This paper examines the behavior of the price of anarchy as a function of the traffic inflow in nonatomic congestion games with multiple origin-destination (O/D) pairs. Empirical studies in real-world networks show that the price of anarchy is close to 1 in both light and heavy traffic, thus raising the question: can these observations be justified theoretically? We first show that this is not always the case: the price of anarchy may remain a positive distance away from 1 for all values of the traffic inflow, even in simple three-link networks with a single O/D pair and smooth, convex costs. On the other hand, for a large class of cost functions (including all polynomials), the price of anarchy does converge to 1 in both heavy and light traffic, and irrespective of the network topology and the number of O/D pairs in the network. We also examine the rate of convergence of the price of anarchy, and we show that it follows a power law whose degree can be computed explicitly when the network’s cost functions are polynomials.

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