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A comparison of Independent Startups and New Subsidiaries in Different Industries

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Abstract

This paper aims to investigate the regional determinants of entry with special attention to the effects of regional human capital, using prefecture-level data from Japan. On the basis of some recent studies in the field, we investigate the effects of several regional factors on business entry, distinguishing between independent startups and new subsidiaries of existing firms on the one hand, and comparing different sectors on the other. Using pooled regional data at the prefecture level for four periods between 1996 and 2006, we estimate the impact of various regional factors, including human capital structure, on the number of independent startups and new subsidiaries for each industry sector, simultaneously. Estimation results demonstrate considerable differences between independent startups and subsidiaries as well as among different industry sectors with regard to the impact of regional human capital structure on business entry. First, the entry of independent startups in the manufacturing sector is positively related with regional human capital. Second, in contrast to our hypothesis, we found a positive relationship between regional human capital structure and the entry of new subsidiaries in the service sector. Third, the regional human capital structure is more important for regional entrepreneurship in more technology-intensive (high-tech) service industries. Considering the possible implications, we suggest that the regional policy to activate business startups should focus more on the differences between encouraging local entrepreneurship and attracting new subsidiaries, and recognize that these differences may vary even within the service sector, depending on what type of human capital is required.

Keywords: entry; region; independent startup; subsidiary; entrepreneurial human capital
JEL Classification Codes: L26; M13; R32

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1. Introduction

Startup of new businesses increases innovation and competition and creates local employment. This is why startup activity has been encouraged and supported by various programs in many countries. Also, in Japan, where the startup ratio has been lower than the closure ratio since the late 1980s, much effort has been put in to increasing the entry of startups, but it remains without much success to date (Okamuro and Kobayashi, 2006).

Business startups are important for not only the national but also the regional economy. In order to consider the impact of business startups on the regional economy in further detail, we find it appropriate to distinguish between new business entries of independent startups and subsidiaries of existing firms. The former depend basically on the decision of people living or working in the region with regard to whether to become independent, and thus, the regional structure of human capital is expected to play a significant role. The latter are based on decisions by the top management of existing firms, which could be located outside the region, on where to locate new subsidiaries. In this case, the regional level of demand and cost may be more important than the human capital structure. Bosma et al. (2008) investigated the differences in the regional determinants of independent startups and new subsidiaries, focusing on agglomeration effects and comparing manufacturing and service sectors.

The effects of human capital structure on entry may differ considerably across sectors and industries. Industries differ in their sensitivity to regional supply and demand (market) conditions as well as in the required levels and types of human capital. However, few studies have examined inter-industry differences of the entry, except for some studies comparing the manufacturing and service sectors. Okamuro (2008) compared the regional determinants of startups in high-tech versus low-tech industries

in the manufacturing sector and found that the agglomeration of specialized human capital and knowledge does matter. Moreover, Acs and Armington (2006) examined the differences in the regional determinants of entry among various sectors (manufacturing, retail trade, local market, distribution, and business services), focusing on educational requirements and market segments.

However, in their analysis of the regional determinants of entry, these studies do not differentiate between independent startups and new subsidiaries of existing firms. Within the same sector, regional factors may differ between the types of startups. As mentioned before, we may assume that the decisions on independent startups are mainly based on human capital structure, while the location of new subsidiaries is determined by considerations of demand and cost factors. Moreover, regional factors of startup may also vary across sectors and industries, depending on whether we focus on independent startups or new subsidiaries. For example, the location choice of new subsidiaries would not necessarily depend on local demand conditions in manufacturing industries with wide markets, including oversees, while it would be influenced by the human capital in the region in the case of knowledge-intensive services.

The aim of this paper is, therefore, to investigate the regional determinants of entry using prefecture-level data from Japan. On the basis of some recent studies in the field, especially Bosma et al. (2008) and Okamuro (2008), we investigate the effects of several regional factors, especially regional human capital structure, on business entry, distinguishing between independent startups and new subsidiaries of existing firms, on the one hand, and comparing various sectors, on the other.

The remainder of this paper is organized as follows. Section 2 reviews related literature. In Section 3, we present our research framework to capture the determinants of regional differences in the number of independent startups and new subsidiaries.

Section 4 provides the estimation results and discusses them. The paper concludes with Section 5.

2. Literature Review

Determinants of regional entry have been investigated in several countries using various kinds of regional variables. A recent trend of research on this topic is to differentiate between and to compare startup types, such as high-tech versus low-tech (Okamuro, 2008) and independent business versus new subsidiary (Bosma et al., 2008).

Based on micro data of startups in the Japanese manufacturing sector, Okamuro (2008) shows that regions characterized by agglomerations of highly educated and specialized human capital as well as research institutes and high-tech industries attract high-tech startups (those in high-tech industries), while a high unemployment ratio would draw only low-tech startups (Push hypothesis). Using a Dutch regional database, Bosma et al. (2008) found that localization economies affect independent businesses positively, while urbanization economies stimulate the entry of new subsidiaries. They also found that these agglomeration economies have a larger impact in the manufacturing sector than in the service sector.

Bosma et al. (2008) highlight the effects of agglomerations (localization and urbanization economies) but do not sufficiently consider the effects of regional human capital (or knowledge agglomeration), to which Acs and Armington (2004) and Okamuro (2008) pay special attention. In this study, founded on the basic models of Bosma et al. (2008) along with the concepts of Okamuro (2008), we will explore different impacts of human capital on the entry of independent businesses and subsidiaries.

Several empirical studies confirm the positive effects of human capital on regional

new-firm formation (Evans & Leighton, 1989, 1990; Guesnier, 1994; Hart and Gudgin, 1994; Reynolds et al., 1995; Acs & Armington, 2004; Okamuro, 2008) and on regional economic growth (e.g., Jovanovic & Rob, 1989; Glaeser et al., 1992, 1995; Rauch, 1993; Simon and Nardinelli, 1996, 2002). However, these studies do not distinguish new subsidiaries from independent startups. As a contribution to the literature, we compare the effects of regional human capital on regional startups of independent businesses with those of new subsidiaries. Several previous studies compare the factors of regional entry in the manufacturing and service sectors (Audretsch and Fritsch, 1994a; Hart and Gudgin, 1994; Keeble and Walker, 1994; Audretsch and Vivarelli, 1996; Bosma et al., 2008) and in high-tech versus low-tech industries in the manufacturing sector (Nerlinger, 1998; Okamuro, 2008). In contrast to these studies, our research not only compares manufacturing and service sectors, but also distinguishes between relatively high-tech and low-tech industries in the service sector. Thus, another contribution of this paper is to compare different industries in the service sector.

3. Empirical Model, Hypotheses, and Data

We estimate the impact of various regional factors on the ratio of independent startups and new subsidiaries, for each industry sector in the sample. Relying on Bosma et al. (2008), we employ the Seemingly Unrelated Regression (SUR), which assumes correlation between the error terms of two regression models, because there might be omitted variables affecting the entries of both independent businesses and subsidiaries. By the SUR estimation procedure, regression models for both types of entries are simultaneously estimated, and asymptotically more efficient estimators (i.e., more efficient than the OLS estimator) can be obtained (Zellner, 1962, 1963). Moreover, as mentioned above, we estimate the same models for each industry sector in the sample and compare the results.

