第7回 再エネ講座公開研究会
科学研究費基盤A成果報告会

電力小売全面自由化が小売価格に与える影響に関する実証研究
Empirical Study on the Impacts of Electricity Retail Market Full Liberalization on Power Retail Prices

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自由化改革政策

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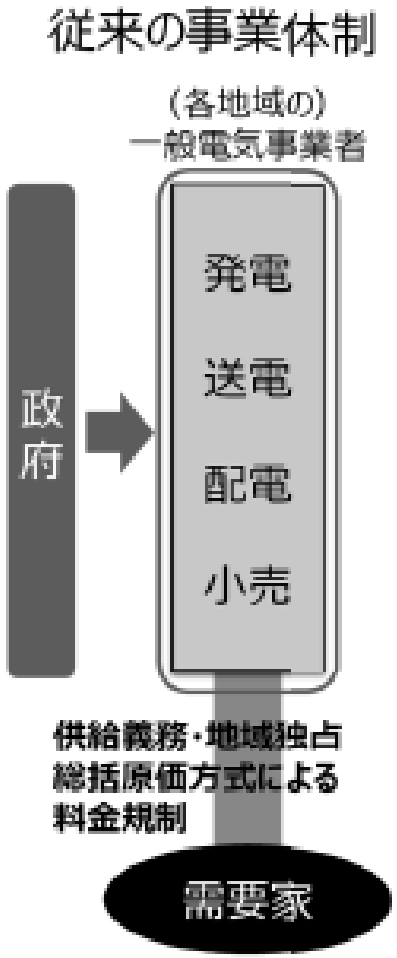

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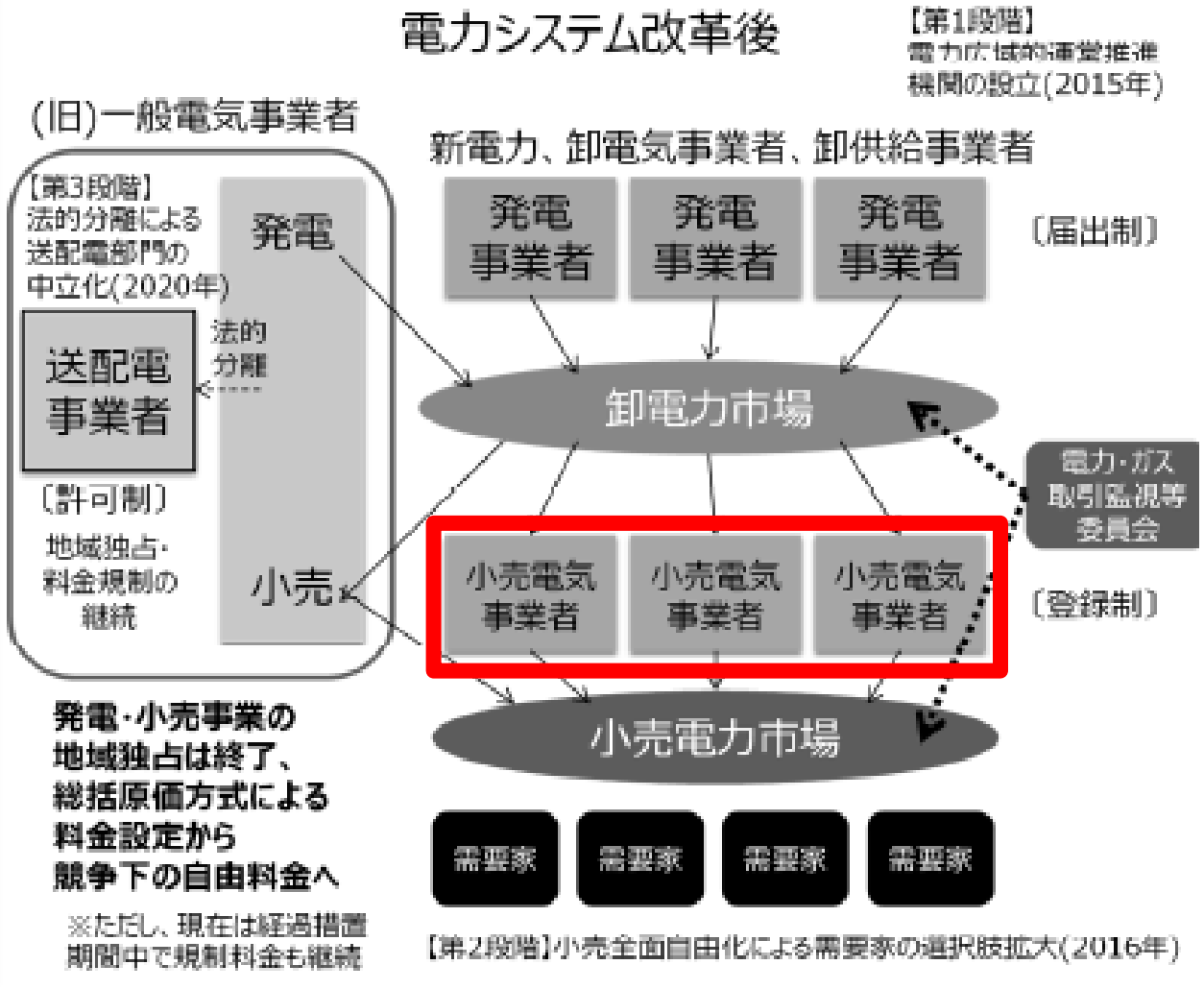

