Web Appendix

A1. Robustness

In section, we provide more extensive robustness results across the focal parameters: a) independents listening, b) independents' homophily, c) the proportion of independents, d) the information quality of independents, and e) the network density.

The following figures support our baseline result that independents can lose influence because they can have less information than imitators. The rows in the figures show increasing independents listening, while the columns from left to right shows increasing independents' homophily. Consistently we see that with higher information quality, independents' influence increases, as expected. Further, they can gain influence by listening to others. However, independents can have less influence they can have listen information than others if they do not listen to others, or driven by homophilious information.

Figures 1, 2, 3 demonstrate consistent results with 0.1, 0.5, and 0.9 proportion of independents. With greater proportion of independents in the population, it becomes easier to find independents. That is, if independents listen to others, there is a greater probability that they will find other independents based on random draw. As a result, the homophily effect diminishes with higher density.

Next, we vary the network density at 7 and 10, and proportion of experts at 0.1, in Figures 4, and 5, respectively, and compare it to Figure 1 with a density of 4

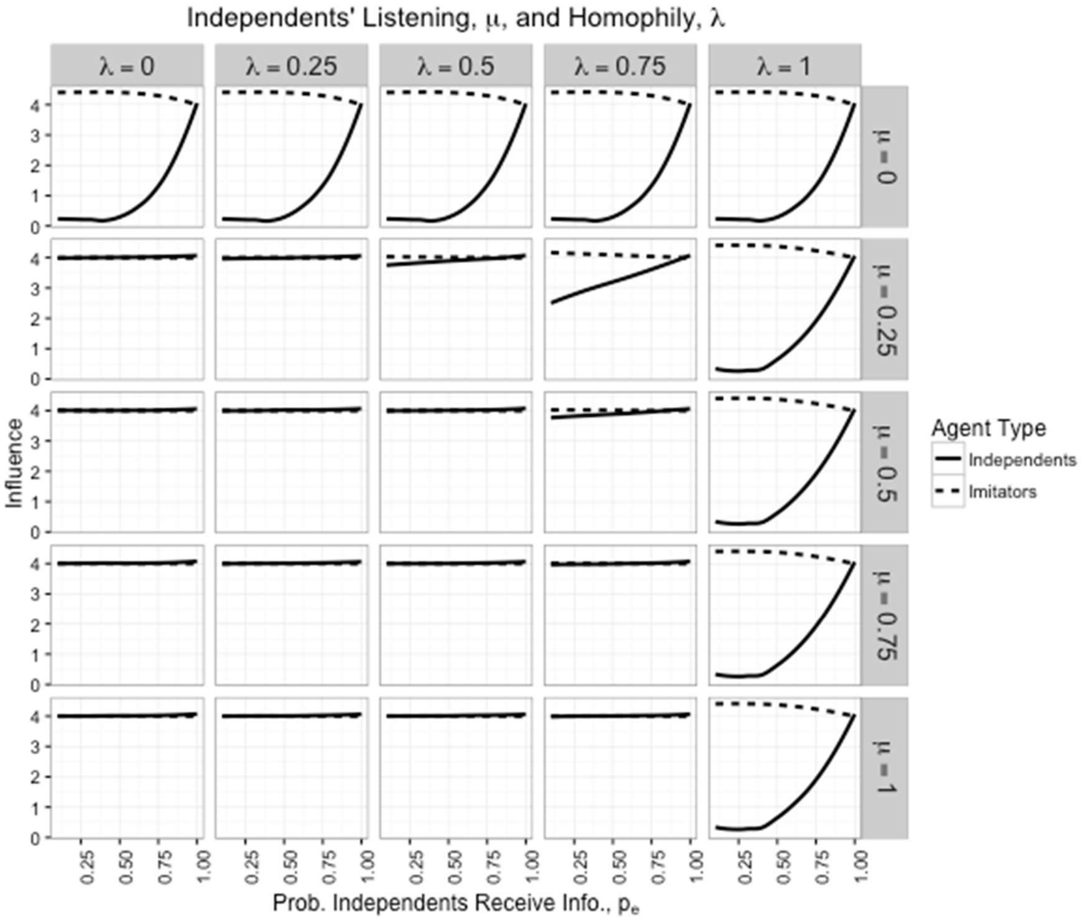

Figure 1 Density = 4, proportion of independents = 0.1

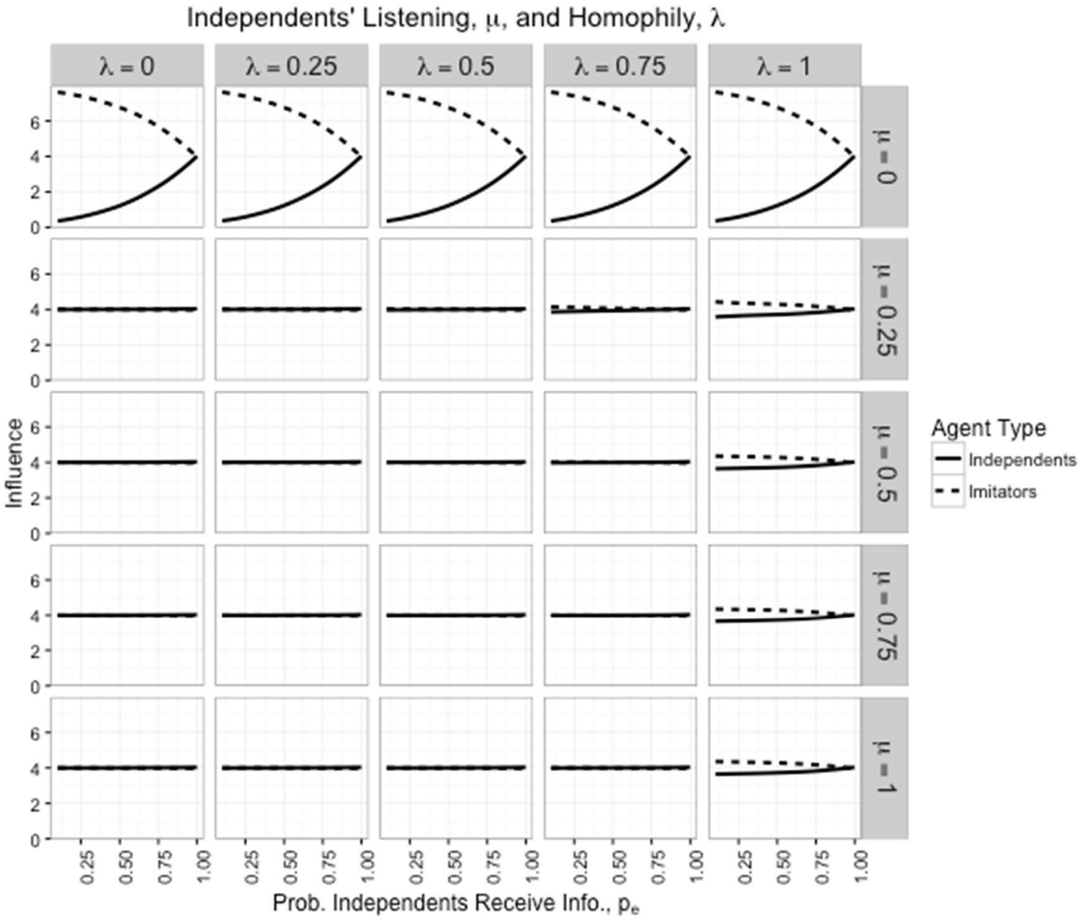

Figure 2 Density = 4, proportion of independents = 0.5

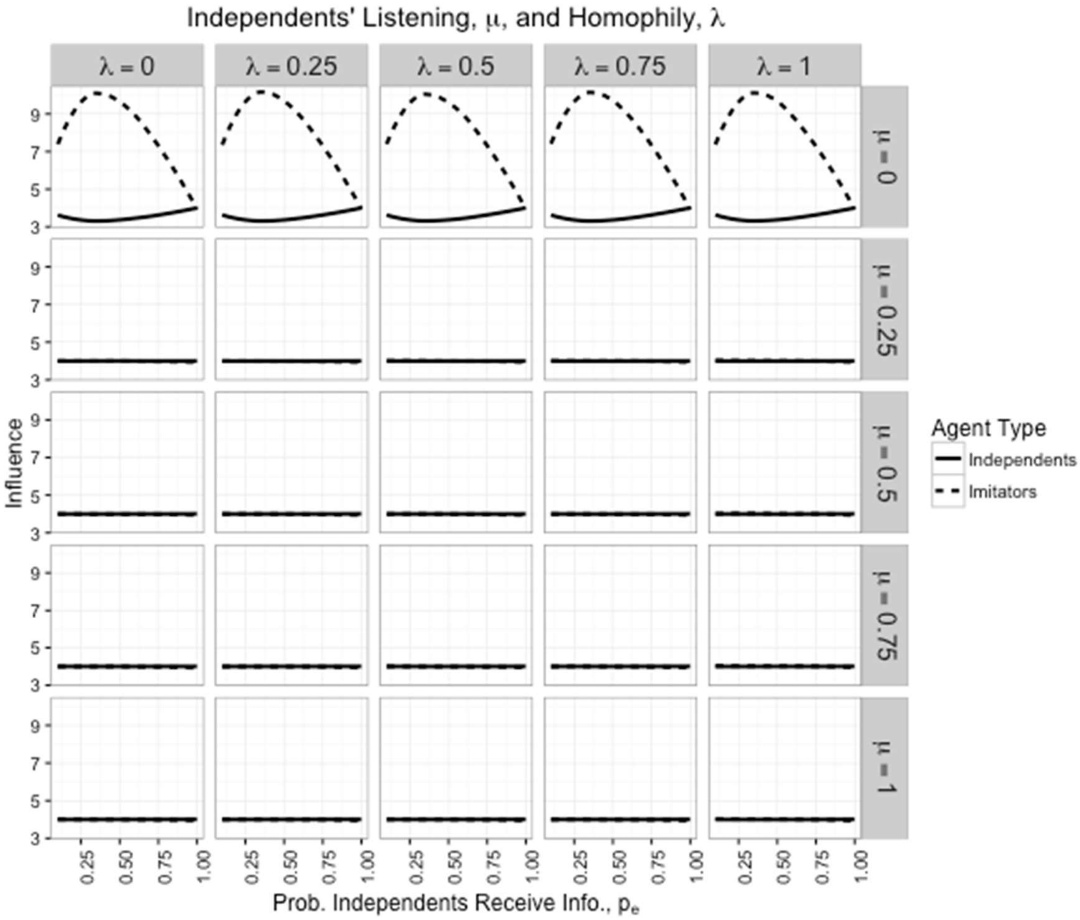

Figure 3 Density = 4, proportion of independents = 0.9

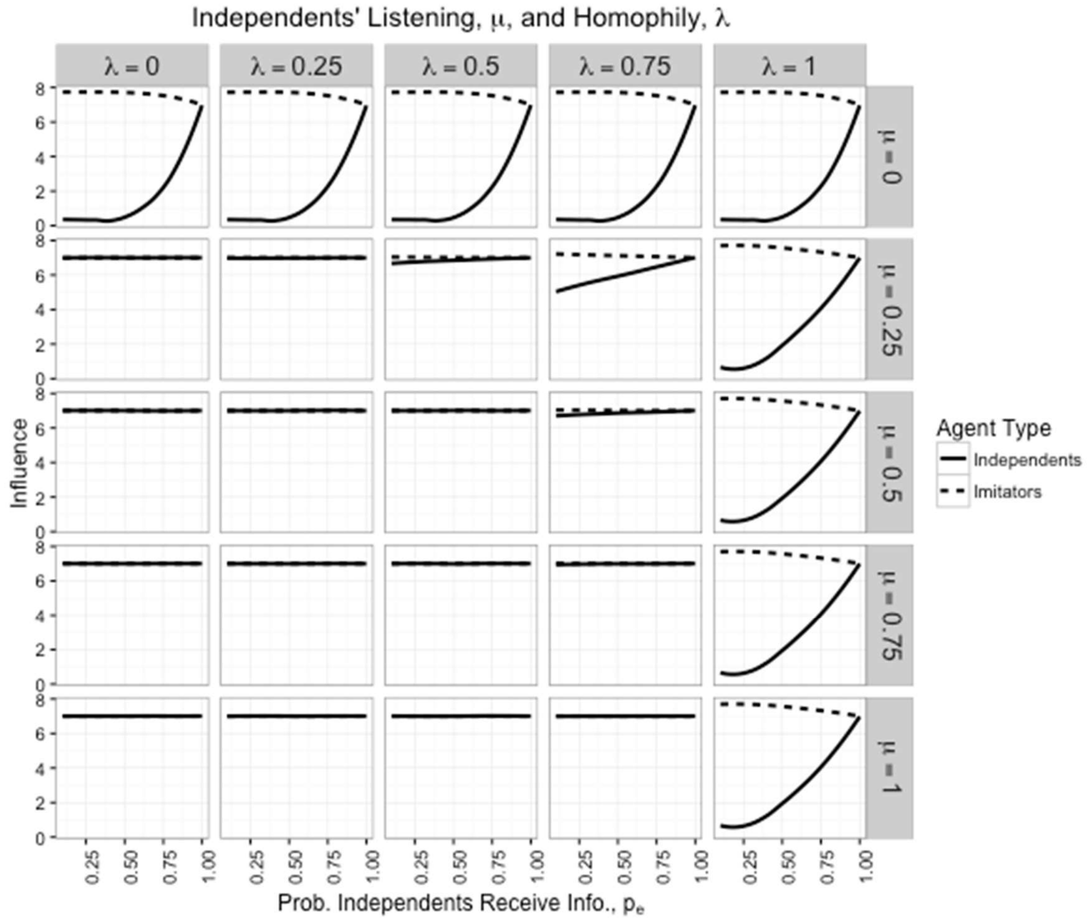

Figure 4 Density=7, proportion of experts = 0.1

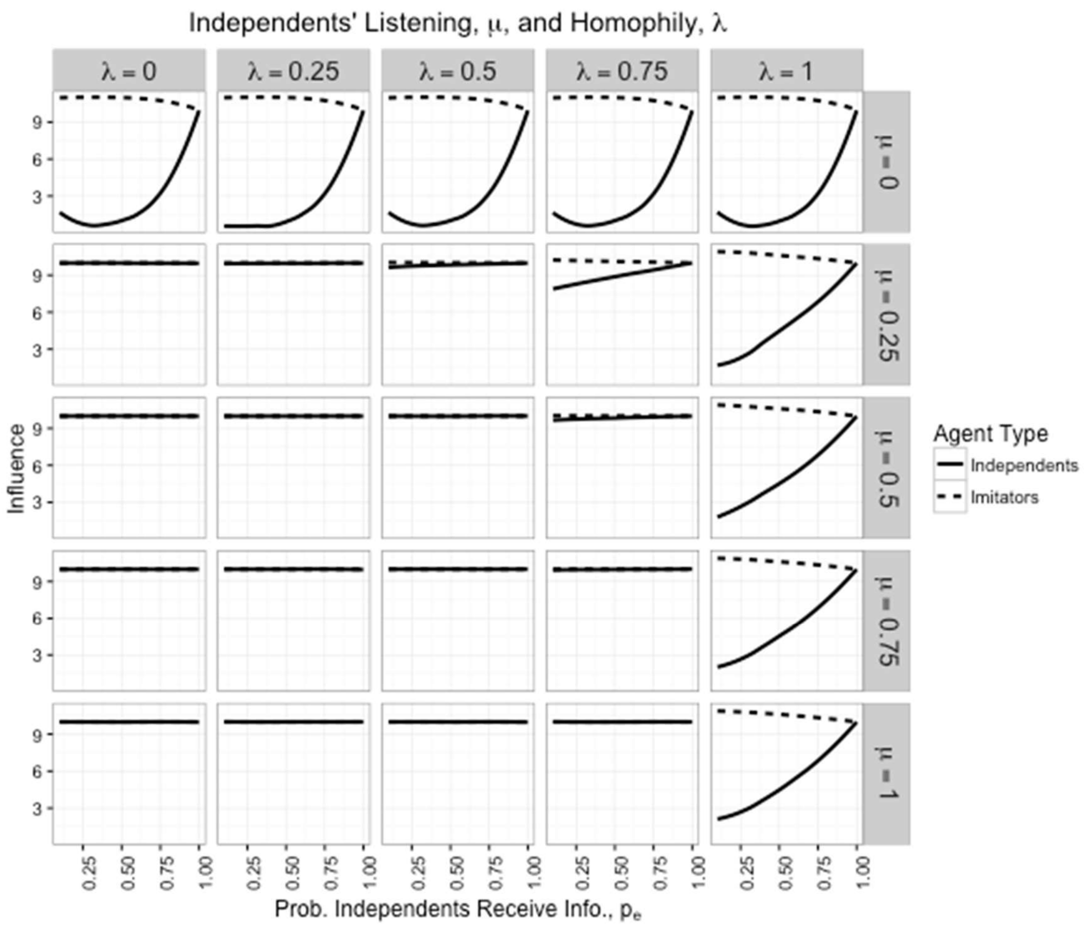

Figure 5 Density = 10, proportion expert = 0.1

A2. Time discounts

In this section, we test whether our base results hold that independents can have less influence than imitators if agents give more weight to early adopters. Early adoptions, however, can also be a signal of an independent with outside information. Further, we note that this requires an additional assumption that agents are aware of when a new idea starts. Although this may be true is some scenario such as a public announcement of a new generation of iPhones, in other domains such as fashion, the start time may not be known to all agents. Furthermore, ...

In this section we provide a model where late adopters are penalized. We specify that the probability that agent *i* keeps peer *j*:

Pr[keep link to peer *j* | *j* adopted in period *t*]= β^t

Where β as the time discount factor. With 50 time periods, we use reasonable time discount factors between 0.99 and 1.0. That is, if a peer adopts at period 50, the ego would have a probability of 0.99^50 = 0.61 to keep the link.

