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Customers' value-for-money for a regulated service across different owners

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Abstract

What are the best ownership and governance arrangements for a natural monopoly facility? There are three broad approaches: (a) private ownership, coupled with arms-length public utility regulation; (b) some form of government (central, state, or local) ownership; and (c) customer or community ownership. While there is a substantial literature comparing outcomes under private and public (i.e., government) ownership, there is relatively little literature comparing private and/or government ownership with customer ownership. One of the obstacles of performance comparison is that different businesses may choose a different price-quality trade-off, making direct comparison impossible. In this study we cut through this problem by comparing customer perceptions of value-for-money. The study is based on interviews of more than 600 randomly selected electricity distribution customers in Sweden, approximately 150 in each ownership category (municipal, customer, private, and state). These distributors are subject to an identical regulatory framework. The results show that those owned directly by customers are perceived to deliver significantly more value for money than those owned by the government or by private investors. These results lend weight to the view that a well-governed customer-owned utility may lead to better outcomes than other owners.

Keywords: utility regulation, electricity distribution, customer-ownership

JEL codes: D42, L33, L94

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1 Introduction

Economic theory posits two broad solutions to the 'natural monopoly problem': (a) arms-length regulation of a privately-owned firm; and (b) vertical integration between the customers and the monopoly facility. The first approach leaves the profit-motive of the firm intact and relies on external controls (i.e., regulation) to bring the behaviour of the regulated firm in line with the public interest. The second approach uses vertical integration to directly align the interests of the monopoly firm with its customers. Both approaches can be routinely found in practice. But which approach delivers better overall outcomes? Should policymakers, in designing policies for monopoly industries, promote customer-ownership?

Government ownership represents something of an intermediate or hybrid approach. In many countries it is common for monopoly facilities to be provided by government-owned firms – that is, by firms owned by federal, state, local or city government. But the behaviour of a government-owned firm depends on the governance and directions by its government-owner.[1] Because of this ambiguity over objectives it is difficult to make clear theoretical predictions about the effect of government ownership or privatisation (at least, without making further assumptions).

But the picture is clearer when it comes to customer-ownership. Customer-ownership allows the customers of a monopoly service to protect themselves against the risk of ex post hold-up without the costs and drawbacks of arms-length regulation.

Customer ownership has been a persistent – if minority – approach to monopoly infrastructure provision since the origin of these sectors. Customer-owned co-operatives in infrastructure industries first emerged in the 19th century in the power and water sectors, but flourished after WWI (Heilman, 1925; Bruner, 1925)[2]. Even today, customer-owned co-operatives are common in the provision of rural electricity distribution services in the US where they serve 56% of the landmass and 42 million people.[3] Customer-owned electricity distribution busi-

[1] There are two possibilities. Either (a) The management of the firm may be directed by the government-owner to act in the interests of the customers (who are also voters). In this case we might expect the government-owned firm to behave in a manner similar to a customer-owned firm; Or (b) The management of the firm may be directed by the government-owner to focus on maximising profits, like any other privately-owned, for-profit firm. In this case the government-owned firm might behave like a commercial enterprise. As an example, in New Zealand enterprises owned by the central government are required by the 1986 State-Owned Enterprises Act (sec 4) to 'operate as a successful business' and to be 'as profitable and efficient as comparable businesses not owned by the Crown'.

[2] Writing 100 years ago, Bruner (1925) comments that "There is no doubt that a utility which has its stock widely dispersed among the customers of its territory is better entrenched in the public favor than one not so situated".

[3] NRECA (2023).

nesses are also common in Italy and New Zealand.[4] According to Mori (2013), customer-owned firms are also occasionally found in other monopoly sectors, such as telecommunications, natural gas supply, and community heating.[5]

Does customer-ownership in practice deliver better overall outcomes than private-ownership coupled with arms-length regulation? On the basis of theory, at least, the answer is somewhat ambiguous. Privately-owned firms have stronger and clearer objectives (profit-maximisation) than customer-owned firms. It is, in principle, possible to write fairly high-powered incentives on the management of privately-owned firms which reward them for maximising the long-term profit. The ability to trade in the shares (equity) of the firm allows for a clear (if noisy) signal of the long-term expected value of the firm which can be used to align the interests of management with the owners. The ability to trade shares also expands opportunities for the raising of capital and exposes the firm to the threat of take-over in the event of persistent under-performance.

