Vertical Integration in EV Fast Charging

IO Lunch Seminar

John Higgins

March 4, 2025

Motivation

- Massive growth in EV fast charging, yet competitive concerns remain:
  - High entry cost, economies of scale, network effects
  - Fragmented, inconsistent payment ecosystem
    $\Rightarrow$ roaming
    $\Rightarrow$ limited price competition and lack of transparency
  - Vertically-integrated networks potentially foreclose competition and lock in consumers using price discrimination
- Left unchecked, top networks' dominance could become entrenched as the sector continues to evolve

Question

- How do large, VI charging networks utilize roaming prices and access fees to foreclose competition?
- What is the welfare effect of price discrimination in this market?
- What is the optimal regulation on access/interchange fees, especially considering their effect on future dynamics of the industry?
- Counterfactuals:
  - Price cap/restriction on access fees
  - Shut down 2nd-degree price discrimination

Stylized facts

1. Certain networks - especially vertically-integrated ones - have strong local market power
2. Consumers tend to stick with their preferred network, but networks which offer volume discounts tend to better retain users
3. Consumers with a roaming plan from a VI network do more charging in-network as their level of affiliation increases
4. Certain VI networks tend to price close competitors higher

Model overview

- I model the market for EV fast charging along the motorway
- I allow consumers to have heterogeneous preferences and valuations of public charging
- On the supply side, I model competition between charging networks given the presence of roaming plans
- I also model competition between roaming providers, including vertically integrated charging networks which offer roaming services

Consumer primitives

Consider a station l in network j which is included in roaming plan n

- Observables:
  - Ω_n: set of charging networks included in roaming plan n
  - z_l: location of station l
  - x_l: characteristics of station l
  - p_{nj}: price of plan n consumer charging at station l (which is in network j)
- Parameters (to be estimated):
  - β: consumer's preference for station characteristics
  - λ: consumer's preference for location proximity
  - α: consumer's price sensitivity

Consumer heterogeneity

- I allow consumers to have heterogeneous charging preferences:
- Each consumer is indexed by type $\theta_i = (l_i, \sigma_i, v_i)$
  - l_i is the 'preferred' charging location of consumer i
  - σ_i represents the heterogeneity in consumers' taste for charging stations (i.e., the variance of their idiosyncratic TIEV shock)
  - v_i represents the heterogeneity in consumers' utility from the outside option (e.g. charging at home or work)

Charging event utility

- The utility of consumer i of type θ_i charging at station l in network j is given by

$$u_{ilt}(\boldsymbol{p}, \Omega_n, \theta) = x_l \beta - \lambda |l_i - z_l| - \alpha p_{nj} + \sigma_i \varepsilon_{ilt}$$

- x_l is a vector of station characteristics, z_l is the station's location, p_{nj} is the price of charging at network j given consumer's plan n

$$u_{i0t}(\theta) = v_i + \sigma_i \varepsilon_{i0t}$$

Value of roaming plan

- The consumer's expected value from a given charging event conditional on having plan n is given by the inclusive value formula:

$$\bar{u}_n(\boldsymbol{p}, \Omega_n, \theta) = \log\left(\exp(v_i/\sigma_i) + \sum_{l \in \Omega_n} \exp((x_l\beta - \lambda|l_i - z_l| - \alpha p_{nj})/\sigma_i)\right) + \gamma$$

- Assuming each consumer has q potential charging events, their optimal plan will be the solution to the following:

$$\max_n \{q\bar{u}_n(\boldsymbol{p}, \Omega_n, \theta) - \alpha r_n + \varepsilon_n\}$$

Plan membership and demand

- Share of type θ_i consumers on plan n, given set of roaming networks $\Omega = (\Omega_n, \Omega_{-n})$:

$$\mu_n(\boldsymbol{p}, \Omega_n, \Omega_{-n}, \theta) = \frac{\exp(q\bar{u}_n(\boldsymbol{p}_n, \Omega_n, \theta))}{\sum_j \exp(q\bar{u}_j(\boldsymbol{p}_j, \Omega_j, \theta))} \mu(\theta)$$

- Probability of type θ_i consumers on plan n picking station l:

$$d_{nlt}(\boldsymbol{p}, \Omega_n, \theta) = \frac{\exp((x_l\beta - \lambda|l_i - z_l| - \alpha p_{nj})/\sigma_i)}{\exp(v_i/\sigma_i) + \sum_{k\in\Omega_n} \exp((x_k\beta - \lambda|l_i - z_k| - \alpha p_{nk})/\sigma_i)}$$

