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FLEXIBLE LABOR AND INNOVATION PERFORMANCE OF R&D-ORIENTED START-UPS IN JAPAN



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ABSTRACT

Whether making labor market flexible is a topic of political debate in most developed countries due to the positive impact of flexibility on economic growth. Using a sample of R&D-oriented Japanese start-ups, this paper aims to shed light on the relationship between flexible labor and innovation of start-ups, which has been overlooked in the literature. Our results indicate that numerical flexibility using temporary employees contributes positively to technological innovation performance while negatively to patent application. External labour turnover of regular employees has a positive impact on patent application. Based on our results, implications to literature and economic policies are discussed.

INTRODUCTION

Over the last two decades, whether to make labor market flexible is a topic of political debate in most developed countries. Since OECD's Jobs Study in 1994, a stream of literature have been developed in favor of flexible labor markets. Flexibility not only contributes to employment but also allows for higher economic growth and higher productivity growth (Nicoletti & Scarpetta, 2003). In recent years, firm-level analyses on flexible labor contracts as determinants of innovation have suggested a significant impact of labor relations on innovation through their influence on knowledge processes (Amabile et al., 1996; Guest, 1997; Trott, 1998). While functional flexibility through reallocating regular employees in a firm's internal labor market is generally suggested good for innovation (Arvanitis, 2005; Chadwick & Cappelli, 2002; Kleinknecht et al., 2006; Michie & Sheehan, 1999, 2001; Zhou et al., 2011), the effect of numerical flexibility is rather mixed.

Numerical flexibility reflects the ability of firms to make use of external labor market through easy hiring and firing regular employees and to make use of temporary employees by fixed-term contracts or through temporary work agencies, in order to respond quickly to changes in labor demand (Beatson, 1995; Michie & Sheehan, 2003; Zhou et al., 2010). On the one hand, numerical flexibility is considered to bring highly skilled workers to infuse the firm with new ideas and networks that may foster innovation (Malcomson, 1997; Matusik & Hill, 1998); on the other hand, such flexibility can destroy loyalty and commitment of employees by easy firing (Naastepad & Storm, 2006). This might not be good for generating firm-specific knowledge and accumulate knowledge for future learning (Belot et al., 2007; Chadwick & Cappelli, 2002; Michie & Sheehan, 1999, 2001). Furthermore, recent studies also indicate that modes of numerical flexibility and the novelty of innovativeness do matter in the relationship (Arvanitis, 2005; Martínez-Sánchez et al., 2011; Zhou et al., 2011).

While most of the empirical evidences were investigated in the context of European countries and focused on relatively large and old corporations (Laursen & Foss, 2003; Michie & Sheehan, 2003; Kleinknecht et al., 2006; Arvanitis, 2005; Lucidi & Kleinknecht, 2010; Zhou et al., 2011),

there is little known about labor flexibility in the context of start-up companies and in the context of Japan whereas empirical evidences in both contexts can be interesting. Using an original panel dataset of Japanese start-ups, we are able to shed light on the nexus between labor flexibility, in particularly numerical flexibility, and innovation in the context of R&D oriented Japanese start-ups. Thereby, we may provide some empirical evidence to current Japanese government's policy stimulus.

LABOR RELATIONS IN THE JAPANESE LABOR MARKET

Japan switches its traditional lifetime employment system to more job mobility practices due to the asset bubble collapse in the early 1990s and the following prolonged recession (Aoyagi & Ganelli, 2013; Bredgaard & Larsen, 2007; Passet, 2003). The subsequent employment reform allows Japanese firms to explore alternative labor practices such as using performance-based pay and making use of non-regular employees (Aoyagi & Ganelli, 2013; Keizer, 2009). In Japan, non-regular employees include part-time employees, 'Arubaito' employees, dispatched employees and contract employees (Aoyagi & Ganelli, 2013). Since the reform, the share of non-regular employees increases to 35% in 2011. Among non-regular employees, Japanese women accounts for 70% and within total female employees 60% of them are part-time employees (Aoyagi & Ganelli, 2013). Compared to regular employees, non-regular employees associated with significantly lower level of job and social security and low wages (Aoyagi & Ganelli, 2013). Non-regular employees are used for protecting fluctuations in labor demand and reducing fixed labor cost (Keizer, 2009).