At the same time, privately-owned firms also have stronger incentives to evade regulatory controls and to exploit regulatory loopholes. This may weaken the confidence in the regulatory framework, undermining the willingness of customers to invest in reliance on the monopoly service. This is of particular concern in sectors where the customers rely heavily on the service (e.g., health or aged care) and subject to the threat of hold-up. In addition, with privately-owned firms, the regulatory process itself is likely to be litigious and hotly disputed, increasing the cost of keeping the monopoly service provider in check.

In contrast, well-governed customer-owned firms, operating in the interests of their customers, are likely to need little or no regulatory oversight, reducing the cost of the regulatory framework. In the case of customer-owned or non-profit firms, customers can have some assurance that they will not be subject to hold-up or shading of the quality of services after they have made a commitment.[6] In addition, most customer-owned firms do not pay separate dividends to their customer-owners but, instead, pay dividends in the form of a discount on the price charged. This improves the apparent value-for-money of customer-owned firms.

At the same time, the objectives of a customer-owned firm are likely to be less clear and less easy to formulate in a single metric. As a consequence

[4] Doni and Mori (2014).

[5] Customer-owned firms are also very common in other sectors, such as banking (in the form of credit unions and mutual funds). In recent years there has been a great deal of interest in 'community' energy projects, such as community sharing of local solar PV or battery storage resources (Löbbe et al., 2022). However these projects are not primarily driven by concerns of customer-ownership, but rather concerns of avoiding tariff structures imposed by traditional electricity distribution utilities (Biggar and Hesamzadeh, 2022).

[6] E.g., in the Guardian newspaper, 16 November 2020: "Aged care residents found to be at greater risk in for-profit homes than government-run ones". "Aged care residents are up to twice as likely to suffer from serious injuries in a for-profit home as in a government-run one, a study released on Sunday by the royal commission investigating the sector has found."

it is harder to design high-powered governance arrangements on the management to promote those outcomes. Furthermore, there can arise problems with collective decision-making. Simple schemes such as one-member-one-vote risk allowing smaller customer classes to be exploited by larger customer classes. Since the sale of equity is usually prohibited, customer-owned firms may find it more difficult to raise capital. In addition, customer-owned firms are largely insulated from the threat of take-over and the discipline of the capital markets. Table 1 summarises the relative costs and benefits of privately-owned and customer-owned firms, while Table 2 summarises the circumstances in which each approach might be preferred.

While there is a substantial literature comparing private ownership of monopoly facilities with public (i.e., government) ownership , the literature comparing the performance of private and customer-owned utilities is much smaller. In a study of electricity distribution businesses in New Zealand Meade and Söderberg (2020) find that, other things equal, there is strong evidence that customer-owned distribution networks have materially lower prices and higher reliability, and some evidence that customer-owned businesses have lower costs than their privately-owned counterparts. Overall they estimate that a move from private (investor) ownership to customer ownership increases overall welfare by 11 per cent.

But these studies can be criticised on the grounds that they reduce 'distribution quality' to only encompass reliability, as measured by the number and duration of outages. End-customers may care about other features of service, such as the speed of which new connections are completed, responsiveness to customer complaints and the ease with which customer information can be understood. Perhaps the customer-owned utilities in New Zealand are cutting on these quality dimensions, allowing them to offer lower prices, even though this leaves end-customers worse off overall.

In this study we resolve this problem by collecting data on customer's perceived 'value for money'. The analysis shows that distribution network service providers (DNSPs) owned directly by customers deliver significantly more value for money than government-owned or privately-owned DNSPs. One reason for this is that customer-owned DNSPs pay out dividends/return to equity in the form of lower prices to their customer-owners, but the strongest reason is that they deliver higher perceived quality along all the non-regulated dimensions. It is only for 'Service reliability', i.e. the only quality attribute that is formally regulated, that they have similar results to the other ownership categories. Thus, the plausible conclusion is that customer owned DNSPs are better at matching customers' Willingness-to-Pay for different quality attributes and their desire for low network tariffs. This is true for all quality attributes, also when the regulatory framework does not stipulate a minimum level or performance incentives. These results lend weight to the view that a well-governed customer-owned utility may lead to better outcomes than either a privately-owned-and-regulated

utility, or a government-owned utility.