- Total demand for station l from type θ consumers on roaming plan n:

$$D_{nlt}(\boldsymbol{p}, \Omega_n, \Omega_{-n}, \theta) = \mu_n(\boldsymbol{p}, \Omega_n, \Omega_{-n}, \theta) d_{nlt}(\boldsymbol{p}, \Omega_n, \theta) q$$

Notation

- J : the set of networks
- N: set of roaming plans
- Ω_n: set of networks in roaming plan n
- Ω_{-n}: vector of all roaming plans except for n
- $\boldsymbol{p}$: industry price vector
- p_{nj}: price for user of plan n to charge at network j
- $\boldsymbol{\tau}$: roaming access fee (interchange fee) vector
- τ_{nj}: access fee roaming network n pays to network j when plan member charges at j
- D_{nj}: demand for network j from members of plan n
- c_j: marginal cost of network j (these are assumed to be common)

VI provider profits

$$\Pi_A(\boldsymbol{p}, \boldsymbol{\tau}, \Omega_A, \Omega_r) = \underbrace{\mu_n(\boldsymbol{p}, \Omega_A, \Omega_{-A}, \theta) r_A}_{\text{Plan fees}} + \underbrace{\sum_{\theta \in \Theta} D_{AA}(\boldsymbol{p}, \Omega_A, \Omega_{-A}, \theta)(p_{AA} - c_A)}_{\text{Plan users charging in-network}}$$

$$+ \underbrace{\sum_{\theta \in \Theta} \sum_{j \in J} D_{Aj}(\boldsymbol{p}, \Omega_A, \Omega_{-A}, \theta)(p_{Aj} - \tau_{Aj})}_{\text{Users roaming on other networks}}$$

$$+ \underbrace{\sum_{\theta \in \Theta} \sum_{n \neq A} D_{nA}(\boldsymbol{p}, \Omega_n, \Omega_{-n}, \theta)(\tau_{nA} - c_A)}_{\text{Other plans' users roaming}}$$

Regular network profits

$$\Pi_j(\boldsymbol{p}, \boldsymbol{\tau}, \Omega) = \underbrace{\sum_{\theta \in \Theta} D_{jj}(\boldsymbol{p}, \Omega, \theta)(p_j - c_j)}_{\text{Profits from direct sales}}$$
$$+ \underbrace{\sum_{n \in N} \sum_{\theta \in \Theta} \sum_{j \in J} D_{nj}(\boldsymbol{p}, \Omega_n, \Omega_{-n}\theta)(\tau_{nj} - c_j)}_{\text{Profits from sales through roaming networks}}$$

Roaming provider profits

$$\Pi_r(\boldsymbol{p}, \boldsymbol{\tau}, \Omega_r, \Omega_{-r}) = \underbrace{\sum_{\theta \in \Theta} \sum_{j \in J} D_{rj}(\boldsymbol{p}, \Omega_r, \Omega_{-r}, \theta)(p_r - \tau_{rj})}_{\text{Profit from roaming sales}}$$

Price-setting

- I'll spare you a bunch of nasty equations: I'll take the derivative w/r/t price and set it equal to zero
- In words: change in profit from direct sales within network + change from substitution effect within plan + change in generic roaming behavior
- Different for smaller networks without roaming plans (no within-plan substitution to worry about)
- Also different for roaming networks: want to set price low enough to attract users and high enough so that they can still turn a profit

Access/interchange fees

- I assume that the access fees (τ) are set through bargaining
- Let $\Delta_{Aj}\Pi_A$ represent the change in A's profits from excluding j from Ω_A and $\Delta_{Aj}\Pi_j$ denote the change in j's profits if it is excluded
- The Nash bargaining problem can be expressed as:

$$\max_{\tau} \Delta_{Aj}\Pi_A(\boldsymbol{p}, \boldsymbol{\tau}, \Omega_A, \Omega_{-A})^{\eta_A} \Delta_{Aj}\Pi_j(\boldsymbol{p}, \boldsymbol{\tau}, \Omega_A, \Omega_{-A})^{1-\eta_A}$$

  Solution is characterized by a τ which satisfies:

$$\frac{\eta_A}{1-\eta_A} = -\frac{\Delta_{Aj}\Pi_A}{\frac{\partial \Pi_A}{\partial \tau}} \frac{\frac{\partial \Pi_j}{\partial \tau}}{\Delta_{Aj}\Pi_j}$$