Following Bosma et al. (2008), we estimate the following model:

$$(1)\begin{cases} \ln NInd = \alpha_0^{\mathrm{Ind}} + \alpha_1^{\mathrm{Ind}} \ln WF + \alpha_2^{\mathrm{Ind}} H + \mathbf{x}'\boldsymbol{\gamma}^{\mathrm{Ind}} + e^{\mathrm{Ind}}, \\ \ln NSub = \alpha_0^{\mathrm{Sub}} + \alpha_1^{\mathrm{Sub}} \ln ES + \alpha_2^{\mathrm{Sub}} H + \mathbf{x}'\boldsymbol{\gamma}^{\mathrm{Sub}} + e^{\mathrm{Sub}}, \\ cor(e^{\mathrm{Ind}}, e^{\mathrm{Sub}}) = \rho. \end{cases}$$

The dependent variables are the natural logarithms of the number of independent startups (*NInd*) and the natural logarithms of the number of new subsidiaries (*NSub*). Following Bosma et al. (2008), we use the variables of the workforce and the stock of existing firms (*WF* and *ES*, respectively) to measure and control for the effect of economic size in the regions. In other words, we apply the "labor market approach" to startups of the independent establishments and the "ecological approach" to startups of subsidiaries (*cf.*, Audretsch and Fritsch, 1994b).

As the main subject of this paper, we examine the effects of human capital structure (*H*) on the numbers of independent startups and new subsidiaries. As the variables for regional human capital structure, we use the ratio of highly educated workforce (the ratio of college graduates), the ratio of the workforce in professional/technological occupations, and the ratio of management employee.

The other determinants of entry (**x**) comprise the demand factor (population growth rate), cost factor (wage rate), supply factor (unemployment rate), knowledge agglomeration factor (number of universities), and measures of localization economies (number of existing establishments per capita) and urbanization economies (population density).

Regional entry in Japan

We use pooled regional data at the prefecture level from four periods (1996–1999, 1999–2001, 2001–2004, and 2004–2006). Regional startup data are obtained from the *e-Stat Database* of the *Establishment and Enterprise Census*. With 47 prefectures in

Japan, we have, at the most, 188 observations in our pooled sample.

Table 1 shows the definitions and descriptive statistics of the variables used for our regressions. The number of regional independent startups in Japan from 1996 to 2006 is, on average, 4600 per prefecture, annually, which is more than the number of new subsidiaries (2400 on average). These numbers vary among regions significantly; the maximum number of regional startups is more than 60 times the minimum.

[Insert Table 1 here]

To control for the effects of regional economic size, we use regional workforce and stock of establishments, obtained from the *Establishment and Enterprise Census,* as proxies for regional economic size. As shown in Table 1, the entry rate of independent startups is, on average, 4.16 per 1000 workers, while that of new subsidiaries is, on average, 1.69% of the existing establishments. Although regional variations of these ratios are smaller than those of the number of startups, the ratio of the highest to the lowest region is more than 6. Thus, not only the numbers but also the entry rates of independent startups and new subsidiaries are significantly different among regions in Japan.

The number and the rate of entry differ also among industries. Table 1 shows the industrial composition of regional independent startups and new subsidiaries. The entry rates of both independent startups and new subsidiaries are higher in the service sector than in the manufacturing sector. Within the service sector, they are relatively lower in the information and communication industry, compared to commercial establishments and restaurants as well as other industries.

Independent Variables and Hypotheses

According to the theoretical and empirical literature, regional human capital resources influence the number of new firms in the regions (Acs and Armington, 2004;

Lazear, 2004, 2005; Okamuro, 2008). However, the types of crucial human capital might be different between independent startups and new subsidiaries, as well as across industries. The "jack-of-all-trades" theory of Lazear (2004, 2005) hypothesizes that individuals with more balanced skill sets, rather than specialized skill sets, are more likely to become entrepreneurs, which is empirically examined in his papers.

We consider the differences among specialized, managerial, and general skills. As the proxies for these three types of skills, we use the ratios of workers in professional/technical occupations[1] (*Expert*), managerial employees (*Manage*) and college graduates (*College*), respectively, to the entire workforce in each prefecture; these are obtained from the *Population Census*.

As shown in Table 2, the mean values of both *College* and *Expert* are approximately 12%-13%, while the regional variations of these variables are different. The proportion of college graduates ranges from 7.2% to 24.2% across regions (standard deviation is 3.7), while that of expert workers ranges from 10.1% to 17.0% (standard deviation is 1.4). In contrast to *College* and *Expert*, the mean value of *Manage* is relatively lower (2.9%).

[Insert Table 2 here]

Regarding the relationship between human capital structure and regional entry, we test the following hypotheses. First, regional human capital structure might have different impacts on independent startups and new subsidiaries. On the one hand, the regional structure of human capital is expected to play a significant role for independent startups because they depend basically on the decisions of people living or working in

1 According to the Standard Occupation Classification of Japan, "professional and technical occupations" include various types of scientists and engineers; medical and health care services, such as doctors, pharmacists, and nurses; social welfare services; legal services, such as lawyers; business support services, such as accountants and management consultants; and teachers and artists.

the region. On the other hand, location choices of new subsidiaries are based on the decisions by the top management of the existing firms, which could be located outside the region. In this case, the regional level of demand and cost may be more important than the regional human capital structure, because the heads of new subsidiaries often come from other regions, especially the headquarters. Therefore, we propose the following three hypotheses.

Hypothesis 1a: *The agglomeration of college graduates at the prefecture level has a positive impact on the number of independent startups in the prefecture, while it has no or a smaller impact on the number of new subsidiaries.*

Hypothesis 1b: *The agglomeration of professional/technical workers at the prefecture level has a positive impact on the number of independent startups in the prefecture, while it has no or a smaller impact on the number of new subsidiaries.*

Hypothesis 1c: *The agglomeration of managerial workers at the prefecture level has a positive impact on the number of independent startups in the prefecture, while it has no or a smaller impact on the number of new subsidiaries.*

Thus, we expect positive and significant coefficients for the variables *College*, *Expert*, and *Manage* for the number of independent startups but insignificant or lower coefficients of these variables for the number of new subsidiaries. We test Hypothesis 1a, 1b, and 1c not only with the sample of all industries but also with the sub-samples of manufacturing and service sectors. These sectors may differ in their sensitivity to regional supply and demand (market) conditions as well as in the required levels and types of human capital.

Second, we also examine whether or not the effects of regional human capital are different between low-tech and high-tech industries in the service sector. In the high-tech (research-intensive) industry, such as the information and communication

industry, firms generally face a rapid technological development. To survive technological competition, entrepreneurs in a high-tech industry may require more highly educated and skilled human capital than those in a low-tech industry.

Hypothesis 2a: *The positive effect of human capital on the number of independent startups is larger in the high-tech than in the low-tech industries within the service sector.*

A similar argument can be applied also to new subsidiaries in the high-tech service industries. In such industries, even subsidiaries might depend more strongly on local high-skilled workforce than those in low-tech industries. Therefore, regional human capital may be more important in determining the location of new subsidiaries in high-tech than in low-tech service industries.

Hypothesis 2b: *The positive effect of human capital on the number of new subsidiaries is larger in the high-tech than in the low-tech industries within the service sector.*

Therefore, we expect that the coefficients of the variables *College*, *Expert*, and *Manage* would be positive, and larger in the high-tech than in the low-tech industries.

The correlation coefficients of the variables are shown in Tables 3 and 4.