NUMERICAL FLEXIBILITY AND INNOVATION

In this paper, we focus on the numerical flexibility that might be more relevant to our interested group: R&D oriented start-ups. Numerical flexibility is defined as the ability of firms to make use of external labor market through easy hiring and firing regular employees and to make use of temporary/fixed-term employees, part-time employees or hiring through temporary work agencies, in order to respond quickly to changes in labor demand (Beatson, 1995; De Spiegelaere et al., 2013; Michie & Sheehan, 2003; Zhou et al., 2010). Common indicators of numerical flexibility are percentages of people on temporary/fixed-term contracts, employees hired from temporary work agencies, freelance workers or external labor turnover, that is, the percentage of regular employees that join or leave the firm (Arvanitis, 2005; Martínez-Sánchez et al., 2011; Zhou et al., 2011).

External labor turnover and innovation

Many mainstream economists tend to be in favour of 'Anglo-Saxon' labor market model that allows easy hiring and firing regular employees (Kleinknecht et al., 2014; Zhou et al., 2011). This is because 1) easier firing enhances the inflow of 'fresh blood' with novel ideas and networks. Ichniowski & Shaw (1995) show that long tenured employees are more conservative and reluctant towards significant changes and novel innovation due to the 'lock-in' effect. 2) redundant employees can be easily replaced to encourage labour-saving process innovations (Bassanini & Ernst, 2002; Nickell & Layard, 1999; Scarpetta & Tressel, 2004). 3) easy firing allows firms to replace underperformed people by better and productive employees. The (latent) threat of firing can also prevent shirking behaviour of employees (Zhou et al., 2011). 4) easy hiring and firing could help keeping wages low, thus reduce fixed labor cost (Storey et al., 2002; Zhou et al., 2011). 5) without strong protection against dismissal, employees may become less powerful in negotiating high wage claims on the profits from innovation. This might stimulate investments in innovation (Malcomson, 1997).

Schumpeterian economists, however, provide the counterarguments against high numerical flexibility (Zhou et al., 2011). They argue that a high external labor turnover can diminish the trust, loyalty and commitment of employees to their firms (Naastepad & Storm, 2006). Employees with an expectation of short-stay in the firm will be demotivated to acquire firm-specific knowledge and to share their knowledge related to the work (Belot et al., 2007; Chadwick & Cappelli, 2002; Michie & Sheehan, 1999, 2001). This harms innovation at the firm level. Less loyal and committed employees can easily leak knowledge to competitors and this will discourage investment in knowledge creation and innovation. Short-term employees can conduct shirking behavior as they expect their contracts will be ended anyway (Bentolila & Dolado, 1994). Furthermore, employers are also less likely to invest in firm-sponsored training due to the high external labor turnover (Coutrots, 2003; Ichniowski & Shaw, 1995).

In the context of start-ups, we argue that numerical flexibility might be in favor to innovation. Start-ups featured in Schumpeter innovation regime I are drivers of creative destruction. It is expected that countries with more labor flexibilities perform much better on Schumpeter innovation regime I. Resource-based view also supports that numerical flexibility might be beneficial as it helps start-ups to utilize labor according to the capital interests, easily make adjustment if meeting unexpected changes in demand (Baughn, et al., 2008; Storey et al., 2002), to easily replace unqualified employees and bring highly skilled workers to infuse the firm with new ideas and networks that may foster innovation (Malcomson, 1997; Matusik & Hill, 1998). Following this logic, we thus propose the following hypothesis:

Hypothesis 1: In the context of start-up companies, a high external labor turnover contributes positively to innovation.

Temporary employees and innovation

Temporary employees include those hired directly by employers on fixed-term contract or part-time contract, and 'temporary agency employees' that hired indirectly through temporary work agencies (Beatson, 1995; Michie & Sheehan, 2003; Zhou et al., 2010). Temporary employees are normally used when firms meet fluctuations in production, aim to reduce fixed labor costs or perform certain tasks at some particular time when regular employees are not available (Storey et al., 2002). Firms rarely consider employees with temporary contracts as magic sources to promote innovation (Storey et al., 2002). Due to resource constraints and high internal transaction cost, start-ups typically utilize temporary employees to fulfill non-core activities such as administration in order to be efficient in operation. Therefore, using temporary employees might not be beneficial for innovation capacity of the firm.