Figure 6 shows the influence of independents and imitators at density 6, and when independents do not listen. First, we note that independents can have less influence than imitators at $p_e < 1$. Second, going down the columns, we find that with larger discount factor, independents lose more influence over ideas. However, at the offset where $p_e = 1$, we find that independents can have at least the same, if not more, influence than imitators at $\beta = 1$ and $\beta < 1$, respectively. This is because independents always adopt at t=0, early adoption is a strong signal that a peer is an independent. This is an extreme case, and is less likely to happen in real life.

We find these are robust against different levels of independents listening at 0, 0.5, and 1.0 in Figures 6, 7, and 8, respectively. Also, we find similar results at higher densities 9 in Figure 9. At higher density, $\delta = 12$, the network is sufficient dense where an ego has enough peers to identify independents as early adopters, and it is easier for her to find new peers who are independents - further supporting for Watts & Dodd's "cascade window" as a result of high network density.

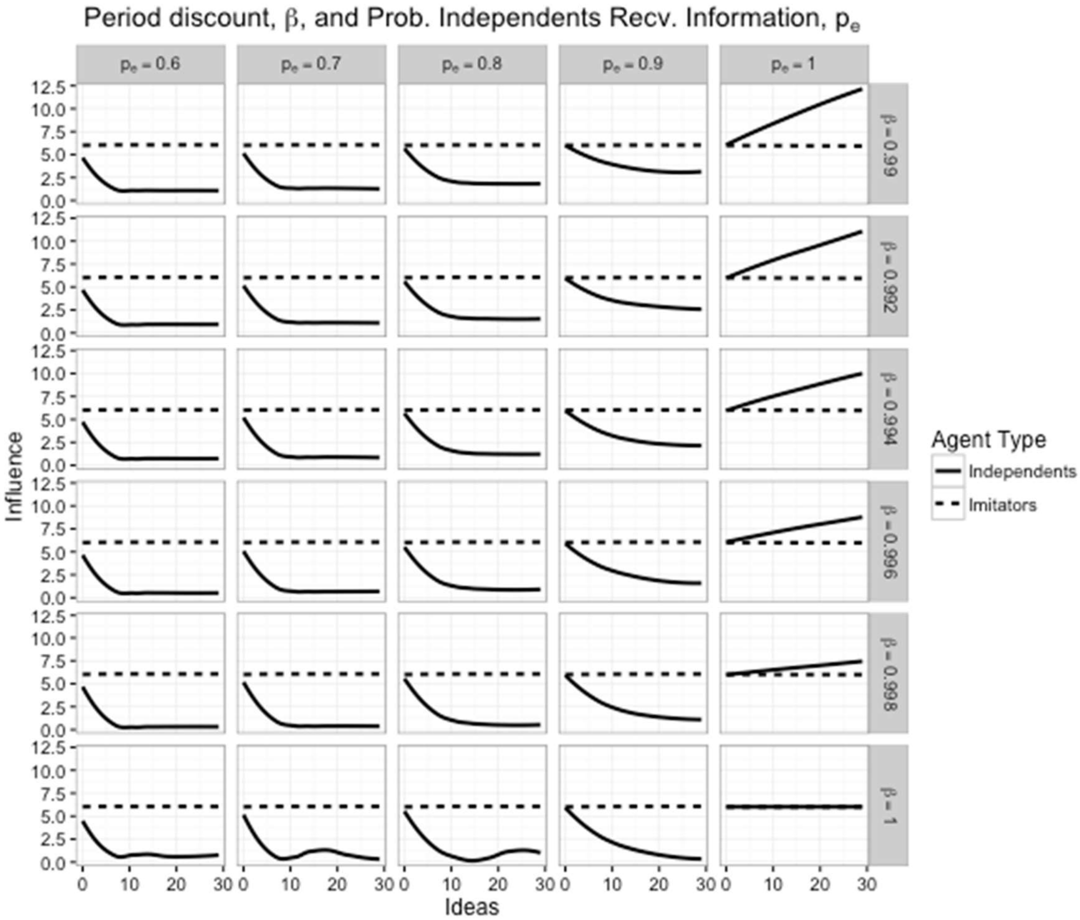

Figure 6 For density = 6 and independents do not listen, as independents have better information quality (column), they lose fewer followers.

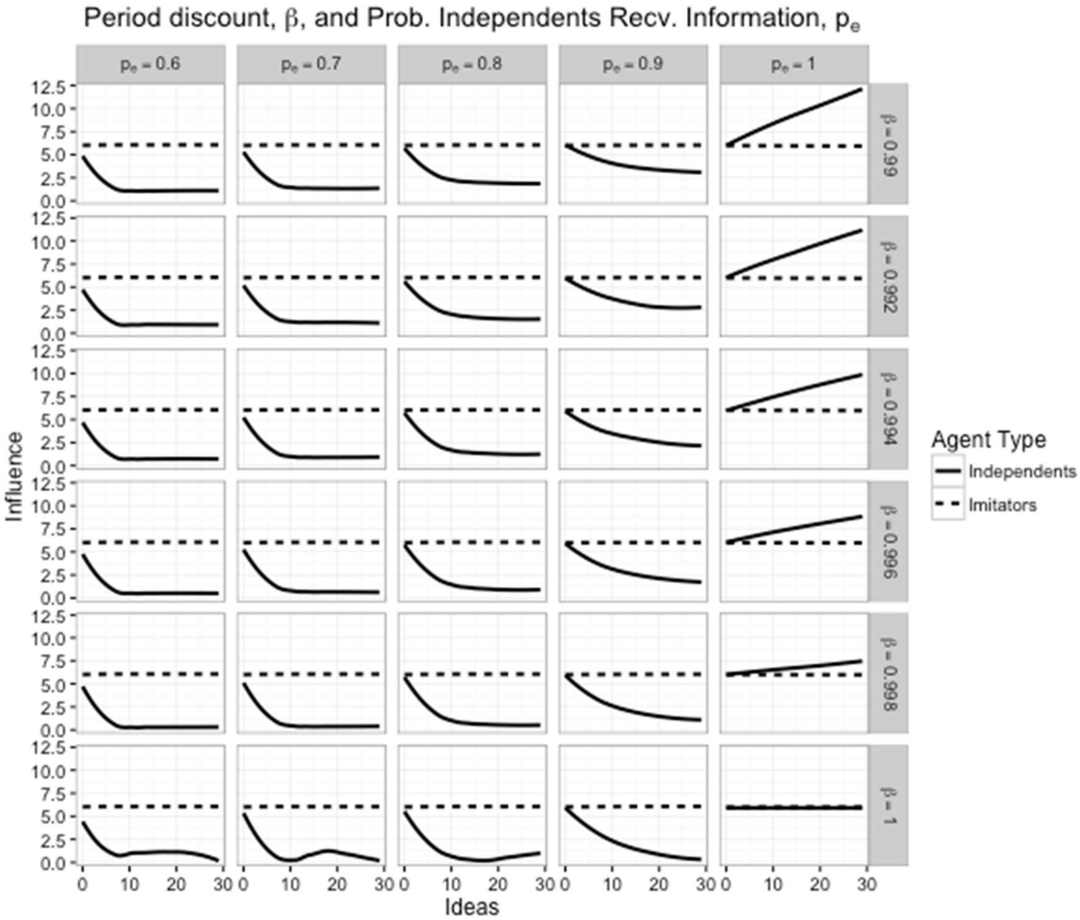

Figure 7 At density = 6, and independents listen = 0.5, a similar pattern merges.

