THE FINNISH ELECTRICITY RETAIL MARKET

Very preliminary draft. Do not cite.
22.2.2010
Anna Sahari

Abstract

This text gives an overall description of the Finnish retail electricity market and presents some relevant literature and the data sets available for analysing the market.

1. Introduction

In the Nordic countries (Nordic here refers to Finland, Norway and Sweden, as Iceland naturally has a separate electricity market) both wholesale and retail of electricity have been deregulated. The countries share a common wholesale market for electricity, Nord Pool, where generators of electricity place bids for buying and selling electricity. Each day the supply and demand bids are equated to produce a market price for each of the 24 hours of the next day. This market price, called the spot price, prevails if there are no transmission constraints between the countries. If transmission capacity is used up, the market is separated into different price areas with separate area prices. In addition to the spot market, Nord Pool also operates a market for derivatives and a real-time balancing market for electricity.

The retail markets are national, although the process towards an integrated Nordic retail market has begun; the Nordic energy ministers gave their support in October 2009 to creating a common Nordic retail market by 2015. Finland allowed for competition in the retail market in 1995. At first, only large users with capacity of 500 kWh were able to choose their supplier, and this became available to all retail customers in 1997. In practice, however, demands on metering prohibited households from switching away from the incumbent supplier as an hourly meter was required. This requirement was removed in 1998 with the adoption of load profiles. Under load profiling, each customer type is given a typical profile of electricity use against time, and these profiles are used in planning how much energy will need to be produced and distributed at each time period. Small-scale customers can now buy electricity from any retailer, and retailers are allowed to sell to any customer that they choose. Also, retailing of electricity is not regulated in the sense that it does not require a permit. Anyone may set up a retailing company and start to sell electricity purchased in some way, usually from the wholesale market.

This text will first give an introduction to the structure and functioning of the Finnish retail electricity market. A review of relevant literature related to the Finnish and other Nordic retail markets will follow. Finally, the available data is presented and some summary statistics are shown. Research questions have not yet been defined.

2. The Finnish electricity retail market

2.1 Institutional setup and market structure

In Finland there are currently 74 retailers listed in the Energy Market Authority's (EMA) website (22.10.2009). This number has come down from around 120 in the early days of deregulation. There have been mergers and some foreign companies have entered the market, most often by buying a local company. Total electricity consumption in 2007 was 90 374 GWh, of which households and agriculture consumed 25 %. This amounts to 22 391 GWh of electricity to be sold by the 74 retailers. In 2003, the average electricity consumption by a household was 8 800 kWh. At the average supply obligation price of that time, this amounts to about 340 euros per year, excluding taxes.

The distribution system operators (DSO) form the link between retailers and customers. There are 88 DSOs in total (EMA website). The DSOs are responsible for the distribution of electricity in low-voltage regional networks, for metering the electricity use of end-users and for maintaining the quality of the electricity in the grid. Distribution requires a permit linked to a geographical area in

which the distributor has the right to build a distribution network. Distribution remains a regulated practice, with pricing rules set by the Energy Market Authority and revenues of DSOs monitored annually. According to preliminary figures, in 2008 the distributors did not realise the full allowable revenues. This has also been the case in past years.

In practice, the distributor and retailer are often the same company. Companies which both distribute electricity and sell electricity to end users must separate these actions at least at a computational level. This means providing separate accounts for electricity distribution and retail. Legal separation is required if the company has distributed at least 200 GWh at a voltage of 400 per year during the last three years. In 2008, there were 34 companies which distributed at least this amount on an annual level. Stricter separation of actions is required for large companies which have at least 50 000 distribution customers (there are 15 companies of this size). The managers of such distribution companies may not act as managing directors or members of the board in a retailing company, if these companies are controlled by the same party. Those DSOs with at least 100 000 customers must also draw up a plan of action ensuring the impartiality of the DSO. This applies to 7 distribution companies. Overall, about half of the distributors need to separate retailing and distribution activities only at computational level.

Although retailing is no longer regulated, some of the retailing companies are determined obligatory suppliers. This obligation is imposed on a retailer who is in a dominant market position within the area of the DSO. An obligatory supplier must provide electricity to small scale users (main fuse 3x63 amperes and annual consumption of 100 000 kWh at most). This obligation is in place so that all electricity users are guaranteed to have a supplier. The supply obligation prices are meant to be "fair" and are monitored by the Energy Market Authority. However, the definition of a "supply obligation price" is not exact, as often all prices offered by the obligatory supplier into its own area are defined as supply obligation prices. Most retailing companies are obligatory suppliers, as only 7 of the 74 companies currently listed were not obligatory suppliers in any area. There are fewer obligatory suppliers than DSO because some of the distribution areas are under the supply obligation of the same retailer.

Given that there are so many companies present in the market, most retailers are quite small in size. Many of the companies, especially those that only supply their own area, are small, municipality owned generator-retailers. Overall, the ownership structure is mixed, with some larger companies being privately owned corporations, and smaller ones being under local or cooperative ownership. Information on the amount of retail customers that firms have is not publicly available, though some firms report it in their annual reports. For example Fortum, which is probably one of the largest retailers in terms of customers, reports on its internet site that it had 1.3 million retail customers in 2008. Another large company, Helsingin Energia, reported that it sold electricity to over 300 000 industrial and household customers in 2007. This was 3 912 GWh of energy.

Because most of the households have not switched supplier, these households buy electricity from the obligatory supplier, which is often the same company that acts as the local DSO. Therefore, looking at the amount of customers that distributors have gives some insight into the size of the retail companies. The DSOs must report the amount of customers they have to the Energy Market Authority, which makes the information available on its internet site. In total, 89 retailers are listed, and the median amount of customers is 11 522.