This study also sheds light on the debate over whether or not customer-owned firms should be subject to arms-length regulation. According to economic theory, a well-governed customer-owned or government-owned utility, operated in the interests of the customers, need not be subject to conventional arms-length regulation. Consistent with this perspective, customer-owned utilities are exempt from regulatory controls in the US and New Zealand. But other countries maintain the view that regulatory controls are required, regardless of ownership, and that all utilities in a sector should be subject to the same regulatory framework. This is the perspective in Australia and Sweden, for example. The analysis set out here lends weight to the view that regulatory controls are not required on customer-owned utilities. This conclusion may be important. Meade and Söderberg (2020) find that, other things equal, exempting distribution businesses from regulatory requirements lowered prices by six per cent.

This paper has 5 sections. The next section sets out the theoretical background and the question to be answered. Section 3 describes the data, section 4 presents the results and section 5 concludes.

2 Background

2.1 Theoretical considerations

In principle, customer-ownership is an alternative mechanism for addressing the problem of natural monopoly.[7] Through vertical-integration, the interests of the monopoly service provider are, in principle, aligned with its customers, eliminating the need for external or arms-length regulation (Hansmann, 1988).As Hansmann emphasises, customer-ownership allows the customers of a monopoly service to protect themselves against the risk of ex post hold-up without the costs and drawbacks of arms-length regulation.

Perhaps the strongest benefit of customer-ownership is that it protects the customers against the exercise of market power without the need for a costly regulatory framework. As Birchall (2002) notes, arms-length regulation of a privately-owned firm is costly and litigious:

> The present system dooms the industry to an adversarial relation-

[7] Situations may also arise where the monopoly infrastructure has market power over its suppliers (i.e., monopsony). Monopsony can also be addressed through vertical integration. Such vertical integration is a feature of the agricultural sector, where farmer-owned co-operative processing facilities are reasonably common.

> ship between companies and regulator'. ... The process itself imposes costs, both on government in comparing the performance of different utilities, and on the utilities in providing information. If they disagree, there are the added costs of appeal and litigation.Then there is the cost imposed when investment decisions are distorted by the regulatory process; discouraging utilities from sharing information, encouraging substitution of labour by capital, and so on.

As noted above, a privately-owned profit-maximising firm, operating under an arms-length regulatory framework, has a strong incentive to test the weaknesses of that framework and to influence the regulator to change the regulatory framework in its favour. These activities increase the cost of monitoring, enforcing and maintaining the regulatory framework.

In contrast, a well-governed customer-owned firm may not require formal regulatory controls at all. Birchall (2002):

> The consumer mutual brings the consumers inside the organization as the primary owner, and so eliminates the most serious potential for conflict, that between consumers and investors. Conflict between different types of consumer can be dealt with through arbitration and an appeals system. There is evidence that consumer co-operation cuts down on regulation costs. In 30 of the 46 states of the USA where there are co-operative electricity distributors, prices are not under the jurisdiction of utility commissions, and where they are regulated there is a streamlined approval process.

Morse (2000) reaches the same conclusion in the case of water utilities:

> [T]he application of Hansmann's general theoretical scheme for assigning ownership leads to the conclusion that water utilities should be consumer cooperatives. ... In short, present and future consumers are likely to be better attended by a cooperative that seeks to maximize service than by an investor-owned utility that endeavors to maximize profits.

But customer-ownership is not without its problems. Amongst other things, customer-owned utilities must deal with problems of raising capital, weaker capital market disciplines, and the increased governance costs of collective decision-making. Hansmann (1988) argues that greater diversity amongst the customer-members can increase the costs of collective decision-making. Customers differ in size, or in load profiles, or their location. Decisions of the monopoly service provider – such as decisions about the amount, timing, or type of upgrades to carry out on the network – affect different customers in different ways. Resolving these conflicts may prove costly and lead to delays, and may lead to proxy

battles over the governance arrangements for the customer-owned firm. Simple governance mechanisms, such as one-member-one-vote risk allowing larger customer classes to expropriate smaller customer classes.