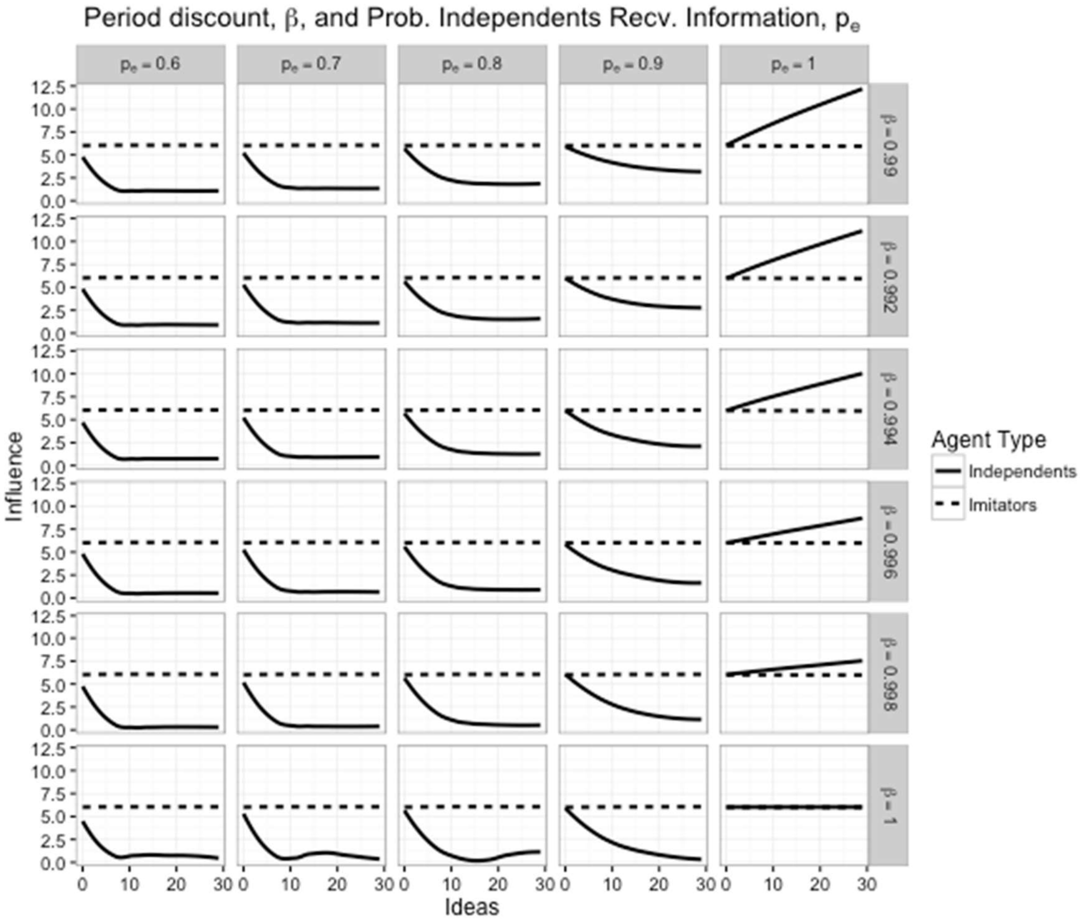

Figure 8 Density = 6, independents listen = 1.0

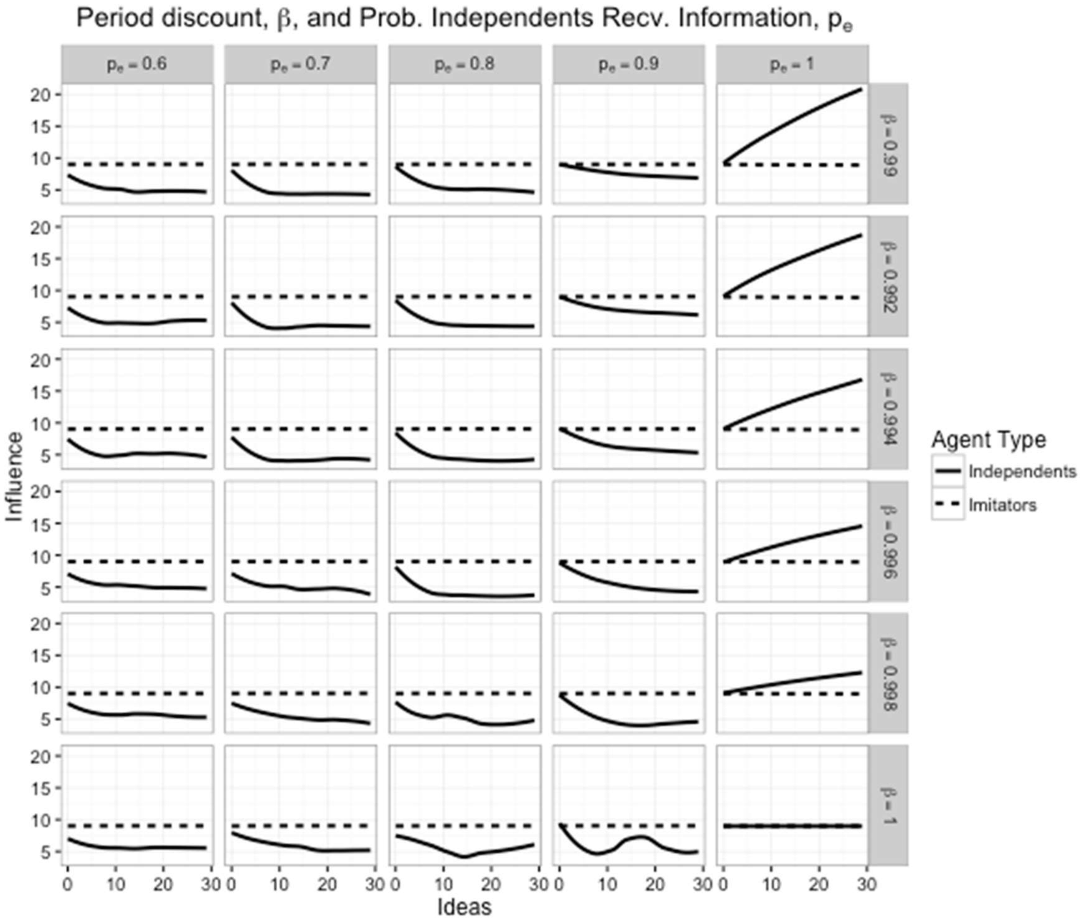

Figure 9 Density = 9, independents listen = 1.0

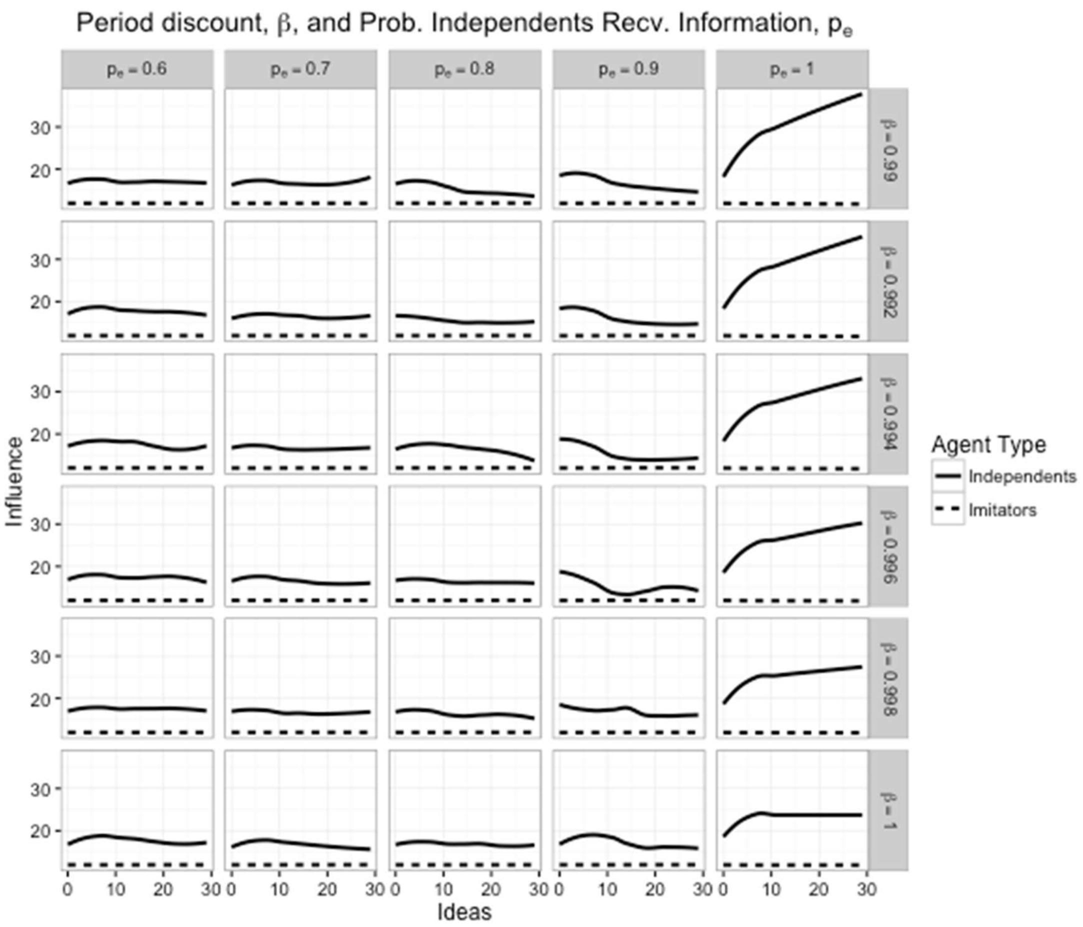

Figure 10 Density = 12, independents listen = 1.0

A3. Count thresholds

While our adoption threshold uses a proportion of peers as supported by literature (Centola and Macy (2007)), we test an alternative adoption rule which uses a count threshold. That is, the ego will adopt when a certain number of her peers have done.

In Figure 11 below, we find similar results to our baseline model – that independents can have less influence than non-independents. We note that our baseline proportional threshold at 0.18 is similar to using a count threshold of 1 for a density of 6. As Watts & Dodds 2007 pointed out, there is a trade off between number of peers (or density of the network) and those who have adopted. Therefore, a higher threshold (eg. Using 2 adopters with a density of 6, or tau=1/3) can result in different dynamics. At higher densities (relative to the count threshold, eg. 1/21), it may require too many peers to adopt, and hence be less likely. However, at lower density (relative to the count threshold, eg. 2/6), it may be too easy to find peers who adopt. As a result, we can only compare similar threshold values using our count threshold as those using the ratio (eg. Count threshold of 1, and density of 6). Furthermore, we used independents always listen, independents' homophily at 1.0 and inform quality, p_e, of 0.9. We now present the results across a broader range of density and count thresholds.