Table 1 lists five of the largest DSOs measured by users, which refers to the amount of customers at the end of 2008 who were billed for distribution of electricity. All the companies listed in the table are affiliated with a retailer.

Table 1. Five largest distribution companies.
Source: Energy Market Authority

Company	Users
Fortum Sähkönsiirto Oy	432 477
Vattenfall Verkko Oy	385 730
Helen Sähköverkko Oy	342 861
Fortum Espoo Distribution Oy	173 461
Tampereen Sähköverkko Oy	129 670

The five smallest companies are listed in table 2. The smallest DSO which also acts as a retailer selling electricity to household users is Jeppo Kraft, which only has 775 customers. The difference in size compared to the largest companies is huge. Though the companies differ greatly in size, the differences in terms of efficiency and performance need not be so large. Many of the retailer-generators own production facilities or shares of production, and thus do not need to buy electricity wholesale and be exposed to this price risk. Lewis et al. (2004) report dependence on spot prices estimated by a selection of suppliers and the values are on average around 10 % of sales.

Table 2. Five smallest distribution companies
Source: Energy Market Authority

Company	Users	Retailer or not
Karhu Voima Oy	22	
Finnish Chemicals Oy	58	
Finavia Helsinki-Vantaan lentoasema	399	Retailer
Jeppo Kraft Andelslag	775	Retailer
Utsjoen Sähköosuuskunta	1228	

Given that the smallest companies have very few customers, it seems understandable that they do not wish to engage in nationwide sales of electricity. There simply may not be enough resources, as expanding sales outside of the obligation area results in extra costs, as explained in the report by the Energy Market Authority (2005). These costs are due to the communication between DSOs and retailers related to information on customers' electricity use. This requires technology for transferring the data.

2.2 Tariffs and billing in the retail market

Households may make two types of contracts with retailers: fixed-term or permanent. The maximum duration for a fixed-term contract is two years, and a permanent contract may be terminated by the customer at 14 days notice. The tariff that is applied may be a constant one or time varying. Tariffs may be changed by the retailer at 30 days notice, with notification mailed personally to each customer. Time varying tariffs usually vary within the week (different tariff for day vs. night or weekday vs. weekend) or within the year (winter vs. other season). In principle, consumers are free to choose any supplier they wish and any contract. In practice, if a consumer wishes to buy electricity at a time-varying price, he may only choose that kind of product which is also offered by the local DSO. For example, if a household wishes to buy electricity at a tariff which specifies a different price for weekdays during 7-20 and other times, but the local DSO offers a corresponding product with times defined as 7-20 all days, the household cannot choose the desired product.

Metering is in practice done by the DSO. The DSO communicates the values to the retailer which then bills the customer for the correct amount. According to a new decree, all metering of consumption and small-scale generation must be hourly and based on remote reading. For households the deadline for this to be in place is 31.12.2013. The same deadline applies to the fact that consumers must be able to get the data at the same time as it is sent to the suppliers. The new decree also states that all meters should be read daily, with an exception in place until 2012 for households who do not buy an hourly product.

Because customers are metered by the DSO, a retailer wishing to sell electricity outside of its own supply obligation area must communicate with several DSOs in order to obtain metered values for billing purposes. It has been reported by the EMA (2005) that the communications between retailers and DSOs are not based on uniform standards, so that retailers may find that they need to invest in several types of technologies in order to be able to exchange information. This may be too costly especially for small retailers, and has been seen as an obstacle to competition.

Customers are billed separately for electricity and transmission, unless electricity is bought from the same company that acts as the local DSO. Billing frequency varies by contract type; some spot-contracts offer monthly billing based on actual use whereas most contracts are still based on billing for example four times a year based on expected use of electricity. The last bill of the year is a settling bill, where the actual use is recorded and accounts settled accordingly.

2.3 Supplier switching

Consumers are free to buy their electricity from any company which offers to sell into the corresponding area. Of the 74 retail companies, about 40 make offers outside of the area where they are the obligatory supplier. Consumers therefore do have a rather large variety of choice. Changing supplier in practice requires contacting the new supplier and terminating the contract with the previous supplier. If the customer was buying electricity from the obligatory supplier, a contract for the distribution of electricity must be drawn separately when the supplier changes. Often electricity companies offer to take care of terminating the old contract for the new customer.

Changing supplier requires an extra reading of the meter. If the switch happens for the first time or at least 12 months have passed since the last switch, the reading of the meter is free of charge. There are thus no monetary costs related to switching supplier. Perceived costs or transaction costs do exist, since changing supplier has not been very popular. The EMA reports (2005) that by 2004, 30 % of retail customers had switched from the supply obligation contract to either another supplier or a new, renegotiated contract with the old supplier. Annual switching rates are reported in table 3. It can be seen that the switching activity is higher the higher is the annual consumption of electricity. Also, small-scale industry is more eager in switching electricity supplier than households. This is natural, as there are more absolute savings to be made the higher is electricity consumption. For low electricity consumption households, the transaction costs related to switching may not be covered by the potential savings. Rather low switching rates may also be due to the fact that, on average, supply obligation prices have been lower than offer prices. The recent downturn in the spot price level has, however, decreased the price of fixed-term contracts, which has incited households to switch to this contract type and benefit from the low price level.