Hansmann (1988) argues that these costs of collective decision-making can explain why customer-ownership is more common in rural electricity distribution than in urban distribution networks. According to Hansmann, while rural electricity customers are relatively homogeneous, urban electricity consumers (e.g., industrial, commercial, residential) are more diverse and therefore there is a greater risk of conflict between customer classes.

Birchall (2002) emphasises that, in practice, the actual operation and governance of a customer-owned firm may fall short of the ideal. Governance and oversight of the management of any firm requires effort. In a customer-owned firm, customers must be engaged to provide that governance or oversight function. Using the term 'mutual' to describe customer-owned and co-operative firms Birchall (2002) notes 'Mutual ownership does not guarantee a mutual ethos. And to some extent, a mutual ethos can be present in non-mutuals such as non-profits, the public sector, and in public-private partnerships.'

At the same time, a customer-owned service provider may have difficulty raising certain forms of capital. While customer-owned firms may borrow (i.e., issue debt), it is often the case that rules prevent trading in the shares of non-profit or customer-owned firms, limiting their ability to raise equity capital. The customer-owned firm may still seek a 'capital contribution' from members, but such requests are rare. In practice, the only major source of equity injection is through 'retained earnings'. One of the key benefits of conversion from customer-owned to privately-owned (known as demutualisation, or privatization) is that it can improve access to capital Perotti and Van Oijen (2001).[8]

The pros and cons of customer-ownership relative to private ownership are set out in Tables 1 and 2. With these pros and cons in mind, it is not immediately clear which ownership structure is preferred. To an extent, this remains an empirical question.

2.2 The question to be addressed

Does customer-ownership lead to better overall outcomes than private-ownership in practice? This paper contributes to that question by reporting the results of a survey of customers of electricity distribution network service providers (DNSPs) in Sweden.

One aspect that has not been covered by the existing literature is how quality

[8] There is a small theoretical literature looking at the pros and cons of customer-ownership, including Doni and Mori (2014).

Table 1: Comparison of costs and benefits of privately-owned and customer-owned monopoly providers

Privately-owned firms	Customer-owned firms
Clear, single, easily-measured objective. Easier to impose high-powered incentives on management.	Objective not easily formulated in a single metric. Difficult to impose high-powered incentives on management.
Relatively limited conflict between shareholders	Potentially substantial governance issues and conflict between members
Ability to raise capital through the sale of equity.	Cannot raise equity capital except through capital injection by members.
Strong incentive on firm to test limits of the regulatory regime and/or influence regulatory to shape the regulatory regime.	Interests of firm aligned with customer-owners, eliminating the need for separate regulatory controls.
Overall outcome depends on quality and effectiveness of regulatory framework.	
Dividends paid separately to owners.	Dividends typically paid out in the form of lower prices to members.

attributes, other than outage minutes and frequency, are affected by different owners. Some of the quality attributes electricity distribution customers receive, and for which they have a positive willingness to pay, cannot be easily defined or measured. Examples of such attributes are (i) availability, (ii) customer service, (iii) competence, (iv) clarity in feedback and responses, and (v) information/help in the event of interruptions and other problematic situations. In addition, there are value-based perceptions that are potentially important, e.g. the extent to which the DSO's support the local economy and society. None of these aspects are captured in modern network regulation, and performing well in those areas therefore lacks formal, economic significance. What do the customers themselves think about these quality aspects?

We perform the first large scale interview study where we ask network customers to assess how much value for money they get from their electricity DSO.

Table 2: Which ownership approach is preferred when?

Privately-owned firms preferred	Customer-owned firms preferred
Hold-up (and quality shading) threat can be adequately controlled	Difficult to prevent quality shading and ex post hold-up
Need for substantial new equity injections	Investment can be financed through borrowing and retained earnings
Regulatory framework can be defined and enforced effectively without incurring undue costs	Implementing and enforcing a regulatory framework would be difficult
Cost efficiency objectives are of primary importance	Other objectives such as quality of service and customer responsiveness are of primary importance
Services fairly standardised and able to be defined in a contract	Services complex or tailored to individual customer needs
Diverse customers with conflicting interests	Homogeneous customers with similar interests

This question has a number of advantages from a policy perspective. The concept 'value for money' can be thought of as the difference between the total economic value received and the cost of obtaining that value. The total value is a function of all relevant quality attributes and knowing which those are, let alone what weight they have for the average customer, is an overwhelming task. But, from a policy, or regulatory perspective, it is not necessary to know all those details. Value for money is a useful summary of the utility or welfare received by the customers. If customers report a higher value for money with one DSO over another we can conclude that the former customers are better off, without going into detail as to how that is achieved.