- Ditto for standalone roaming networks

Equilibrium conditions

- Predicted network market shares match observed shares
- Charging behavior within each plan is consistent with consumer optimality
- Charging network and roaming prices must be consistent with profit maximization (solving firms' FOC given demand functions)
- Estimated access prices and bargaining parameters must satisfy the FOC of the Nash bargaining solutions for each network/roaming pair, given demand estimates and observed price vector

Data

1. Real-time, station level charging utilization data for the German fast charging market (11/2023-present day)
2. Charging check-in data from two major sources:
   - &-Charge.com: Charging check-in data from over 16,000 German drivers (with driver ID!)
   - GoingElectric.de: Charging check-in data with charging plan used and vehicle driven (but no driver ID)
3. Comprehensive data on roaming prices in the German market (scraped): for each plan r and network j, I can see the cost to the consumer to charge with plan r on network j

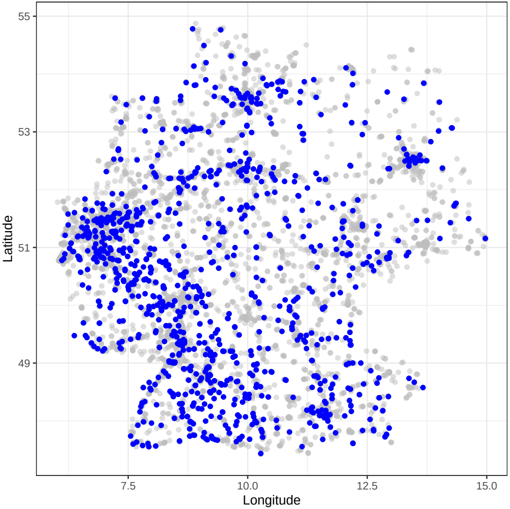
Top 10 networks (within 1km of motorway)

Network	Stations	Share
EnBW (Power)	465	0.24
IONITY (Automaker)	133	0.13
Aral (BP) Pulse (Gas)	194	0.12
Allego (Pure Play)	219	0.06
E.ON (Power)	233	0.05
EWE (Power)	208	0.05
Shell Recharge (Gas)	128	0.04
Fastned (Pure Play)	33	0.03
TotalEnergies (Gas)	70	0.03
Pfalzwerke (Power)	107	0.02
Other	1255	0.21

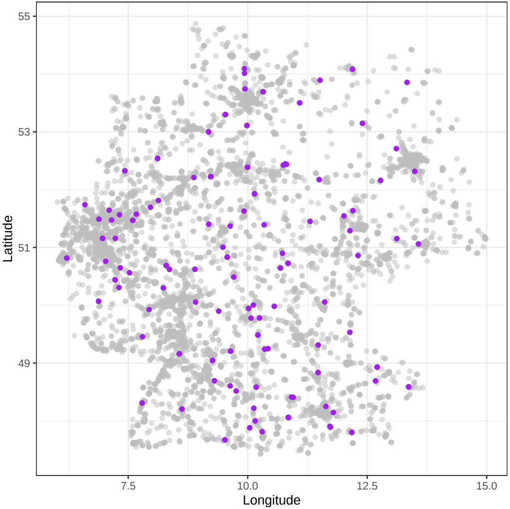
Daily charges per station, by network

network	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
IONITY	0.00	22.00	36.00	37.43	50.00	162.00
Fastned	0.00	16.00	27.00	35.12	46.00	161.00
Aral Pulse	0.00	10.00	19.00	23.90	32.00	192.00
EnBW	0.00	8.00	16.00	19.44	26.00	142.00
TotalEnergies	0.00	3.25	11.00	15.42	22.00	139.00
Shell Recharge	0.00	3.00	8.00	12.89	16.00	218.00
Mer	0.00	2.00	6.00	10.51	14.00	125.00
Allego	0.00	2.00	6.00	9.64	13.00	131.00
E.ON	0.00	2.00	6.00	8.68	12.00	123.00
Pfalzwerke	0.00	3.00	6.00	8.26	11.00	79.00