Table 3. Percentage of end-users that has switched suppliers.
Source: Energy Market Authority

	2006	2007	2008	2009
< 10 000 kWh/a	3.10 %	3.00 %	3.40 %	7.20 %
> 10 000 kwh/a	7.70 %	6.80 %	5.60 %	10.90 %
Other small-scale users	3.80 %	3.30 %	2.80 %	5.10 %
SME	7.70 %	8.00 %	6.20 %	11.60 %
All users, total	4.20 %	4.00 %	4.40 %	8.10 %
Total customers	127 900	123 800	135 500	249 600

Switching supplier is facilitated by several internet sites, which aim to lower the cost of gathering information on prices. The Energy Market Authority, for example, provides a service where households may see the evolution of all electricity prices or list all the electricity contracts offered into their area and to the relevant type of household, ordered from cheapest to most expensive. Other organisations offer similar services, for example related to green electricity contracts. Comparison of prices and gathering information on the overall price level is therefore rather simple, provided one has access to the internet (which most Finnish households do, in 2008 76 % of households had an internet connection, according to Statistics Finland).

3. Review of literature

Several reports, conference proceedings and working papers have been published concerning the Finnish retail market and other Nordic markets. Most reports concerning the Finnish market have been commissioned by ministries and drawn up by research institutions. Scientific journal publications are harder to come by, and most reports are not very explicit about what data and type of analysis their conclusions are based on. The following is a summary of some of the most recent literature, focusing mainly on the Finnish retail market. Many noteworthy papers are not yet listed here (articles related in general to electricity markets), and also the search into literature on other similar wholesale-retail markets (for example gasoline) is still ongoing.

Sturluson 2003. In his PhD thesis, Sturluson estimates transaction costs for switching supplier in the Swedish retail market. [More on this].

Lewis et al. 2004 study the relationship of prices between wholesale and retail markets in the Nordic countries in a report commissioned by the Ministry of Trade and Industry. Overall, they conclude that Finnish retail prices tend to follow spot prices in an aggregated and lagged fashion. This is very different compared to Norway, where retail prices are adjusted often, and prices visibly follow spot price levels up and down. Also, the Finnish customers have been much less active in switching supplier than their Norwegian or Swedish counterparts. The authors of the report convey the image that competition is absent from the Finnish retail electricity market: "Finnish electricity suppliers in particular have generally given up with the idea of competition, at least concerning residential customers (partly due to customer apathy)." (Lewis et al. 2004, page 91.)

Kinnunen (2004) reports on the offer prices of electricity retailers in a publication by the National Consumer Research Centre. She collects data by asking retail companies for offers of electricity for two typical consumer types at two points in time. Kinnunen finds that a large part of the retailers did not respond to the request or did not make offers that were below their supply obligation prices. The conclusion is that retailers do not seem to be truly competing for customers and that there is some factor which is keeping prices at a high level. Kinnunen suspects that the retailers were

unwilling to offer lower prices in expectation of prices rising due to the emissions trading system which began operation in 2005.

The Energy Market Authority published an internal report in 2005 on the functioning of competition in the retail electricity market. The focus of the report is on factors that hinder competition, and it is based on interviews of most retail companies. Most of the problems are related to the tasks which are carried out by the distribution system operator for the retailer, such as information on consumption, exchange of customer information and distribution tariff setting. These factors can lead one to question whether retailers truly are in an equal position when offering to sell electricity into an area outside of their own. Also, the fees related to information exchange and balance payments may form such a large expense that the smallest companies do not find it profitable to offer electricity outside of their own supply obligation area. In addition to the relationship between distribution and retail companies, the report brings forth things such as uninformative billing, the obligation to announce price changes a month beforehand and the supply obligation as elements which discourage competition in the market.

Olsen et al. (2006) report on the experiences of implementing competitive retail electricity markets in the Nordic countries. They note that the margins in retail markets can only stay low if consumer switching actually takes place. Olsen et al. conclude that the formation of a truly functioning retail market takes time, and that several barriers regarding access to information and the integration of distributors and retailers need to be overcome. Since the publication of their article, most of the issues which they bring about have actually been addressed.

Johnsen and Olsen (2008) examine the relationship between wholesale and retail prices in the Nordic countries. They model the first difference of the retail price using lags in differences of the wholesale price and retail price. The idea is to see whether adjustment to wholesale price changes is asymmetric. The data is average retail prices, for Finland the prices consist of supply obligation prices from 1998 onwards as monthly observations. Given that the Finnish retail prices are extremely stable, the model for Finland does not produce a good fit and the authors must reject the model due to unrealistic results. They suggest modelling the relationship for Finland using electricity forwards and fuel prices.

Lewis et al. (2007) report to the Ministry of Trade and Industry on the impacts of the changes in the law on electricity markets. The new law came into force in 2005 and specified new guidelines for calculating the distribution prices. Also, the law made separation of distribution and retail activities stricter, required offer prices of electricity to be public and limited the supply obligation to apply only to small-scale customers. The authors report that insofar as the separation of distribution and retail has any impacts on retail prices, it tends to increase prices rather than decrease. Based on interviews of retailers, the same is said of the obligation to publish all offer prices. Also based on interviews, the supply obligation was mostly seen as not affecting the level of prices.

Annala and Viljainen (2008) describe the state of the Finnish retail market and point to several issues which may act as barriers to competition. These include lack of customer activity, lack of supplier equality, balance settlement and metering and lack of retailer activity. They state that increasing customer activity is crucial in order to improve the performance of the market.

Pakkanen et al. (2008) report on differences in consumer switching activity in the Nordic countries and look for factors which could explain the observations. Features such as supply obligation, separate billing and price matching are similar in all countries and are therefore not likely to explain why annual switches for example in Demark are practically zero and in Norway more than 10 %. A

clear difference between the countries is the amount of electricity consumed on average by households; this is highest in Norway (19 000 kWh) and lowest in Denmark (4 000 kWh). It seems natural that in countries where the electricity bill forms a noticeable share of household expenses, consumers are more active. The low activity of customers in Denmark can also be due to the fact that the price level of default contracts is in practice regulated, and there are thus very low incentives for companies to truly compete or customers to seek an alternative supplier.