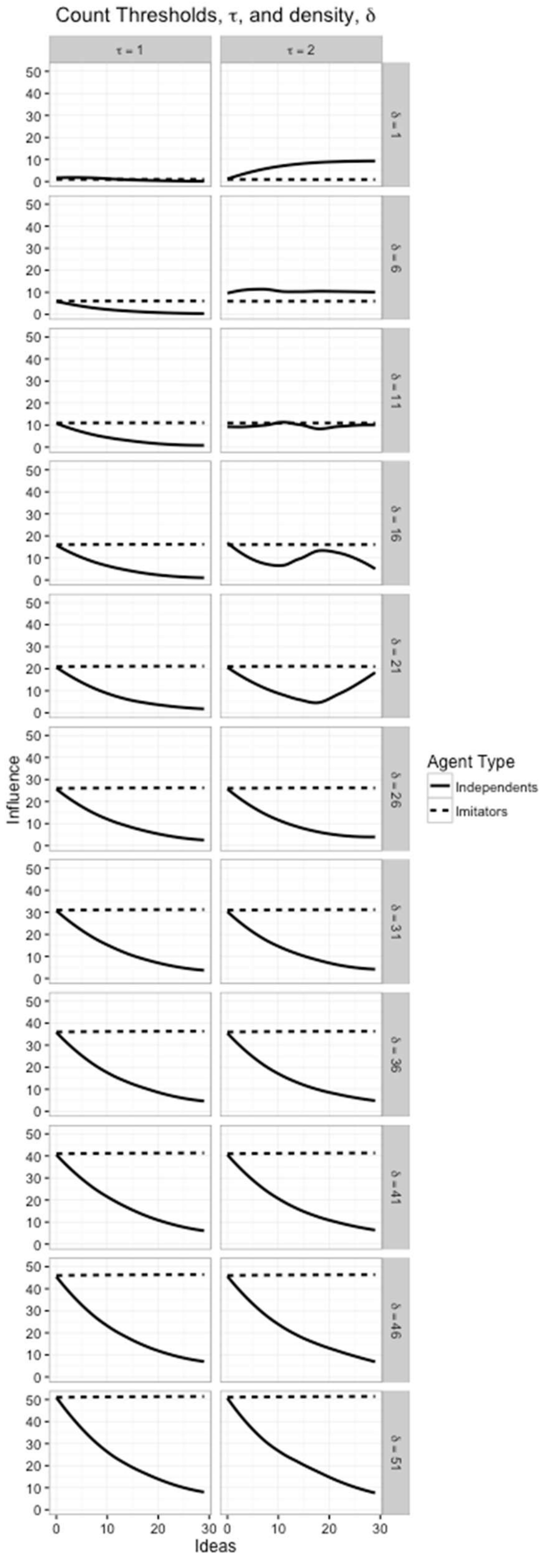

Figure 11 At different densities (rows), we find similar results that independents can be less influential than imitators under different count thresholds (column).

A4. Increasing and decreasing Thresholds with Degrees

In this section, we test whether our baseline results hold when the proportional thresholds are increasing (decreasing) with the number of influencers an agent has. Because an agent has discrete number of influencers, we use the Beta distribution. That is, given an agent's in-degree, p_i, let $\underline{p}$ (=20) be the assumed maximum values of in-degrees. For parameters $a \in \{0,3,6,9\}$ and $b \in \{5,10,15,20\}$, we draw the increasing relationship between the agents' threshold and in-degree from the given Beta distribution:

$$\tau_i = Beta(a + p_i, b + \bar{p} - p_i)$$

Similarly, we draw from the Beta distribution for the decreasing relationship between the threshold and the in-degree as follows:

$$\tau_i = Beta(a + \bar{p} - p_i, b + p_i)$$

We also tested on our baseline model parameters $\delta \in \{3,7,11,15\}, \mu \in \{0.5,0.6,0.7,0.8,0.9,1.0\}, \lambda \in \{0.5,0.6,0.7,0.8,0.9,1.0\}$. This resulted in 2304 simulation parameters. Exploring this parameter space, we find that our main results hold – that independents can have fewer followers (influence) than imitators, with both increasing and decreasing thresholds.

For example, for $\mu = 1, \lambda = 0.9, \delta = 3$, independents have fewer followers at lower p_e.

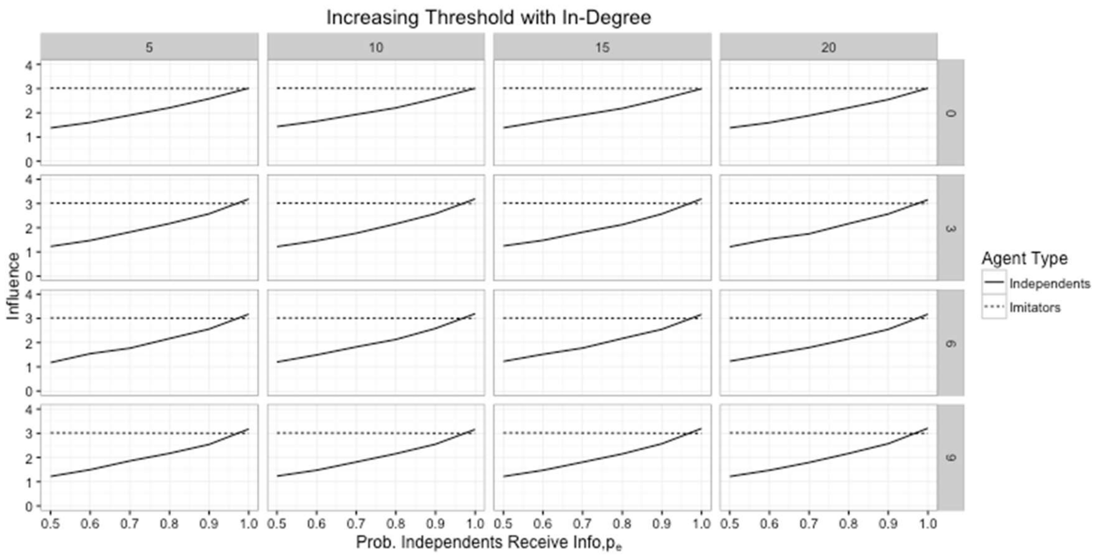

Figure 12 With varying parameter a (columns) and b (rows) for the Beta distribution for increasing relationship between thresholds and in-degrees, we find that independents have fewer followers at lower probabilities of independents receiving information ($\mu = 1, \lambda = 0.9, \delta = 3$)

Similarly at higher densities, 7, 11, and 15 in figures 13, 14, and 15, respectively below.