Temporary employees hired directly by employers might be less committed compared to regular employees due to their short job duration (Michie & Sheehan, 2003, 2005; Posthuma et al., 2005). Ng & Feldman (2008) indicate that organizational commitment is the factor that ties individual and organization together, which is important to innovation at the firm level. Committed employees are more likely to devote extra time and efforts for innovation while less committed employees are reluctant to acquire firm-specific knowledge and are tend to hind their tacit knowledge on a specific innovation project (Belot et al., 2007; Chadwick & Cappelli, 2002; Michie & Sheehan, 1999, 2001). Temporary agency employees feel even less associated with the company (De Ruyter et al., 2008). They are hard to organize and often have different objectives from regular employees. This makes them easily to create tensions in labor relations to others (Pfeffer and Baron, 1988). Temporary agency employees have low commitment (Svensson and Wolvén,

2010) and likely to withdraw (at least partially) from work related helping behaviors (Broschak and Davis-Blake, 2006). Therefore, temporary agency workers may contribute negatively to innovation due to their poorer labor relations, lower organizational commitment and being involuntarily left out from innovation team (Martínez-Sánchez et al., 2011; Mitlacher, 2008). Following the arguments, we thus propose:

Hypothesis 2: In the context of start-up companies, using high share of temporary employees hired directly by employers (including fixed-term and part-time employments) contributes negatively to innovation.

Hypothesis 3: In the context of start-up companies, using high share of temporary agency employees (including dispatched employees) contributes negatively to innovation.

Sample: an unbalanced panel of 514 R&D-oriented Japanese start-up firms (931 observations) covering the period of 2008 to 2011.
DV= 1) technological innovation measured by the number of product and/or process innovation between periods t and $t+1$; 2) patent application measured by the number of patent applied between periods t and $t+1$, indicating novel knowledge generation
IV= 1) external labor turnover by the change of regular labor inflow and outflow between periods t and $t+1$; 2) temporary employee is measured by the share of temporary workers including part-time and fixed-term employees at period t ; 3) temporary agency employee is measured by the share of dispatched workers at period t ('Haken' in Japanese context)
Controls=firm size, firm age, R&D expenditures, industry dummies and year dummies, etc.
Statistical analysis=negative binominal regression model

DATA AND METHODOLOGY

RESULTS

Using technological innovation as the dependent variable, we find that both temporary employees ($=1.213$, $p<0.01$) and temporary agency employees ($=3.114$, $p<0.01$) have a positive impact while no association found with external labor turnover. Different results emerge when using patent application as the dependent variable, we find that external labor turnover has a positive impact on patent application ($=0.846$, $p<0.05$) while temporary employees contribute negatively to patent application ($=-2.263$, $p<0.01$).

DISCUSSION AND CONCLUSION

This paper examines the relationship between flexible labor and innovation performance in the context of R&D-oriented start-ups in Japan. From a macro-economic perspective, promoting start-ups and stimulating innovation through increasing labor mobility are both in the political agenda of Japanese government. However, it is less known whether these two policy stimulus enforce, complement or contradict to each other. Using an original panel dataset of Japanese start-ups, we are able to shed light on this issue at the firm level. Based on negative binomial regression analyses, we first observe a positive impact of external labor turnover on patent application of start-ups while there is no effect on technological innovation performance. Due to resource constraints and high risks (Autio, 2005; Baughn & Neupert, 2003), efficiently utilizing and managing the regular personnel are key to the success of start-ups (Baughn et al., 2008). Therefore, start-ups might be less tolerant to underperformed people in the firm. Easy hiring and firing allow start-ups, with a low cost, to replace unqualified and conservative employees and bring highly skilled

workers (fitting their real needs) to infuse the firm with new ideas and networks that may foster innovation (Ichniowski & Shaw, 1995; Malcomson, 1997; Matusik & Hill, 1998). Furthermore, the need for growth also triggers the high external labor turnover in start-ups. They need to develop an effective human resource in order to survival and efficiently implement their growth strategies.