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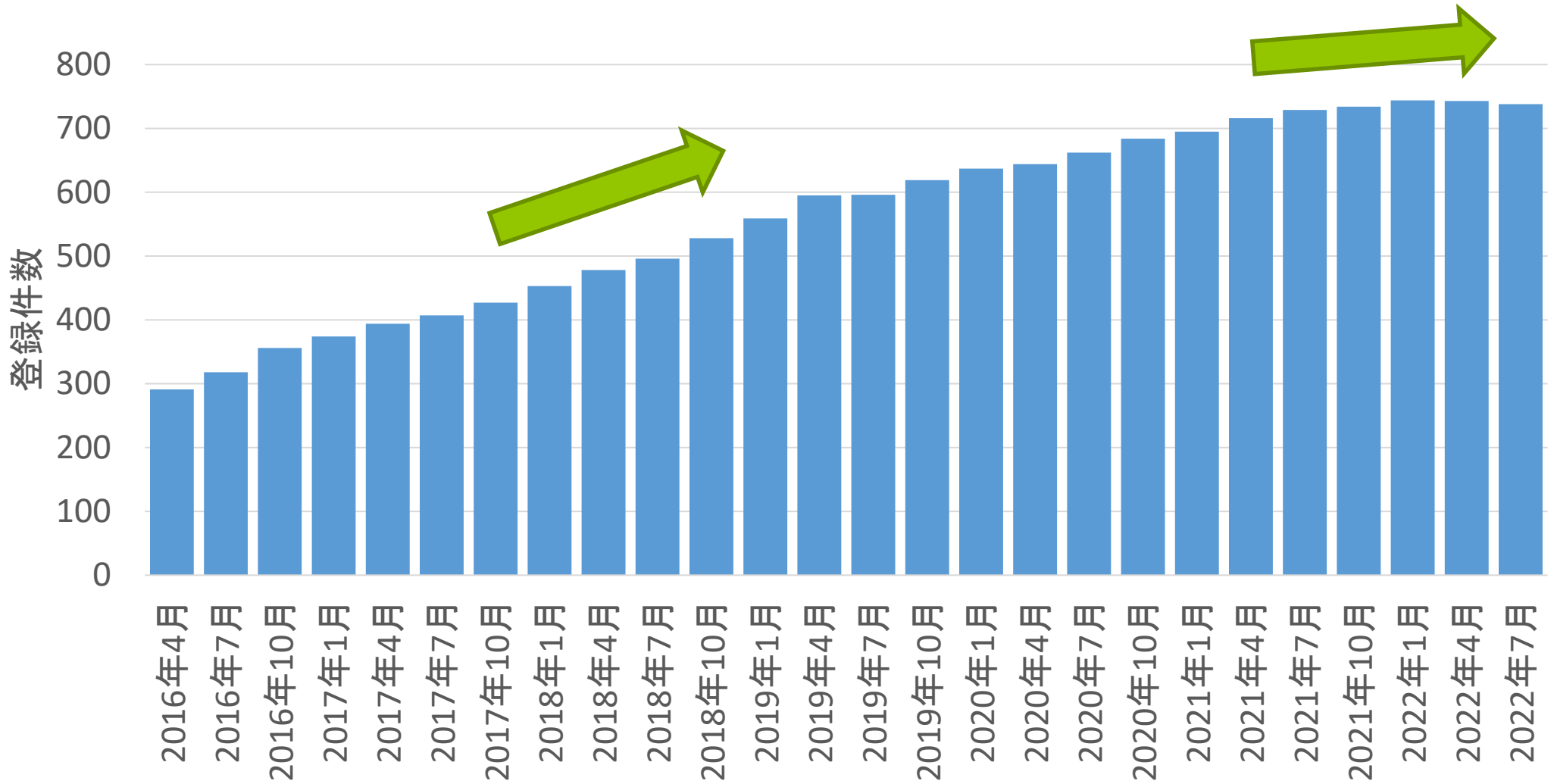