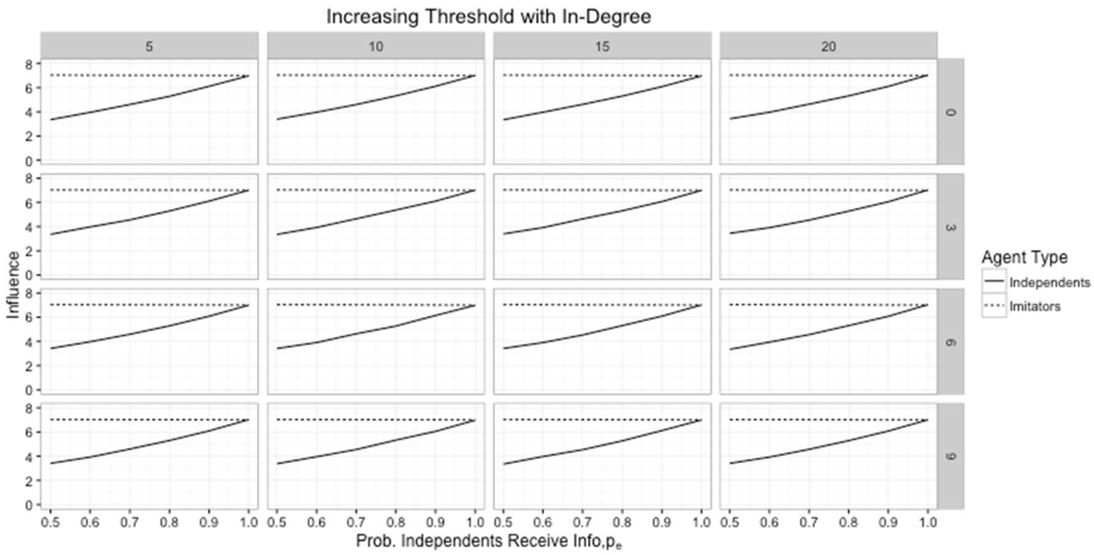

Figure 13 $\mu = 1, \lambda = 0.9, \delta = 7$

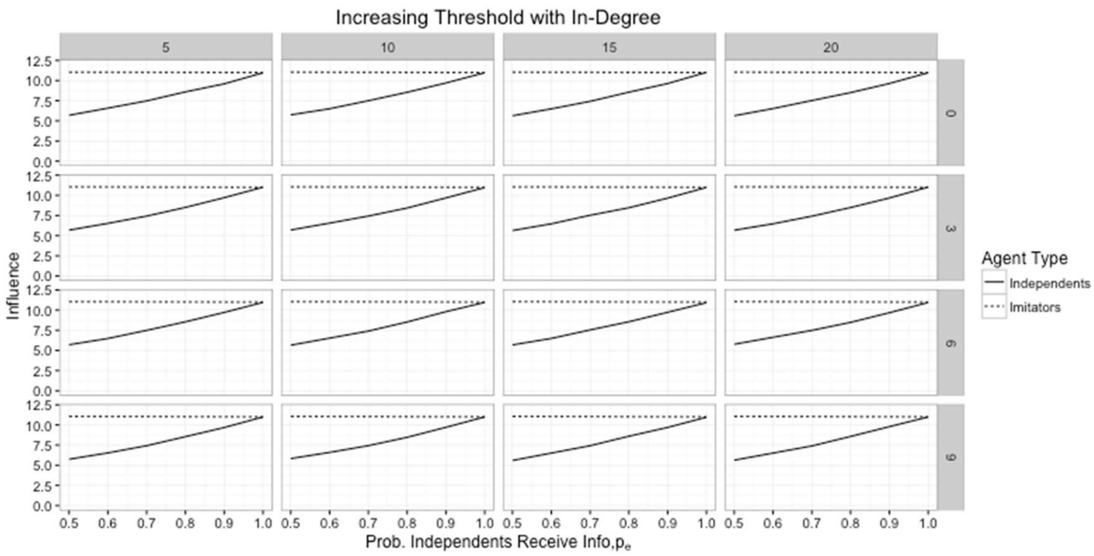

Figure 14 $\mu = 1, \lambda = 0.9, \delta = 11$

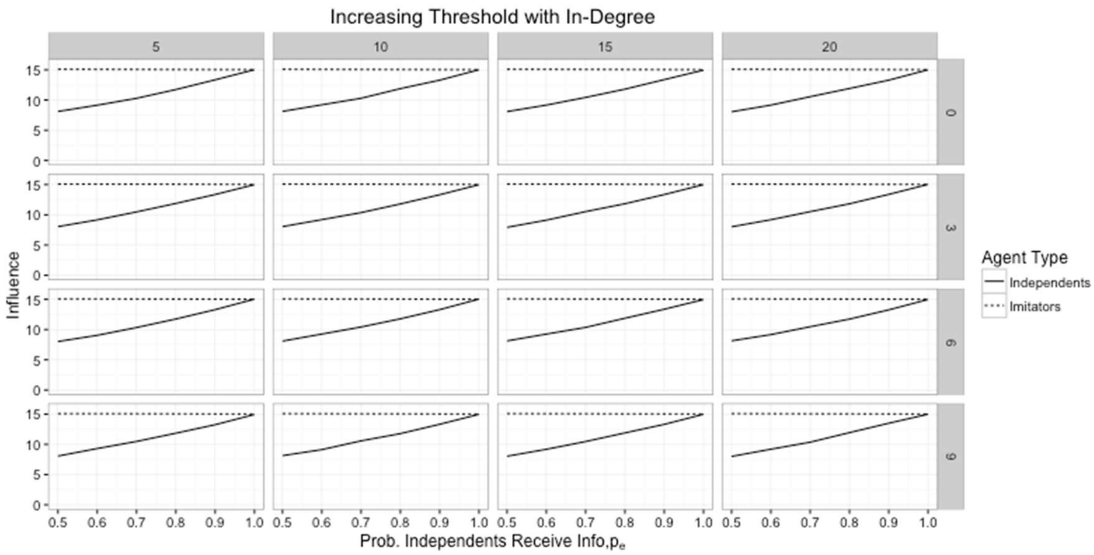

Figure 15 $\mu = 1, \lambda = 0.9, \delta = 15$

At lower probability that independents listen to other independents, at $\lambda = 0.5$, for example, we find that independents are similar to imitators. This provides further support and evidence for Watts & Dodds "cascade window" which suggests that parameters outside the window give trivial results. Figures 16, 17, 18 and 19 show the results at densities 3, 7, 11, and 15, respectively.

