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Association between business switch or liquidation, and the demographics of Small and Medium Enterprises in South Korea*

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Abstract

Purpose – In this study, we consider and examine relationships between reasons for business switch or liquidation (BSL), and the demographics of small and medium enterprises (SMEs) in South Korea. The related five variables are occupations, administrative districts, age of employer, firm age and foundation motivation. In addition, eleven levels in association with reasons for BSL visualize the corresponding demographics by measuring their similarity on the dimensional planes assuming that the association exists between variables under consideration.

Research design, data, and methodology - This study is done by the Ministry of SMEs and Startups in 2016 and examines 20,307 small and medium enterprises. For examining the distinct relationships among variables under consideration, both chi-squared test and correspondence analysis as main statistical tools are used.

Results - The results show that among levels of reasons for BSL the three levels –weakening profitability, poor sales and economic depression- are main ones for the five demographics variables mentioned above, and we can obtain the detailed associations between attributes of corresponding variables by inspecting the two dimensional plane.

Conclusions - This study suggests reasons for BSL are closely associated with the five different demographics variables – Administrative districts, Firm age, Occupations, Age of employer and Foundation motivation-by looking over results.

Keywords: Association, Business Switch and Liquidation, Correspondence Analysis.

JEL Classifications: C12, M10, M30, N75, Q12.

1. Introduction

According to data released by Ministry of SMEs and Startups and Statistics Korea on October 26, 2017, both small business and self-employed workers climbed up to 37.6% within one year after the start-ups, and closed up to 72.5% within five years. The principal reasons for facing the close peril are weakening operation profit and poor income. Rate of increase for disposable income stands at 5.7% in 2013, down to 0.4%, while the number of discontinuance of business convert to 13.5% rise in 2016.

Sales of major business such as retailers, wholesalers and hospitality sector was sluggish, whereas self-employed persons, franchisee and super-super market are at a growing trend at village markets. The steep increase in the

minimum wage this year is feeding inflationary pressure and anxiety of public charge hikes making progress that can increase the burden on common people.

Kang et al. (2017) investigated the role of penetration and outlet in productivity growth of some chosen service sectors in which government targets decreased excessive penetration. Their findings showed that obese rates of penetration and outlet in the service sectors might account for the dynamic course of productivity growth rather than inordinate race.

Kim and Chung (2016) examined the effect of venture capital syndication on performances of venture industry in South Korea by analyzing Cox's proportional hazard model and found out that as total funding increases, successful outlet time can be shorter, and joint investment between government-operated bank and private venture capital did not have a significant effect on successful outlet.

Suh et al. (2014) investigated influence of excessive competition among SMEs on penetration and outlet rates by using detection of economic variables and estimation model. As a result, the penetration rate of SMEs had a significant

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positive effect on, whereas rate of economic growth does a significant negative effect on the outlet rate.

In this study, some associations between eleven levels of reasons for BSL and five demographics variables are examined by computing the numerical power and graphing their distances on the two dimensional plane. Eleven levels of reasons for BSL mentioned above are following: weakening profitability, poor sales, bankruptcy of trading partner, switch to high-tech industry, economic depression, government-sponsored policy, distribution structure, aggravation of export condition, dis-investment, personal reasons, and others.

In section 2, both data collection and brief statistical methods such as a chi-squared test and correspondence analysis will be described. Five demographics variables in association with reasons for BSL will be summarized as p-value of chi-squared test, inertia and a biplot in section 3 and the findings will be treated based on these analyses. Finally, conclusion remarks and imitations of this work will be stated in section 4.

2. Data Collection and Statistical Methods

Ministry of SMEs and Startups examined 20,307 small and medium enterprises samples in 2016 (January, 2016–December, 2016) which were classified into four sectors and 57 items such as current situations of enterprises, current situations of start-up, current situations of corporate management and a self-employed creative business supporting policy.

The goal of this survey is to grasp the status of a self-employed creative business, start-up and the state of corporate management comprehensively and to take advantage of basic source for development measures and policy-making.