Coverage

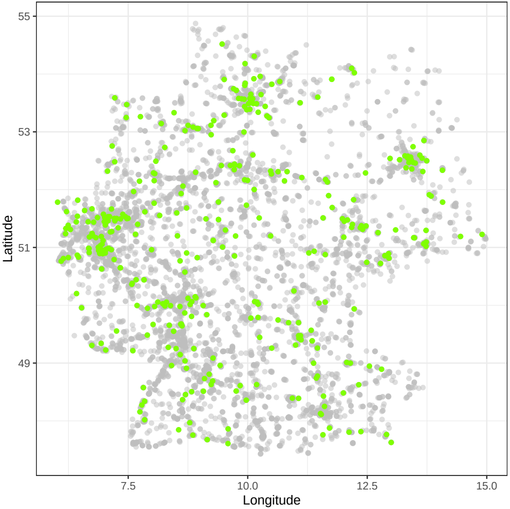


Coverage

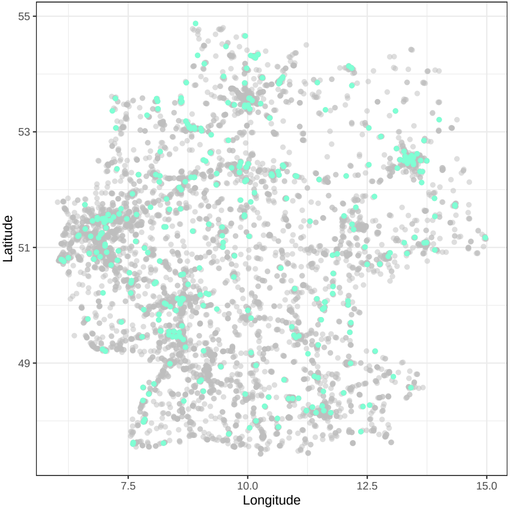


IONITY

Coverage

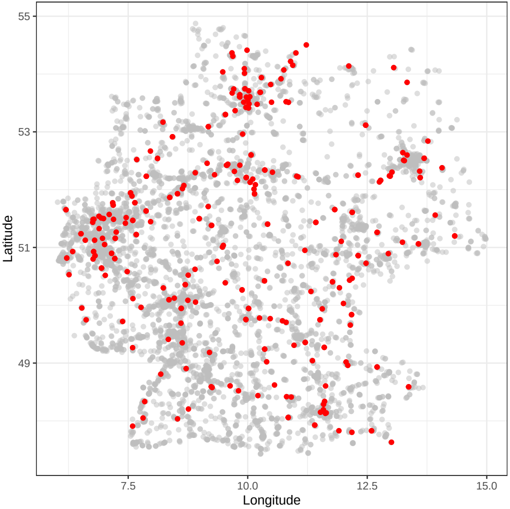


Coverage



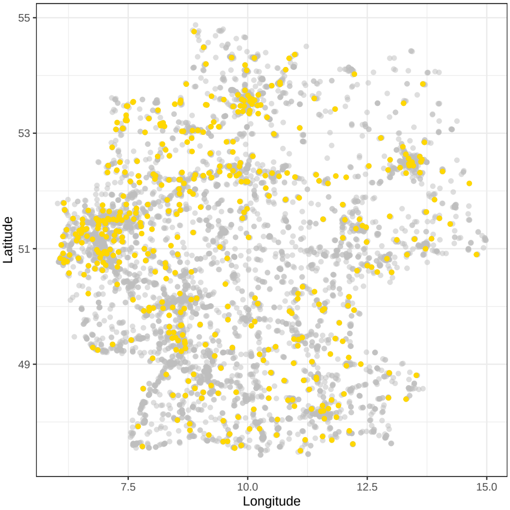
Allego

Coverage



E.ON

Coverage

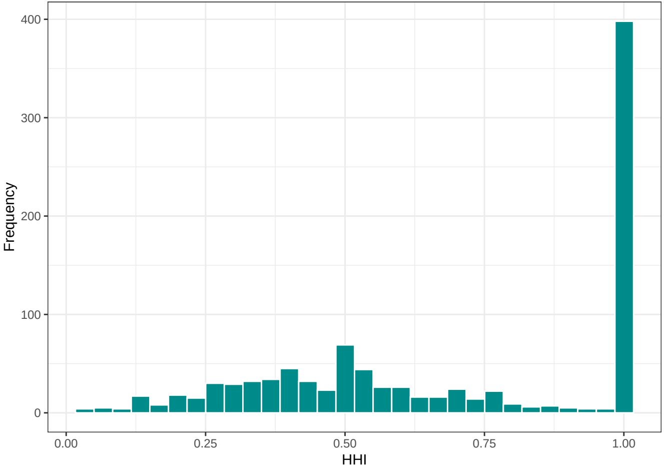


Stations per market: summary stats

	0%	25%	50%	75%	100%
Stations	1.00	1.00	2.00	3.00	47.00
Networks	1.00	1.00	2.00	3.00	19.00
Stations/Net	1.00	1.00	1.00	1.00	3.00

Here, I'm defining a market as a city. This is a relatively narrow market definition, as there may be numerous cities along a highway segment. However, this is intended to capture the idea that whenever you need to charge, you may not have the flexibility to drive 25 more miles

HHI histogram (A hhistogram, if you will)



Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.03	0.43	0.68	0.69	1.00	1.00

Logit regression?