We interview more than 600 customers, about 150 from each of the four ownership categories that exist in Sweden: municipal, customer, private investors and state government. The group with municipally owned networks is more heterogeneous than other groups of owners and we therefore also examine 'small municipal networks' and 'large municipal networks'. In addition, we also compile and analyse the comments that customers leave to better understand the underlying drivers behind value for money.

3 Data

A total of 604 interviews were conducted and distributed across the ownership categories according to Table 3. The approximately 150 individuals who responded within each category have been selected at random using a national telephone directory as a base. The phone register only contains mobile phone numbers. When the person being called answers, the interviewer asks if he/she is of legal age (above 18 years old) and is the person who has signed the contract with the electricity DSO and/or if s/he regularly contributes to paying the electricity network cost. If the person answers 'yes' to those questions, the rest of the questions are asked, otherwise the interview ends without any further questions being asked.

Table 3: Number of respondents per ownership category

Ownership category	Number of respondents
Municipal	153
Customer	150
Private investor	151
State government	150

The interviews were conducted during the period from January 18, 2023 to February 17, 2023. During that period, the electricity price was approximately twice as high as it was during the years 2018-2020, but at the same level as it was during the years 2021-2022, except for a few short price peaks. The electricity spot market was relatively intensively exposed in the media before and during the data collection period and it seems reasonable to assume that respondents were better informed during this period than prior to 2021. At the same time, the period is short enough for the production and distribution conditions, and the respondents' perceptions of electricity as a service, not to have changed in a remarkable way within the period.

Since 'value for money' is a function of the price customers pay for their connection and the quality attributes they have a willingness to pay for, we begin by looking at how the actual price and a broad set of quality perceptions vary across ownership categories. Prices are collected from the Swedish Energy Markets Inspectorate, recorded as the prices charged by each DNSP on the 1st January 2023. The quality perceptions are collected in our survey. All quality attributes are measured on a 5-grade scale where '5' is the highest. Results are summarized in Table 2.

The first column shows the average annual price in SEK for a customer with a 20A connection who consumes 20,000 kWh electricity per year. As indicated, there are large differences across categories. DNSPs owned by the state government and by private investors set prices that are relatively similar

Table 4: Price and quality attributes

Ownership category	Annual price (SEK)	Satisfaction with staff	Service reliability	Invoice easy to understand	Complaint resolution
Municipal	7,684	4.42	4.77	4.17	4.00
Customer	8,981	4.51	4.73	4.26	4.20
Private	9,649	3.92	4.57	4.12	2.11
State	9,424	3.93	4.52	3.91	2.14

Notes: Price data comes from the Swedish Energy Markets Inspectorate. Prices represent what a customer with a 20A connection who consumes 20,000 kWh per year is charged. Quality attributes are measured on a 5-grade scale where '5' is the highest. 'Satisfaction with staff' is a composite measure that is calculated as the average of (i) Staff Accessibility (answer phone quickly, punctual), (ii) Attitude (kindness, empathy). (iii) Competence, (iv) Give clear response, and (v) Inform/help when outages and other problems occur (willingness to repair, response time). All quality perceptions are collected as part of this study.

– the state's price is only 2 percent lower. The customer owned DNSPs set a price that is 7 percent lower than the privately owned firms. Finally, the DNSPs owned by the municipalities set a price that is more than 20 percent lower.

On the quality attributes, customer and municipality owned DNSPs have the highest scores, with the customer-owned firms rating highest in every attribute except one. The attribute that stands out the most is how the firms resolve customer complaints, where the muncipal and customer-owned DNSPs score substantially higher. The privately and state-owned DNSPs are almost identical, with their customers' ability to understand the invoices being the only attribute that is noticeably different, which may potentially set them apart.

