Regulating network charges

A potential framework for NBN pricing

UWA Business School

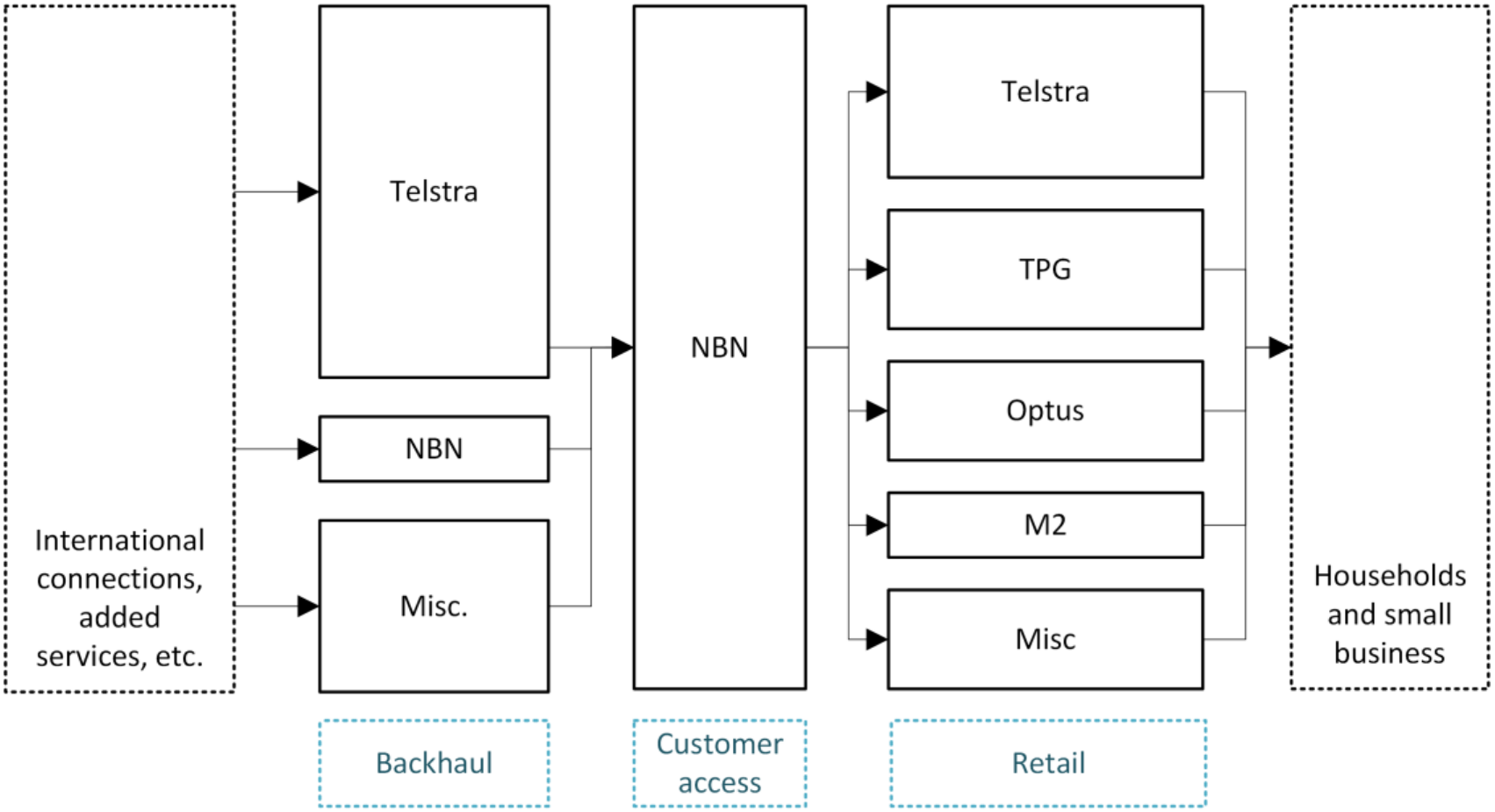
ACE 2017

Troy Barry

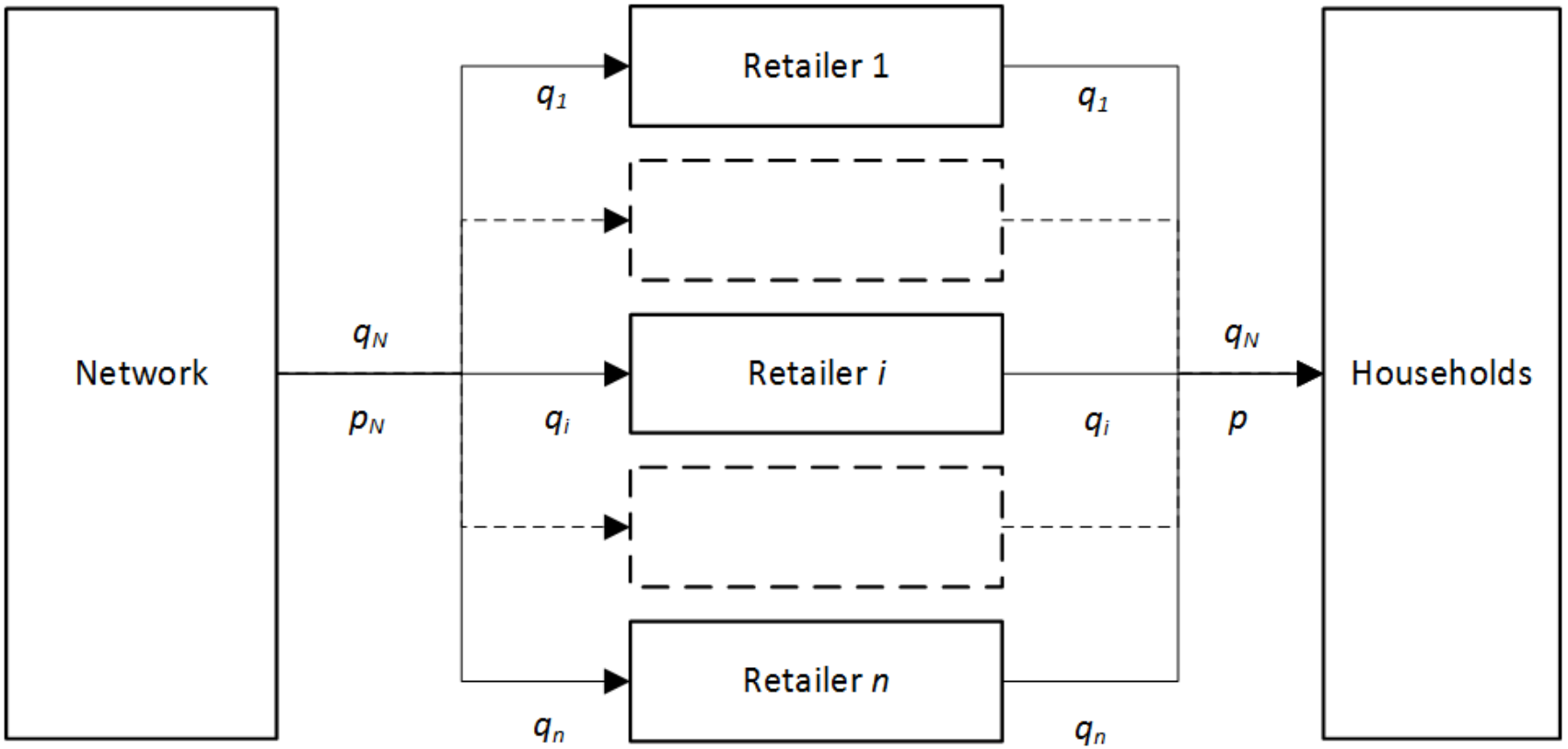
This research is supported by an Australian Government Research Training Program (RTP) Scholarship.

Australian broadband industry

The Australian NBN is an atypical industry intervention



Broadband industry model



Stage 1: Regulator sets p_N.

Stage 2: Retailers simultaneously set q_i.

A monopoly supplying an oligopoly, partial equilibrium.

How should the regulated network access price (p_N)be set?

What is the effect of oligopoly size?