[Insert Tables 3 and 4 here]

We also include several control variables as additional determinants of regional entry. The definitions and descriptive statistics of these variables are summarized in Table 2. First, following Bosma et al. (2008), we include the number of universities (*Univ*) as an indicator of regional knowledge agglomeration, the population growth rate (*PopGrowth*), the natural logarithm of average wage (*Wage*), and the unemployment rate (*Unemp*) as the demand and supply factors for regional entrepreneurship[2], and the

2 We obtained or calculated prefecture-level data on the number of universities from the *Establishment and Enterprise Census*, the population growth rate and the unemployment rate from the *Population*

number of existing firms relative to local population and the population density as the measures of "localization economy" (*Localization*) and "urbanization economy" (*Urbanization*), respectively[3]. We expect that the coefficients of the variables *Univ*, *PopGrowth*, *Localization*, and *Urbanization* would be positive and the coefficient of the variable *Wage* would be negative, for both the number of independent startups and new subsidiaries. For independent startups, the coefficient of the variable *Unemp* is expected to be positive according to the "push hypothesis" and negative according to the "pull hypothesis," while it is expected to be insignificant for new subsidiaries.

Second, we include the indicators for the average employment size of existing establishments (*AvgSize*) and the industry share of regional employment (*IndShr*) to control for the industrial structures in regions[4]. According to the empirical literature, the average size of existing establishments tends to be negatively related to the number of new businesses. As shown in Table 2, the value of *IndShr* for each industry varies across regions and, as shown in Table 4, this variable is also correlated to the variables for regional human capital structures. Thus, to estimate the effects of human capital structure on regional business startups consistently, the industrial structures of regions should be simultaneously controlled for in regressions.

4. Estimation Results

SUR estimation results of all industries (excluding the primary sector) are shown in Table 5. For each specification, the results for the models of the number of independent startups and new subsidiaries are shown in the first (ln*NInd*) and second (ln*NSub*)

Census, and the average wage from the *Basic Survey on Wage Structure (Wage Census)*.

3 We calculated the variables *Localization* and *Urbanization* using data from the *Establishment and Enterprise Census* (the number of existing firms) and *the Population Census* (the population size) at the prefecture level.

4 These data were compiled from the *Establishment and Enterprise Census* at the prefecture level.

columns, respectively. The variable for the employment share of the service sector (*IndShrService*) is not included in the specifications I-III, but included in the specifications IV-VI. These six specifications interchangeably include *College*, *Expert*, and *Manage* as measures for the regional human capital characteristics.

As shown in specifications I and II in Table 5, the coefficients of *College* and *Expert* for independent startups are positive and significant at the 10% and 1% levels, respectively. Their coefficients for new subsidiaries are also positive and significant at least at the 5% level, and larger than those for independent startups. These results are not consistent with Hypothesis 1a and 1b. Moreover, in specifications IV and V, both coefficients of *College* and *Expert* for independent startups become insignificant after controlling for the industrial structure of regions (*IndShrService*). The results indicate that these types of human capital and industrial structures are correlated with each other (as shown in Table 4) and the industrial structures have a larger impact on the number of independent startups than the human capital structures do.

In contrast to Hypothesis 1c, the coefficient of *Manage* for independent startups is positive but insignificant and that for new subsidiaries is positive and significant at the 1% level. These results do not change even after controlling for the industrial structure (see specification III and VI).

With regard to the effect of regional economic size, the elasticity of both the number of workforce to the number of independent startups and the number of existing establishments to the number of new subsidiaries is around one. The increase in wage has an overall negative and significant effect, while the population growth and unemployment rate have positive impacts solely on independent startups after controlling for the share of the service sector (*IndShrService*). Similar to Bosma et al. (2008), localization economies have no significant impacts on independent startups.

However, unlike Bosma et al. (2008), we find no significant and positive impact of urbanization economies (population density) on new subsidiaries.

Both the coefficients of the number of universities (*Univ*) and the average establishment size (*AvgSize*) are significant but with different signs for independent startups and new subsidiaries: The number of universities is related positively to independent startups and negatively to new subsidiaries. In contrast, the average establishment size is related negatively to independent startups and positively to new subsidiaries.

[Insert Table 5 here]

Tables 6 and 7 show the estimation results on manufacturing and service sectors, respectively. The variables for industrial structures are included in models IV-VI, but not in models I-III. We find some differences in the determinants of entry between manufacturing and service sectors.

As shown in Table 6, in the manufacturing sector, the proportions of college graduates (*College*) and managers (*Manage*) positively affect independent startups, even after controlling for the effect of industrial structure, while these human capital structures have no positive and significant effects on new subsidiaries (see specifications IV and VI). These results support Hypothesis 1a and 1c, and imply that higher education and managerial skills in the regional workforce promote regional entrepreneurship in the manufacturing sector.

Hypothesis 1b is, however, not supported since the coefficient of *Expert* is positive but insignificant in both specification II and V. Therefore, we do not find evidence that agglomerations of professional/technical workers promote regional entrepreneurship in the manufacturing sector.

In the service sector, the effects of the proportion of college graduates (*College*)

and professional/technical workers (*Expert*) on independent startups are significantly positive at 1% level, while those effects on new subsidiaries are insignificant when the industrial structure is not controlled for (see the results of specifications I and II in Table 7). These results are consistent with Hypothesis 1a and 1b, respectively. However, the positive effects of these types of human capital on independent startups disappear when the industrial structure is controlled for (see the results of specifications IV and V in Table 7). On the other hand, similar to the results of the manufacturing sector, the proportion of managers has a significantly positive impact on new subsidiaries, while it has no significant impact on independent startups. Thus, Hypothesis 1c is not supported. This result implies that agglomerations of managerial workforce attract new subsidiaries rather than promote regional entrepreneurship, and firms might contemplate local recruitment of managers for their subsidiaries in the service sector.

[Insert Table 6 here]

[Insert Table 7 here]

To test Hypotheses 2a and 2b, we focus on two industries in the service sector with regard to technological intensity: the information and communication as well as commerce and restaurant industries. The R&D intensity of the information and communication industry is highest (0.74%) in the service sector[5], based on the *Input-Output Tables* of 2005. In contrast, the R&D intensity of the commerce and restaurant industry is 0.22%. Thus, we regard the information and communication industry as a high-tech industry and compare the results for this industry and the commerce and restaurant industry[6].

5 The R&D intensity of a certain industry is defined as the ratio of its R&D expenditure to its total output.

6 Other service industries include various industries with different levels of technology intensity, such as research institutes, postal service, medical service, education, social work, advertizing, machine maintenance, amusement, barbers, and laundries. Because of data limitation, we cannot divide them in

Table 8 shows the estimation results for these two industries in the service sector[7], with the industrial structures being controlled for. We find that the effects of human capital on entry differ between a high-tech service and a low-tech service. First, as expected in Hypothesis 2a, the effect of the proportion of professional occupation expert workers (*Expert*) on independent startups are significantly positive in the information and communication industry, while it is not significant in the commerce and restaurant industry. On the other hand, the coefficients of college graduates (*College*) and managerial experience (*Manage*) for independent startups in the information and communication industry are positive and higher than those in the commerce and restaurant industry, although not significant in both industries. Therefore, we cannot strongly support Hypothesis 2a. Thus, these results indicate that Hypothesis 2a is partially supported.

Second, all the coefficients of the human capital variables (*College*, *Expert*, and *Manage*) for the number of new subsidiaries are significantly positive and higher in the information and communication industry than those in the commerce and restaurant industry. These results support Hypothesis 2b, which implies that the positive effect of human capital on the number of new subsidiaries is larger in the high-tech than in the low-tech industries within the service sector.

[Insert Table 8 here]

5. Conclusion

This paper investigated the determinants of regional entry distinguishing between independent startups and subsidiaries, with special attention to the effects of regional

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further detail. For that reason, we exclude this industry from the detailed analysis to test Hypothesis 2a and 2b.