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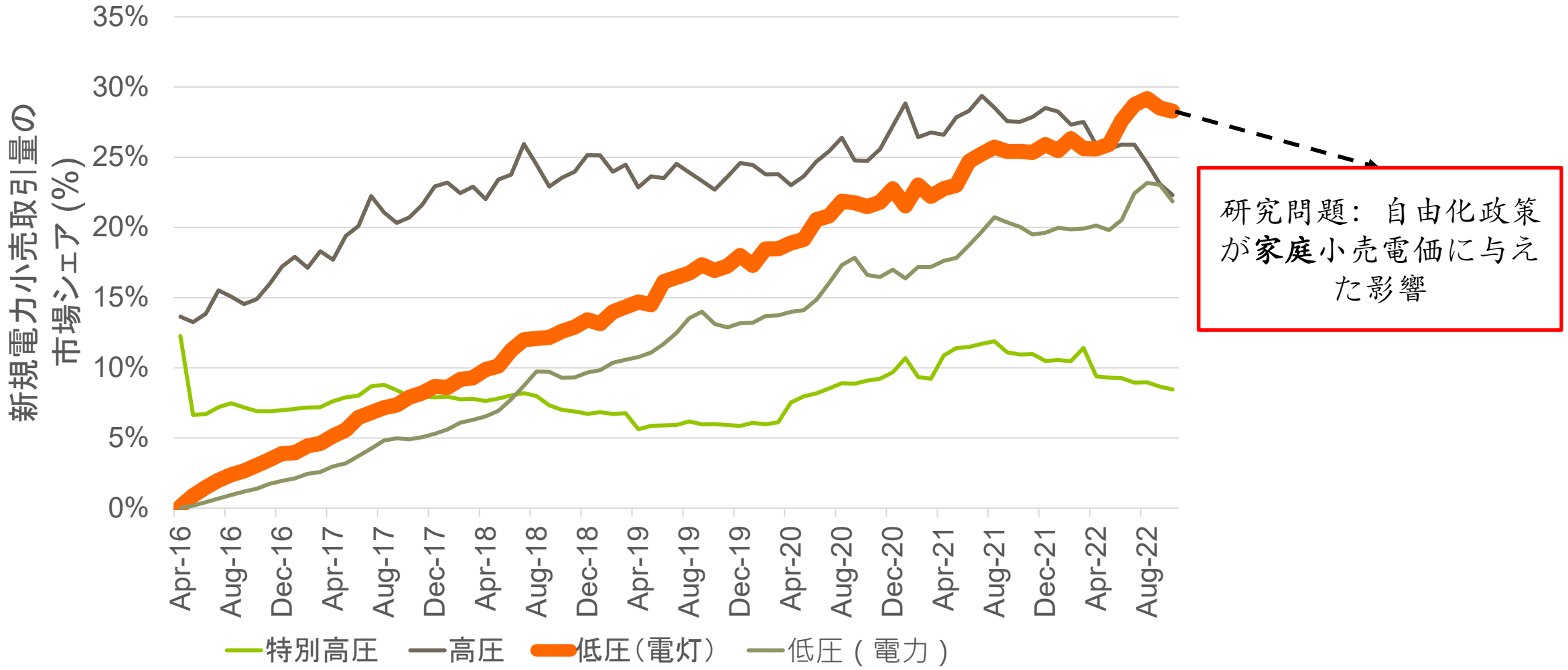
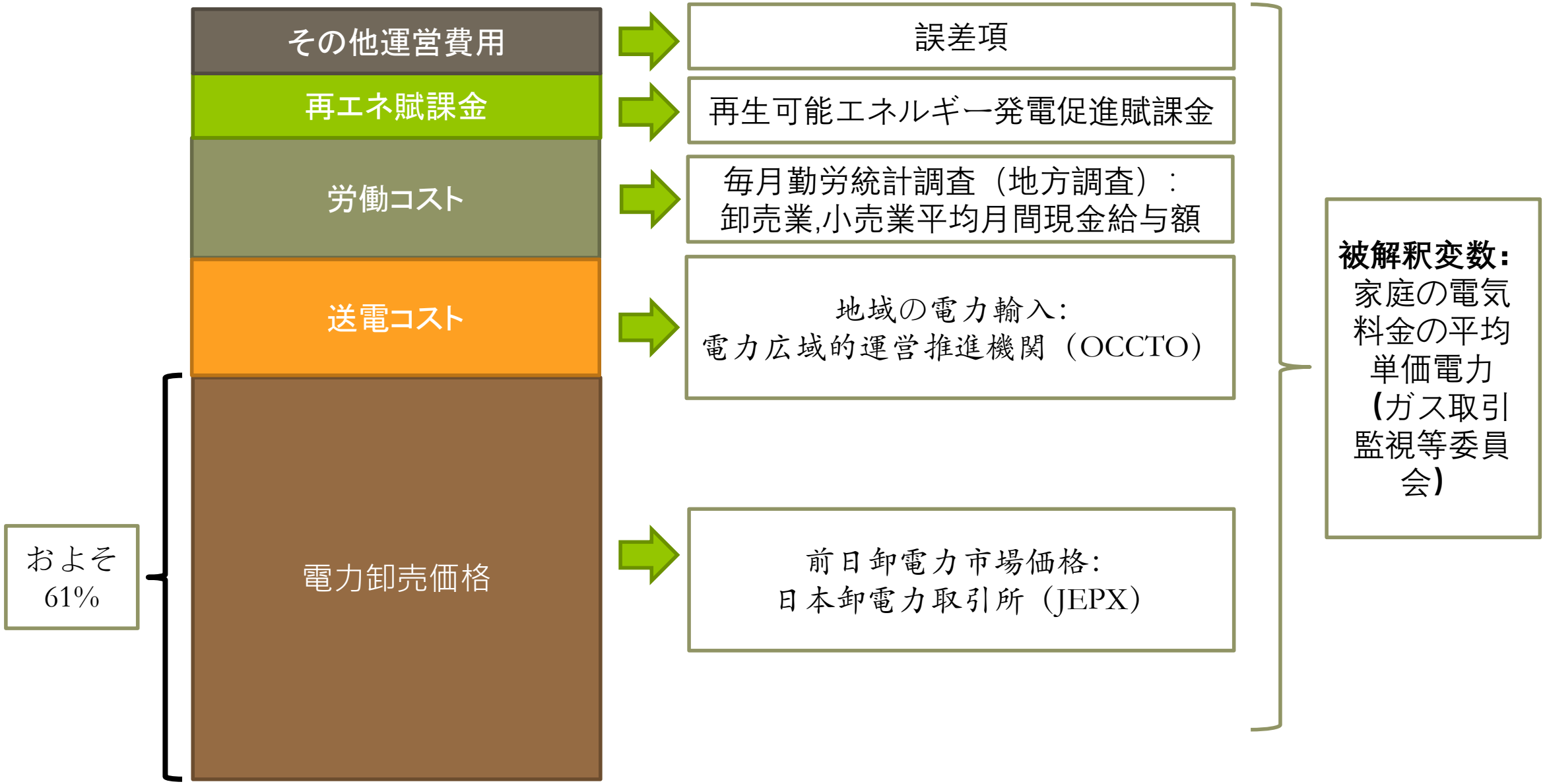