Mean local market share

Network	Mean share	Mean charges/stat
EnBW	0.62	2749.33
IONITY	0.64	5383.02
Aral Pulse	0.55	3397.19
Allego	0.34	1374.18
E.ON	0.47	1236.79
EWE	0.32	1309.17
Shell Recharge	0.36	1785.34
Fastned	0.61	5302.79
TotalEnergies	0.46	2095.49
Pfalzwerke	0.33	1163.63

Found market share of each network by city, then found the mean share across all cities by network. Big caveat: Biased upwards towards 1 since around 45% of markets have only one network Part of this is driven by fact that smaller markets may have few (or only one) stations, leading to high share of the present network

Market share by market size

	# of rival networks			
network	1	2	3	4
EnBW	0.64	0.53	0.38	0.49
IONITY	0.76	0.63	0.52	0.46
Aral Pulse	0.66	0.44	0.47	0.26
Allego	0.49	0.26	0.18	0.11
E.ON	0.44	0.22	0.17	0.20
EWE	0.38	0.25	0.21	0.22
Shell Recharge	0.58	0.38	0.16	0.27
Fastned	0.82	0.56	0.38	0.31
TotalEnergies	0.46	0.33	0.44	0.07
Pfalzwerke	0.40	0.44	0.27	0.17

Large VI networks (EnBW, IONITY, Aral) do pretty well even when facing stiff competition

Roaming price tiers

- Around 60% of plans use a flat price
- Around 20% use two tiers (example: discount own network + flat roaming, flat roaming + premium roaming)
- Around 95% of plans use less than 6 pricing tiers
- Some plans set a different price for each network, and a small number have a price which varies by station (these are the exception)

Roaming prices (major roaming)

- MAINGAU Autostrom: €0.69/kWh at most, €0.79/kWh at Aral, Allego, Mer, EnBW, EWE Go or E.ON
- ADAC e-Charge (Aral): €0.57/kWh at Aral, €0.75 everywhere else[1]
- EnBW: anywhere from €0.51-€0.89, depending on network (link to histogram/table)

[1] Prior to Aug 1, 2024, was €0.51 at EnBW, €0.60 at other providers, and €0.79 for EWE and IONITY. Members were transitioned to EnBW Ladetarif S unless they opted into the new plan

Ad-hoc and roaming price by network

Network	Ad-Hoc	Mean	Median	SD
EWE Go	0.52	0.75	0.74	0.12
TotalEnergies (HPC)	0.79	0.78	0.79	0.10
Fastned	0.69	0.72	0.72	0.09
IONITY	0.69	0.75	0.75	0.13
allego	0.73	0.76	0.77	0.12
Pfalzwerke	0.79	0.76	0.75	0.10
Shell Recharge	0.79	0.76	0.74	0.12
Aral/BP	0.79	0.77	0.79	0.13
E.ON	0.80	0.77	0.79	0.11
EnBW	0.89	0.76	0.75	0.14

- First column contains the ad-hoc price; remaining three columns contain the mean, median, and SD of roaming prices at each network (all in €/kWh)
- Sorted by ad-hoc price in ascending order

EnBW Roaming Tariff Bins (selected networks)

- €0.69: EWE Go
- €0.74: IONITY, Fastned, Pfalzwerke, Shell Recharge
- €0.79: Aral, E.ON
- €0.84: Allego
- €0.89: TotalEnergies

VW Roaming

- Elli Drive Free: (€0.69 IONITY, €0.89 others)
- Elli Drive Plus: (€5.99) (€0.50 IONITY, €0.89 others)
- Elli Drive Highway: (€14.99) (€0.50 IONITY, Aral, Audi, €0.73 for others)

Network differentiation?

- Most use similar (or same) hardware, with most sourcing from a select few manufacturers[2]
- Companies may differ in their ability/willingness to maintain chargers and respond to issues
- Speed and quality are correlated with price, to an extent
- Reliability may differ across networks
- However, my sense is that the biggest differentiating factors are network breadth and density: can I usually find this network's stations whereever I go?

