THE STRUCTURE OF THE TELECOMMUNICATIONS INDUSTRY AFTER THIRTEEN YEARS OF COMPETITION

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Abstract
Telecommunications deregulation in 1997 meant the removal of all significant barriers to entry. Government of various hues have trumpeted the continued entry of new providers as evidence of success in achieving the policy objective. At the same time the ongoing dominant position of Telstra has been identified by some as a failure of the policy.

Data on industry revenues are used to show the evolution of the market structure over thirteen years. This data and various price indices are used to try to determine what extent price movement can be attributed to competition and what to technology change.

Overall the data is used to try to assess the evidence for benefits from competition.

(This is an initial draft of this paper and is not fully referenced. Visit www.havyatt.com.au for an updated version.)

Introduction
The deregulation of the Australian telecommunications occurred as one continual process from 1988 to 1997, with each stage foreshadowed in the implementation of the previous stage. The motivation of this process was the deregulatory thrust that found its intellectual spur in the US movement more recently known as neo-liberalism (Freidman 1980) and detailed application of neo-classical microeconomics to regulated industries (Kahn 1970, 1971). Friedman noted

Perfection is not of this world. There will always be shoddy products, quacks, con artists. But on the whole, market competition, when it is permitted to work, protects the consumer better than do the alternative government mechanisms that have been increasingly superimposed on the market. (Friedman 1980:189)

The only market imperfection that Friedman was prepared to admit was the case of monopoly and on that he also thought the cure was competition. In this he was supported by the detailed work of Kahn on the economics of regulation natural monopolies.

The application of this policy orientation to telecommunications had its main first outing in the Report of the Committee of Inquiry into Telecommunications Services in Australia (the Davidson report) in 1982. In its short section on the role of competition, the committee concluded;

- While there are economies of scale in many parts of telecommunications these were no greater than in many other industries where competition operates, and hence the argument of a ‘natural monopoly’ do not hold.
- That customer choice, innovation and access to tailored equipment were more important than economies of scale in the provision of terminal equipment.

1 Appendix F of the Regional Telecommunications Independent Review Committee report Framework for the Future contains a very useful summary of the history of telecommunications regulation, albeit with a focus on the objective of equity rather than efficiency.
That there was already some competition and the growth of improved information services will force further liberalisation.

That the question was not between competition or monopoly but how to allow competition to develop in a manner to gain the most benefit for the community. (Australia 1982:8–9).

Despite at the time appearing to be a very radical report ultimately competition in ‘terminals’ (customer premises equipment or CPE) and value added services were introduced in 1988. The 1988 changes also presaged a review known as ROSA or the Review of Ownership and Structural Arrangements. The public servant in charge of the project wrote that these changes should be seen as part of a trend in developed and rapidly developing countries and that;

The Australian model for reform is based upon regulated competition between two major telecommunications carriers (along with a third public mobile carrier) as a transition to full competition for telecommunications after mid 1997. (Fanning 1992:28)

The review analysed overseas experience to assess how competition would affect policy objectives. Three fundamental observations were made;

- Competition was generally associated with low or reduced prices for telecommunications services.
- Competition has generally been accompanied by improved productivity.
- Competition was associated with a high level of service. (By which was meant take up rather than customer service).

In the introduction to the ACCC’s annual telecommunications report for 2007–08, Graeme Samuel noted;

During 2007–2008 the ACCC observed continued innovation, investment and price competition in the telecommunications sector. However, the competitive markets anticipated in 1997 do not appear to be emerging …

The high degree of concentration may in some part explain the high levels of complaints about telecommunications and internet services observed during 2007–08. (ACCC 2009)

In broad terms the ACCC is stating that competition’s expected benefits relate to prices, innovation and customer service and that these benefits do not seem to be realised. To the extent that these are not realised the suggestion is that it is due to the ongoing dominance of the previous incumbent. The reports for the first time reported on a standard measure of industry concentration — the HHI — but only for the largest firms.

However, the report goes on to report ongoing price reductions which are usually attributed to the effects of competition.

This paper attempts to analyse those price movements. The first is by comparison to other indexes of telecommunications prices. The second is by looking at the complete structure of the industry at the carrier level and attempts to relate the price movements to changes in concentration. Finally an econometric model is used to model the industry on an assumption of input price declines.

### Price indices

The ACCC annually publishes a report on prices paid for telecommunications services. This report includes a number of price indices. The index for All Services (Fig 1) shows a reduction in prices since 1998 of nearly 40%. This would appear to be evidence of a massive downward pressure on prices as a consequence of competition.

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2 As at 3 November 2010 the report for 2008–09 had not been published.
However, the price of telecommunications services was, in real terms, declining prior to the introduction of competition. The Australian Bureau of Statistics includes a telecommunications services index as a sub-index within the overall CPI index. Dividing this telecommunications index with the overall index gives a comparable index to the ACCC one.

This index (Figure 2 including trendline) shows a continual decline from 1980.

**Figure 7: ABS Telecommunications Index**

The indexes are measuring different things. The CPI by definition only measures prices for consumers — or residential services. The ACCC index measures all services and only the PSTN index is composed of a residential and a business component (Figure 3 shows the top level composition of the ACCC index).
The high level ACCC Indices have moved at different rates (see Figure 4). The primary observation is that the all services index lies between the mobile and PSTN index. The PSTN index lies between the PSTN Bus and PSTN Res index.

It isn’t possible to conclude anything about the relative movements of residential mobile prices from this. However, one can infer that business rates move faster than residential and that it is at least possible that the residential mobile rate has moved the same as the residential PSTN rate.

