On the inequity of flat-rate electricity tariffs

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Motivations underlying the research

Residential electricity prices in Australia doubled over the period 2008 – 2015. The single largest contributor to the 2008-2015 increases would come from the regulated monopoly charges for electricity networks following record levels of capital investment in response to reliability concerns and historic growth in peak load.

Residential customers in Australia generally face a two part tariff comprising a daily fixed charge and a flat rate variable charge. Yet expected peak loads during 'critical event' days drive system capacity, and capital-intensive capacity costs (as opposed to system marginal running costs) dominate the cost structure of electricity supply. Flat rate variable energy charges fail to capture this dynamic because peak load is mis-priced. Proposals to reform default 'flat-rate' electricity tariffs to better reflect the value of periodic demand are rarely met with enthusiasm by consumer groups or policymakers because such reform produces winners and losers.

Research Performed

Our analysis makes use of AGL Energy's *SAP HANA*, an ultra-high speed in-memory computing appliance which enables us to work rapidly with a truly vast data set. Our modelling incorporates 2.8 billion meter reads from 160,000 smart meter customers from metropolitan Victoria (i.e. 17,520 meter reads for each customer, representing a full year of half-hourly consumption data). Approximately 6000 of these households were matched with AGL Energy's online household survey (one of Australia's largest ongoing household surveys with more than 70,000 entries). This combination of data sources enables us to analyse inter- and intra-segment wealth transfers. We present five variations and an Overall Average household load shape based on demographic characteristics:

1. Working Couples, No Kids;
2. Working Parents with Kids;
3. Family, Parent at Home;
4. Households in Hardship;
5. Concession & Pensioner Households; and
6. Overall Average.

By specifying a set of broadly representative household cohorts, our analysis of tariff reform should be of interest to the electricity industry, consumer groups and policymakers.

Main Conclusions

Holding all household loads constant, modelling results revealed that 50% of households would be immediate winners (i.e. structural winners) following a change from flat rate variable charges to Time-of-Use rates, and by implication 50% of households would be structural losers.

When Demand Response is accounted for, modelling results revealed that 75% of households would be better off (and 25% worse off). However, Demand Response results in (short run) industry revenue losses and accordingly, network tariffs would need to be 'rebalanced' – that is, network rates were then increased in order to re-coup lost revenues. (In the Australian market, generators and retailers operate in contestable markets and accordingly, the generator/retailer rates were not 'rebalanced'). Once electricity network tariffs were rebalanced, 64% of households were found to be better off (and 36% of households worse off).

Given that proposals to reform default 'flat-rate' electricity tariffs are rarely met with enthusiasm by consumer groups, a surprising result emerging from this research was that the Households in Hardship cohort were found to be the largest structural winners, and by implication, are somewhat ironically the most adversely impacted by existing flat-rate structures. The reason for this is that the Households in Hardship Cohort exhibited the flattest load curve. Even after network tariff rebalancing, Households in Hardship (and Concession & Pensioner Households) are significant beneficiaries of more cost-reflective tariff structures.

Benefits & Policy Implications

Most microeconomic reforms produce structural winners and losers when benchmarked against (an inequitable) status quo. Our objective has been to provide policymakers with missing evidence on the extent and intensity of existing inter- and intra-segment cross-subsidies. Our initial analysis showed that under a flat rate tariff, up to half of the consumer base is being overcharged relative to their peak load, while remaining consumers are being cross-subsidised – results that are consistent with the simulations in Faruqui (2010a) and Borenstein (2013).

The efficiency benefits of shifting to time-of-use tariffs include slower growth in peak demand, delayed or avoided network augmentation, improvements to power system load factors, more predictable plant run times, an increase in the thermal efficiency of the plant stock, delayed requirements for costly peak load generation equipment and greater tariff stability (and therefore enhanced welfare). In the present analysis, we have argued that existing tariffs dominated by a flat variable charge are inefficient and inequitable. From an economics perspective, the case for default tariff reform is as clear as it is unremarkable.