[2] Alpitronic, ABB, EKO Energetyka, or Tritium

Charger example

&-Charge.com data

- I now present some descriptive analysis of the checkin data from &-Charge
- Charge events per user: (> 1 charge, truncated at 95th percentile)

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.00	10.00	29.00	68.79	87.00	496.00

- The main takeaways:
  - Drivers do most of their charging at one network
  - There is a decent amount of persistence in consumers' charging choices over time
  - Large, VI networks seem to better retain users, small networks are used more as a supplement

Individual shares (if charged at network)

net	med_share	mean_share
EnBW	0.42	0.49
Ionity	0.2	0.31
Aral pulse	0.15	0.25
Allego	0.33	0.51
E.ON Drive Infrastructure	0.08	0.16
EWE Go	0.12	0.22
Shell Recharge	0.09	0.18
Fastned	0.07	0.17
TotalEnergies	0.05	0.14
PFALZWERKE	0.17	0.32

- Example: across all users who have ever charged at EnBW, the median (mean) share of charging done at EnBW is 42% (49%)
- Distinction: primary vs supplementary networks

Usage share (of top network)

net	mean_share	med_share	N
EnBW	0.68	0.67	3800
Allego	0.86	1.00	2299
Ionity	0.62	0.50	1005
Aral pulse	0.64	0.57	635
PFALZWERKE	0.76	1.00	597
EWE Go	0.66	0.62	380
Shell Recharge	0.59	0.50	220
E.ON Drive Infrastructure	0.67	0.50	163
Fastned	0.65	0.50	108
TotalEnergies	0.67	0.50	71

Usage share (of top network, with more than 5 charges)

net	mean_share	med_share	N
EnBW	0.50	0.45	1650
Ionity	0.48	0.43	479
Allego	0.37	0.33	270
Aral pulse	0.42	0.38	254
PFALZWERKE	0.50	0.44	193
EWE Go	0.41	0.38	118
Shell Recharge	0.37	0.33	105
E.ON Drive Infrastructure	0.36	0.27	32
Fastned	0.43	0.44	21
TotalEnergies	0.33	0.31	18

Monthly share of top net

- Averaging across all time not necessarily ideal as it obscures variation over time
- For instance, a consumer may switch from a generic roaming plan to a paid EnBW plan
- Their top network would change over time, which would show a overall lower share of total charging done at their primary network (even if they do most of their charging with their primary network at that point in time)

Charging done at consumer's top network, monthly

net	mean_sh	med_sh	N
EnBW	0.79	1.00	11482
Allego	0.80	1.00	4142
Ionity	0.73	0.75	3637
Aral pulse	0.76	1.00	2505
PFALZWERKE	0.80	1.00	2215
EWE Go	0.76	1.00	1455
Lidl	0.73	1.00	1301
Shell Recharge	0.69	0.67	1218
Tesla Supercharger	0.81	1.00	1207
Kaufland	0.79	1.00	993

- Takeaway: within a given month, consumers do a majority of their charging within one network

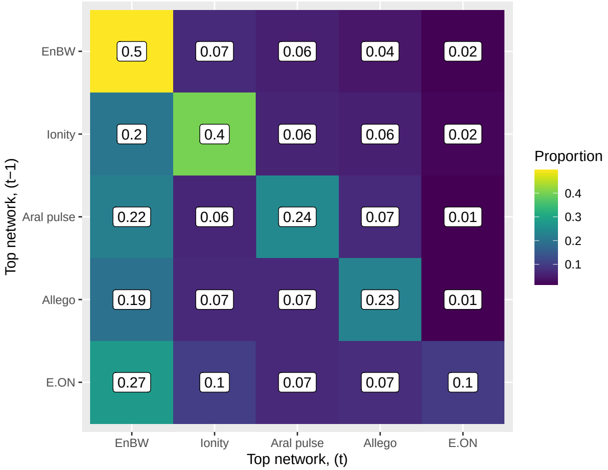
Monthly share (>1 charge event)

net	mean_sh	med_sh	N
EnBW	0.70	0.67	5636
Ionity	0.66	0.67	1794
Allego	0.61	0.50	1179
PFALZWERKE	0.67	0.67	944
Aral pulse	0.62	0.60	936
Shell Recharge	0.54	0.50	691
Lidl	0.61	0.57	596
EWE Go	0.62	0.60	484
Tesla Supercharger	0.66	0.67	482
Kaufland	0.63	0.60	387