Second, we find that temporary employees including both part-time and fixed-term employees have a positive impact on technological innovation performance but a negative effect to patent application of start-ups. This finding is consistent to recent findings of Zhou et al. (2011) using the Dutch firm-level data. Start-ups can only focus on conducting core activities in-house due to their limited human and capital resources. Temporary employees can be used to fulfil routinized non-core tasks during the innovation process and to reduce the cost of innovation. The requirement of firm-specific knowledge is trivial. This is, however, not the case for patent application. Writing a patent needs to have novel knowledge and to develop firm-specific knowledge. Given Japanese context, our findings can be also explained by the characteristics of temporary employees in Japan. Female employees constitute the majority of temporary employees in particularly part-time contracts due to the need of fulfilling their family responsibilities in the meantime. They are normally hired for simple tasks such as secretary or administrators. Furthermore in Japan, temporary employees might be given the same job profile as regular employees, but with lower payment, and lower job and social security (see examples in the book of Ouchi & Kawaguchi (2014)). Therefore, they are not motivated to engage in the firm-specific knowledge learning.

Last, in a similar vein, we also observe the dispatched employees have a positive impact on the technological innovation while have no effect to patent application. This finding supports the arguments on lack of commitment and loyalty of dispatched employees. Compared to temporary employees that hired directly by the employer, dispatched employees feel even less associated with the company (De Ruyter et al., 2008). Given that they are normally on project-based call, dispatched employees are hard to organize and often have different objectives from regular employees. This can create tension in the labor relationship (Pfeffer and Baron, 1988). Employers will simply exclude them from specific training for innovation projects (Broschak and Davis-Blake, 2006; Martínez-Sánchez et al., 2011; Mitlacher, 2008). Therefore, dispatched employees are de-motivated to contribute to firm-specific knowledge generation.

This study should be seen as one of the few exploration of the relationship between labor flexibility and innovation in the context of start-ups and of Japan. Therefore, we contribute new and fresh empirical evidence to the existing literature, the majority of which focuses on EU larger and older corporations. Our findings suggest that the characteristics of start-ups might explain the different relationship between numerical flexibility and innovation in start-up companies compared to it in established larger companies. Numerical flexibility might not be the practices only for reducing fixed labor cost. Easy hiring and firing can help start-up companies optimize their resources for firm-specific knowledge generation. Using non-regular employees can allow start-ups to foster their innovation performance according to their capital interests.

Based on our empirical findings, we derive a few implications to Japanese government's current policy interests. Similar to EU countries such as Denmark, Japan experiences dual labor market model, namely flexicurity. However, differently, Japanese model puts a lot of emphasis on internal flexibility than external flexibility (Bredgaard & Larsen, 2010). Non-regular employees are associated with low wages, job and social security. This demotivates non-regular employees, which might be used often by start-ups due to resources constraints, to contribute to innovation of start-

ups. Japanese government could learn from Denmark's model, make a transition from job security to employment security (Bredgaard & Larsen, 2010). When temporary employees enjoy same level of security as regular employees, they will be motivated to engage in more firm-specific activities, this may in turn foster innovation of start-ups. Furthermore, our study indicates that flexibly using external labor market play an important role in firm-specific knowledge generation of start-ups. This allows them to effectively and efficiently find right personnel. Strict dismissal protection will discourage start-up companies to actively search and hiring right regular employees. Japanese government might think about some stimulus that can help start-ups reduce their transaction cost while exchanging with external labor market.

Our study has a few limitation, thus we propose several directions for future research that might help to deepen into the relationship examined in this paper: first, for better policy implication, it might be interesting to investigate what kinds of employment systems promote innovation by firms. For instance, an optimal value can be calculated based on the division between regular employees and non-regular employees in start-ups. Second, additional detailed information on employees can bring more insights given types of employees may differ between industries. Last, though we claim that the characteristics of start-ups might explain the different relationship between numerical flexibility and innovation compared to it in established companies. Due to the data limitation, we are not able to empirically compare them. Future research could consider using a dataset including both samples in order to conduct comparative studies.

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