7 Because of the limitation of data, this analysis is restricted to two observation periods, 2001-2004 and 2004-2006.

human capital. This is the major contribution of this paper. Another contribution to the literature is that we make a comparison of the determinants of regional entry between the manufacturing and service sectors as well as across industries in the service sector. For the empirical analyses, we used pooled data of 47 Japanese prefectures for four observation periods.

The estimation results of SUR demonstrate considerable differences in the impact of regional factors between independent startups and subsidiaries as well as among different industries. First, the number of independent startups in the manufacturing sector is positively related to regional human capital, especially college graduates and managerial employees. Second, in contrast to our hypothesis, we found a positive relationship between regional human capital, especially managerial employees, and the number of new subsidiaries in the service sector. These results imply the firms' intention of local recruitment of managerial employees for their subsidiaries in the service sector. Third, regional human capital structures are more important for regional entrepreneurship in more technology-intensive (high-tech) service industries. As a whole, we find that the determinants of entry differ not only between the manufacturing and service sectors but also within the service sector. Moreover, the determinant differences between the types of startup vary across sectors.

However, some limitations remain to be addressed in future research. First, although we found positive relationship between the regional structure of human capital and the number of independent startups, these relationships can be explained by two possibilities. One possibility is that entrepreneurs have gained those human capital skills within the regions; another is the migration of high-skilled workers (e.g., Ritsila and Ovaskainen, 2001). Thus, because of the latter possibility, regional education might not result in business startups within the region.

Despite these limitations, this study provides at least the following implications: Regional policies to activate business startups should recognize the differences between encouraging local entrepreneurship and attracting new subsidiaries. These differences may vary even within the service sector, depending on technological intensity (or innovativeness).

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References

Acs, Z. J. & Armington, C. (2006), Entrepreneurship, Geography, and American Economic Growth, Cambridge University Press.

Acs, Z. J. & Armington, C. (2004), "The Impact of Geographic Differences in Human Capital on Service Firm Formation Ratio," *Journal of Urban Economics* **56**, 244-278.

Audretsch, D. B. & Fritsch, M. (1994a), "The Geography of Firm Births in Germany," *Regional Studies* **28(4)**, 359-365.

Audretsch, D. B. & Fritsch, M. (1994b), "On the Measurement of Entry Rates," *Empirica* **21,** 105-113.

Audretsch, D. B. & Vivarelli, M. (1996), "Determinants of New-Firm Startups in Italy," *Empirica* **23(1),** 91-105.

Bosma, N., van Stel, A., & Suddle, K. (2008), "The Geography of New Firm Formation: Evidence from Independent Start-ups and New Subsidiaries in the Netherlands," *International Entrepreneurship and Management Journal* **4(2),** 129-146.

Evans, D. S. & Leighton, L. S. (1989), "The Determinants of Changes in U.S. Self-Employment, 1968-1987," *Small Business Economics* **1(2),** 111-119.

Evans, D. S. & Leighton, L. S. (1990), "Small Business Formation by Unemployed and Employed Workers," *Small Business Economics* **2(4),** 319-330.

Glaeser, E. L., Hedi D. Kallal, J. A. S., & Shleifer, A. (1992), "Growth in Cities," *Journal of Political Economy* **100(6),** 1126-1152.

Glaeser, E. L., Scheinkman, J., & Shleifer, A. (1995), "Economic Growth in a Cross-Section of Cities," *Journal of Monetary Economics* **36(1),** 117-143.
Guesnier, B. (1994), "Regional Variations in New Firm Formation in France," *Regional Studies* **28(4),** 347-358.
Hart, M. & Gudgin, G. (1994), "Spatial Variations in New Firm Formation in the Republic of Ireland, 1980-1990," *Regional Studies* **28(4),** 367-380.
Jovanovic, B. & Rob, R. (1989), "The Growth and Diffusion of Knowledge," *Review of Economic Studies* **56(4),** 569-582.
Keeble, D. & Walker, S. (1994), "New Firms, Small Firms, and Dead Firms: Spatial Patterns and Determinants in the United Kingdom," *Regional Studies* **28(4),** 411-427.
Lazear, E. P. (2005), "Entrepreneurship," *Journal of Labor Economics* **23(4),** 649-680.
Lazear, E. P. (2004), "Balanced Skills and Entrepreneurship," *American Economic Review* **94(2),** 208-211.
Nerlinger, E. A. (1998), *Standorte und Entwicklung junger innovativer Unternehmen. Empirische Ergebnisse für West-Deutschland,* Baden-Baden: Nomos.
Okamuro, H. & Kobayashi, N. (2006), "The impact of Regional Factors on the Start-Up Ratio in Japan," Journal of Small Business Management **44(2)**, 310-313.
Okamuro, H. (2008), "How Different Are the Regional Factors of High-Tech and Low-Tech Start-Ups? Evidence from Japanese Manufacturing Industries," *International Entrepreneurship and Management Journal* **4(2),** 199-215.
Rauch, J. E. (1993), "Productivity Gains from Geographic Concentration of Human Capital: Next Term Evidence from the Cities," *Journal of Urban Economics* **34(3)**, 380-400.
Reynolds, P. D., Miller, B., & Maki, W. R. (1995), "Explaining Regional Variation in Business Births and Deaths: U.S. 1976-88," *Small Business Economics* **7(5),** 389-407.
Ritsila, J. & Ovaskainen, M. (2001), "Migration and Regional Centralization of Human Capital," *Applied Economics*. **33(3)**, 317-325.
Simon, C. J. & Nardinelli, C. (2002), "Human Capital and the Rise of American Cities, 1900-1990," *Regional Science and Urban Economics* **32(1),** 59-96.
Simon, C. J. & Nardinelli, C. (1996), "The Talk of the Town: Human Capital, Information, and the Growth of English Cities, 1861 to 1961," *Explorations in Economic History* **33(3),** 384-413.
Zellner, A. (1963), "Estimators for Seemingly Unrelated Regression Equations: Some Exact Finite Sample Results," *Journal of the American Statistical Association* **58(304)**, 977-992**.**
Zellner, A. (1962), "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias," *Journal of the American Statistical Association* **57(298),** 348-368.

Table 1. Definitions and descriptions of the dependent variables

	# of Obs.	Mean	S.D.	Min.	Max.
NInd = the # of annual independent start-ups (1000 establishments)					
Overall industry	188	4.60	5.73	0.63	44.75
Manufacturing	188	0.28	0.39	0.03	2.97
Service	188	3.85	4.89	0.51	38.38
Information&Communication	94	0.08	0.30	0.01	2.61
Other Service	94	1.34	1.78	0.20	13.38
Commerce&Restaurant	94	1.81	1.98	0.27	13.42
NSub = the # of annual new subsidiaries (1000 establishments)					
Overall industry	188	2.40	2.97	0.34	20.73
Manufacturing	188	0.11	0.15	0.01	0.99
Service	188	2.09	2.61	0.30	18.62
Information&Communication	94	0.07	0.13	0.01	1.00
Other Service	94	0.80	0.97	0.09	6.59
Commerce&Restaurant	94	1.17	1.44	0.19	9.67
WF = Workforce (1000 workforce)	188	1161.54	1347.17	228.67	8416.06
Entry rate of independent start-ups = Annual # of independent start-ups / 1000 workforce					
Overall industry	188	4.16	1.87	2.00	14.16
Manufacturing	188	0.24	0.13	0.07	0.62
Service	188	3.45	1.59	1.66	12.72
Information&Communication	94	0.04	0.04	0.01	0.34
Other Service	94	1.20	0.53	0.60	4.22
Commerce&Restaurant	94	1.75	0.84	0.88	7.29
ES = Establishment Stock (1000 establishments)	188	130.81	126.14	28.10	759.52
Entry rate of new subsidiaries = 100 x Annual # of new Subsidiaries / stock of establishments					
Overall industry	188	1.69	0.68	0.57	3.44
Manufacturing	188	0.08	0.04	0.02	0.22
Service	188	1.48	0.60	0.50	3.08
Information&Communication	94	0.04	0.02	0.01	0.15
Other Service	94	0.61	0.33	0.18	1.19
Commerce&Restaurant	94	0.84	0.30	0.38	1.65