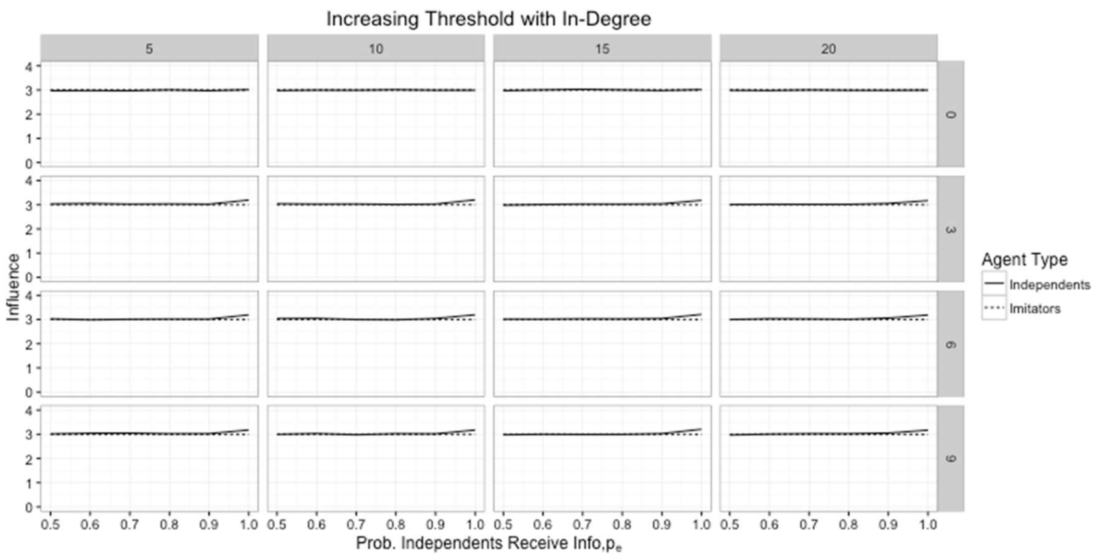

Figure 16 $\mu = 1, \lambda = 0.5, \delta = 3$

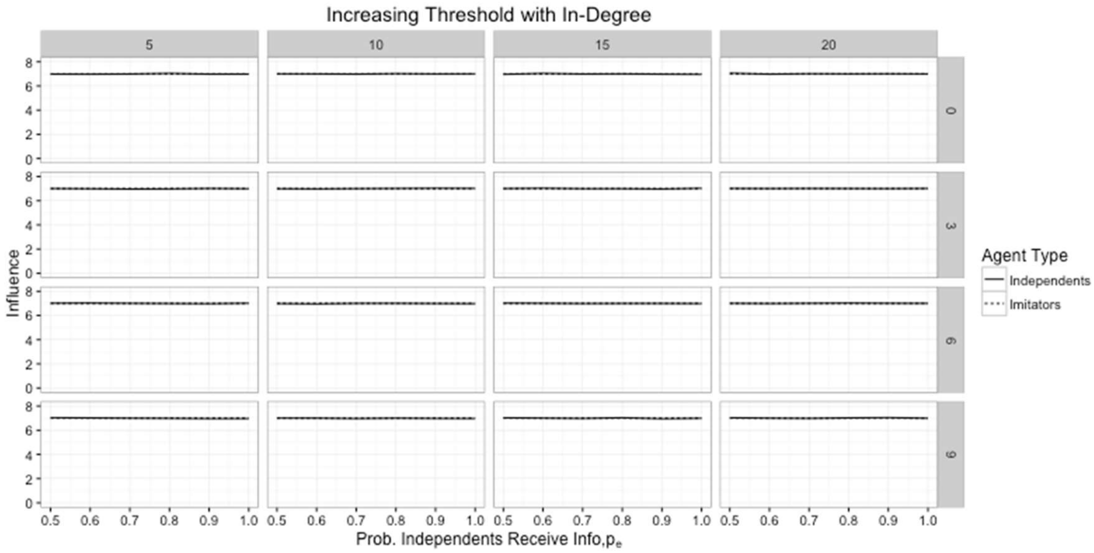

Figure 17 $\mu = 1, \lambda = 0.5, \delta = 7$

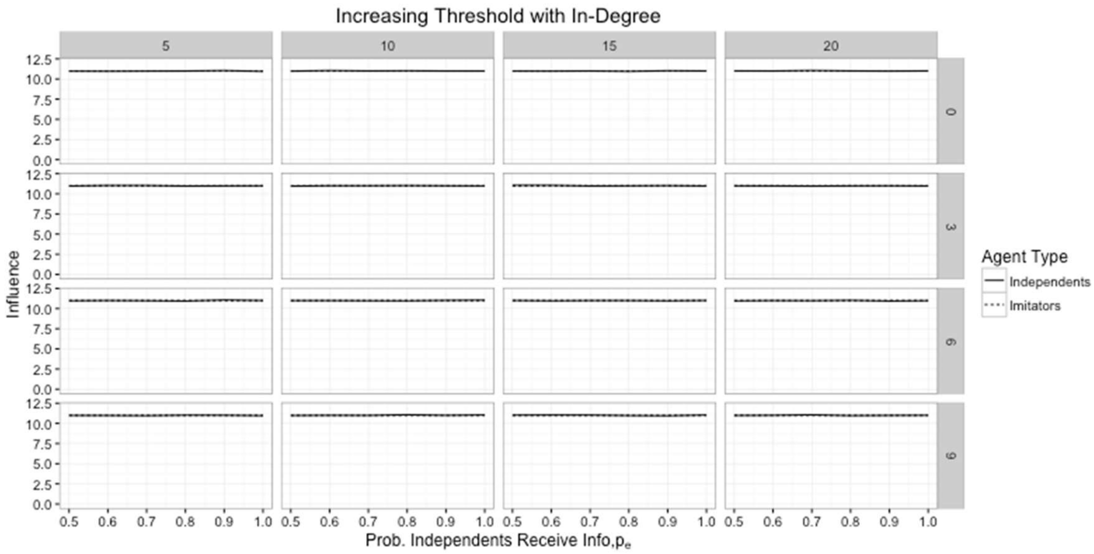

Figure 18 $\mu = 1, \lambda = 0.5, \delta = 11$

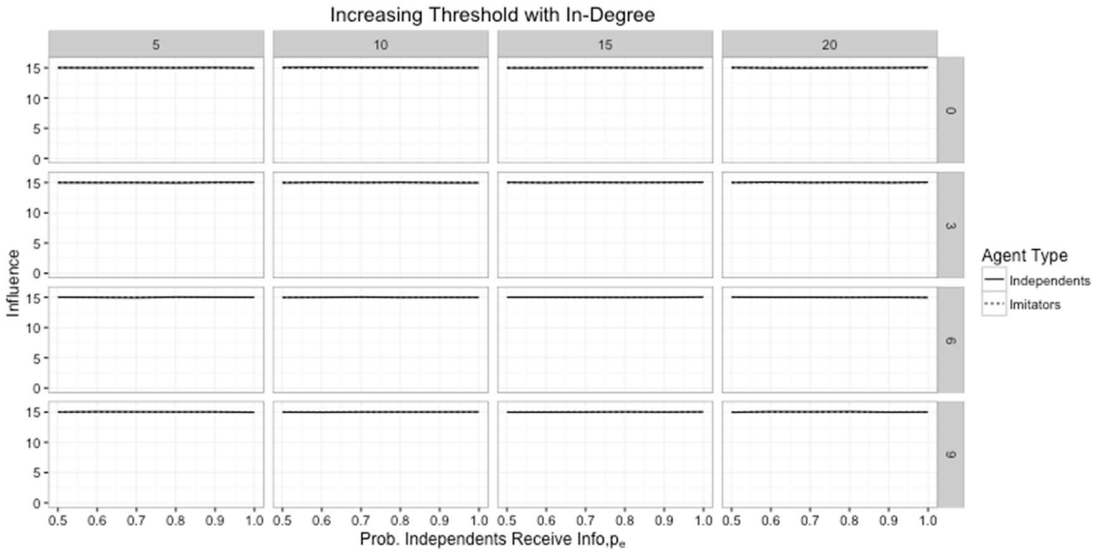

Figure 19 $\mu = 1, \lambda = 0.5, \delta = 15$

We also find that the lower probability independents listen, μ, can further penalize the independents' influence. Comparing Figure 20 to Figure 15, the lower probability, μ=0.6, we find a similar pattern, but with greater magnitude.

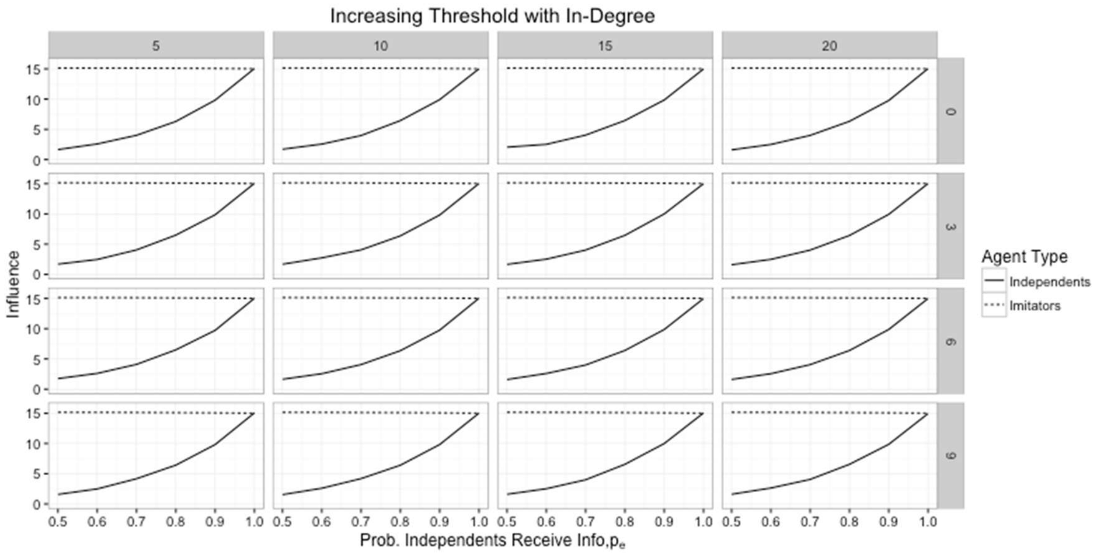

Figure 20 $\mu = 0.6, \lambda = 0.9, \delta = 15$

We now show results from the model for a negative relationship between threshold and in-degree. We find that there similar results as for the positive relationship shown above. We show results at densities 3, 7, 11, and 15 in Figures 21, 22, 23, and 24 below, and compare these to Figures 12, 13, 14, and 15.

