

Regulation of Future Energy Systems

Demand-side response to price signals: current findings and ways for improvement

29.1.2025

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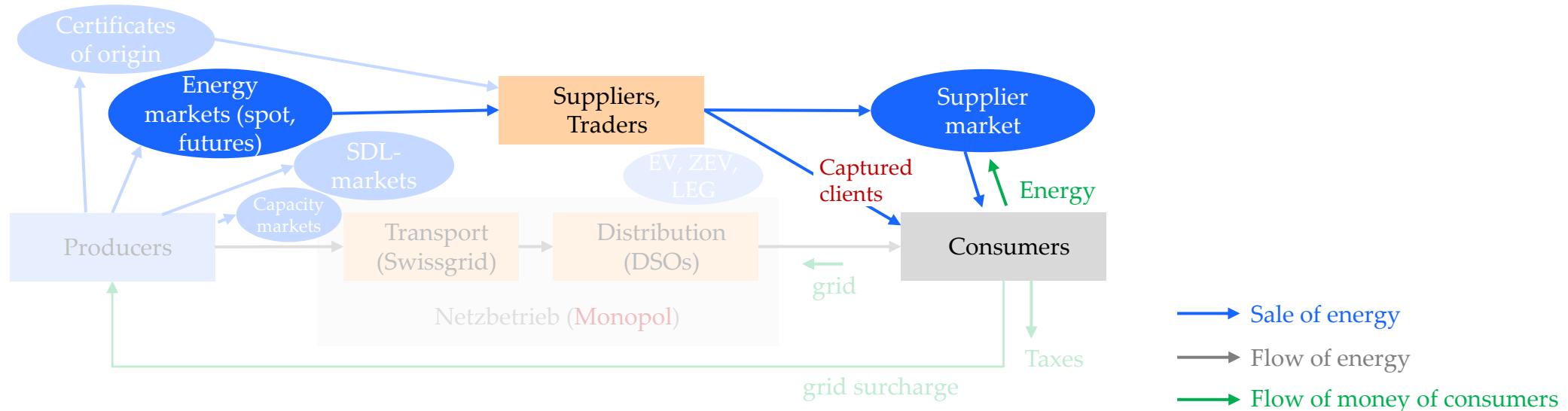
Introduction

Market opening in EC, partial market opening in CH

- Disaggregated approach to market opening: Elements of the value chain
 - that are competitive are opened to competition,
 - others (grids) remain a ring-fenced regulated monopoly
- Switzerland following the EC approach, however market for small clients not opened yet

Contents: Contribution of findings of recent work

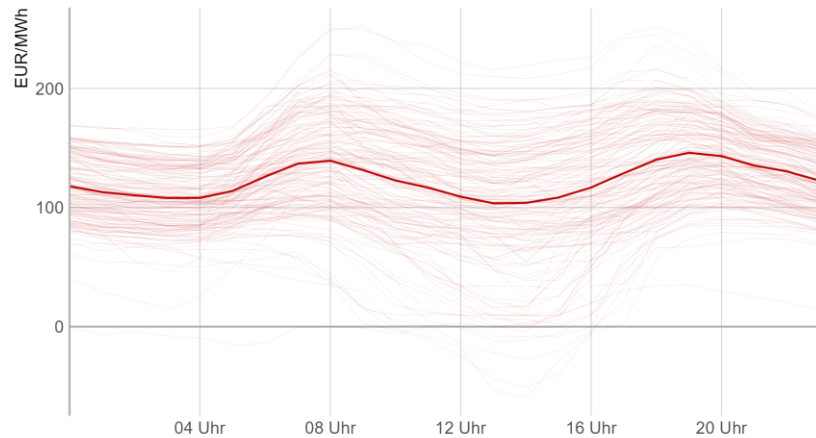
- Comprehensive study with Eschenbaum, Habibulina, Sabotic, de Luze & de Stadelhofen for the State Secretariat of Economic Affairs on price signals in the Swiss energy market (“Wirkung von Preissignalen und Regulierungen auf die Stromnachfrage”, Swiss Economics, 2024)
- Paper with Elsenbast and Winzer on ways to make dynamic tariffs more attractive (Elsenbast et al., 2025)



