

# When Promotions Meet Operations: Cross-Selling and Its Effect on Call-Center Performance

Mor Armony<sup>1</sup>

Itay Gurvich<sup>2</sup>

Submitted July 28, 2006; Revised August 31, 2007

## Abstract

We study cross-selling operations in call centers. The following question is addressed: How many customer service representatives are required (staffing) and when should cross-selling opportunities be exercised (control) in a way that will maximize the expected profit of the firm while maintaining a pre-specified service level target. We tackle these questions by characterizing scheduling and staffing schemes that are asymptotically optimal in the limit, as the system load grows to infinity. Our main finding is that a threshold priority (TP) control, in which cross-selling is exercised only if the number of callers in the system is below a certain threshold, is asymptotically optimal in great generality. The asymptotic optimality of TP reduces the staffing problem to the solution of a simple deterministic problem, in some cases, and to a simple search procedure in others. Our asymptotic approach establishes that our staffing and control scheme is near-optimal for large systems. In addition, we numerically demonstrate that TP performs extremely well even for relatively small systems.

## Acknowledgment

We thank Assaf Zeevi for his helpful suggestions on the proofs of asymptotic optimality.

---

<sup>1</sup>Stern School of Business, New York University, marmony@stern.nyu.edu

<sup>2</sup>Graduate School of Business, Columbia University, ig2126@columbia.edu