For finding out details of this association between two categorical variables, two important statistical analyse given below will be exploited. The first tool to check the association between two variables is chi-squared test and there exists a significant association between two variables if the computed test statistic is large (Agresti, 2002).

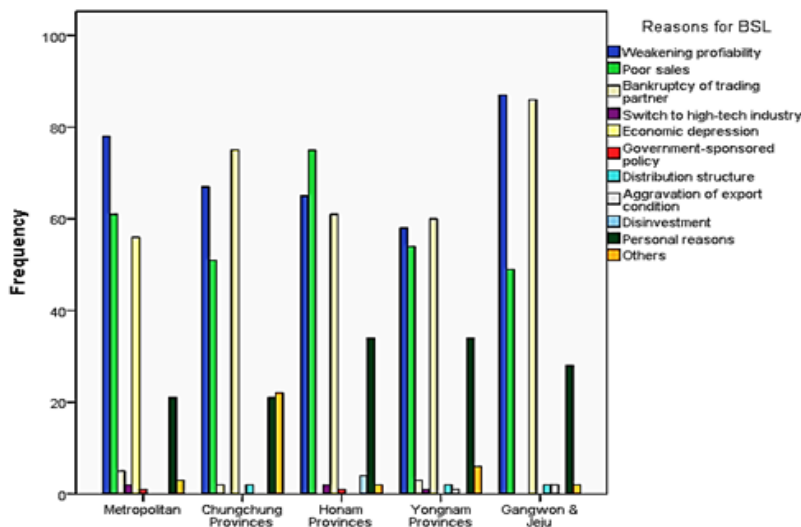
When we find a significant association between two variables by chi-squared test, we can convert this association into a graphical expression, in which each row and each column is described as a point. We can understand easily and closely the degree of associations by monitoring the distance between levels of the corresponding variables (Greenacre, 1984; Hoffman & Franke, 1986; Clausen, 1988; Benzercri, 1992; Greenacre, 2007; Hair et al., 2007; Brigitte, 2009; Steven, 2009; Doey & Kurta, 2011; Yang, 2013).

3. Research Results

3.1. Association between administrative districts and reasons for BSL

The three reasons for business switch or liquidation (BSL) — ‘weakening profitability’, ‘poor sales’ and ‘economic depression’ — are main ones for all administrative districts (see Figure 1). In particular, both ‘weakening profitability’ and ‘economic depression’ are the most frequent reasons for ‘Gangwon & Jeju’, whereas ‘poor sales’ is for ‘Honam Provinces’.

