This paper focuses on the firm’s decision regarding the composition of workers in teams when there exists a heterogeneity among workers in efficiency levels. Firms aim to maximize expected profits by choosing the optimal composition of types of workers in the team. The results indicate that the effect of both an increase in cost of effort for workers, or an increase in hiring costs of more efficient type workers, can change a firms choice from hiring homogeneous teams to heterogeneous teams. As costs for the firm increase, less high efficiency types are hired and less effort is induced. Therefore, to complete the team, positions are filled with cheap, less efficient labour. In contrast, if a firm already an existing workforce, heterogeneous teams are generally chosen.

This analysis aims to answer the question regarding composition of teams with a moral hazard model that assumes a firm can hire workers from a pool of applicants to assemble a team. The pool contains two types of workers; high and low. It is assumed that high efficiency type workers are more expensive to hire compared to low efficiency types (i.e., high efficiency types have a higher reservation payoff compared to low efficiency types). The technology used by the firm requires a team of two workers. The results indicate that as cost of effort for workers or cost of hiring high efficiency types for firms increase relative to low efficiency types, the firm changes from hiring a team of high efficiency types (homogeneous) to a heterogeneous team of high and low efficiency types. The focus is on incentivizing the high efficiency type to exert high effort while filling the second position with a low efficiency type and incentivizing low effort.

Most of the literature regarding team composition falls into the field of management, sociology, and psychology and the results between homogeneous and heterogeneous are mixed. A conventional approach regarding team composition is to form a group consisting of different types allowing for a comparative advantage where individuals perform tasks in which they specialize. Hoffman and Maier (1961) discussed that heterogeneity of characteristics allows a group to have access to many sources of information or skills to enable the group to perform optimally. Using this logic and assuming learning between members of the group, the formation of heterogeneous teams in organizations seem to be the common practice. They assume that there is heterogeneity in skills among individuals and a heterogeneous team of workers specializing in their respective field optimizes output. Hoffman and Maier (1961) discuss horizontal differentiation where workers are different according to features that can’t be ordered in an objective way. Most of the literature focus on horizontal differentiation among workers. In contrast, this work focuses on vertical differentiation. To my knowledge, no papers are similar in nature to the analysis presented in this paper.

Ancona and Caldwell (1992) observe that as teams increasingly get called upon to perform tasks and to cross functional boundaries within organizations, conventional wisdom suggests that

---

1 Consider a manufacturing facility that has experienced and rookie workers. The experienced workers can be considered high efficiency types. Since they have been doing the job a lot longer, they are considered more efficient compared to the rookies. The rookies are new to the job and therefore, slower and less efficient in the task. If manufacturing of goods requires a team of workers, the firm needs to decide the composition of teams in production.
teams be composed of more diverse members. Although in their model diversity brings more creativity to problem solving and product development, it impedes implementation because there is less capability for and teamwork than there is for homogeneous teams. Hamilton et al. (2003) evaluated rationales for team participation and the effects team composition had on productivity using data from a garment plant and found heterogeneous teams, composed of more diverse workers, were more productive. Cornell and Welch (1996) and Athey et al. (2000) showed that teams tend to be composed of workers with similar backgrounds because team members “get along” easier. Mello and Ruckes (2006) present a model of team composition when agents have differing preferences for projects. A heterogeneous team provides more information in the decision making process allowing for better selection of projects but a homogeneous team exerts greater total effort because all members prefer the same project. The results of the analysis of Mello and Ruckes (2006) suggest that under most conditions, a heterogeneous composition of team members with different efficiency levels is preferred even if there is no helping/teaching involved or other factors influencing effort (i.e., reputation, social norms). —

The contribution of this paper is in answering the question of composition of teams when there is a heterogeneity among workers in the levels of a single characteristic, efficiency (vertical differentiation). The model examines the impact of the team composition on the effort decision of workers and a firm’s choice for composition. The only incentive scheme is the linked payoffs between workers where the effort of one worker increases the payoff of the team which is directly related to his own payoff. The analysis provides insight into team composition as an incentive for effort when workers produce in teams.

Some possible examples of applications of the model include auto assembly lines and law firms. The workers mainly do similar tasks, have the same skills, and work in teams to produce goods. Consider a manufacturing facility that has experienced and rookie workers. The experienced workers can be considered high efficiency types. Since they have been doing the job a lot longer, they are more efficient compared to the rookies. The rookies are new to the job and therefore, slower and less efficient in the task. Perhaps they are unionized and there isn’t much difference in the pay for experienced and inexperienced workers. The auto manufacturer needs to choose the composition of teams in production, heterogeneous or homogeneous, that maximizes their profits. For a law firm, in forming teams to work on a case, perhaps the difference in the demands of an experienced lawyer and one at the start of their career is very large and that will affect the optimal team composition.

The literature regarding assortative matching is similar to the ideas presented in this paper. In a marriage market, the competition for a spouse leads to sorting of mates by characteristics such as wealth, education, and other characteristics. Economists have tried to understand sorting patterns in the marriage market and other matching markets by focusing on the nature of the gain from match and the mechanism of the market force of competition. The results in this paper would be somewhat different because the matching of workers in teams is done by a firm that maximizes expected profits, while in assortative matching, workers of a certain type choose a partner that would maximize his own expected payoff.