Prior literature

Gans (2001) *Regulating private infrastructure investment: Optimal pricing for access to essential facilities*

- Network and retail competition
- No structural separation

Haucap & Klein (2012) *How regulation affects network and service quality in related markets*

- How network charges affect incentives to invest in quality
- Exogenous network charge and Bertrand competition

Grajek & Röller (2012) *Regulation and investment in network industries: evidence from European telecoms*

- Trade-off between regulation and investment

Assumptions and equations

Costs: Retailers have constant marginal costs *c*, no fixed costs.

Network has no variable or fixed costs.

Household demand:

$$p = \alpha - \beta q_N$$

Profits:

$$\pi_i = pq_i - (p_N + c)q_i$$

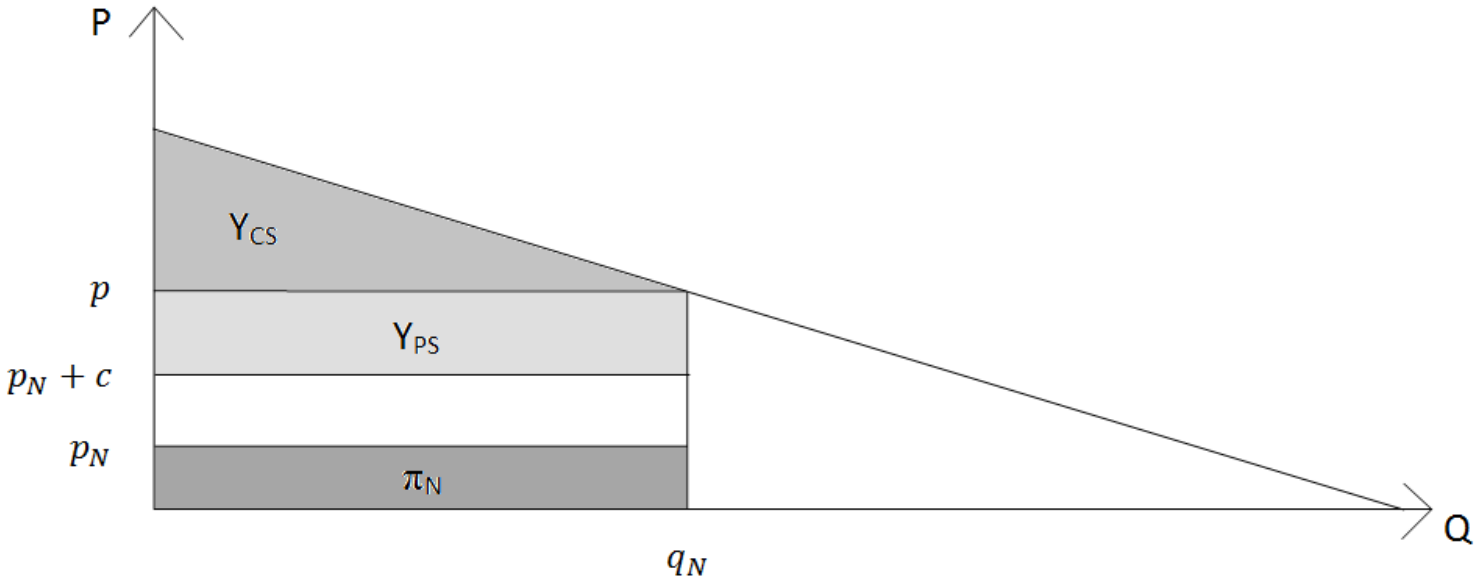
$$\pi_N = p_N q_N$$

Cournot equilibrium outcome:

$$p = \frac{\propto + n(p_N + c)}{n+1}$$

$$q_N = \frac{n}{n+1} \frac{\propto - c - p_N}{\beta}$$

Elements of surplus



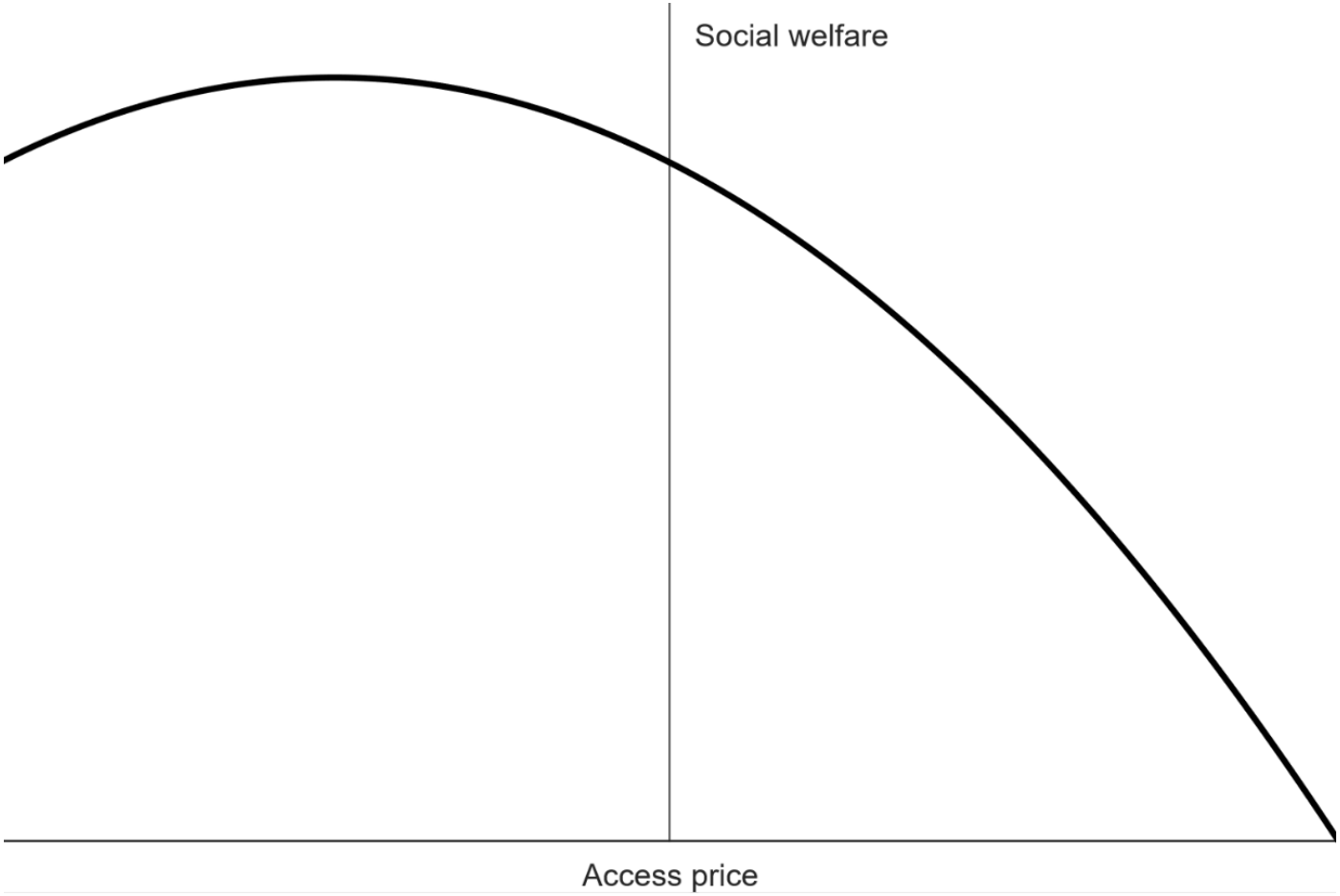
Social welfare:

$$Y = Y_{CS} + Y_{PS} + \pi_N$$

$$Y = \frac{n^2}{(n+1)^2}\frac{(\alpha - c - p_N)^2}{2\beta} + \frac{n}{(n+1)^2}\frac{(\alpha - c - p_N)^2}{\beta} + \frac{n}{n+1}\frac{p_N(\alpha - c - p_N)}{\beta}$$