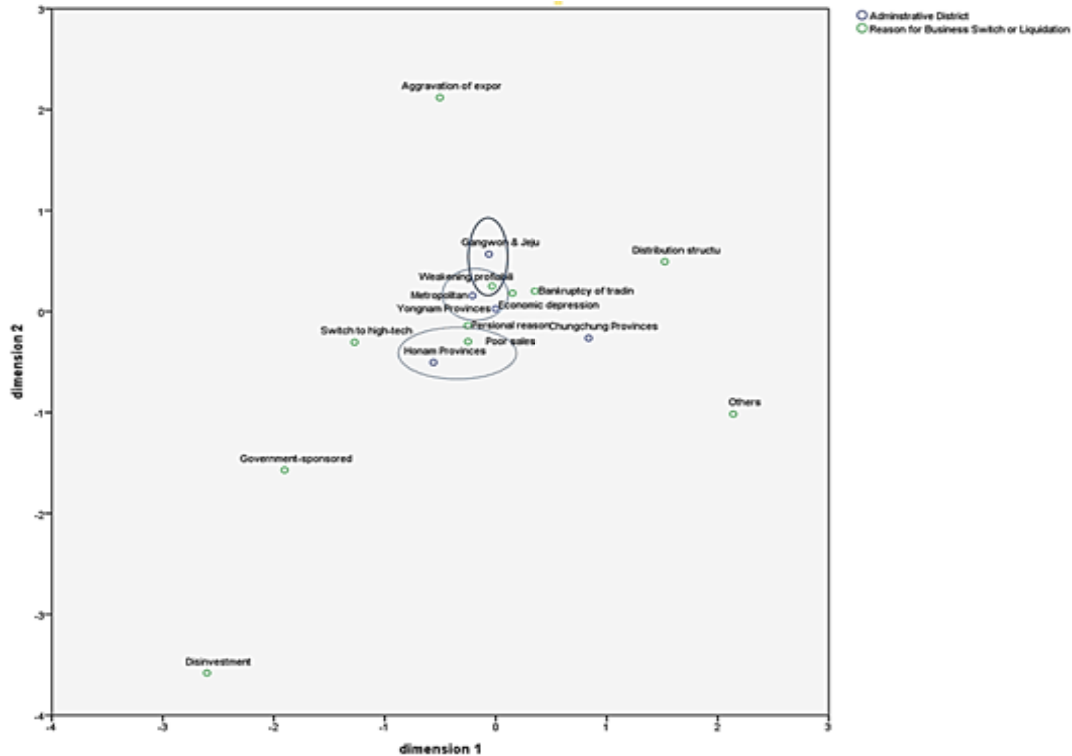
We can conclude that there exists a significant relationship between administrative districts and reasons for BSL ($p\text{-value} < .001$). The first dimension explains 4.7% and the second, the third and the fourth do 2.0%, 1.6% and 0.6%, respectively of the total 8.8% of variance accounted for in the model (see <Table 1>).



<Figure 1> Administrative districts

<Table 1> Summary on administrative districts

| Dimension | Singular Value | Inertia | Chi Square | P value. | Proportion of Inertia | | Confidence Singular Value | |
|-----------|----------------|---------|------------|----------|-----------------------|-----------|---------------------------|---------------|
| | | | | | Accounted | Cumulated | Standard Deviation | Correlation 2 |
| 1 | .216 | .047 | | | .527 | .527 | .030 | .274 |
| 2 | .141 | .020 | | | .225 | .752 | .024 | |
| 3 | .127 | .016 | | | .181 | .933 | | |
| 4 | .077 | .006 | | | .067 | 1.000 | | |
| Total | | .088 | 104.514 | <.001 | 1.000 | 1.000 | | |



<Figure 2> Row and column points with symmetric normalization

The first dimension explains 52.7%, the second dimension does 22.5%, the third dimension does 18.1% and the fourth dimension does 6.7% of the total 8.8% of variance explained in the model (see <Table 1>).

A plot on <Figure 2> shows visual associations of all levels of reasons for BSL and administrative districts by evaluating the distance between levels. From <Figure 2>, 'metropolitan' among administrative districts is marginally connected with both 'weakening profitability' and 'economic depression'. In addition, 'Honam Provinces' and 'Gangwon & Jeju' are deeply connected to 'poor sales' and 'weakening profitability', respectively.

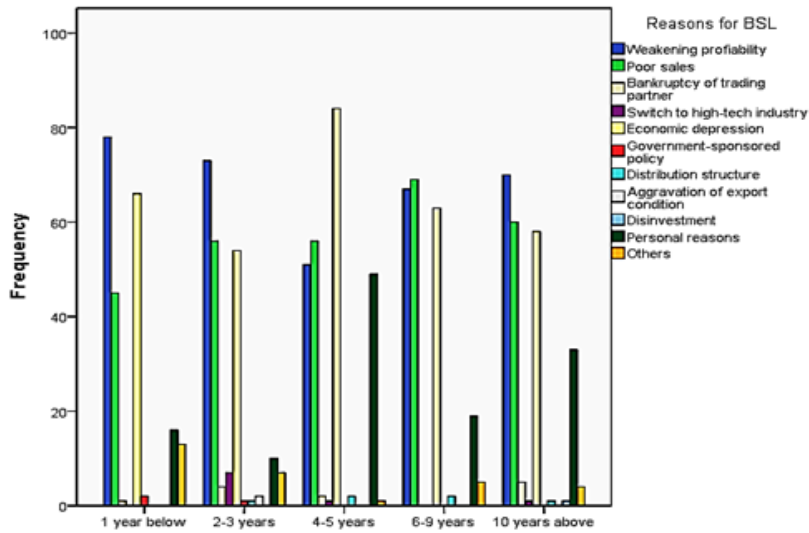
3.2. Association between firm age and reasons for BSL

