

A Dynamic Theory of Fidelity Networks with an Application to the Spread of HIV/AIDS¹

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Abstract: We study the dynamic stability of fidelity networks, which are networks that form in a mating economy of agents of two types (say men and women), where each agent desires direct links with opposite type agents, while engaging in multiple partnerships is considered an act of infidelity. Infidelity is punished more severely for women than for men. We consider two stochastic processes in which agents form and sever links over time based on the reward from doing so, but may also take non-beneficial actions with small probability. In the first process, an agent who invests more time in a relationship makes it stronger and harder to break by his/her partner; in the second, such an agent is perceived as weak. Under the first process, only egalitarian pairwise stable networks (in which all agents have the same number of partners) are visited in the long run, while under the second, only anti-egalitarian pairwise stable networks (in which all women are matched to a small number of men) are. Next, we apply these results to a new index of contagion to find that, in the long run, under the first process, HIV/AIDS is equally prevalent among men and women, while under the second, women bear a greater burden. The key message is that discrimination against women does not necessarily lead to higher HIV/AIDS prevalence among women in the short run, but it does in the long run, implying that, even if HIV/AIDS is initially more prevalent among men than women, the number of infected women will grow overtime to offset the number of infected men, which is consistent with empirical observations.

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