# Supplementary Analysis

We also conducted experiments varying the number of specializations to 4 and 5. Due to computational resource constraints, we generated a single random network [1] for each combination of network topology and parameter value. To mitigate the impact of random initialization, we averaged results across 100 runs for every network structure and game type. Consequently, for each specialization count, we performed 2,600 experiments on the global trade network, 1,200 on the preferential attachment networks, and 2,200 on the small-world networks. These results are consistent with our main analysis, where the number of specializations was fixed at 3. Figures 6 through 8 illustrate these results for the global trade, preferential attachment, and small-world networks, respectively. Additionally, a comparison of the coordination success rates across subfigures suggests that while increasing the number of specializations encourages differentiation, it simultaneously inhibits the division of labor within a given network structure.
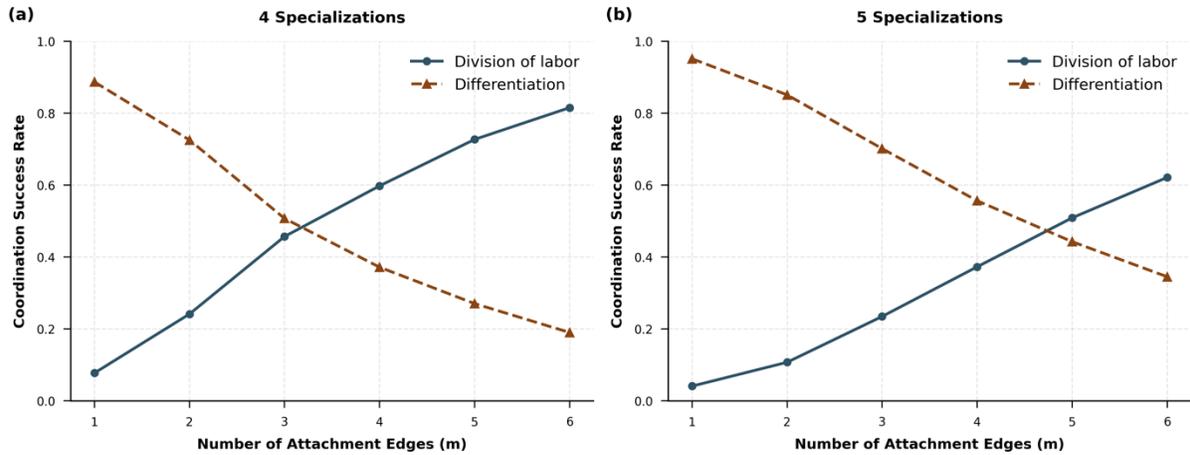
Figure 6: Coordination Experiment on World Trade Networks with Varying Number of Specializations
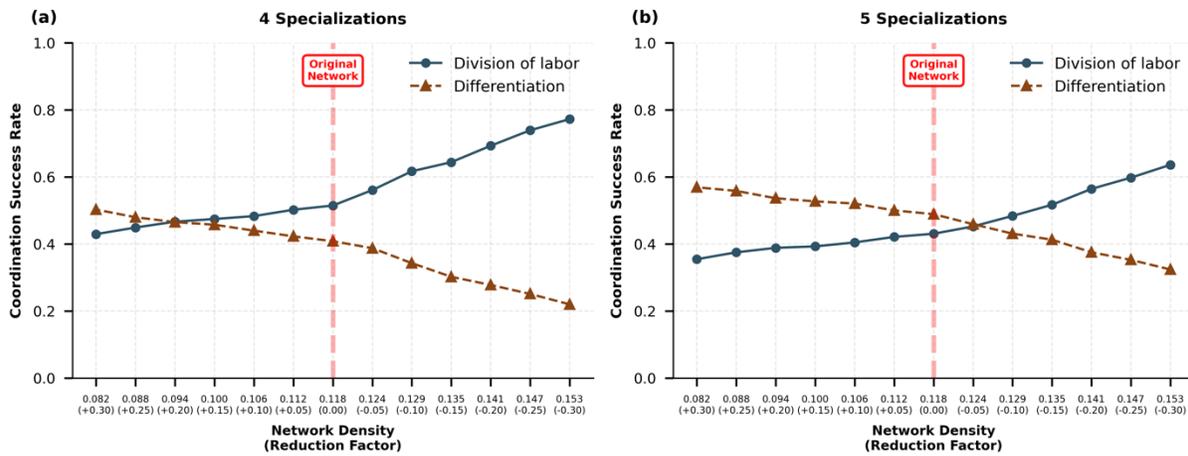
Notes: Experiments were conducted on the 2016 world electrical automotive goods trade network and simulated networks in which we randomly reduced or added a certain proportion of existing ties. The reduction parameter is called the reduction factor: positive values indicate reduced edge density relative to the 2016 network, while negative values indicate increased edge density. The dual x-axis shows network density (bottom) and reduction factor (top).

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[1] We set the random seeds to 1.

Figure 7: Coordination Experiment on Preferential Attachment Networks with Varying Number of Specializations

(a) 4 Specializations

(b) 5 Specializations

Notes: Experiments were conducted on Barabási-Albert preferential attachment networks with the number of nodes set to 100. The aggregated results show data from multiple experiments across different attachment edge configurations (m) from 1 to 6.

Figure 8: Coordination Experiments in Small-World Networks with Varying Number of Specializations

(a) 4 Specializations

(b) 5 Specializations
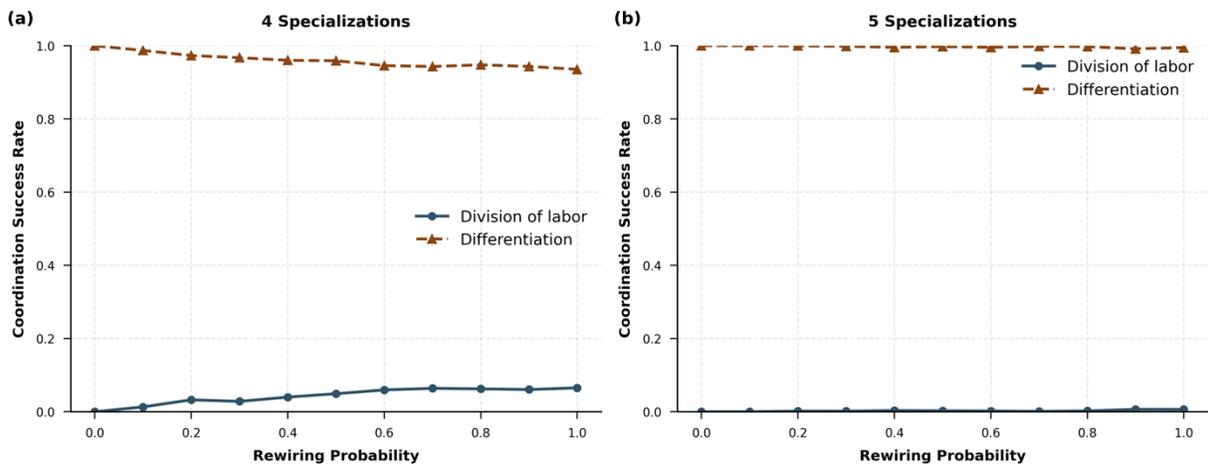
Notes: Experiments were conducted on Watts-Strogatz small-world networks with the number of nearest neighbors set to 2 (k=2) and the number of nodes in each network set to 100. The aggregated results show data from multiple experiments across varying rewiring probabilities from regular lattice (p=0) to random network (p=1).