The attribute that measures customers' level of satisfaction with the DNSP's staff members in Table 3 is a composite variable that potentially hides further heterogeneity. Hence, in Table 4 we show customers' perception of each of those attributes, which comprise:

- Accessibility. How quickly they answer the phone, how punctual they are to appointments etc.,
- Attitude. Degree of kindness, empathy, etc.,
- Competence. How well they do their job,
- Understanding. To what extent they give clear responses to questions, and
- Inform/help when outages and other problems occur. Willingness to repair and the speed with which they respond.

The results do indeed show that there are differences across these attributes. For example, when comparing private and state-owned DNSPs, it is not clear which of the two is better in the eyes of the customers, since state owned DNSPs have higher scores for three of the five attributes. However, the customer owned DNSPs have higher scores than the municipality-owned DNSPs on every attribute, except on 'Competence', where they have the same score.

Table 5: Staff characteristics

Ownership category	Accessibility	Attitude	Competence	Clear response	Info/help when problems occur
Municipal	4.27	4.58	4.55	4.51	4.20
Customer	4.56	4.60	4.55	4.57	4.29
Private	3.66	3.90	4.00	3.94	4.10
State	3.43	4.10	4.11	4.11	3.91

Notes. All quality attributes are measured on a 5-grade scale where '5' is the highest.

4 Analysis

4.1 Value for money

One of the questions asked in the interview is 'How much value for money do you think you get from your DNSP?'. Respondents indicate an answer on an ordinal scale from 'very low value' to 'very high value'. They can also answer 'don't know' or choose not to answer at all. Those who give a response that cannot be placed on the five-grade scale are excluded from the subsequent analysis. The respondents' answers are recoded into numbers where 1 corresponds to 'very low value' and 5 to 'very high value'. This information allows us to calculate the average value for money for each ownership category. The results of these calculations are displayed in Table 6.

Table 6 shows that networks owned by municipalities and customers deliver higher value for money than networks owned by the state government or private investors. For private vs. municipal/customer-owned, it is almost a one-unit difference on the 5-grade scale, and for government vs municipal/customer-owned, the difference is slightly less. It is notable that respondents who have networks owned by large and small municipal networks have identical values.

It is also interesting to also look at the distribution of the responses for each ownership category. Figure 1 shows that the values are relatively uniformly distributed when customers have networks owned by the state and private investors. Incidentally, it is noteworthy that no respondent who has networks

Table 6: Value for money

Ownership category	Value for money
Municipal	3.52
Municipal, large ($> 20,500$ customers)	3.52
Municipal, small ($< 20,500$ customers)	3.52
Customers	3.65
Private investors	2.63
State government	2.86

No. of respondents 420. Of the 604 interviews, 420 give a response that generate a value on the 5-grade scale. The threshold between a small and large municipal network is 20,500 customers. This makes the two groups as equal in size as possible (76 and 77, respectively).

owned by private investors has given the rating '5' (figure 1, upper right). Respondents who have networks owned by municipalities and customers are not only more positive overall, approximately 50 percent of respondents give the rating '4' and for the customer owned networks almost 20 percent give the rating '5'. Fewer than 5 percent of the respondents from both of these owner categories give the rating '1'.

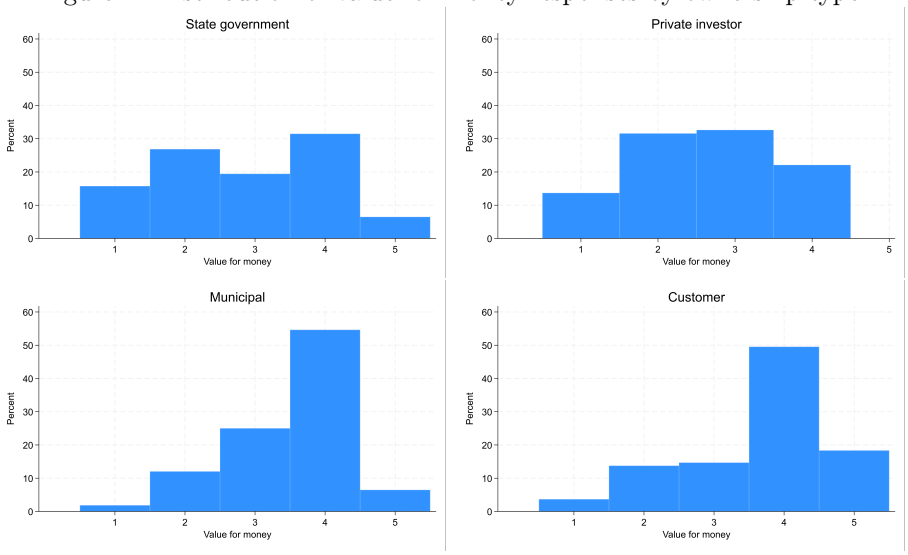
4.2 Isolating potential differences in the customers