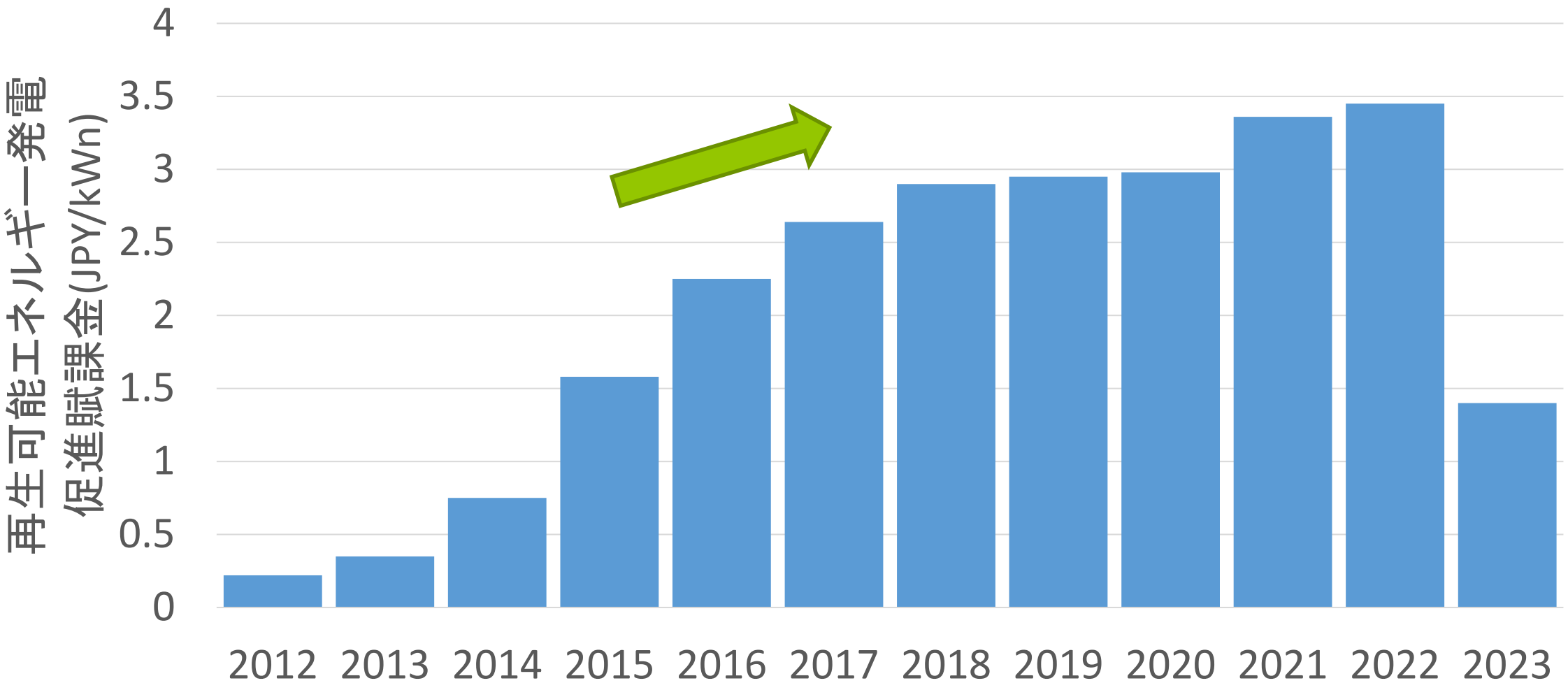
研究問題：自由化政策が**家庭**小売電価に与えた影響

2 データセット、モデル、および識別戦略

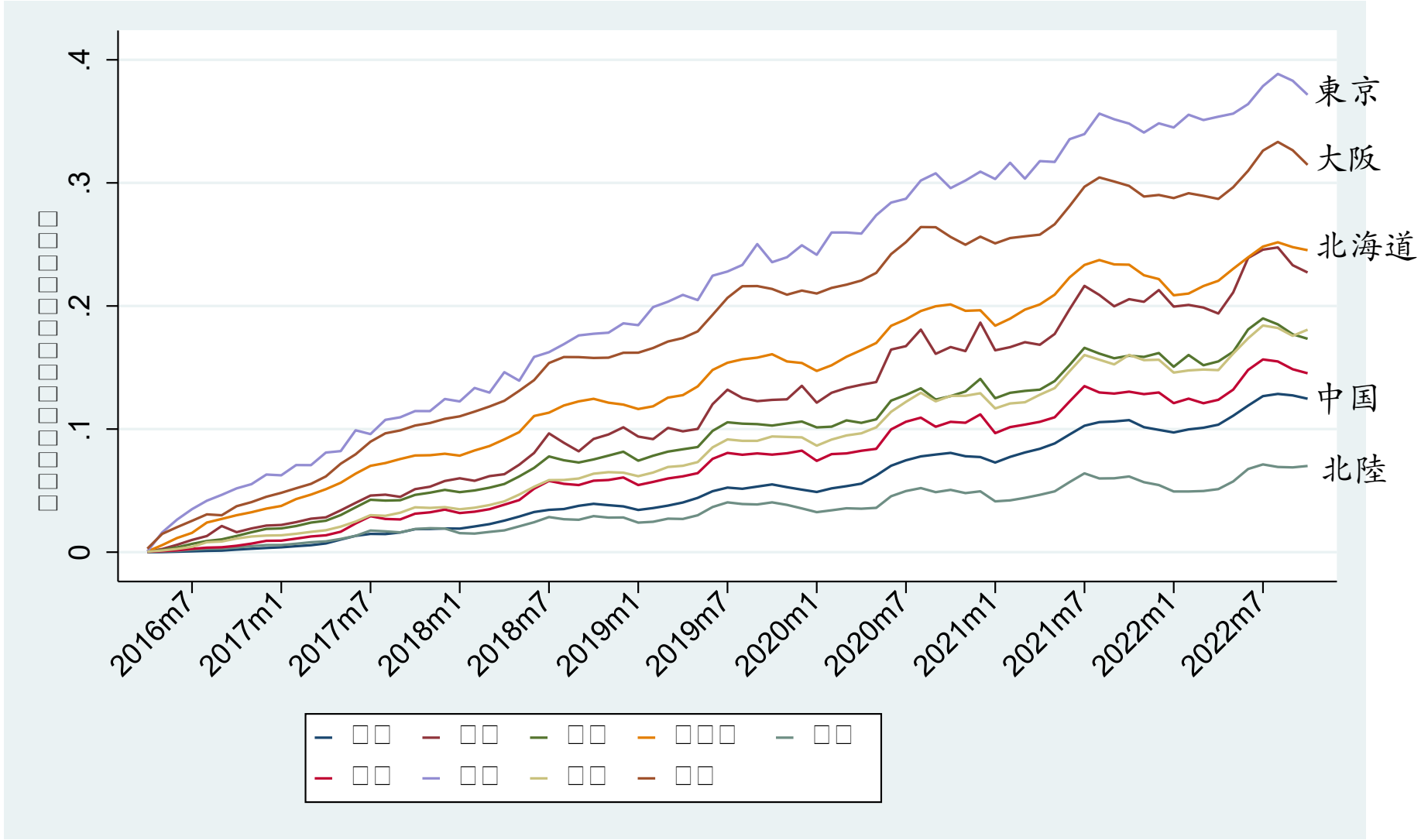
電力小売価格のコスト構造



再生可能エネルギー発電促進賦課金の推移



解釈変数: 新電力取引量の小売市場シェア
明らかな群間異質性



実証モデル

$$P_{it}^{Retail} = \alpha t + \gamma Share_{it}^{Liberalization} + \beta_1 P_{it}^{Wholesales}$$
$$+\beta_2 C_{it}^{Labor} + \beta_3 C_{it}^{Transmission} + \lambda_i + \eta_t + \varepsilon_{it}$$

- P_{it}^{Retail}：家庭の電気料金の平均単価電力
- $Share_{it}^{Liberalization}$：新電力取引量の小売市場シェアは、市場自由化の指標として使用されている。
- 上記のモデルで考慮されている卸売電力価格$P_{it}^{Wholesales}$、雇用コストC_{it}^{Labor}、送電コスト$C_{it}^{Transmission}$などに加え、地域固定効果λ_iと月次固定効果η_tを制御している。
- t：擬似相関（Spurious Correlation）を回避するために、時間を制御している。
- ε_{it}:誤差項の異質性（時間的自己相関やグループ間の相関）を考慮するため、GLS推定法を用いる。

内生性：逆因果性の問題(I)

The increase in market share of new retail firms can promote competition, leading to lower retail prices.