Electricity wholesale markets

Prices fluctuate heavily, but price-elasticities are low

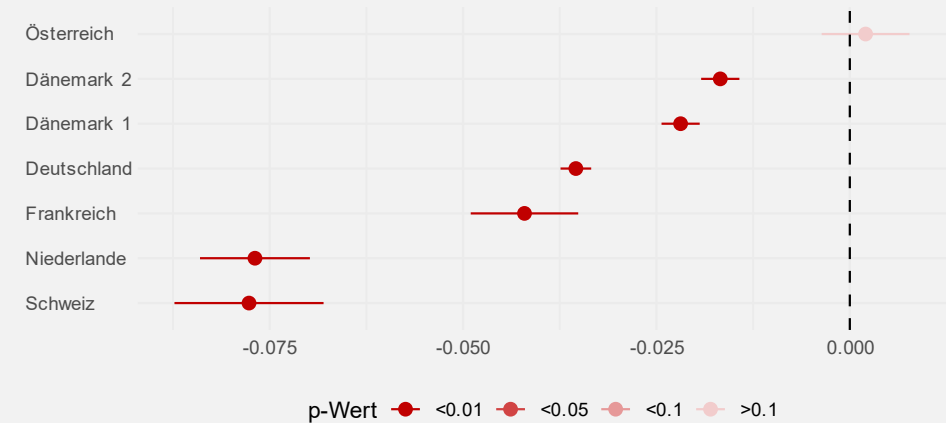
Heavily fluctuating prices on Swiss wholesale market (Spot, 2023)



Source: Swiss Economics (2024)

- Every 15' a new market price
- Fluctuating prices reflect changing supply and demand conditions
- Important incentives for producers and consumers
- Interplay is crucial with increasing share of new renewables

Low price elasticities on European wholesale markets



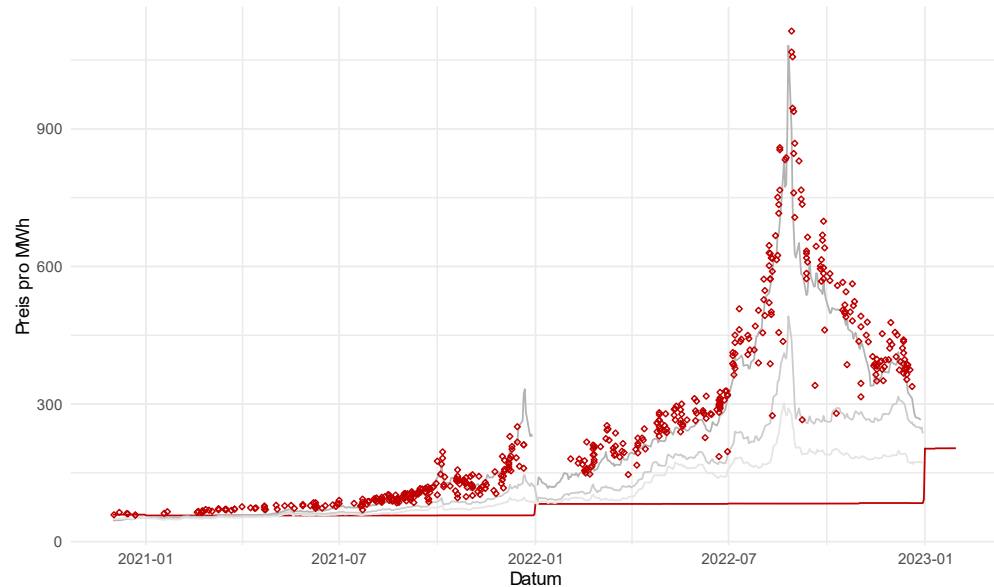
Source: Swiss Economics (2024)