Welfare optimisation

$$p_N = \frac{c - \propto}{n}$$



Regulator's objective function

Weighted surpluses:

$$Y_R = 3(\chi Y_{CS} + \psi Y_{PS} + \omega \pi_N)$$

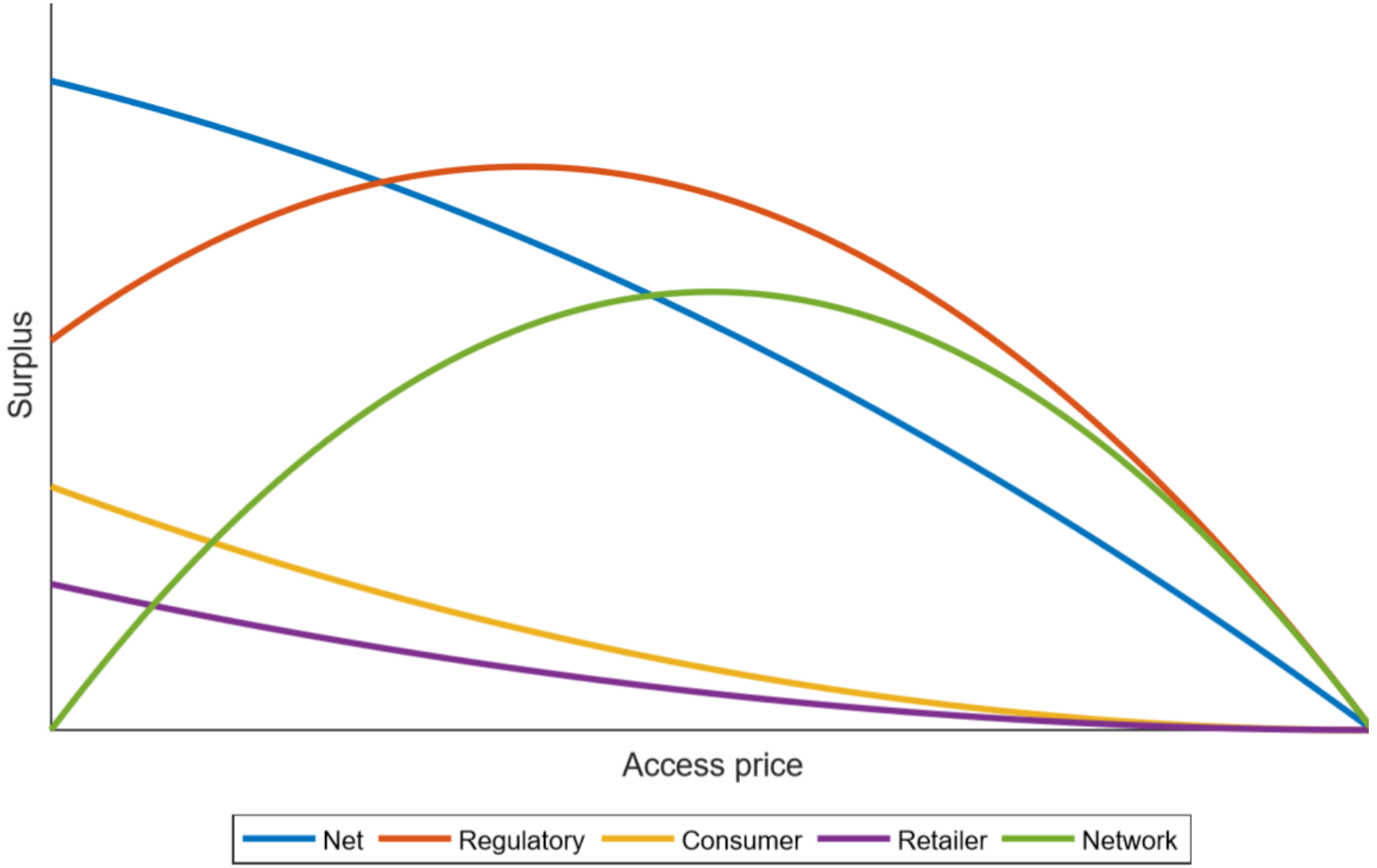
$$\chi + \psi + \omega = 1$$

For an optimised retail duopoly:

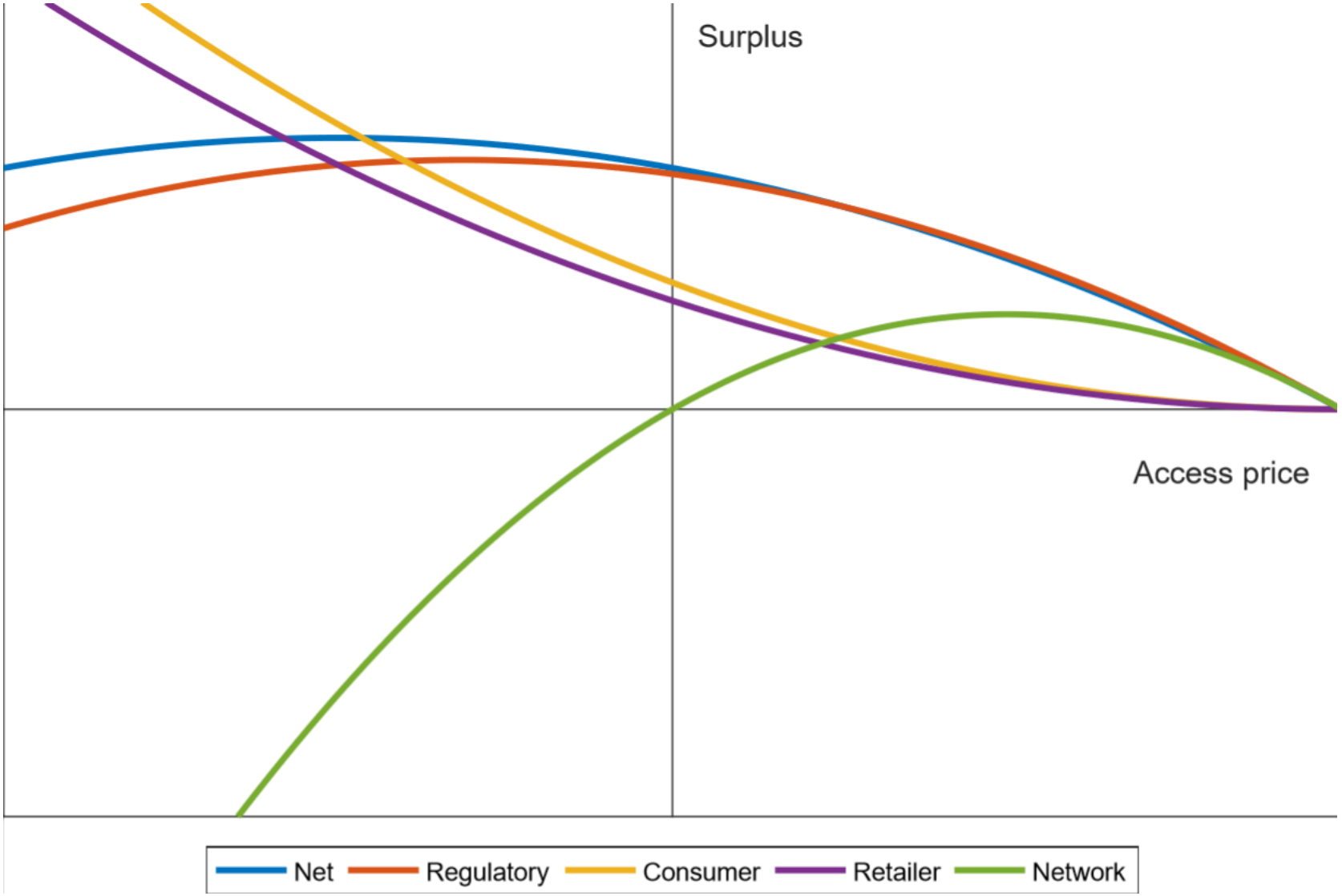
$$p_N = \frac{\alpha - c}{2}\left(\frac{2 - 5\omega}{3 - 4\omega}\right)$$