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新電力取引量の小売市場シエア

家庭の電気料金の平均単価電力

+

逆因果性： High retail prices attract more retail companies to enter the market, thereby increasing the market share of new retail firms

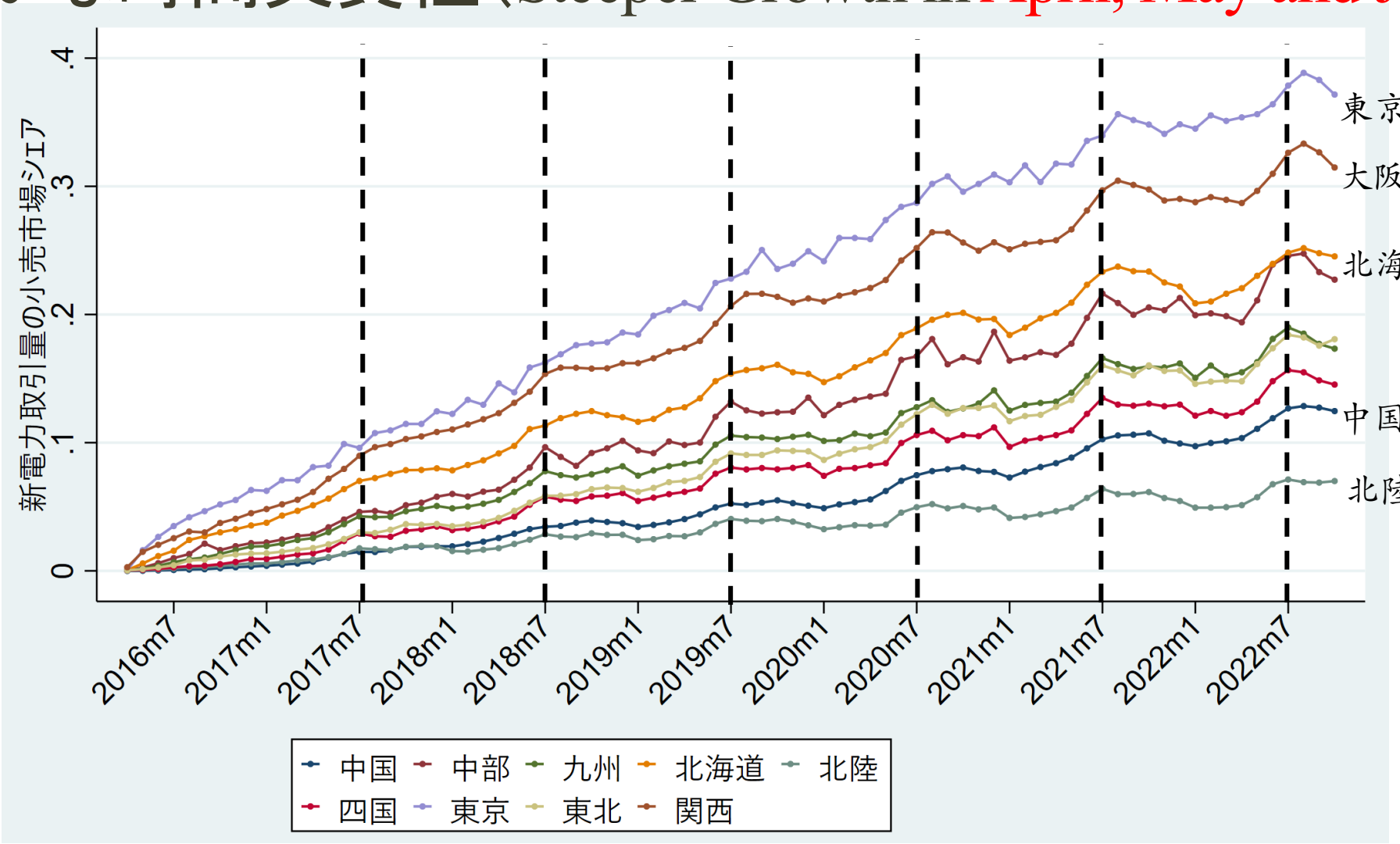
Migration is usually unaffected by Electricity price, but will affect the share of new small retailers

内生性：逆因果性の問題(II)
Migration and Switch Behaviors

Residents are more likely to switch their contracted electricity retailer after Moving/Migrating:

- Firstly, the **switching costs** associated with changing electricity retailers is lower during the moving process;
- Secondly, electricity retailers often conduct **Marketing/Sales-Promotion activities** during the moving process to attract consumers to choose them as their provider.

解釈変数: 新電力取引量の小売市場シェア(再掲)
明らかな時間異質性（Steeper Growth in April, May and June）



Selection of Instrument Variable(IV): Share of residents migrating to the region

- Residential movements inside the region would **NOT directly** affect the total demand and therefore, the retail price, but will affect the swifts from the Otte Denryoku(大手電力) to the Shindenryoku(新電力).
  - On the one hand, the residential moving behaviors are not likely to be associated by the retail power price.
  - On the other hand, residents are more likely to switch their contracted electricity retailer after moving.
- In Japan, promptly registering one's residential information to the municipal government(市役所) is a legal obligation of residents.
- The info on monthly movement is recorded on the Basic Resident Registration Card(住民基本台帳), and is made public by the local government.
- Therefore, we use the **accumulated share of female and male migration** as the instrumental variables for share of new retailers.