From <Figure 3>, we can find the fact that, as we can

see in section 3.1, 'weakening profitability', 'poor sales' and 'economic depression' can be main reasons BSL for all levels of firm age, and personal reasons can be for both '4 ~5 years' and '10 years above'.

The chi-squared test indicates that the close association between firm age and reasons for BSL (p-value <.001), and the first dimension accounts for 56.2%, and the first three dimensions do 91.0% of the total inertia (see <Table 2>).

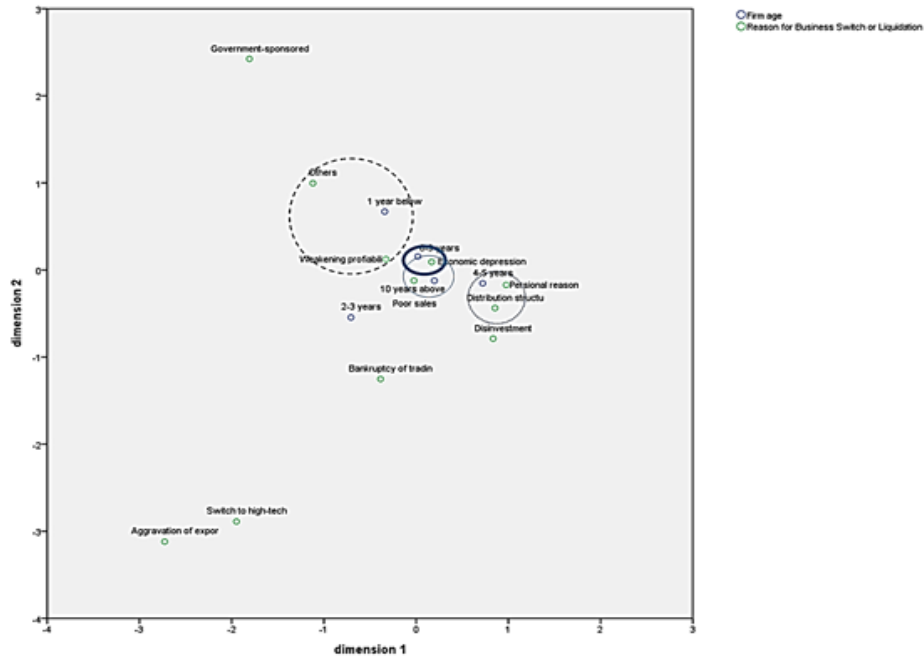
From <Figure 4>, both '1 year below' and '6~9 years' are closely related to 'weakening profitability' and 'economic depression', respectively. Additionally, '4~5 years' appears to be in a marginal connection with both 'distribution structure' and 'personal reasons', and '10 years above' does with both 'economic depression' and 'poor sales'.



<Figure 3> Firm age

<Table 2> Summary on firm age

| Dimension | Singular Value | Inertia | Chi Square | P value. | Proportion of Inertia | | Confidence Standard Deviation | Singular Value |
|-----------|----------------|---------|------------|----------|-----------------------|-----------|-------------------------------|----------------|
| | | | | | Accounted | Cumulated | | Correlation 2 |
| 1 | .237 | .056 | | | .562 | .562 | .027 | .235 |
| 2 | .156 | .024 | | | .244 | .806 | .028 | |
| 3 | .102 | .010 | | | .104 | .910 | | |
| 4 | .095 | .009 | | | .090 | 1.000 | | |
| Total | | .100 | 113.554 | <.001 | 1.000 | 1.000 | | |