Table 2. Definitions and descriptions of the independent variables

		Mean	S.D.	Min.	Max.
CollegeGrad = 100 x college graduates / workforce (in 2000	188	12.23	3.74	7.18	24.19
Expert = 100 x the # of expert workers / workforce	188	12.79	1.38	10.10	16.97
Manage = 100 x # of management workers / workforce	188	2.93	0.56	1.99	5.01
Univ = the # of universities / 100	188	0.26	0.40	0.01	2.52
PopGrowth = % growth between (t-4) and (t-1)	188	-0.05	1.07	-2.66	2.80
Wage = Wage rate (1000 yen per a hour)	188	2.06	0.27	1.55	2.93
Unemp = Unemployment rate (%)	188	4.74	1.30	2.52	11.40
Localization = 1000 x # of existing establishments / regional population					
Overall industry	188	49.70	6.52	30.80	64.93
Manufacturing	188	5.15	2.16	2.07	12.09
Service	188	38.26	4.74	24.77	50.41
Information&Communication	94	0.34	0.20	0.13	1.55
Other Service	94	12.79	1.51	8.91	15.51
Commerce&Restaurant	94	20.91	2.85	12.73	26.88
Urbanization = 1000 population per square meters	188	0.65	1.12	0.07	5.94
IndShr = industrial share of workforce					
Overall industry	188	99.37	0.42	98.18	99.98
Manufacturing	188	21.57	5.92	6.07	34.55
Service	188	63.88	5.74	52.94	80.16
Information&Communication	94	1.53	1.11	0.59	8.27
Other Service	94	24.79	2.61	19.95	30.86
Commerce&Restaurant	94	32.96	2.34	28.59	39.71
AvgSize = workforce / # of existing establishments					
Overall industry	188	8.19	0.94	6.11	11.67
Manufacturing	188	18.10	4.08	9.34	27.14
Service	188	6.82	0.97	5.41	11.07
Information&Communication	94	17.45	5.40	9.94	42.14
Other Service	94	7.74	1.13	5.76	12.14
Commerce&Restaurant	94	6.32	0.83	5.13	9.41

Table 3. Correlation coefficients of the dependent and independent variables

	Overall industry		Manufacturing		Service		Info.&Communication		Other services		Commerce &Rest.	
	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*
ln*NInd*	1.000		1.000		1.000		1.000		1.000		1.000	
ln*NSub*	0.967	1.000	0.948	1.000	0.964	1.000	0.960	1.000	0.967	1.000	0.962	1.000
ln*WF*	0.873	0.902	0.833	0.876	0.876	0.900	0.880	0.892	0.883	0.796	0.878	0.930
ln*ES*	0.882	0.894	0.841	0.866	0.884	0.892	0.880	0.887	0.882	0.787	0.887	0.923
CollegeGrad	0.564	0.586	0.594	0.572	0.566	0.586	0.618	0.593	0.592	0.531	0.536	0.599
Expert	0.326	0.304	0.224	0.183	0.341	0.313	0.407	0.338	0.340	0.278	0.326	0.296
Manage	0.081	0.033	0.065	-0.016	0.087	0.031	0.196	0.140	0.047	-0.044	0.044	0.101
Univ	0.755	0.752	0.700	0.692	0.762	0.753	0.862	0.802	0.770	0.673	0.750	0.774
PopGrowth	0.482	0.450	0.495	0.479	0.483	0.442	0.535	0.524	0.496	0.373	0.485	0.518
ln*Wage*	0.579	0.614	0.676	0.681	0.573	0.608	0.583	0.582	0.562	0.489	0.514	0.601
Unemp	0.320	0.239	0.148	0.074	0.343	0.250	0.295	0.282	0.339	0.296	0.410	0.236
Localization	-0.243	-0.330	0.314	0.196	-0.184	-0.309	0.629	0.545	-0.406	-0.420	-0.339	-0.452
Urbanization	0.682	0.668	0.657	0.636	0.687	0.668	0.781	0.707	0.696	0.596	0.669	0.684
AvgSize	0.637	0.751	-0.209	0.025	0.731	0.812	0.714	0.664	0.815	0.766	0.715	0.817
IndShr	0.418	0.410	0.125	0.142	0.429	0.362	0.762	0.674	0.298	0.309	0.176	0.041

Table 4. Correlation coefficients among the independent variables

	ln*WF*	ln*ES*	*College Grad*	*Expert*	*Manage*	*Univ*	*Pop-Growth*	ln*Wage*	*Unemp*	*Localization*	*Urbanization*	*AvgSize*	*IndShr*
ln*WF*	1.000												
ln*ES*	0.995	1.000											
CollegeGrad	0.639	0.611	1.000										
Expert	0.234	0.217	0.699	1.000									
Manage	0.229	0.232	0.385	0.098	1.000								
Univ	0.824	0.814	0.718	0.465	0.305	1.000							
PopGrowth	0.578	0.563	0.655	0.313	0.396	0.506	1.000						
ln*Wage*	0.726	0.701	0.842	0.412	0.263	0.673	0.622	1.000					
Unemp	0.090	0.118	0.083	0.434	-0.278	0.142	-0.006	-0.108	1.000				
Localization													
Overall industry	-0.196	-0.153	-0.322	-0.384	0.200	-0.033	-0.139	-0.155	-0.267	1.000	-0.047		
Manufacturing	0.153	0.171	0.165	-0.287	0.223	0.125	0.202	0.384	-0.441	1.000	0.126		
Service	-0.211	-0.162	-0.356	-0.224	0.179	0.026	-0.192	-0.285	-0.001	1.000	0.010		
Info.&Communication	0.490	0.487	0.433	0.373	0.505	0.808	0.411	0.414	0.049	1.000	0.712		
Other Service	-0.447	-0.415	-0.549	-0.286	-0.048	-0.160	-0.405	-0.518	-0.072	1.000	-0.194		
Commerce&Rest.	-0.345	-0.293	-0.480	-0.271	0.079	-0.136	-0.303	-0.361	-0.009	1.000	-0.154		
Urbanization	0.737	0.725	0.721	0.501	0.276	0.875	0.484	0.658	0.229	-	1.000		
AvgSize													
Overall industry	0.808	0.747	0.699	0.330	0.163	0.737	0.563	0.732	-0.071	-0.399	0.682	1.000	
Manufacturing	0.010	-0.053	-0.126	-0.158	-0.124	-0.161	-0.040	-0.078	-0.269	-0.512	-0.153	1.000	
Service	0.818	0.775	0.776	0.554	0.103	0.831	0.519	0.720	0.191	-0.395	0.769	1.000	
Info.&Communication	0.680	0.661	0.645	0.480	0.287	0.664	0.560	0.561	0.139	0.471	0.737	1.000	
Other Service	0.801	0.768	0.756	0.628	0.298	0.823	0.602	0.674	0.231	-0.512	0.793	1.000	
Commerce&Rest.	0.833	0.790	0.830	0.505	0.395	0.816	0.716	0.783	0.005	-0.562	0.761	1.000	
IndShr													
Overall industry	0.473	0.465	0.714	0.325	0.220	0.426	0.571	0.740	0.081	-0.037	0.484	0.441	1.000
Manufacturing	0.013	-0.012	0.039	-0.465	0.045	-0.195	0.172	0.313	-0.665	0.684	-0.158	0.134	1.000
Service	0.229	0.245	0.292	0.684	-0.097	0.397	0.049	0.024	0.784	-0.016	0.375	0.442	1.000
Info.&Communication	0.618	0.609	0.596	0.534	0.496	0.874	0.520	0.505	0.173	0.922	0.835	0.754	1.000
Other Service	-0.010	-0.004	0.087	0.577	-0.020	0.164	-0.104	-0.227	0.686	-0.058	0.171	0.404	1.000
Commerce&Rest.	-0.015	0.030	0.105	0.450	0.364	0.117	0.001	-0.100	0.635	0.221	0.099	0.011	1.000