Haltia et al. (2009) report on the impacts of nuclear investments on the retail prices of electricity. The analysis is part of a report commissioned by Fennovoima, one of the applicants for a nuclear plant licence. The impact is studied by identifying how company ownership structure affects retail prices, controlling for the size and generation capacity of the firm. The econometric analysis implies that privately owned companies tend to price higher than municipalities or cooperatives. Approximately this difference is around 5 %. Also, small firms tend to price around 10 % lower than larger firms. The change in ownership structure is also studied, and results indicate that if the company goes from being locally owned to privately owned, its price will be higher in the years following this change.

Johnsen and Olsen 2009. Follow-up on previous paper. [More on this].

4. Data

This section presents the data available for analysing the Finnish retail electricity market. There are two date sets, one containing aggregate data and another which has firm specific price information. The aggregate data includes nationwide averages of supply obligation and offer prices, prices of fuels and spot and forward prices from the wholesale market. This data ranges from 2000 to 2009 although some variables are not recorded for the whole time frame. The firm-level data includes all price offers made by retailing companies, identified by area and company. This data ranges from 2006 to 2009. In addition, there is another firm-level data set which reports prices in each firm's supply obligation area, decomposed into the fixed and variable part of the tariff. The firm-level data allows for studying differences in prices between companies, areas and offers made into the own supply obligation areas versus outside areas.

4.1 Aggregate data

The variables in the aggregate data set and their sources are listed in table 4.

Table 4. Aggregate data variables.
Sources: EMA, Nord Pool, Reuters

Variable	Description
5kwh_a	Average supply obligation price for annual consumption of 5000 kWh
18kwh_a	Average supply obligation price for annual consumption of 18000 kWh
5kwh_offer	Average offer price for annual consumption of 5000 kWh
5kwh_offer_1yr	Average offer price, 1 year contract, annual consumption 5000 kWh
5kwh_offer_2yr	Average offer price, 2 year contract, annual consumption 5000 kWh
kwh22	Average supply obligation price for annual consumption of 22000 kWh
Spot	Daily spot price at NordPool
6m_fwd	Price of 6 month forward contract
3m_fwd	Price of 3 month forward contract
yr1fwd	Price of 1 year forward contract
BFOE	Brent crude oil, day to day delivery, Europe
BFO	Brent crude oil, day to day delivery, world
Coal	Coal, North-West Europe, Mccloskey index

Figure 1 shows the NordPool spot price, the average supply obligation price and the average of offer prices for 1 year contracts. These prices are for households with annual consumption of 5000 kWh. This amounts to a detached house with no electric heating. The shape of the price time series is the same for annual consumption levels of 18 000 or 22 000 kWh, only the level differs since households that consume more pay less per unit for energy.

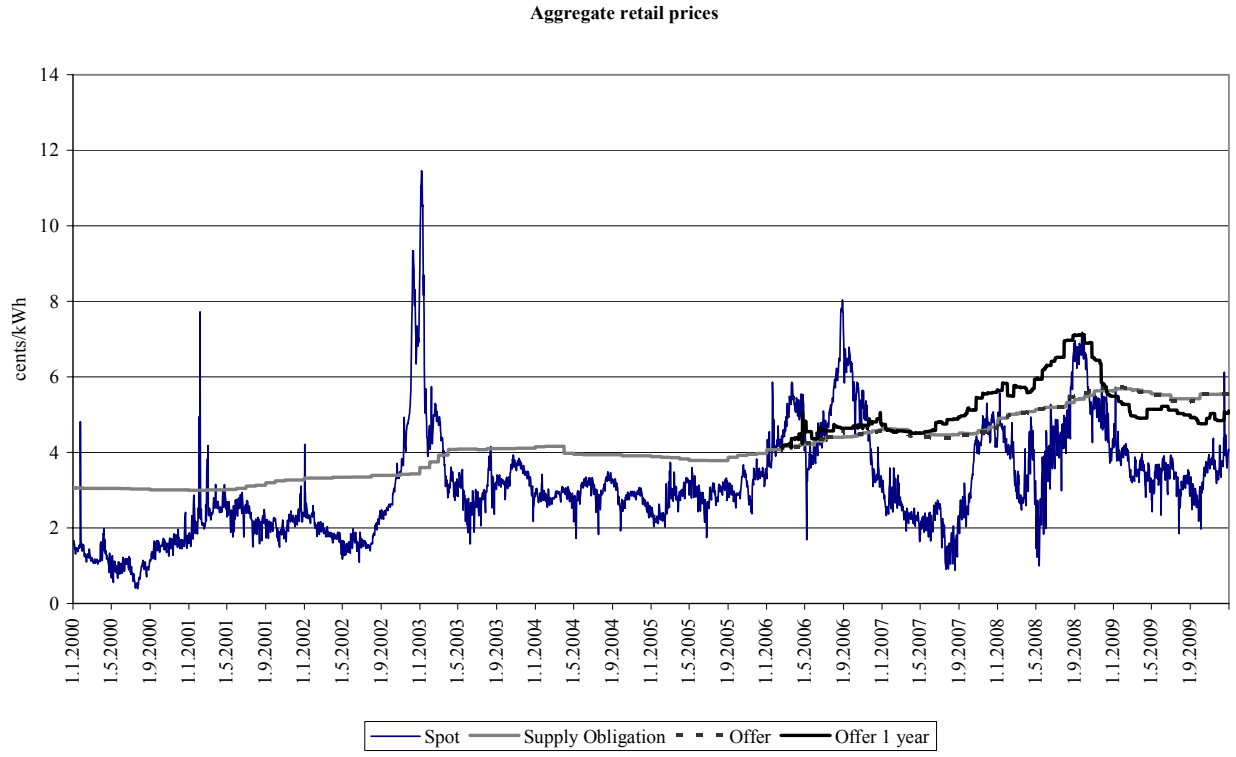

Figure 1. Aggregate retail prices and the spot price, 2000 – 2009.

