A Note on the Incorporation of Seller's Targets in the Network Redundancy Tradeoff

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Note to reader: This note is intended for use with our article, "Why Knowledge Does Not Equal Power: The Network Redundancy Trade-Off."

In adopting assumption 5, we model price exclusively on the basis of the number of sellers or sources available to a buyer, but we ignored the number of buyers or targets available to a seller. Two considerations support this simplification. First, although it seems reasonable to assume that a seller will have more power the more buyers there are in the market, increasing the number of buyers available to a seller does not always heighten the seller's bargaining power. In particular, if the seller competes with at least one other seller who offers an equivalent product (i.e., the seller is not a monopolist), and especially insofar as each seller can supply more buyers than they currently supply at little additional cost, the seller will effectively have no bargaining power regardless of the number of buyers there are. These conditions are captured in classic economic models of Bertrand competition (see e.g., Saloner, Shepard, and Podolny 2000) and are familiar from the many commodity markets in which we participate as consumers. Consider how little capacity an individual apple-grower has to dictate price despite the fact that she has many customers. By contrast, consider how the market for apples would be transformed if suddenly there were an apple cartel that monopolized the industry-- i.e., all buyers faced just one seller. Indeed, even if all apple-buyers were able to form a cooperative (i.e., the monopolist now faces a monopsonist), the seller would still have a great deal of power, even if it now faces "countervailing power" (Galbraith 1952) from the single buyer. More generally, while increasing the number of buyers lowers their bargaining power when there is just one seller (and when it is costly for competing sellers to each increase supply), it does not do so when other conditions hold. By contrast, increases in the number of (non-colluding) sellers *always* increases buyers' bargaining power (though at a diminishing rate).

Second, it is not clear how to model the way additional targets affects seller power when valuations are homophilic. When valuations are uniform, the buyers have the same *wtp* and so it is straightforward to model bargaining power as a function of the number of sources available to the seller. But when valuations are homophilic, two sellers with the exact same number of targets could be in very different strategic positions because if the *wtp* of those targets varies.

At the same time, it is useful to examine the effect that additional targets has on our propositions when valuations are uniform. We thus run simulations identical to those reported in the paper, but with a price equation that was modified to include the number of targets available to a seller, as follows:

$$\text{price}_{ijb} = \text{wtp}_{jb} * \frac{0.5^{\frac{RO_{jb}}{GO_{ib}}}}{1.0}, \qquad \text{(A1)}$$

where wtp_{jb} is based on uniform valuation (equation [2]) and where GO_{ib} is defined as the number of contacts of *i* who do not yet possess bit *b*. When a seller does not have additional options for selling a bit, the equation reduces to the original price equation (1). But to the extent that such targets multiply, the price will increase.

Results from simulations using this equation are presented in table A1. As we can see, the patterns are substantively the same as those presented in the top panel of table 4. That is, incorporating the number of buyers available to a seller into our expectations regarding bargaining power serves to reinforce our argument. To appreciate why this is so, consider first how structural position affects the number of seller's targets. Before any trade occurs, a seller has as many targets as he has contacts. But as trade occurs and bits diffuse, a seller should sometimes discover that he has fewer targets than contacts because his contacts have already obtained the bits he possesses. The key factor affecting this reduction in targets is the extent to which the seller is structurally equivalent with his contacts. The more structurally equivalent a seller is with his contacts, the more likely it is that those contacts have already obtained a bit being offered by ego from a common third-party by the time that ego offers it, thus lowering the seller's leverage. And the reason that the incorporation of targets reinforces our propositions is because: (a) ego's structural equivalence with her alters increases as they become more redundant, thus making ego a less powerful seller; and (b) the alters' structural equivalence with their own contacts also increases with their redundancy with one other, thus making ego more powerful as a buyer.

Reference

Galbraith, John Kenneth. 1952. *American Capitalism: The Concept of Countervailing Power*. Boston, Houghton Mifflin.

Table A1
Summary Statistics and Correlations Matrix, Variables averaged over 50 Simulations on 50 Clustered Networks of Size=40 (N=2000) and Degree=4 for All Actors. Prices Computed According to Equation (A1).

Assuming Uniform Valuation (6a)								
	Mean (SD)	1	2	3	4	5	6	7
1. Slow accumulation	20.42 (1.80)	--						
2. Total buyer surplus	14.10 (0.64)	.630	--					
3. N bits transmitted	39.00 (1.31)	-.454	-.362	--				
4. Total seller surplus	24.89 (2.56)	-.495	-.497	.784	--			
5. Total surplus	39.00 (2.31)	-.373	-.271	.769	.970	--		
6. Ego-density	0.27 (0.16)	.503	.535	-.489	-.860	-.804	--	
7. Farness	84.22 (9.89)	.566	.682	-.372	-.692	-.577	.765	--
8. Information centrality	1.25 (0.11)	-.669	-.727	.342	.641	.508	-.761	-.884