In follow-up interviews and the May 2013 survey, most of the interviewed employees who had decided they no longer wanted to work from home cited social reasons. Another group who had thought working from home would be attractive found that it was troublesome for the people with whom they lived (often parents), especially if they were called to work outside normal business hours. In reverse, a number of employees switched to working from home because they saw the success of their peers who worked from home.

VI.D. Why did the firm not introduce working from home before?

Finally, one question that arises is why Ctrip (or any other similar firm) did not introduce working from home earlier, given it was highly profitable. From extensive discussion with the senior management team there seemed to be two reasons.

First, there was the classic free-rider problem that arises with all forms of process innovation where the absence of intellectual property makes it hard to prevent imitation. Ctrip believed that the private benefits of home-based working would be short-lived (if it was successful), as rivals would copy the scheme and use it to drive down commission margins in the travel agent market, while the costs of experimentation would be borne entirely by Ctrip. Hence, they viewed themselves as paying the full cost of experimentation but only capturing part of the benefits because of imitation based on knowledge spillovers.

Second, within Ctrip the senior management had incentives that provided limited upside and extensive downside from the experimental outcomes. Senior managers were primarily motivated by career concerns, with limited bonus or equity compensation. As a result, their incentives to experiment were muted – they gained little from a successful experiment, but risked career damage if the experiment failed. James Liang, the Chairman and co-founding CEO, had more balanced incentives to promote the experiment since he owned extensive Ctrip equity and had no firm-level career concerns. He played a major role in persuading the Ctrip executives to run the experiment.

Both factors – the threat of imitation and risk-aversion from the career concerns of senior managers – are likely to represent forces deterring process innovations in many large firms, so they may be pervasive forces curtailing experimentation in managerial and operational practices.

VII. CONCLUSIONS

The frequency of working from home has been rising rapidly in the U.S. and Europe, but there is uncertainty and skepticism over the effectiveness of this, highlighted by phrases like "*shirking from home*". We report the results of the first randomized experiment on working from home, run in a 16,000 employee, NASDAQ-listed Chinese firm, Ctrip. Employees who volunteered to work from home were randomized by even/odd birth-date into a treatment group who worked from home four days a week for nine months and a control group who were in the office all five days of the work week. We found a highly significant 13% increase in performance from home-working, of which about 9% was from working more minutes of their shift period (fewer breaks and sick days) and about 4% from higher performance per minute. We found no negative spillovers onto workers who stayed in the office. Home workers also reported substantially higher work satisfaction and psychological attitude scores, and their job attrition rates fell by over 50%. Further, when the experiment ended and

workers were allowed to choose whether to work at home or in the office, selection effects almost doubled the gains in performance.

This experiment highlights how complex the process of learning about new management practices is. For Ctrip, having no precedent in terms of similar Chinese firms that had adopted working from home for their employees led them to run this extensive field experiment. Given their success, other firms are now likely to copy this practice, generating the type of gradual adoption of a new management practices that Griliches (1957) highlighted. More generally, given the large impact of this practice on employee performance – a $1900 per employee reduction in costs and a 25% increase in TFP – this also provides a management-practice based explanation for heterogeneous firm performance.

While our results suggest a promising future for working from home, we should note that several distinctive factors at Ctrip contributed to the success of the experiment and the implementation of the practice. First, the job of a call center employee is particularly suitable for telecommuting. It requires neither teamwork nor in-person face time. Quantity and quality of performance can be easily quantified and evaluated. The link between effort and performance is direct. These conditions apply to a range of service jobs such as sales, IT support, and secretarial assistance, but they are far from universal. Second, the firm can closely monitor the performance and labor supply of the employees thanks to its extensive centralized database. Team leaders and managers could generate a report from the database of the performance of the team members daily and easily detect problems in individual employees' performance. Third, the extent of WFH was limited, so that it did not require a significant reorganization at the workplace. Because the participation rate ranged between 15% and 25%, team leaders continued to supervise their teams with a mix of home and office workers without any major reshuffling of team membership.

While these features arguably favored successful implementation of working from home at Ctrip, we believe the practice of working from home is worth further exploration. After all, much of the research for this paper and its writing were done by the authors working from home.