- Price changes of 6 European wholesale markets have a small, statistically significant effect on electricity consumption
→ Price elasticities between -0.07% and -0.02%
- Why so low?
- Remark: Switzerland as “price taker”: Prices usually determined by arbitrage considerations of market players

Swiss electricity retail market

Companies on the free market choose fixed prices, hardly any spot contracts

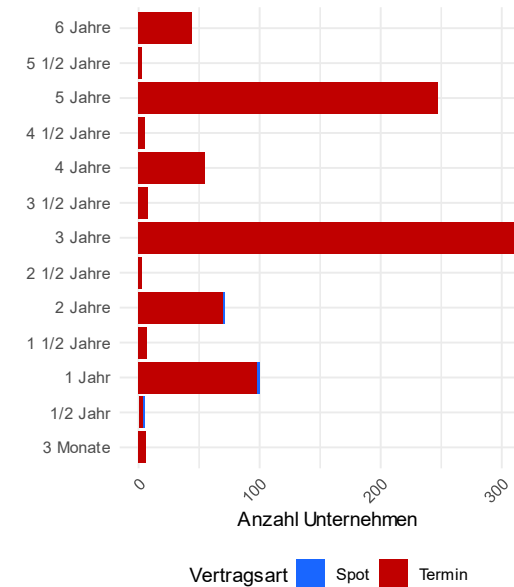
Futures prices vs. contractual prices of



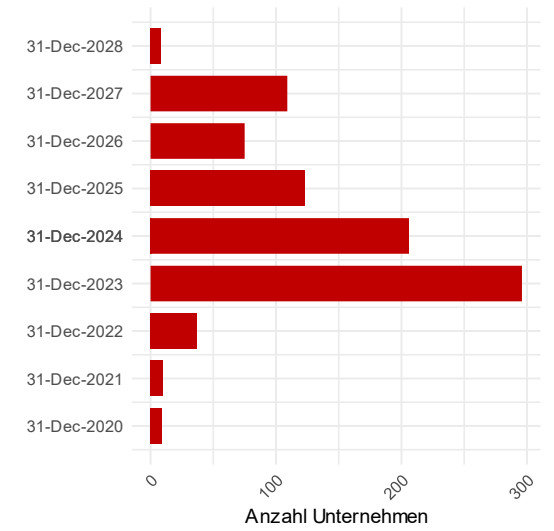
— 1-jähriger Future CH — 2-jähriger Future CH — 3-jähriger Future CH
— Mittelwert Terminverträge — Mittelwert Vertragsabschluss

Source: Swiss Economics (2024)

Length of contract



End of Contract



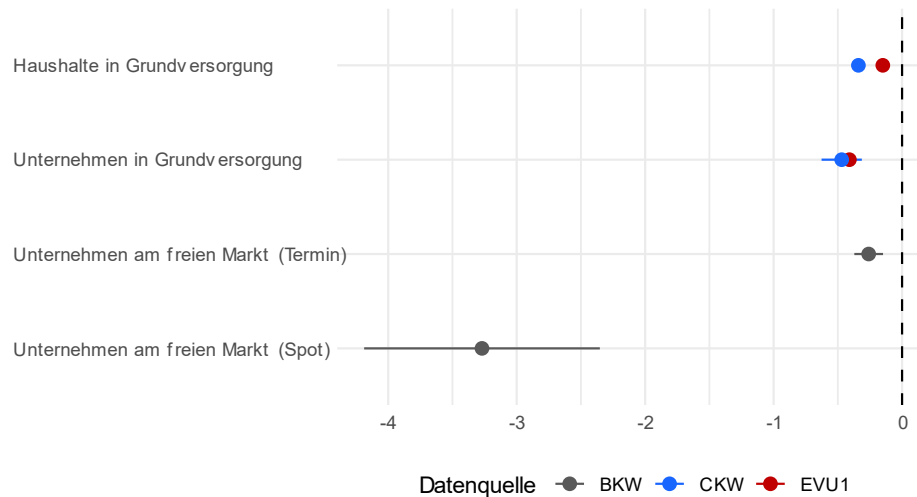
Source: Swiss Economics (2024)