From the figure it can be seen that the retail price varies a lot less than the spot price, and stays well above the spot price for a considerable amount of time. The retail price is very rarely adjusted downwards. Looking at annual means reveals that retail prices have been clearly above spot prices for all years except 2006 when retailers made losses on average. The magnitude of the annual

marginal varies over the year, being at most 138 % (in 2000) and at smallest -11 % (2006) compared to the spot price. In 2009, average supply obligation prices were 61 % above spot prices on an annual level. An unexpectedly high average spot price causes the margins to shrink, but otherwise retail prices are well above spot prices. Comparing offer prices to supply obligation prices shows that the difference is very small, with offers being slightly more expensive. The fixed term contracts have stated noticeably higher prices, except for 2009 where perhaps retailers are anticipating lower electricity prices due to the recession.

The retailers are thus not transferring the seasonal price variation to consumers, but rather the change in the overall level of prices. Compared to for example Norway, the Finnish retail price is extremely stable. This may be because adjusting prices is difficult due to the long notice times. This could be viewed as beneficial to consumers, as energy expenses remain predictable. On the other hand, nearly constant electricity prices do not increase sensitivity of consumers to electricity prices, and increasing the elasticity of demand is often cited as one way to induce energy savings and reduce the need for expensive peak capacity.

Table 5 presents correlations between fuel prices, forwards, the spot price and the supply obligation prices. The correlations are calculated from weekly data. It can be seen that the supply obligation prices are strongly correlated with forward contracts of 1 year ahead. The correlation is 0.76 for 5000 kWh customers and 0.77 for 18 000 kWh customers. Also the price of coal is highly correlated with supply obligation prices, the correlation is about 0.72. The data thus seems to imply that retailers take into account the price level of long-term forward contracts and fuel prices when pricing electricity.

Table 5. Correlations between aggregate electricity prices and forward and fuel prices.

	kwh5	kwh18	spot	fwd6m	fwd3m	bfo	coal	yr1fwd
kwh5	1							
kwh18	0.9975	1						
spot	0.4564	0.4698	1					
fwd6m	0.5299	0.5452	0.6851	1				
fwd3m	0.4718	0.4834	0.8624	0.8368	1			
bfo	0.5738	0.6029	0.3778	0.7253	0.5317	1		
coal	0.7218	0.7222	0.3667	0.56	0.46	0.7063	1	
yr1fwd	0.7566	0.7746	0.6191	0.8545	0.752	0.8861	0.7211	1

If these variables are moving according to a common trend, cointegration analysis could be applied to investigate the long-run relationship between the variables. This approach has been used by Johnsen and Olsen (2008), who study the relationship between wholesale and retail prices in Nordic countries by cointegration methods. Their model for Finland fails, and the authors suspect that other variables than simply the spot price should be used. Looking at the data suggests that coal prices and long-term forwards could be more important than the spot price for determining the level of retail prices. Preliminary investigation of the time series suggests that the series are integrated of order 1; Dickey-Fuller tests imply nonstationary series, and first differencing produces stationary series. The next step would be to test whether the series are cointegrated, and then carry on by specifying a model which describes the long-term relationship between retail prices and forwards and fuel prices. [Perhaps more on this!?]

4.2 Firm level data

There are two types of firm level data available: one data set presents prices with the fixed and variable part combined, and the other data set separates total price into the fixed and variable component. The first data set includes all price offers made by all electricity companies from 2006 onwards and will be examined first. The prices have been recorded monthly. The offers are recorded for each area, where an area is defined by the company which acts as the obligatory supplier. Also, contract types are specified. For example, we could study the offers made by Helsingin Energia into the area of Tampere, separately for each contract type that Helsingin Energia offers. This type of data allows for studying price dispersion across firms and areas, as well as the activity of firms with respect to offering into other areas than their own. The variables are listed in table 6. Prices are for three different customer profiles:
K1: Apartment, consumption 2 000 kWh per year
K2: Detached house, consumption 5 000 kWh per year
L1: Detached house, electric heating, consumption 18 000 kWh per year

Table 6. Variables in the firm-level data set.

Variable	**Description**
Company	Name of company acting as obligatory supplier in the area
Retailer	Name of company offering to sell electricity into the area
Contract	Name of contract, identifying contract type
K1	Retail price of electricity (fixed and variable cost combined)
Spot	Spot price at NordPool
Obligatory	Dummy variabe, 1 if offer has been made by the obligatory supplier

The data set includes 66 obligatory suppliers. The amount of firms making offers to each customer profile is the following: K1: 74, K2: 74, L1: 71. Less firms offer into the category L1 because some of the small commercial companies that have no own production have dropped out. As for the amount of firms that make offers outside of their own area, we have the following figures:
K1: 46 (leaving 28 companies that only sell in their own area)
K2: 45 (29 companies only sell in their own area)
L1: 39 (32 companies only sell in their own area)

As the amount of electricity consumed by the customer increases, fewer firms are willing to supply outside of their area. The consumers in category L1 often by electricity at a seasonal or time-varying price, so monitoring their electricity use is more expensive and thus it is natural that companies are less willing to interact with other DSOs to collect the information required for serving this customer type.