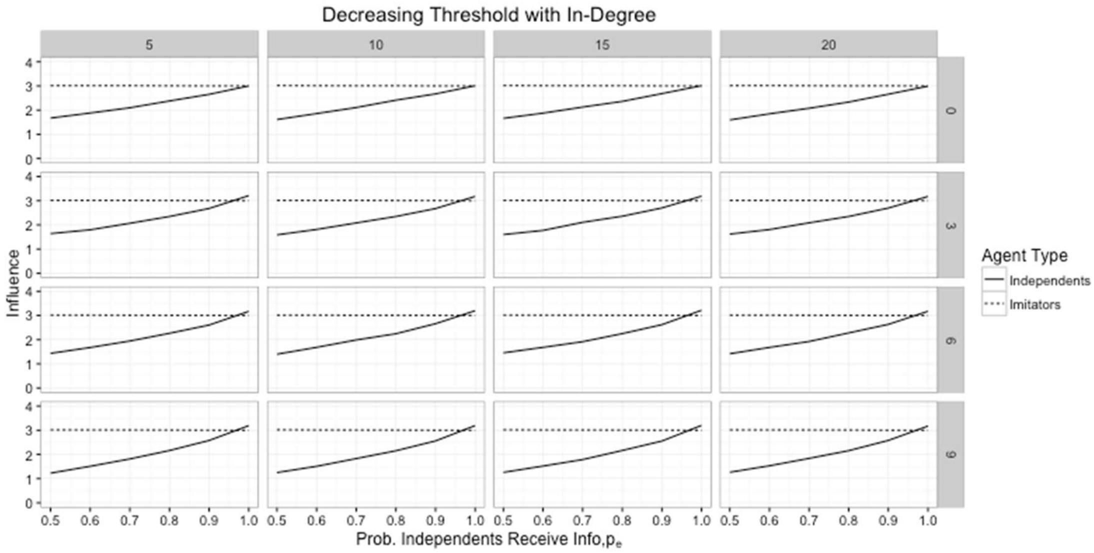

Figure 21 $\mu = 1, \lambda = 0.9, \delta = 3$

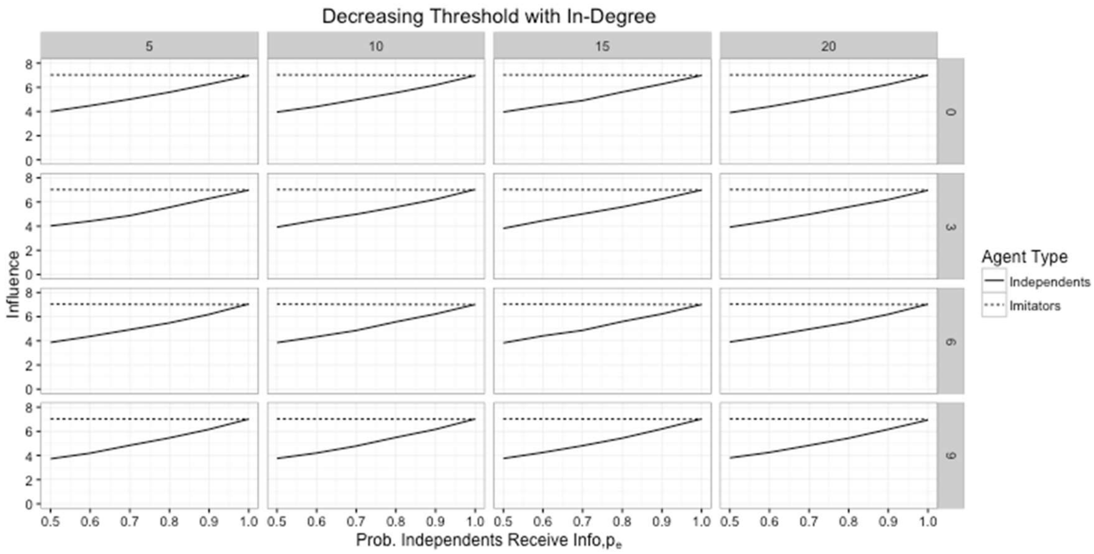

Figure 22 $\mu = 1, \lambda = 0.9, \delta = 7$

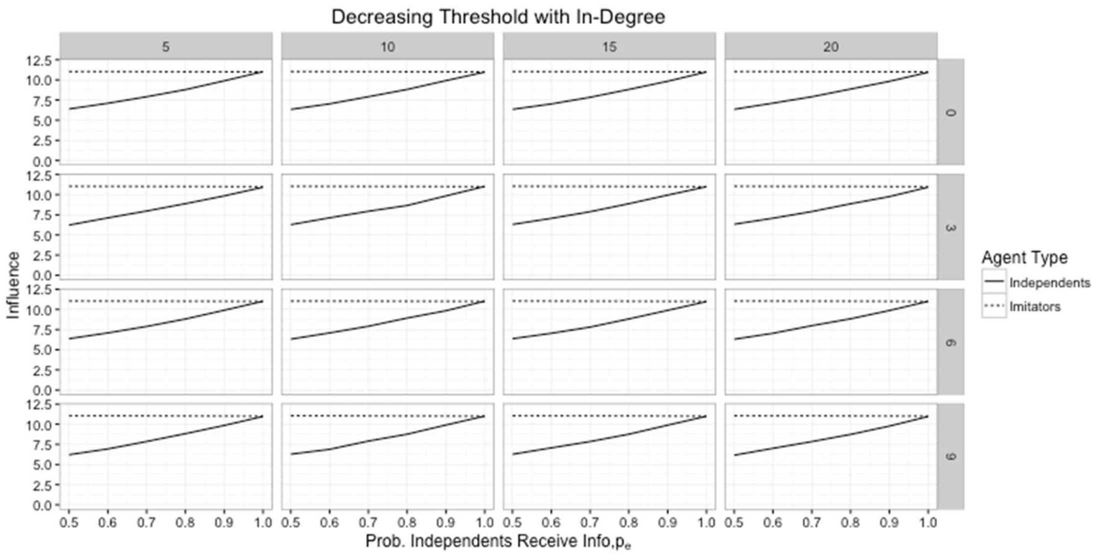

Figure 23 $\mu = 1, \lambda = 0.9, \delta = 11$

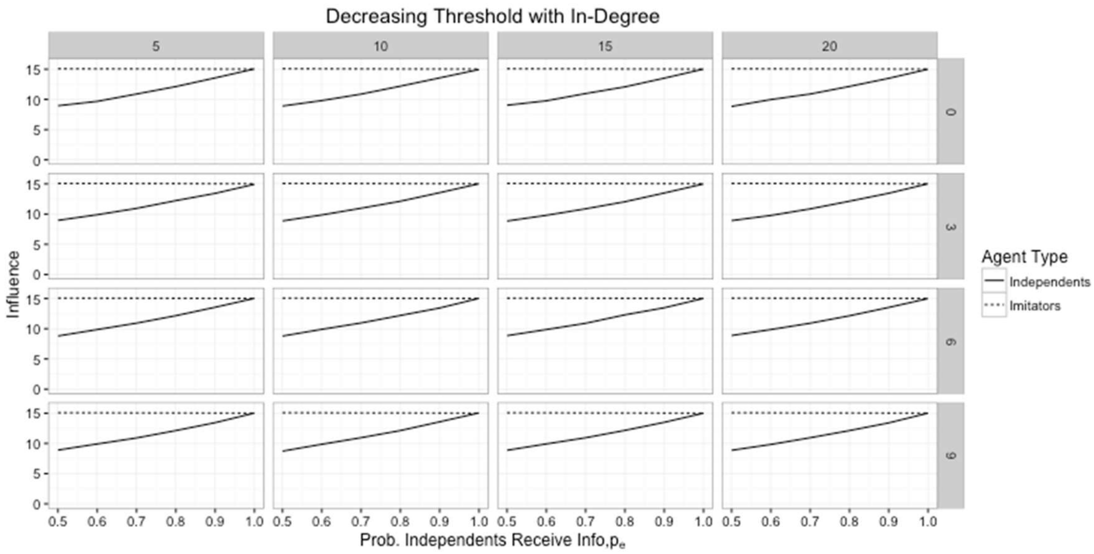

Figure 24 $\mu = 1, \lambda = 0.9, \delta = 15$

Similarly, Figure 25 shows lower probability independents listen to other independents result in trivial outcomes.

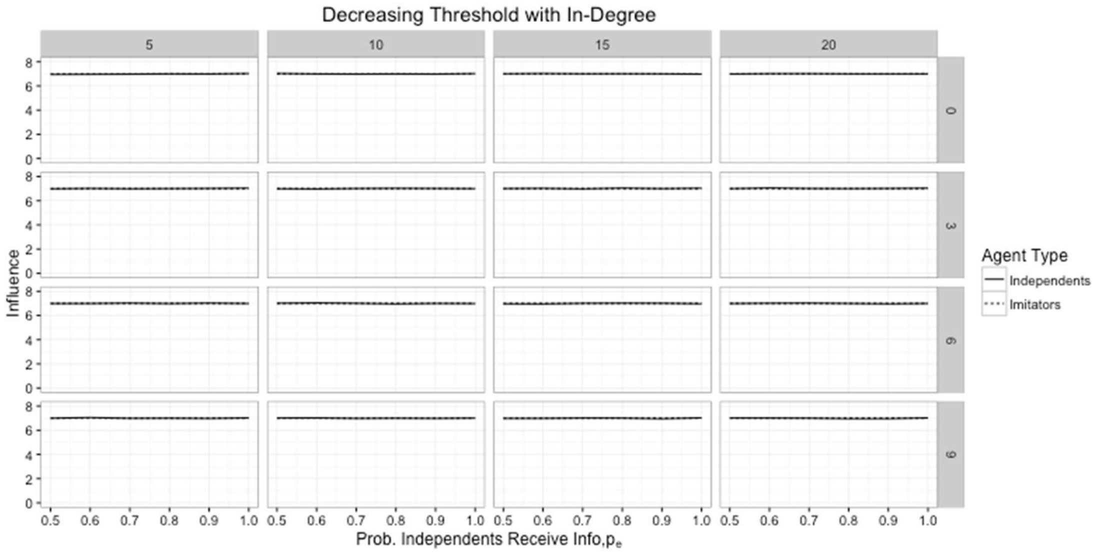

Figure 25 $\mu = 1, \lambda = 0.6, \delta = 7$

Simiarly, lower probability independents listen also amplifies the effect. Figure 26 shows consistent results with the prior 10 figures.

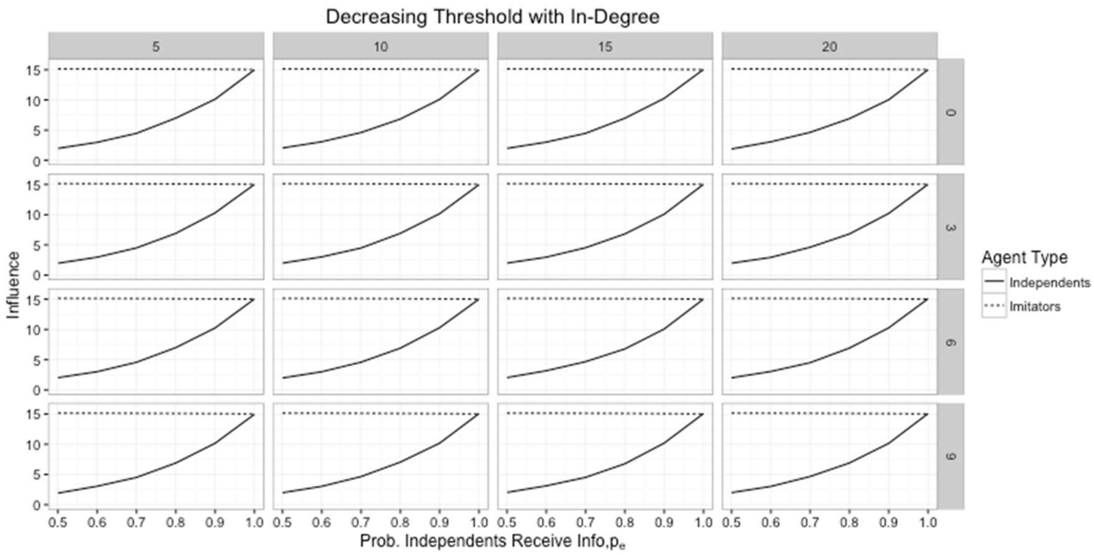

Figure 26 $\mu = 0.6, \lambda = 0.9, \delta = 15$

Full results for the 2304 parameter space are available from the authors upon request.