From this analysis, it is tempting to conclude that networks owned by municipalities and customers deliver higher value for money. However, A key possible objection is that the sample is not random. Municipal and customer-owned networks, which dominate in more rural areas, tend to have customers with different preferences and socio-economic characteristics – perhaps these customers tend to give higher value-for-money ratings.

To reduce this selection problem, we can focus on those individuals who have recently moved and who previously had a DNSP with a different owner than their current DNSP. Since the customer who moved likely did not do that to obtain a DNSP with different/particular owner, the resulting change in ownership can act as a proxy for a random allocation mechanism. Thus, focusing on these respondents eliminates two types of respondents:

- everyone who has had the same DNSP throughout their life (those who have lived at the same address and those who have moved within a DNSP's concession area), and
- everyone who moved and got a new DNSP but where the new DNSP was owned by the same type of owner as the previous one (e.g. those who

Figure 1: Distribution of value-for-money responses by ownership type



moved from an location with a DNSP owned by a municipal to a location with DNSP owned by a different municipal).

After eliminating these respondents, we get new results, see Table 7.

Table 7: Value for money when respondents have had two networks with different types of owners

Ownership category	Value for money
Municipal	3.26
Municipal, large ($> 20,500$ customers)	3.04
Municipal, small ($< 20,500$ customers)	3.42
Customers	3.44
Private investors	2.57
State government	2.63

Number of respondents 112.

All the values in Table 7 are lower than the corresponding values in Table 6 – the value for private investors only marginally though. There is now a distinctive difference between small and large DNSPs owned by municipalities, suggesting that small DNSPs owned by municipalities and DNSPs owned by customers are very similar. However, the overall conclusion remains unchanged, namely that DNSPs owned by municipalities and customers deliver higher value for money than DNSPs owned by private investors and DNSPs owned by state government.

However, there is another potential problem. For the ownership to be considered random, two more criteria must be met. First, respondents must have access to all relevant information about distribution quality and price and this can be assumed to take at least a year as price change cycles and weather variations vary by calendar year. The second criterion is that the respondents are not influenced by factors other than the actual conditions. After a long time as a customer of a specific DNSP, it may be that a customer remembers historical events and those events influence the customer's perception today (even if the conditions have changed). A closely related phenomenon is that as a customer, you develop habits and sluggish perceptions that do not adequately reflect current conditions. It is also probable that you will be exposed to rumours, and the likelihood of being affected by other people's perceptions of the DNSP will increases the longer you live in a location. Thus, we would also like to exclude those respondents who have been with the current DNSP for a long period of time. In addition to the criteria stated above, we would also like to restrict the respondents to those who have been with their current DNSP for at least one year, but not much more than that.

The time the respondents have been with their current DNSP can vary, but, as mentioned above, it should be at least one year. The shortest time considered here is up to two years. We then extend the time period by one year at a time to see if more experience with a specific owner changes the perception of how much value for money they get. These results are displayed in Table 8.

Table 8: Value for money when respondents have had two DNSPs with different types of owners

Ownership category	Time with new network			
	< 2 yrs	< 3 yrs	< 4 yrs	< 5 yrs
Municipal	2.72	2.02	1.97	
Customers	3.81	3.21	2.83	2.99
Private investors	2.47	2.11	2.26	2.02
State government	2.65	2.03	2.37	2.72
No. of respondents	7	11	16	19

While the results in Table 8 should be interpreted with care, and only indicatively, due to the limited sample sizes, respondents with customer-owned networks seem to consistently report greater value-for-money than respondents in the other categories. DNSPs owned by municipalities have high values for the first three years, but drop sharply after that. Customers with a DNSP owned by a municipality has the lowest values of all categories when they have been with their DNSP for four to five years. Restricting the time to three years, however, the value is higher than when the owners are either private investors or the state government.