Looking at the mean prices of offers reveals that companies that offer only into their own area set their prices on average slightly lower than companies that sell nationwide. Table 7 presents mean values calculated for subsamples of firms that offer into their own area only, and those offers made by firms outside of their own area (note that these are therefore not the same firms). In practice, those firms that offer into all areas post the same price everywhere. The prices here offered to other than the own area can therefore be viewed as representing average prices by firms that offer nationwide. It is noticeable, then, that those firms selling nationwide price slightly higher on average than firms who operate only in their own area. The average prices for the different customer groups are 10 % to 15 % higher if the offer is made outside of the firm's own area. Small, local companies are thus on average less expensive than large, national companies. This has also

been reported in the study by Haltia et al. 2009, and the differences they found were of the same magnitude.

Table 7. Mean prices for offers outside of own area and offers made by firms offering into own area only.

	K1	K2	L1	K1	K2	L1
Offers to other than own area				**Own area only**		
Mean	7.36	6.22	5.52	6.41	5.67	4.88
Standard Error	0.00	0.00	0.00	0.03	0.02	0.02
Median	7.15	6.12	5.37	6.39	5.57	4.82
Mode	6.88	5.42	5.08	4.75	4.30	3.75
Standard Deviation	1.10	0.84	0.80	1.19	1.15	1.17
Sample Variance	1.20	0.71	0.64	1.42	1.33	1.37
Kurtosis	3.66	2.79	-0.20	-0.09	9.34	14.17
Skewness	1.05	0.83	0.50	0.42	1.69	2.21
Range	13.35	10.82	5.56	6.21	10.56	10.87
Minimum	4.55	4.06	3.53	4.20	3.54	2.88
Maximum	17.90	14.88	9.09	10.41	14.10	13.74
Count	97475	167982	138865	1811	3328	2544

Looking more closely at those firms which offer nationwide reveals that there is practically no differentiation between the prices posted into different areas. An example of this is given in figure 2. Each line in the figure corresponds to a contract offered by a company on 1.1.2007. This is a subsample of companies that offer outside of their own area. The horizontal axis lists all the supply obligation areas. It can be seen that prices do not vary by area. For example, the most expensive contract in this sample is an offer for time-varying wind-generated electricity by Lahti Energia. This contract is offered at the same price into all areas.

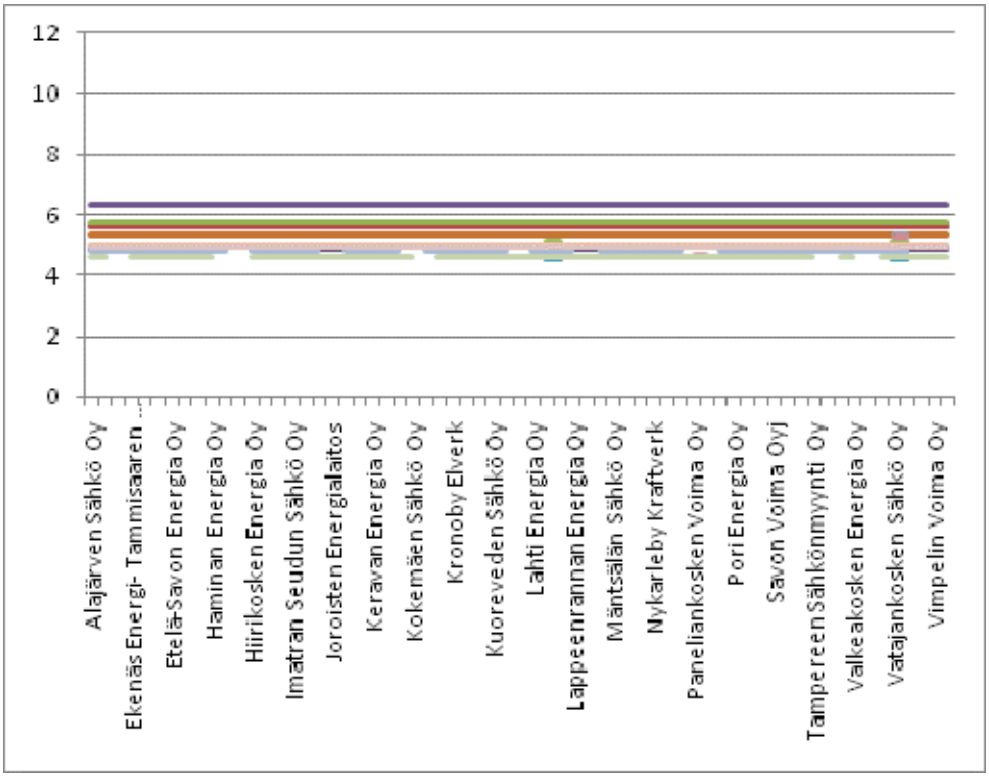

Figure 2. Offers by selected firms into all areas, 1.1.2007.

Though there seems to be no variation between areas in prices posted by a given firm, there are however differences between firms. In figure 2, the highest price is just above 6 cents/kWh whereas the lowest price is less than 5 cents/kWh. For example, if we look at prices posted into the Espoo area on January 1st, 2007, the lowest price offer is by Pori Energia Oy at 5.77 cents/kWh and the highest is by Savon Voima, 8.63. The highest offer is thus 49 % higher than the lowest. Both companies also offer other contracts into the area, for example Savon Voima has another contract which is cheaper at 6.85 cent/kWh. Thus, Savon Voima offers two contracts, of which one is 26 % cheaper than the other. All these prices are quoted for a consumer of type K1.