Table 5. SUR estimation results for all sectors

Specification	I		II		III		IV		V		VI	
Dependent variable	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*
Constant	-4.877***	-6.596***	-5.409***	-6.743***	-4.738***	-6.61***	-5.511***	-7.597***	-5.598***	-7.207***	-5.459***	-7.708***
	[0.303]	[0.396]	[0.355]	[0.478]	[0.293]	[0.378]	[0.346]	[0.45]	[0.361]	[0.474]	[0.345]	[0.442]
ln*WF*	0.995***		1.017***		0.988***		1***		1.008***		0.996***	
	[0.019]		[0.02]		[0.019]		[0.019]		[0.021]		[0.018]	
ln*ES*		1.074***		1.079***		1.072***		1.082***		1.057***		1.085***
		[0.026]		[0.029]		[0.025]		[0.025]		[0.028]		[0.024]
CollegeGrad	0.009*	0.02***					0.005	0.014**				
	[0.005]	[0.006]					[0.005]	[0.006]				
Expert			0.026***	0.027**					0.013	-0.003		
			[0.008]	[0.011]					[0.009]	[0.013]		
Manage					0.033	0.121***					0.018	0.098***
					[0.025]	[0.033]					[0.024]	[0.032]
Univ	0.191***	-0.043	0.163***	-0.03	0.205***	-0.049	0.111**	-0.172***	0.118**	-0.134**	0.115**	-0.188***
	[0.043]	[0.059]	[0.043]	[0.061]	[0.043]	[0.058]	[0.048]	[0.065]	[0.047]	[0.064]	[0.048]	[0.064]
PopGrowth	0.042***	-0.015	0.044***	-0.004	0.05***	0.006	0.048***	-0.005	0.049***	0.008	0.053***	0.011
	[0.01]	[0.013]	[0.009]	[0.012]	[0.009]	[0.012]	[0.01]	[0.013]	[0.009]	[0.012]	[0.009]	[0.011]
ln*Wage*	-0.562***	-0.857***	-0.51***	-0.607***	-0.421***	-0.591***	-0.452***	-0.683***	-0.423***	-0.403***	-0.37***	-0.512***
	[0.121]	[0.164]	[0.089]	[0.125]	[0.087]	[0.117]	[0.121]	[0.163]	[0.096]	[0.131]	[0.085]	[0.113]
Unemp	0.101***	0.04***	0.092***	0.03***	0.098***	0.034***	0.078***	0.004	0.078***	-0.003	0.076***	-0.002
	[0.008]	[0.01]	[0.008]	[0.011]	[0.008]	[0.01]	[0.01]	[0.013]	[0.01]	[0.013]	[0.01]	[0.013]
Localization	-0.001	-0.002	-0.001	-0.004*	-0.003**	-0.005***	0	0	0	-0.002	0	-0.002
	[0.002]	[0.002]	[0.001]	[0.002]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]
Urbanization	-0.015	-0.044**	-0.015	-0.036**	-0.008	-0.026	-0.008	-0.033*	-0.009	-0.021	-0.004	-0.02
	[0.013]	[0.018]	[0.012]	[0.017]	[0.013]	[0.017]	[0.013]	[0.017]	[0.012]	[0.017]	[0.012]	[0.016]
AvgSize	-0.129***	0.194***	-0.129***	0.185***	-0.139***	0.171***	-0.121***	0.208***	-0.124***	0.194***	-0.126***	0.192***
	[0.018]	[0.024]	[0.017]	[0.024]	[0.018]	[0.023]	[0.018]	[0.023]	[0.017]	[0.023]	[0.018]	[0.022]
IndShrService							0.008***	0.013***	0.006**	0.015***	0.008***	0.013***
							[0.002]	[0.003]	[0.003]	[0.004]	[0.002]	[0.003]
1999-2001	0.728***	0.663***	0.717***	0.643***	0.744***	0.735***	0.724***	0.658***	0.719***	0.645***	0.733***	0.718***
	[0.018]	[0.025]	[0.017]	[0.024]	[0.025]	[0.034]	[0.018]	[0.024]	[0.017]	[0.023]	[0.025]	[0.033]
2001-2004	-0.094***	-0.001	-0.107***	-0.021	-0.064*	0.118***	-0.104***	-0.016	-0.109***	-0.026	-0.088***	0.082*
	[0.019]	[0.026]	[0.019]	[0.026]	[0.033]	[0.044]	[0.019]	[0.025]	[0.019]	[0.025]	[0.032]	[0.043]
2004-2006	0.481***	0.667***	0.479***	0.666***	0.528***	0.839***	0.491***	0.682***	0.488***	0.687***	0.516***	0.821***
	[0.025]	[0.033]	[0.024]	[0.034]	[0.042]	[0.057]	[0.024]	[0.032]	[0.024]	[0.033]	[0.041]	[0.054]
N	188	188	188	188	188	188	188	188	188	188	188	188
R sq.	0.991	0.985	0.991	0.985	0.991	0.985	0.992	0.986	0.992	0.986	0.992	0.987
AIC	−689.5		−692.2		−692		−709		−706		−713.4	
Resid. Cor. with Indep.	1	0.319	1	0.31	1	0.328	1	0.264	1	0.276	1	0.268
Breusch-Pagan test	19.2***		18***		20.3***		13.1***		14.3***		13.5***	

Notes: standard errors are in brackets. *** p < .01, ** p < .05, * p < .10.
Sample periods are 1996-1999, 1999-2001, 2001-2004 and 2004-2006.

