A Structural Estimation Approach to Agent Attrition

Abstract

Worker attrition is a costly and operationally disruptive challenge throughout the world. Although large bodies of research have documented drivers of attrition and its operational consequences, managers still lack an integrated approach to understanding attrition and making decisions to address it on a forward-going basis. To fill this need, we build a structural model that captures both the firm’s decision to terminate a workers’ employment (involuntary attrition) and uses an optimal stopping problem process to model a workers’ decision to leave the firm (voluntary attrition). We then estimate the parameters of the model and conduct counterfactual analyses on the population of 1,135 agents serving one client over five years for an Indian business process management (BPM) company. Our model reveals a number of interesting findings as we see that agents’ voluntary attrition decisions are relatively insensitive to salary. We also find that supervisors have a strong impact on whether employees stay as they reshape the way that agents make their decisions. If all employees were managed by the best supervisor in our data then voluntary attrition would reduce by over 40%. Altogether our paper contributes to the burgeoning literature on people operations, as well as to managerial practice.

Introduction

The departure of existing employees from a firm, employee attrition, is a costly and consistent operational challenge. For example, industry estimates suggest that attrition costs a firm as much as two times an individual’s salary (WSJ (2017)). However, as noted by Heskett et al. (2008), “the real cost of turnover is the loss of productivity and decreased customer satisfaction (p. 168).” Research in operations supports this view finding that attrition leads to slower delivery of products and services and worse quality of the output (Oliva and Sterman (2001); Ton and Huckman (2008); Narayanan et al. (2009)). All told this suggests that attrition can lead to billions of dollars in lost profits for firms (Glebbeek and Bax (2004)).

Given that the cost of attrition is clear, what then is a manager to do? A reasonable first step is to examine drivers of attrition. A long line of research has done just that identifying a myriad of factors from compensation to work structure to one’s manager that may lead to increases in attrition (see Griffith et al. (2000) for a review of the literature). The next step would then be to use research to identify rigorous approaches to decrease turnover by finding the impact of different policies on attrition. Although prior research has found correlates with worker attrition that could help in this regard, two significant and related challenges remain. First, to the best of our knowledge, even though agents may take their future utility from staying with a firm into account when making their attrition decisions, none of the works in the extant literature model agents as forward looking decision makers. Second, the extant literature investigates each type of attrition (voluntary and involuntary) in isolation from each other. In other words, the extant literature does not consider a unified approach that takes both attrition types and their effects on each other. In this paper we aim to address these difficulties by building and then estimating a unified structural model for agent attrition that models agents as forward looking decision makers. With this approach we not only are able to gain insight into the relative impact of different drivers of attrition, but also through the use of counterfactual analysis we can make recommendations on
how managers should most effectively address the attrition challenge.

As a context to examine attrition we choose the Indian business process management (BPM) industry. In this industry workers complete back office processes such as data entry or customer support through voice or text. This is an important industry to study as it is estimated that India accounted for 38% of the $186 billion global market in 2015 (NASSCOM (2016)). Moreover, attrition is a constant challenge, with reported industry attrition rates hovering anywhere from 50% - 75% annually (Mukherjee et al. (2009)). Therefore, we collected detailed data from one contact center account within a leading Indian BPM firm. Combining individual demographic information with salary data, and macroeconomic data we study 1,135 individuals working in one customer account at the firm over five years.

To examine the agent attrition decision we build a structural model of the attrition process. We build on prior work that use a structural estimation approach. Aksin et al. (2013), Aksin et al. (2016) and Yu et al. (2016) use an optimal stopping model, similar to that of the seminal work by Rust (1987), to model customers’ decision between waiting and abandoning in the call center context. We use a similar stopping model for agents’ voluntary attrition decision. An individual can leave a firm either unwillingly (involuntary attrition) or willingly (voluntary attrition). To incorporate this duality we first characterize the firm’s decision for involuntary attrition to terminate or not terminate an agent’s employment using a logistic regression framework. We then model agents’ decision to stay or leave the firm as an optimal stopping process in a dynamic programming context. In our setting, agents are modeled as forward looking decision makers who take into account their expected future utility when making their voluntary attrition decisions. After estimating the parameters of our model, we use a series of 5-fold cross validations to assess the prediction power of our model. Our cross validation analysis shows that the relative error of our model in predicting the attrition rates and agents’ average tenures is less than 10%. After evaluating our findings and testing the prediction performance of our model, we then conduct a Monte-Carlo based counterfactual analysis to understand how a firm could address the attrition challenge.

Our model reveals a number of interesting findings. First, we find that sensitivity to salary is generally low in our sample. This suggests that agents are unwilling to change their attrition behavior dramatically with increases in salary. Second, we find that work experience at the firm changes agents’ behavior in important ways. Over time agents’ sensitivity to salary decreases but their willingness to stay for non-monetary utility goes up. This is consistent with a view that employee relationships with a firm may grow less transactional over time. Finally, we find important differences in employee behavior under different supervisors as supervisors terminate agents’ employment at different rates and also employees choose to leave supervisors at varying rates. Our counterfactual analysis shows that if all supervisors were to achieve results like the most successful supervisor in the firm then voluntary attrition would decrease by over 40%. Somewhat surprisingly we find that this supervisor actually separates employees at a higher rate than normal, however, this link is consistent throughout our model as we see that an increasing chance of termination is related to increasing forward looking behavior which decreases voluntary attrition.

Altogether our paper contributes to literature on attrition in operations as we introduce a powerful tool to consider the systemic nature of attrition and to make decisions going forward. In addition, our findings help managers to address one of their most significant problems - managing attrition.
References


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