We note that the perceived value for money drops during the initial years for all owner types – for some types it drops during the first three years and for others during the first five years. It is unclear what is driving this increasing dissatisfaction, but one possibility is that several of the distribution service's broad set of quality attributes are not immediately observable and that the value customers receive declines as more attributes are 'discovered'.

4.3 Qualitative feedback about value for money

How do these results match the qualitative comments the respondents have given? A compilation of the responses shows, firstly, that about a third of the respondents in each ownership category have left one or several qualitative comment in addition to their 'value for money' assessment. Thus, there are no differences in how engaging the respondents are as a function of who owns their network. The following differences in their responses are particularly relevant to note:

- 13 percent of those with a customer owned DNSP explicitly emphasize the value, or value for money, they receive, while only 6-8 percent of customers with the other types of owners mention that.
- By far the most common comment is how the own DNSP is performing compared to other DNSPs.[9] One third of customers highlight such comparisons, except those who have a state-owned DNSP, where only 25 percent mention such comparisons. If it is the case that the comparative competition that customers engage in is reduced when the state is the owner, then that is relevant, and worrying, because it has implications for the economic outcome.
- A quarter of the customers with a municipal owned DNSP use the argument that the price is temporarily high, which therefore excuses, or explains, the lower value for money right now. It may, therefore, be the case that customers with municipal owned DNSPs consider the value for money to be low right now, while customers owned by other owners take a more long- term perspective and (partially) ignore the fact that the electricity price are currently high and contributes to higher network prices.
- There is a difference in how much respondents think their DNSPs contribute to the local economy and community. Just over 15 percent of customers with customer-owned DNSPs highlight the local contribution in positive terms, while none of the customers with other owners mention that aspect. It is particularly strange that customers with (small) municipal owners do not bring this up.

[9] Bonev et al. (2022) show that the price charged by Swedish district heating firms are affected by the price charged by their neighbours.

In summary, customers' comments vary based on ownership. The customer-owned DNSPs distinguish themselves by emphasizing the quality of the distribution service and the network's contribution to the local community. Both these claims are economically relevant and it is therefore not surprising that the value for money reported by respondents who have customer-owned DNSPs is higher than other owners. The relatively low value of money for large municipal networks stands out. It may be worth investigating whether the municipal DNSPs have used the high electricity price over the past 1.5 years as an excuse to raise the network price, and whether it has happened there to a greater extent than with other networks. That state-owned networks are not clearly providing more value for money than those owned by private investors is unexpected.

5 Conclusions

It has long been recognised that ownership can be an alternative solution to the regulatory (public utility) problem. Provided customers can be effectively represented in the governance of the public utility, and provided the costs of collective decision-making are not too severe, in principle a customer-owned entity can protect customers from the threat of market power, while ensuring that the regulated firm delivers the service quantity and quality that customers desire. Yet, in many countries, the regulatory framework is 'blind' to ownership. This may make sense in a context in which government-owned firms are required (by law, or by convention) to operate in a similar manner to privately-owned firms. But it is not clear that this makes sense in the context of well-run customer-owned firms which are responsive to the needs and desires of customers.

This paper reports the results of a telephone survey of customers of electricity distribution operators in Sweden, which vary by ownership structure. The analysis shows that DNSPs owned directly by customers are considered to provide higher value for money than DNSPs earned by the local municipality, state-owned DNSPs, or privately-owned DNSPs. The explanation for this appears to be that customer-owned DNSPs contribute economic value that is not included in existing regulation.

These observations raise the question whether the regulatory framework could be lightened or eliminated in the case of customer-owned firms. One way to do that, as New Zealand did in 2009, is to largely exempt customer-owned networks from the regulatory framework. The results in this report indicate that such a policy should extend to networks owned directly by customers and possibly also those owned by small municipalities.

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