Table 6. SUR estimation results for the manufacturing sector

Specification	I		II		III		IV		V		VI	
Dependent variable	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*
Constant	-9.271***	-11.04***	-8.305***	-9.509***	-9.133***	-10.616***	-8.995***	-10.883***	-8.966***	-9.81***	-9.195***	-10.652***
	[0.433]	[0.456]	[0.616]	[0.64]	[0.496]		[0.373]	[0.443]	[0.539]	[0.634]	[0.423]	[0.511]
ln*WF*	1.016***		0.97***		1.001***		1.013***		1.004***		1.007***	
	[0.035]		[0.039]		[0.035]		[0.03]		[0.034]		[0.03]	
ln*ES*		1.24***		1.172***		1.223***		1.238***		1.189***		1.228***
		[0.042]		[0.045]		[0.042]		[0.041]		[0.044]		[0.04]
CollegeGrad	0.018**	0.002					0.019***	0.003				
	[0.008]	[0.01]					[0.007]	[0.009]				
Expert			-0.022	-0.058***					0.014	-0.041**		
			[0.017]	[0.019]					[0.016]	[0.02]		
Manage					0.041	-0.067					0.105**	-0.031
					[0.05]	[0.057]					[0.043]	[0.056]
Univ	-0.354***	-0.391***	-0.318***	-0.351***	-0.354***	-0.352***	-0.09	-0.234**	-0.07	-0.231**	-0.11	-0.217**
	[0.086]	[0.097]	[0.087]	[0.095]	[0.091]	[0.101]	[0.081]	[0.103]	[0.082]	[0.101]	[0.083]	[0.105]
PopGrowth	0.047**	0.096***	0.07***	0.113***	0.065***	0.097***	0.016	0.078***	0.029*	0.094***	0.034**	0.08***
	[0.019]	[0.021]	[0.018]	[0.02]	[0.017]	[0.019]	[0.017]	[0.021]	[0.016]	[0.02]	[0.015]	[0.019]
ln*Wage*	-0.456*	0.001	0.093	0.447*	-0.109	0.116	-0.916***	-0.276	-0.614***	0.111	-0.639***	-0.177
	[0.255]	[0.29]	[0.219]	[0.239]	[0.189]	[0.211]	[0.226]	[0.29]	[0.21]	[0.26]	[0.173]	[0.22]
Unemp	0.04**	-0.072***	0.032*	-0.076***	0.034*	-0.074***	0.067***	-0.056***	0.061***	-0.062***	0.063***	-0.058***
	[0.019]	[0.021]	[0.019]	[0.021]	[0.019]	[0.021]	[0.016]	[0.021]	[0.017]	[0.021]	[0.016]	[0.021]
Localization	0.096***	0.057***	0.075***	0.028*	0.088***	0.053***	0.005	0.002	-0.002	-0.009	-0.006	0.001
	[0.012]	[0.014]	[0.014]	[0.016]	[0.012]	[0.013]	[0.016]	[0.02]	[0.016]	[0.02]	[0.015]	[0.019]
Urbanization	0.058**	0.091***	0.078***	0.111***	0.071***	0.092***	0.059***	0.091***	0.068***	0.106***	0.073***	0.093***
	[0.026]	[0.029]	[0.026]	[0.029]	[0.025]	[0.028]	[0.022]	[0.028]	[0.022]	[0.028]	[0.021]	[0.028]
AvgSize	-0.022***	0.024***	-0.029***	0.015**	-0.025***	0.023***	-0.049***	0.008	-0.052***	0.004	-0.053***	0.007
	[0.006]	[0.006]	[0.006]	[0.007]	[0.006]	[0.006]	[0.006]	[0.008]	[0.006]	[0.008]	[0.006]	[0.007]
IndShr							0.041***	0.024***	0.042***	0.02***	0.043***	0.024***
							[0.005]	[0.007]	[0.005]	[0.007]	[0.005]	[0.007]
1999-2001	1.009***	0.971***	1.001***	0.979***	1.027***	0.921***	0.991***	0.961***	0.976***	0.967***	1.055***	0.937***
	[0.036]	[0.041]	[0.036]	[0.04]	[0.051]	[0.058]	[0.031]	[0.04]	[0.031]	[0.039]	[0.044]	[0.057]
2001-2004	0.081**	0.284***	0.081**	0.301***	0.116*	0.213***	0.072**	0.279***	0.059*	0.291***	0.174***	0.245***
	[0.038]	[0.044]	[0.039]	[0.043]	[0.065]	[0.074]	[0.033]	[0.042]	[0.034]	[0.042]	[0.056]	[0.072]
2004-2006	0.787***	1.154***	0.82***	1.192***	0.856***	1.069***	0.708***	1.107***	0.714***	1.142***	0.857***	1.07***
	[0.046]	[0.053]	[0.047]	[0.053]	[0.079]	[0.09]	[0.041]	[0.053]	[0.043]	[0.054]	[0.067]	[0.087]
N	188	188	188	188	188	188	188	188	188	188	188	188
R sq.	0.97	0.965	0.97	0.967	0.97	0.965	0.978	0.968	0.977	0.968	0.978	0.968
AIC	−235		−239.2		−233.2		−290.6		−290.4		−291.3	
Resid. Cor. with Indep.	1	0.412	1	0.407	1	0.419	1	0.331	1	0.348	1	0.343
Breusch-Pagan test	32***		31.1***		33***		20.6***		22.8***		22.2***	

Notes: standard errors are in brackets. *** p < .01, ** p < .05, * p < .10.
Sample periods are 1996-1999, 1999-2001, 2001-2004 and 2004-2006.

Table 7. SUR estimation results for the service sector

Specification	I		II		III		IV		V		VI	
Dependent variable	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*
Constant	-5.788***	-6.67***	-6.435***	-6.503***	-5.297***	-6.812***	-6.491***	-6.676***	-6.546***	-6.536***	-6.434***	-6.871***
	[0.348]	[0.406]	[0.365]	[0.445]	[0.356]	[0.403]	[0.308]	[0.418]	[0.326]	[0.446]	[0.318]	[0.43]
ln*WF*	0.97***		1.011***		0.934***		1***		1.004***		0.994***	
	[0.022]		[0.023]		[0.021]		[0.019]		[0.021]		[0.019]	
ln*ES*		1.063***		1.05***		1.063***		1.064***		1.052***		1.068***
		[0.028]		[0.031]		[0.026]		[0.028]		[0.031]		[0.027]
CollegeGrad	0.019***	0.01					0.005	0.011				
	[0.005]	[0.006]					[0.005]	[0.007]				
Expert			0.047***	0.006					0.01	0.006		
			[0.008]	[0.011]					[0.009]	[0.014]		
Manage					0.028	0.081**					0.011	0.082**
					[0.029]	[0.035]					[0.024]	[0.035]
Univ	0.215***	-0.177**	0.217***	-0.145**	0.275***	-0.184***	0.16***	-0.178**	0.169***	-0.149**	0.169***	-0.191***
	[0.057]	[0.073]	[0.053]	[0.071]	[0.058]	[0.071]	[0.049]	[0.073]	[0.048]	[0.071]	[0.049]	[0.072]
PopGrowth	0.018*	-0.008	0.026***	-0.003	0.03***	0.002	0.048***	-0.01	0.049***	-0.003	0.053***	0.003
	[0.01]	[0.013]	[0.009]	[0.012]	[0.01]	[0.012]	[0.009]	[0.014]	[0.009]	[0.013]	[0.009]	[0.013]
ln*Wage*	-0.717***	-0.822***	-0.574***	-0.677***	-0.421***	-0.715***	-0.319***	-0.847***	-0.282***	-0.676***	-0.237***	-0.714***
	[0.129]	[0.16]	[0.097]	[0.128]	[0.102]	[0.122]	[0.12]	[0.178]	[0.097]	[0.145]	[0.086]	[0.127]
Unemp	0.145***	0.016*	0.129***	0.017*	0.151***	0.017*	0.075***	0.019	0.075***	0.016	0.073***	0.014
	[0.007]	[0.009]	[0.008]	[0.01]	[0.007]	[0.009]	[0.01]	[0.015]	[0.01]	[0.015]	[0.01]	[0.015]
Localization	0.004*	-0.001	0.003	-0.003	0.001	-0.002	0	0	-0.001	-0.003	-0.001	-0.002
	[0.003]	[0.003]	[0.002]	[0.003]	[0.002]	[0.003]	[0.002]	[0.003]	[0.002]	[0.003]	[0.002]	[0.003]
Urbanization	-0.05***	-0.041**	-0.043***	-0.036**	-0.04***	-0.033*	-0.012	-0.042**	-0.012	-0.036*	-0.008	-0.031*
	[0.014]	[0.017]	[0.013]	[0.017]	[0.014]	[0.017]	[0.013]	[0.019]	[0.013]	[0.019]	[0.012]	[0.018]
AvgSize	-0.06**	0.272***	-0.093***	0.269***	-0.057**	0.262***	-0.165***	0.275***	-0.166***	0.267***	-0.169***	0.259***
	[0.023]	[0.028]	[0.023]	[0.029]	[0.024]	[0.029]	[0.024]	[0.034]	[0.023]	[0.033]	[0.024]	[0.033]
IndShr							0.022***	-0.001	0.021***	0	0.022***	0.001
							[0.003]	[0.004]	[0.003]	[0.005]	[0.002]	[0.003]
1999-2001	0.696***	0.613***	0.673***	0.604***	0.701***	0.665***	0.676***	0.614***	0.671***	0.604***	0.68***	0.666***
	[0.02]	[0.025]	[0.019]	[0.025]	[0.03]	[0.036]	[0.018]	[0.026]	[0.017]	[0.025]	[0.025]	[0.036]
2001-2004	-0.113***	-0.066**	-0.131***	-0.076***	-0.101**	0.017	-0.109***	-0.065**	-0.114***	-0.075***	-0.101***	0.019
	[0.023]	[0.029]	[0.021]	[0.028]	[0.041]	[0.048]	[0.02]	[0.029]	[0.019]	[0.028]	[0.034]	[0.049]
2004-2006	0.404***	0.614***	0.41***	0.607***	0.426***	0.725***	0.482***	0.612***	0.478***	0.609***	0.497***	0.73***
	[0.03]	[0.037]	[0.028]	[0.037]	[0.053]	[0.063]	[0.027]	[0.039]	[0.027]	[0.04]	[0.045]	[0.064]
N	188	188	188	188	188	188	188	188	188	188	188	188
R sq.	0.989	0.984	0.99	0.984	0.988	0.984	0.992	0.984	0.992	0.984	0.992	0.984
AIC	−619.5		−637.5		−610.9		−681.5		−679.7		−684.2	
Resid. Cor. with Indep.	1	0.213	1	0.236	1	0.231	1	0.257	1	0.263	1	0.263
Breusch-Pagan test	8.5***		10.5***		10***		12.5***		13***		13***	