<Figure 4> Row and column points with symmetric normalization

3.3. Association between occupations and reasons for BSL

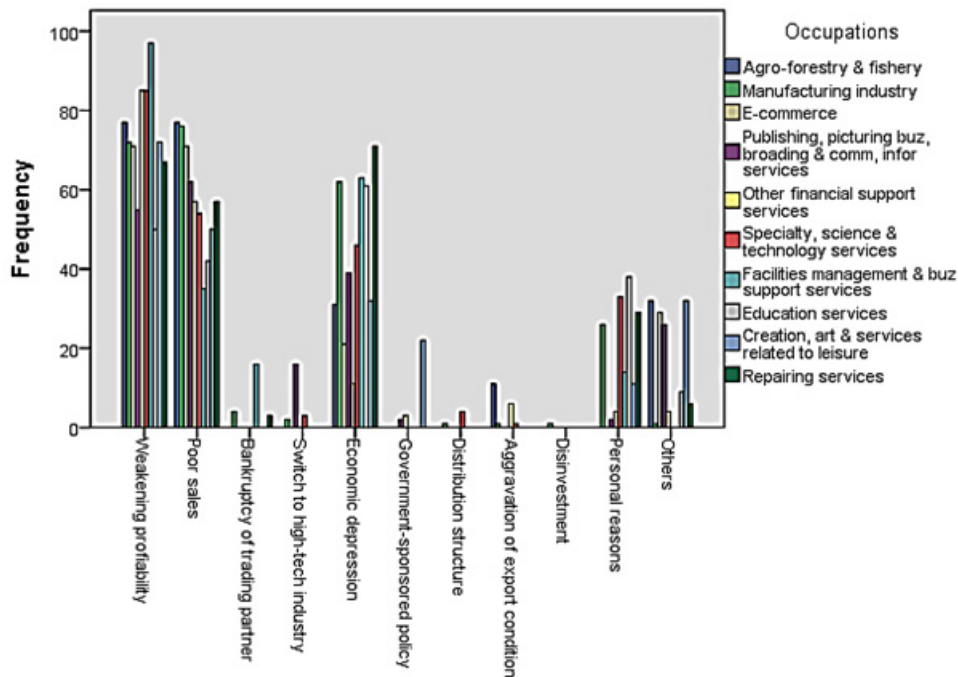
<Figure 5> shows that ‘weakening profitability’, ‘poor sales’ and ‘economic depression’ can be main reasons BSL for most of occupations. In particular, ‘economic depression’ is the most frequent reasons for both ‘repairing services’ and ‘education services’ of occupations.

The chi-squared statistic suggests the significant association between occupations and reasons BSL (p-value<.001). In addition, dimension 1, 2, 3 and 4 account for 39.4%, 18.6%, 16.8% and 12.1%, respectively, and the first

four dimensions explain 86.9% of total inertia (see <Table 3>).

The numeric value (.387) in inertia column shown in <Table 3> shows that knowing something about occupations accounts for 38.7% of something reasons for BSL and vice versa.