As an example of the differences between the prices offered into the same area, figure 3 shows offers made into the area of Espoo by the obligatory supplier Fortum and the cheapest supplier Porin Energia. Both offers are for a similar type of contract. The cheaper contract is consistently well below the supply obligation contract, the difference being on average 20 %. Based on these price differences it seems justified to say that a household could save a noticeable amount of money by switching to the cheapest possible contract. In the case shown here, for a household who consumes on average 2000 kwh of electricity per year, the price difference translates into about 30 euros of savings. In absolute terms the amount is not much. But for customers with, say, electric heating, the amount could easily be in the magnitude hundreds of euros.

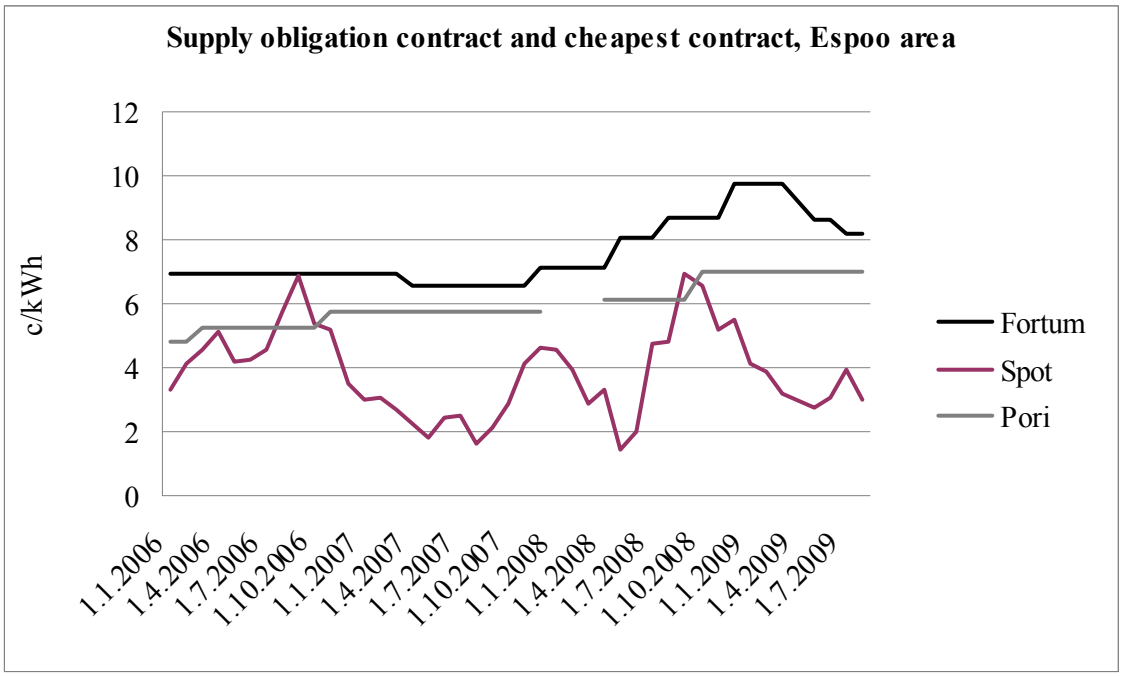

Figure 3. Example of offers into Espoo area, K1 prices.

Given that households are allowed to choose freely between retailers, that there are several retailers to choose from in each area and that price information is easily publicly available, it seems puzzling that companies offer several differently priced contracts into the same area and that price differences between different contracts and companies persist. One explanation could be that contracts differ between how the price is divided between the fixed and variable component. This difference does not show up in this price data. Contracts may also offer different products, for example a certain percentage of renewable energy, or a price tied to the spot price. These kinds of contracts have become more common in recent years. The spot priced contracts offer a frequently changing price, say monthly or quarterly, which is based on the development of the wholesale electricity price. There are quite large differences between firms with respect to these contracts. For example, the contract offered by KSS energia changes monthly and offers on average a price 2 cents higher than the spot price. Kymenlaakson sähkö on the other hand adjusts its price less often and takes a marginal on average of 4 cents. Green contracts are more commonly available than spot contracts, and have been so for a longer time. The contracts may offer for example power produced by wind or renewable sources, and the amount may correspond to total consumption of the household or a specific percentage. The price differences between green contracts are noticeable but not as large as between spot contracts. In green contracts the price differences may be justified by the fuel mix; a customer may be willing to pay more for wind-based energy than hydro energy, though both are considered green.

The second data set of firm level prices allows for a closer inspection of the different components of the price of electricity. This data set includes only those offers made by firms into their own area. Customer types are distinguished by the size of the main fuse. Also in this set prices have been recorded on a monthly basis. The variables are listed in table 8.

Table 8. Variables in second set of firm-level prices.

Variable	Description
Company	Identification of retailer by name
Contract	Name of contract, identifies contract type
1x25A	Fixed cost for users with fuse of 1x25 amperes
3x25A	Fixed cost for users with fuse of 3x25 amperes
3x63A	Fixed cost for users with fuse of 3x63 amperes
c/kWh	Variable cost of contract
Supply obligation	Dummy variable, 1 if price is supply obligation price
No new cust.	Dummy variable, 1 if no new customers are signed to the contract

The yearly averages of fixed costs and the variable energy cost are depicted in figure 4. These are for permanent, constant price contracts. The fixed cost, stated as euros per month, is higher for higher consumption levels. A main fuse of 1x25 amperes is for consumer type K1, whereas 3x25 amperes refers to houses with electric heating and annual consumptions up to 22 000 kWh. A fuse of 3x63 amperes is for large small-scale consumers such as farmhouses. Both fixed costs and the variable cost have increased in time, the largest upward adjustment was made in 2008 when all components of prices increased about 11 %.