Notes: standard errors are in brackets. *** p < .01, ** p < .05, * p < .10.
Sample periods are 1996-1999, 1999-2001, 2001-2004 and 2004-2006.

Table 8. SUR estimation results for high-tech and low-tech service industries

Industry	Information & Communication (high-tech)						Commerce & Restaurant (low-tech)					
Specification	IV		V		VI		IV		V		VI	
Dependent variable	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*	ln*NInd*	ln*NSub*
Constant	-12.332***	-12.42***	-14.116***	-13.204***	-12.403***	-12.65***	-7.423***	-7.643***	-7.935***	-7.965***	-7.34***	-7.756***
	[1.09]	[1.009]	[1.242]	[1.233]	[1.139]	[1.086]	[0.548]	[0.61]	[0.619]	[0.703]	[0.549]	[0.604]
ln*WF*	1.038***		1.102***		1.019***		1.029***		1.053***		1.023***	
	[0.088]		[0.087]		[0.085]		[0.032]		[0.034]		[0.033]	
ln*ES*		1.249***		1.255***		1.223***		1.105***		1.117***		1.118***
		[0.097]		[0.1]		[0.095]		[0.04]		[0.042]		[0.04]
CollegeGrad	0.028	0.046**					0.004	0.012				
	[0.017]	[0.018]					[0.009]	[0.011]				
Expert			0.09***	0.074**					0.023	0.023		
			[0.029]	[0.032]					[0.014]	[0.017]		
Manage					0.186	0.308**					0.001	0.121*
					[0.123]	[0.131]					[0.06]	[0.072]
Univ	0.126	-0.232	0.093	-0.156	0.162	-0.188	0.158*	-0.05	0.128	-0.062	0.167**	-0.065
	[0.26]	[0.267]	[0.243]	[0.263]	[0.256]	[0.266]	[0.081]	[0.097]	[0.08]	[0.098]	[0.081]	[0.096]
PopGrowth	0.004	0.026	0.009	0.047	0.033	0.071**	0.069***	-0.031	0.064***	-0.029	0.073***	-0.013
	[0.034]	[0.035]	[0.031]	[0.034]	[0.032]	[0.034]	[0.018]	[0.021]	[0.016]	[0.02]	[0.016]	[0.019]
ln*Wage*	-1.058**	-0.842*	-0.993***	-0.368	-0.673*	-0.226	-0.592***	-0.943***	-0.604***	-0.831***	-0.531***	-0.792***
	[0.47]	[0.493]	[0.364]	[0.4]	[0.36]	[0.38]	[0.206]	[0.248]	[0.155]	[0.189]	[0.152]	[0.181]
Unemp	0.125***	0.101***	0.105***	0.083***	0.121***	0.094***	0.083***	0.054**	0.083***	0.049**	0.08***	0.048**
	[0.026]	[0.028]	[0.026]	[0.029]	[0.026]	[0.029]	[0.018]	[0.021]	[0.016]	[0.02]	[0.017]	[0.02]
Localization	2.095**	2.68***	2.709***	2.77***	1.725*	2.07**	-0.003	-0.002	0	-0.003	-0.005	-0.009
	[0.921]	[0.972]	[0.908]	[1.005]	[0.874]	[0.926]	[0.008]	[0.01]	[0.007]	[0.009]	[0.007]	[0.008]
Urbanization	-0.059	-0.125**	-0.05	-0.109**	-0.041	-0.094*	-0.025	-0.059**	-0.032	-0.058**	-0.021	-0.046*
	[0.051]	[0.054]	[0.048]	[0.054]	[0.051]	[0.054]	[0.024]	[0.028]	[0.022]	[0.027]	[0.022]	[0.026]
AvgSize	0.027	0.031	0.037*	0.035	0.024	0.025	-0.208***	0.288***	-0.2***	0.292***	-0.212***	0.249***
	[0.021]	[0.022]	[0.02]	[0.022]	[0.021]	[0.022]	[0.047]	[0.056]	[0.046]	[0.056]	[0.049]	[0.056]
IndShr	-0.133	-0.312	-0.3	-0.375	-0.086	-0.23	0.05***	-0.003	0.044***	-0.005	0.052***	-0.001
	[0.238]	[0.251]	[0.238]	[0.262]	[0.234]	[0.247]	[0.009]	[0.011]	[0.009]	[0.011]	[0.008]	[0.01]
1999-2001	-	-	-	-	-	-	-	-	-	-	-	-
2001-2004	-	-	-	-	-	-	-	-	-	-	-	-
2004-2006	0.593***	0.653***	0.621***	0.689***	0.662***	0.766***	0.566***	0.436***	0.562***	0.441***	0.571***	0.483***
	[0.055]	[0.058]	[0.052]	[0.058]	[0.064]	[0.07]	[0.034]	[0.041]	[0.032]	[0.039]	[0.036]	[0.042]
N	94	94	94	94	94	94	94	94	94	94	94	94
R sq.	0.964	0.951	0.967	0.95	0.964	0.95	0.987	0.984	0.987	0.984	0.987	0.985
AIC	6.2		0.8		7.5		−282.1		−285.1		−283.9	
Resid. Cor. with Indep.	1	0.16	1	0.123	1	0.171	1	0.155	1	0.133	1	0.162
Breusch-Pagan test	2.4		1.4		2.7*		2.2		1.7		2.5	

Notes: standard errors are in brackets. *** p < .01, ** p < .05, * p < .10.

Sample periods are 1996-1999, 1999-2001, 2001-2004 and 2004-2006.