- Companies on the free market seek to protect themselves against price volatility even if futures prices are very high
 - They opt for (multi-)year fixed-price contracts that are procured by the energy suppliers on the futures market with annual products. Contracts run by calendar year; contracts are very similar to prices in protected segments (“Grundversorgung”, “basic supply”)
- **Fixed prices mean that consumers have no financial incentives to adjust their demand to high market prices**

Clear potential to benefit from consumer reactions fluctuations

Consumers react to prices but are reluctant to dynamic pricing

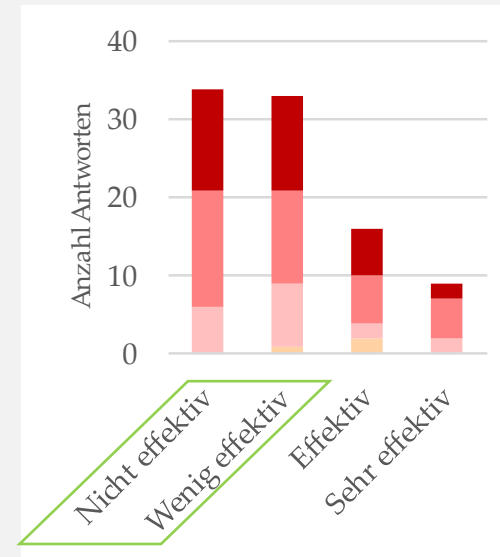
Price elasticities in the Swiss retail market



Source: Swiss Economics (2024). Note: $p < 0.05$ for all estimates.

- The short-term elasticity for companies is significantly higher than for households (approx. twice as high)
- The price elasticity of final consumers is significantly higher than in the wholesale market (approx. ten times as high)
- Companies on the spot market react very strongly to price changes (special sample however)

Assessment of dynamic pricing models – view of consumers



Source: Swiss Economics (2024)

- The use of dynamic pricing models – i.e. passing on price signals – is almost universally seen as ineffective.
- **Challenge:** combining increased price flexibility with the necessary security and predictability for consumers

There are ways to make dynamic tariffs more attractive

Mandatory bonuses for fixed price contracts?

Standard load profile at a fixed price, deviations settled with market prices

Consumer gets a bonus on fixed tariff if he follows market or supplier signals

x% of reference consumption at fixed price, 1-x% at spot-based price

	Fixed price contract	Fully variable tariffs	Profile contract	Bonus contract	Franchise contract
Benefits for energy system	Time-independent incentives only	Market-serving, (Grid-serving)	Market-serving, (Grid-serving)	Market- and/or forecast serving*, (Grid-serving)	Market-serving, (Grid-serving)
Consumer's risk exposure	None	Full exposure	unhedged consumption during high-price hours	No exposure	unhedged consumption during high-price hours
Possibility of risk avoidance	Not necessary	Reduction, relocation	Reduction, relocation	Reduction, relocation	Reduction, relocation
Strength of incentive	None	Market price	Market price	Bonus	Above Deductible: Market Price Among them: none
Profit potential	No	Yes	Yes	Yes	Yes

*Forecast serving: Incentives aligned to forecast of supplier
Source: Elsenbast et al. (2025)

- Alternatives to fully variable tariffs available
- Bonus contracts with no additional risks to consumers, but incentives to respond to market/forecast signals
- Ideally, regulations would prevent pure fixed price contracts **across Europe**. Suppliers can then innovate on attractive alternatives

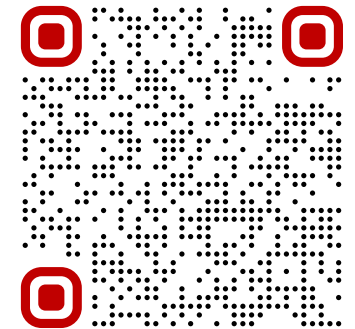
Thank you for your attention!

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