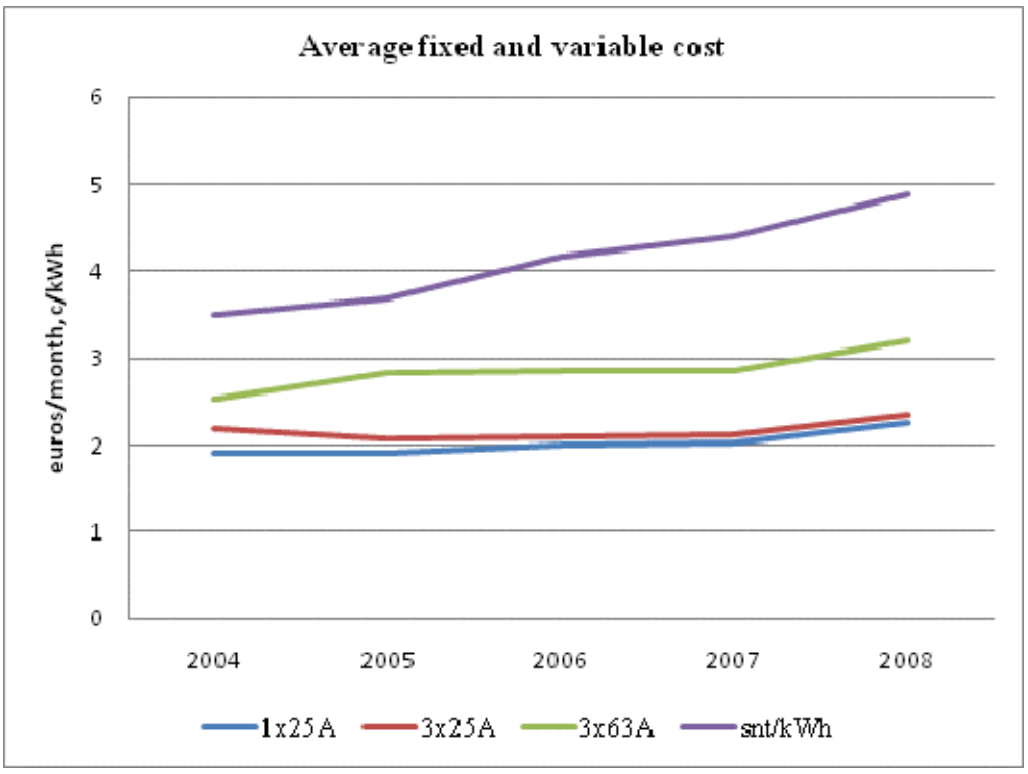

Figure 4. Annual means of fixed and variable costs of electricity contracts.

The overall average fixed cost is approximately 2 euros per month, but the highest value is as high as 16.56. There are also several contracts which have no fixed cost. The average variable cost for contracts with a fixed cost of at most 2 euros is 4.51. For contracts with a fixed cost of at least 2 euros the value is 4.74. It is not therefore evident that a high fixed cost would be associated with a lower variable cost and vice versa.

References

Annala, S. and Viljainen, S. 2008. Functioning of Competition in the Finnish Retail Electricity Market. IEEE conferences.

Energy Market Authority 2005. Sähkön vähittäismyyntimarkkinoiden toimivuus. Internal report.

Haltia, V. Holm, P. Kiander, J. Lehto, E. Maliniemi, K. Ollikainen, M. 2009. Ydinvoimainvestointien vaikutukset elinkeinoelämän ja kotitalouksien sähkön hintaan. Pellervon taloudellinen tutkimuslaitos, report no. XXX.

Johnsen, T. and Olsen, O. 2008. The relationship between wholesale and retail electricity prices to households in the Nordic countries. Working paper.

Johnsen, T. and Olsen, O. 2009. Passive households in liberalized retail electricity markets: Lucky free-riders or sitting ducks? Evidence from Norway, Sweden and Finland. Working paper.

Kinnunen, K. 2004. Kilpailullisuus sähkömarkkinoilla. Sähköenergian tarjoushinnat 2003-2004. Kuluttajatutkimuskeskus.

Lewis, P. Johnsen, T. Närvä, T. Wasti, S. 2004. Analysing the relationship between wholesale and end-user prices in the Nordic electricity market. Ministry of Trade and Industry.

Lewis, P. Pakkanen, M. Närvä, T. Hernesniemi, L. Partanen, J. Viljainen, S. Honkapuro, S. Tahvanainen, K. Jylhä, R. 2007. Selvitys sähkö- ja maakaasumarkkinoiden kehityksestä sekä sähkö ja maakaasumarkkinalakien soveltamisesta saaduista kokemuksista. Ministry of Trade and Industry report 2/2007.

Olsen, O. Johnsen, T. Lewis, P. 2006. A Mixed Nordic Experience: Implementing Competitive Retail Electricity Markets for Household Customers. The Electricity Journal, vol. 19, issue 9, pages 37-44.

Pakkanen, M. Johnsen, T. Olsen, O. Närvä, T. 2008. Differences in Consumer Activity at the Nordic Electricity Market - Searching for Explanations. Vaasa energy conference.

Sturluson, J. 2003. Topics in the Industrial Organisation of Electricity Markets. PhD dissertation. Stockholm School of Economics.