$$q_N = \frac{\alpha - c}{\beta}\left(\frac{\omega}{4\omega - 1}\right)$$

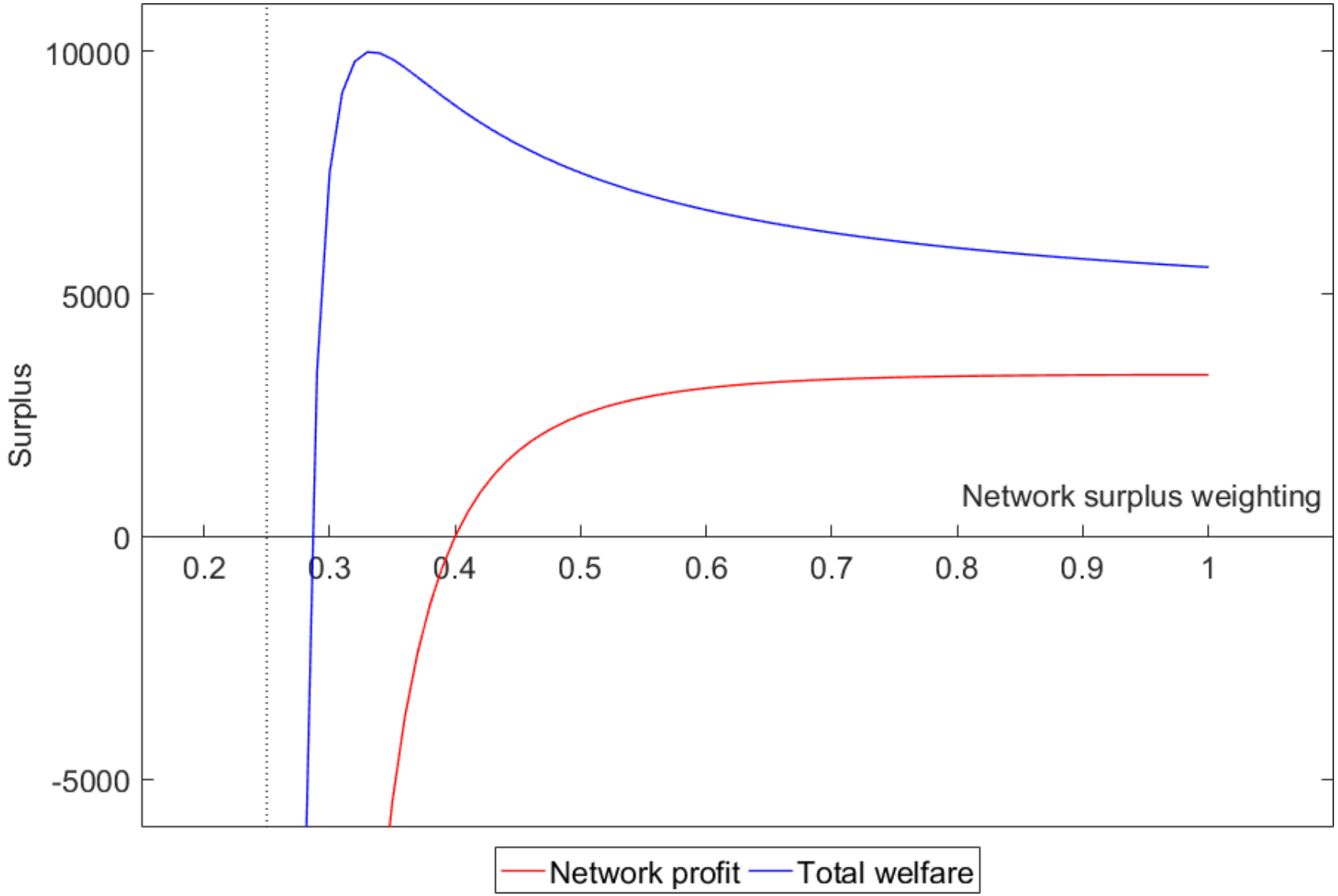
Welfare – favour network profit



Welfare – favour retailers and consumers



Welfare versus regulatory optimisation

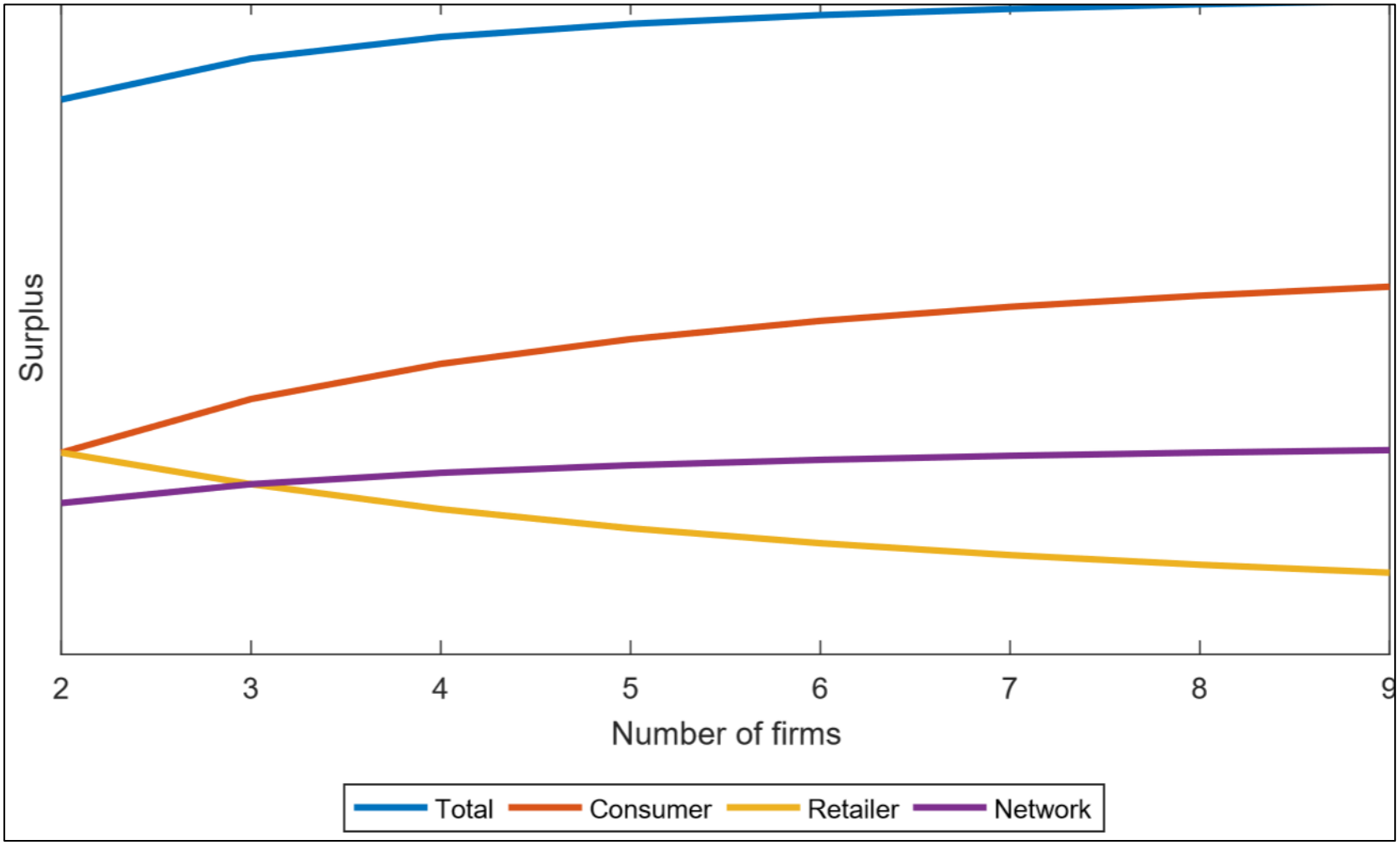


Welfare effects

Network profit weight	Access price	Total quantity	Network profit	Welfare
1	50.0	1.67	83.3	139
0.4	0.0	6.67	0.0	889
0.3333	-100.0	10.0	-1000.0	1000

Retail duopoly, $\alpha=200$, $\beta=20$, $c=0$

Number of firms



Regulatory levers

	Increase retail competition	Decrease network access price
Consumers	Benefit	Benefit
Retailers	Detriment	Benefit
Network	Benefit	Detriment

Discussion

General outcomes

- Pure welfare maximisation requires subsidised network access.
- Regulatory actions trade-off consumer, retailer and network profits.
- In network access pricing, consumer and retailer interests are aligned, network opposed.
- In firm entry and exit, consumer and network interests are aligned, retailers opposed.

Australian NBN implications

- Eventual privatisation versus welfare.
- Credibility of future price regulation.

Limitations and extensions

- Cost model
- Whole government fiscal analysis

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