Transition of top network

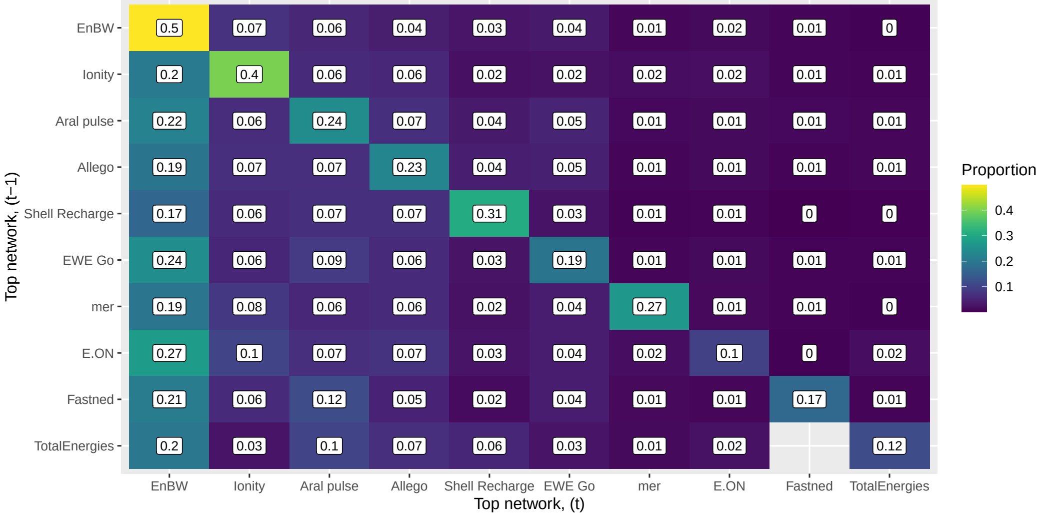
- I also document how consumers' top network evolves over time
- The model predicts:
  - There will be some degree of persistence in a consumer's most-used network from month to month (revealed preference)
  - This persistence will be stronger for consumers who have a plan with a VI network and get a volume discount
  - Consumers with such a plan will be more likely to go back to the plan's network (even after charging out of network)
- To illustrate this, I compute the transition matrix for consumers' top network from month to month
- For each network A and B:
  - I compute the proportion of users whose top network is A at time $t-1$ and B at time t
  -

Top network transition



- Note: the cell in row i, column j is the proportion of consumers whose top network was i in month $t-1$ and j in month t

Top network transition (more nets)



Top network transition

- Caveat: this is averaging over all users, each with different plans/roaming prices/volume discounts
- Nevertheless, there are some interesting patterns:
  1. Asymmetry of transition: e.g. Aral to EnBW much more likely than EnBW to Aral
  2. EnBW has highest persistence, followed by Ionity (both VI providers offering volume discounts as well as roaming)
  3. EnBW has a lot more ‘returning’ customers (first column): consistent with membership idea
  4. Certain networks have far lower ‘retention’ than others - suggests that these are not consumers’ primary network
- Helps reveal potential substitution patterns and correlation of consumer preferences

Card usage by network

- To further belabor this point, I now examine how consumers use different plans across networks
- For a variety of roaming plans, I look at the proportion of charging done at each network
- We would expect that consumers of VI roaming plans do more charging in-network, especially when they pay for discounted rates

EnBW roaming usage, by tariff level

(top 10)

Network	S	M	L
EnBW	0.42	0.53	0.73
Aral pulse	0.10	0.09	0.06
allego	0.07	0.08	0.02
E.ON	0.07	0.04	0.01
EWE Go	0.05	0.05	0.02
Mer	0.03	0.01	0.00
TotalEnergies	0.02	0.00	0.00
Fastned	0.02	0.03	0.02
IONITY	0.02	0.01	
Pfalzwerke	0.01	0.01	0.01

- S: free, M: €5.99/month, L: €17.99/month

Maingau roaming plan usage (top 10)

network	share
EnBW	0.20
Aral pulse	0.15
allego	0.12
E.ON	0.08
Fastned	0.07
EWE Go	0.05
Mer	0.03
Comfortcharge	0.03
be.energised	0.03
IONITY	0.03

ADAC (EnBW) roaming plan usage (top 10)

network	share
EnBW	0.44
Aral pulse	0.08
allego	0.08
E.ON	0.05
EWE Go	0.04
Fastned	0.04
Comfortcharge	0.02
be.energised	0.02
NewMotion	0.02
Mer	0.02