4 実証結果

when the proportion of small retailers reaches 100%, the retail electricity price will decrease by 3.431 JPY/kWh

固定効果パネルモデルの回帰結果

Spurious Correlation

	(1) baseline0		(2) baseline1		(3) baseline2		(4) baseline3	
Share of New Retailers(%)	8.243***	(0.931)	-3.002***	(0.938)	-3.599***	(0.904)	-3.431***	(0.893)
Wholesale Price					0.124***	(0.017)	0.118***	(0.017)
time			0.066***	(0.005)	0.044***	(0.005)	0.041***	(0.006)
Wind Output(log)							-0.378***	(0.125)
Solar Output(log)							0.545***	(0.180)
Import(log)							-0.010	(0.014)
Constant	18.056***	(0.120)	20.338***	(0.228)	19.440***	(0.251)	16.779***	(2.753)
Region Dummy	Y		Y		Y		Y	
Month Dummy	N		Y		Y		Y	
Samples	711		711		711		711	
Groups	9		9		9		9	
Adj R2	0.089		0.852		0.863		0.867	
F	78.394		52.707		57.194		57.035	
rho	0.478		0.890		0.887		0.907	

GLSパネル回帰の結果

when the proportion of small retailers reaches 100%, the retail electricity price will decrease by 3.752 JPY/kWh

	(1) longpanel 0		(2) longpanel 1		(3) longpanel 2		(4) longpanel 3	
Share of New Retailers(%)	-4.130***	(1.382)	-3.671***	(1.359)	-3.752***	(1.350)	-3.752***	(1.350)
Wholesale Price			0.023***	(0.007)	0.023***	(0.007)	0.023***	(0.007)
time			0.061***	(0.004)	0.062***	(0.004)	0.062***	(0.004)
Wind Output(log)					0.059	(0.039)	0.059	(0.039)
Solar Output(log)					0.050	(0.074)	0.050	(0.074)
Constant	19.419***	(0.407)	19.048***	(0.406)	17.767***	(1.089)	17.767***	(1.089)
Region Dummy	Y		Y		Y		Y	
Month Dummy	Y		Y		Y		Y	
Samples	711		711		711		711	
Groups	9		9		9		9	

操作変数法回帰の結果

when the proportion of small retailers reaches 100%, the retail electricity price will decrease by 3.031 JPY/kWh

	(1) ivregr0		(2) ivregr1		(3) ivregr2		(4) ivregr3	
Share of New Retailers(%)	18.861***	(3.296)	-2.105**	(1.062)	-3.325***	(1.022)	-3.031***	(0.984)
Wholesale Price					0.124***	(0.017)	0.119***	(0.017)
time							0.549*	(0.303)
Sales of New Retailers(%)							-2.491***	(0.554)
Wind Output(log)							-0.342***	(0.124)
Solar Output(log)							0.405**	(0.179)
Region Dummy	Y		Y		Y		Y	
Month Dummy	N		Y		Y		Y	
Samples	711		711		711		711	
Groups	9		9		9		9	
Adj R2	-0.082		0.851		0.863		0.871	
F	32.753		52.550		57.119		59.007	

4 まとめと今後の課題

まとめと今後の課題

- Using data from the period between April 2016 and October 2022, a total of six and a half years, we empirically demonstrate that this policy indeed has a significant lowering effect on prices.
  - For example, between April 2016 and October 2022 in Tokyo, the proportion of electricity sold by new retailers increased to 37.16%, resulting in **a net reduction of 1.2846 yen/kWh** in retail electricity prices.
  - In the nine major distribution regions of Japan, the proportion of electricity sold by retail power companies was 26.69% in October 2022, leading to **an overall decrease of 0.9227** yen/kWh in retail electricity prices by the end of October.
- The nationwide average penetration rate is around 20%, with the lowest share in the Hokuriku region at only 7%.
- Therefore, how to encourage households to further participate and promote competition will be an important focus of future policies.

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ご清聴ありがとうございました