The only meaningful comparison therefore is between the ACCC data for residential PSTN and the ABS data (Figure 5). The outcome is that the different data collection methods (provider data versus household surveys) result in similar outcomes. The significance however is that you can’t conclude that the ABS data is inaccurate and that you equally can’t conclude that there has been any impact of competition on prices paid.
Industry structure

The theoretical basis that competition will lead to lower prices is built on the model that a monopolist will restrict output resulting in prices that are above cost, whereas in a competitive market the process of firm entry and exit results in prices at (marginal) cost.

How real markets perform between the extremes of monopoly and competition is a subject of conjecture. The first question is whether industry has been becoming more or less concentrated. The industry consists of both individually licensed carriers and class licensed service providers. Figure 6 is a ‘waterfall chart’ of the movement in carrier licences since 1997.

The next challenge is to model the structure of the industry for which typically some form of industry concentration measure is used. There are three potential measures; concentration ratios, a Gini coefficient and the Herfindahl-Hirschman Index or HHI. Concentration ratios are often used in many anti-trust areas and relate to the percentage of industry revenue accounted for by the largest \( n \) firms. It unfortunately doesn’t tell you much about the structure of the industry beneath these large firms.
The Gini coefficient measures the area under a curve that relates proportion of firms in an industry to proportion of industry revenue (from a ranked list of firms) to the position of all firms being of equal size (the Lorenz curve). While this provides an effective measure of equality it doesn’t deal with concentration (all industries of \( n \) equal size firms have the same coefficient of 1).

The HHI is derived from the sum of the square of the market shares of firms. It is a value from 0 to 1 (though in some US matters they use percentage shares and get data from 0 to 10,000). The HHI of a market of \( n \) equal sized firms is therefore \( 1/n \).

Each of these requires a means to measure the relative size of the firms in the industry, that is to measure revenue.

The telecommunications industry is somewhat unique in having a data set of revenue for all carriers. This is derived from carrier eligible revenue returns and is calculated as total revenue from a carrier and any related entities, from which is deducted non-telecommunications service revenues, revenue from sale of equipment, revenue from content sales and any amounts paid to other carriers.

It is not a perfect industry measure as it does not include revenue earned by service providers who aren’t also carriers and possibly over emphasises the revenue of the carriers who are large sellers in the wholesale market.

Figure 7 shows the computed Herfindahl-Hirschman Index for the industry from 1998 to 2009 using the Eligible Revenue data. It is interesting to note how neatly the data has thus far matched a power law, though no interpretation is offered of that in this paper.

**Figure 12: Industry HHI**

To determine whether the declines observed in the ACCC price index can be ascribed to the increase in competition (increase in HHI) the Cornot model for competition in an oligopoly can be used.

In this each firm is presumed to set its profit maximising level of output based upon its knowledge of how other firms will behave. The Cournot model concludes that the industry mark-up is given by:

\[
\frac{(p - c)}{p} = \frac{HHI}{\varepsilon}
\]

where \( p \) is the price in the market, \( c \) is the (marginal) cost, and \( \varepsilon \) is the own price elasticity of demand.
The blue line in Figure 8 provides some comfort for the theory that HHI and price index movements are related — they move in the same direction. However, if cost is constant and elasticity is constant the mark-up equation becomes

\[ h_t = \varepsilon - \varepsilon^* c/p_t \text{ where } h_t = \text{HHI} \]

That means the linear relationship should be between \( h_t \) and \( 1/p_t \) which is shown as the red line in Figure 8. The two lines show that the stronger linear relationship is the wrong one — the correlation between \( h \) and \( p \) is more likely to be an opportunistic correlation simply due to both being time series.

**Figure 13: Price Index and HHI**

The downward trend of prices could be due to a downward trend in costs.

The underlying technology has two effects; Moore’s Law and Cooper’s Law.

The former states that the capacity of microprocessors doubles (and price halves) every eighteen months. Cooper’s Law tells us that the capacity of wireless networks double every two and a half years.

The theory of experience (or learning) effects that suggest any time cumulative production doubles that costs decline by a fixed percentage. In various industries 10 to 30 per cent declines have been seen)

The challenge then is to model a demand and supply system;

\[ q_t = a_1 + a_2 p_t + a_3 d_t \text{ (demand)} \]

\[ q_t = b_1 + b_2 p_t + a_3 p_{ft} \text{ (supply)} \]

Where:

- \( p_t \) is the ACCC Price Index
- \( q_t \) is a quantity index derived by dividing industry revenue by the price index
- \( d_t \) is an income index (the annual GDP has been used)
- \( p_{ft} \) is a price index for a factor of production derived by computing a growth rate for the quantity and aggregating over the 175 history of telecommunications, and assuming that costs drop by 10% every time cumulative production doubles.
Table 2: Variables for estimation

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The equations were estimated using a two-stage least squares using SHAZAM software. The estimated parameters are shown below:

Table 3: Estimated parameters

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We are then able to ‘predict’ the values of $p$ from the other variables. These predictions and the actual values of $p$ are shown in Figure 9:

Figure 14: Predictions of $p$ compared with $p$

The correspondence of declining industry concentration and the ACCC price index does not fully explain the observed price declines. It is possible to model the declining prices making only a modest assumption about an experience curve in costs.

Not addressed in this paper has been the data that suggests competition has been accompanied by a decline rather than an increase in quality of service.

Competitors to the incumbent were responsible for some of the major innovations over recent years — the first 3G network, the first ADSL 2+ services. However, policy focus needs to be on these dynamic characteristics and not a blind acceptance that competition necessarily produces benefits.

REFERENCES


Kahn 1970 The Economics of Regulation.