Ionity-affiliated plan usage (top 10)

network	share
IONITY	0.51
EnBW	0.13
Aral pulse	0.09
allego	0.06
EWE Go	0.04
Fastned	0.02
E.ON	0.02
be.energised	0.02
Pfalzwerke	0.01
Mer	0.01

Share of network usage, by plan

- I now present the converse: I look at the share of each network's charging done by a given plan
- Most of a network's charging comes either from its own consumers, major roaming providers, or other minor roaming
- Ad-hoc charging is not super common
- I group plans into the following classifications:
  1. I include the major generic roaming providers (ADAC, MAINGAU)
  2. I aggregate all plans from both EnBW and Ionity-affiliates (e.g. VW, BMW, Hyundai, etc.) into their respective groups (EnBW, Ionity)
  3. If a consumer uses any of the other roaming plans, I include them in 'Other'
  4. If a consumer charges with the network's own free charging rate[3], I label this as "Own"

[3] That is, the rate that a consumer gets by signing up for a free account with the provider. These are often lower than the ad-hoc rate. For instance, Aral offers €0.61/kWh if you create a free account and €0.79/kWh for ad-hoc charging

Breakdown by network (EnBW)

chargecard	share_of_net
ADAC e-Charge mit EnBW	0.31
EnBW	0.24
Other	0.22
Ionity	0.10
MAINGAU Autostrom	0.07
Ad-Hoc	0.06

Breakdown by network (IONITY)

chargecard	share_of_net
Ionity	0.50
Other	0.39
Ad-Hoc	0.06
MAINGAU Autostrom	0.02
ADAC e-Charge mit EnBW	0.02
EnBW	0.01

Breakdown by network (Aral)

chargecard	share_of_net
Other	0.29
ADAC e-Charge mit EnBW	0.16
Ionity	0.14
MAINGAU Autostrom	0.14
EnBW	0.13
Ad-Hoc	0.11
ADAC e-Charge mit Aral pulse	0.02

Breakdown by network (Allego)

chargecard	share_of_net
Other	0.36
ADAC e-Charge mit EnBW	0.19
MAINGAU Autostrom	0.13
EnBW	0.12
Ionity	0.11
Ad-Hoc	0.09

Breakdown by network (EWE Go)

chargecard	share_of_net
Other	0.29
Own	0.17
ADAC e-Charge mit EnBW	0.16
EnBW	0.10
Ionity	0.10
Ad-Hoc	0.10
MAINGAU Autostrom	0.09
EnBW ODR MobilityMe Privat	0.00

Breakdown by network (Shell)

chargecard	share_of_net
Other	0.50
Own	0.16
ADAC e-Charge mit EnBW	0.13
Ad-Hoc	0.09
EnBW	0.05
Ionity	0.05
MAINGAU Autostrom	0.02

Breakdown by network (E.ON)

chargecard	share_of_net
ADAC e-Charge mit EnBW	0.22
Other	0.20
Ad-Hoc	0.16
MAINGAU Autostrom	0.15
EnBW	0.14
Ionity	0.09
Own	0.03

Breakdown by network (Fastned)

chargecard	share_of_net
ADAC e-Charge mit EnBW	0.24
Other	0.19
MAINGAU Autostrom	0.17
EnBW	0.14
Ionity	0.12
Own	0.08
Ad-Hoc	0.06

Breakdown by network ()

Breakdown by network ()

Major price changes

- June 5, 2024: EnBW reduces own charging prices (€0.61 to €0.59) and introduces variable tariffs for other networks (€0.59-€0.89); used to be €0.65, €0.57,€0.50 for other networks on S, M, and L plans; now constant across all plans
- Used to partner with ADAC for 0.51, other providers 0.60 (0.79 for EWE/IONITY)
- Aral/ADAC: 0.51 from August-Sep 2024, 0.57 from Oct onward; 0.75 for other stations
- Allego: reduced prices on 1 July 2023 (€0.85 to €0.73 for HPC)
- Ionity: lowered from €0.79 to €0.69 August 18 2023 for free tier; Passport lowered from €0.59 to €0.49
- Ionity: Jan 2024, lowered passport fee (€12 to €5.99
- Ionity: added tier, now passport motion is €5.99 w/ €0.49 price and passport power is €11.99 for €0.39
- Maingau: 1 May 2023: 0.59 to 0.64 (0.49 to 0.59 for consumers); IONITY 0.75;
- Maingau: July 10, 2024: 0.69 for all, 0.79 for select (Aral, Allego, Mer, EnBW, EWE, E.ON); (0.59 for own customers)