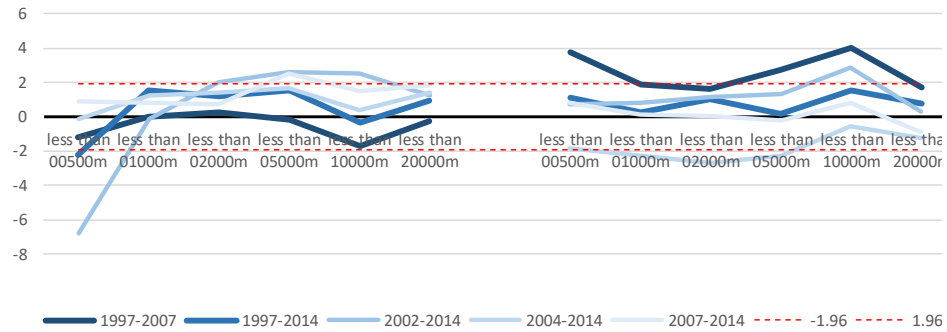
Middle term

全体・食料品・中期



Long term

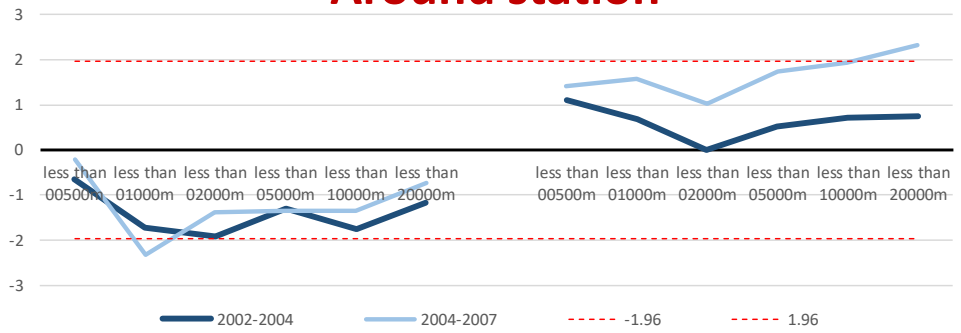
全体・食料品・長期



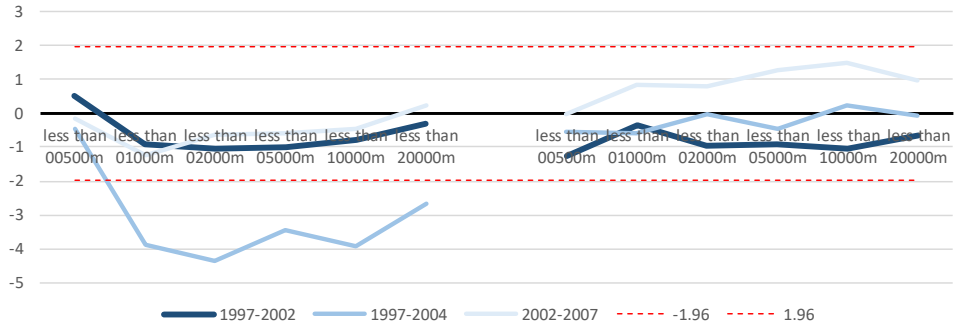
Left (On exit); Right (On sales);

Around station

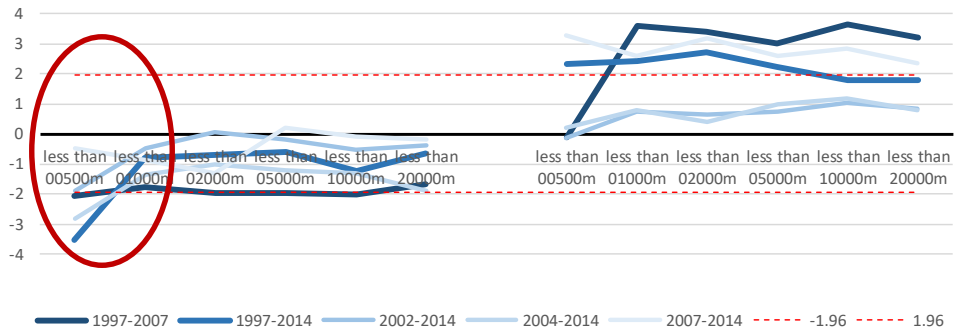
駅周辺・食料品・短期



駅周辺・食料品・中期



駅周辺・食料品・長期



Summary of results

Impact	On clothing stores		On grocery stores	
	Short to Mid term	Long term	Short to Mid term	Long term
Survival	Negative	Negative	Negative ~ Not significant	Not significant
Sales	Negative ~ Not significant	Positive	Not significant	Not significant Positive (around station)

Discussion

- Impact is *not* localized.
  - It ranges 10000~20000 meter in some cases.

  >> Regional coordination
- Is “Town Centre First” approach adopted in e.g., Hyogo, Fukuoka, and Nagasaki prefectures is valid ?
  - In case of the entry to the city centers (around train stations), the negative survival impacts are detected near the entrants (< 1000m) in the long run.
  - Also, magnitude of negative impact is strong at such short distance.
- Vidal (2016) and Sadun (2015)

Discussion *cont.*

- Spain Example by Vidal (2016):
  - *Four years after the big-box opening, between 20 and 30% of the grocery stores in the municipality have disappeared. However, the empty commercial premises are taken by some other new small retail stores. Thus, these results show that a retail shock in the suburbs does not empty the city centre but it changes the composition of its commercial activity.*

- But in Japan, properties in town centre are typically not “rent” but “owned”.
- Liquidity is not so high and situation is different.

Vidal (2016): Retail shocks and city structure, Conference paper.

Discussion *cont.*

- UK example by Sadun (2015):
  - *Analyzing a planning reform launched in the United Kingdom in the 1990s, I show that independent retailers were actually harmed by the creation of entry barriers against large stores. This is because the entry barriers created the incentive for large retail chains to invest in smaller and more centrally located formats, which competed more directly with independents and accelerated their decline. Overall, these findings suggest that restricting the entry of large stores may exert negative competitive effects on independent retailers.*

Sadun, R.: Does planning regulation protect independent retailers? Review of Economics and Statistic.

Discussion *cont.*

- 金本(2005):「中心市街地問題のように『症状』がわかりやすい問題は，かえって『政府の失敗』を招きやすい.
- 『症状』にとらわれ，その『原因』の分析がおろそかになりがちだからである.
  因果関係の分析をきちんと行わない短絡的な対処療法はほぼ確実に失敗する.」

Discussion *cont.*

- It is dangerous to introduce “Town Centre First” type policy *blindly* in Japan.
- Careful discussion based on evidence is needed.
- Our results cannot support such policy, but more detailed analyses is needed.
  - For instance, we need to consider the size of entrants.
  - Linked trip

Future works

- Expansion of the study area to whole Japan.
  - But we need to improve efficiency of data set building procedure.
- Analyzing impacts of exit of large-scale retail establishments.
- Treat demand side as endogenous.