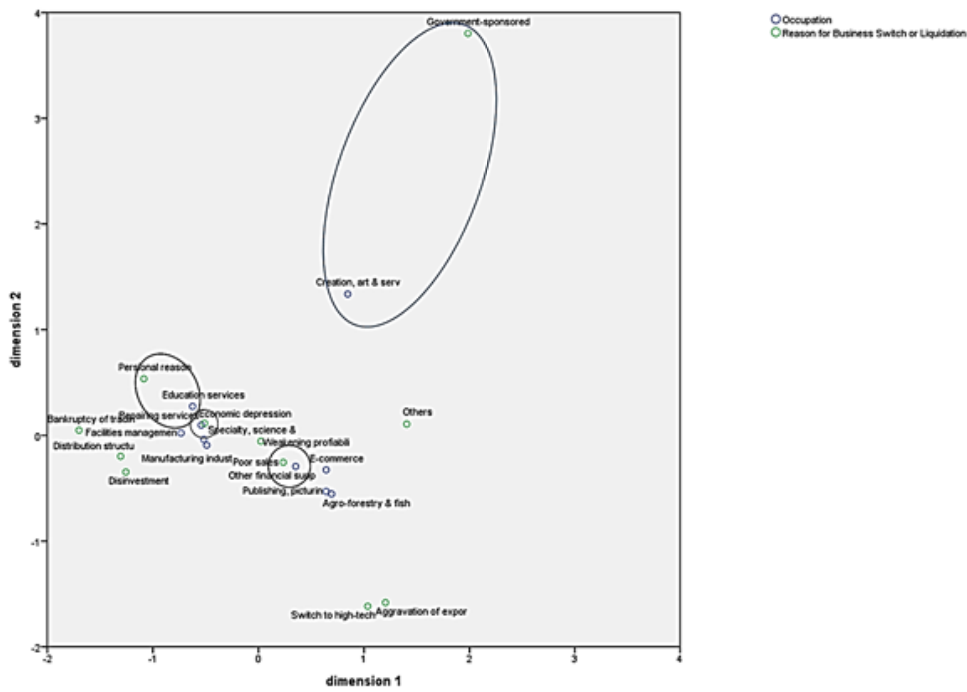
We can find out ‘other financial support services’, ‘education services’, and ‘specialty, science & technology services’ among occupations are, in particular, related to ‘poor sales’, ‘personal reasons’, and ‘economic depression’, respectively (see <Figure 6>). On the other hand, ‘creation, art, & services related to leisure’ is far away from all reasons for BSL.



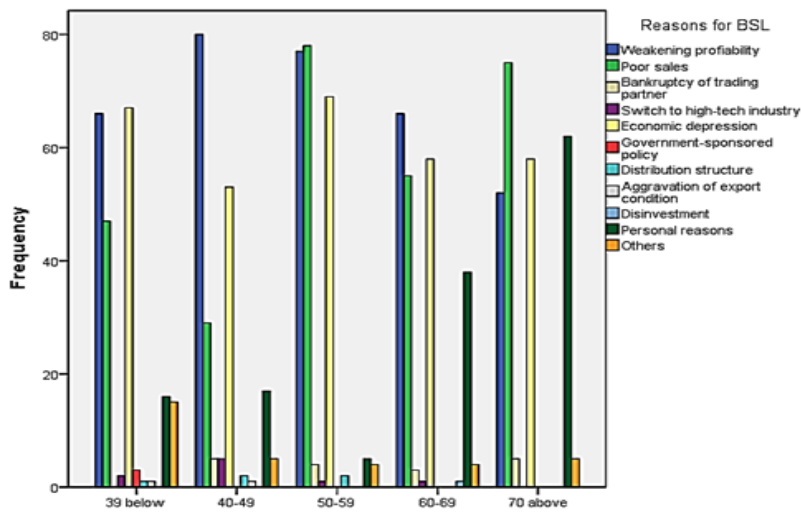
<Figure 5> Occupations

<Table 3> Summary on occupations

| Dimension | Singular Value | Inertia | Chi Square | P value. | Proportion of Inertia | | Confidence Singular Value | |
|-----------|----------------|---------|------------|----------|-----------------------|-----------|---------------------------|-------------|
| | | | | | Accounted | Cumulated | Standard Deviation | Correlation |
| 1 | .390 | .152 | | | .394 | .392 | .016 | .228 |
| 2 | .268 | .072 | | | .186 | .580 | .029 | |
| 3 | .255 | .065 | | | .168 | .747 | | |
| 4 | .217 | .047 | | | .121 | .869 | | |
| 5 | .160 | .026 | | | .066 | .935 | | |
| 6 | .109 | .012 | | | .031 | .966 | | |
| 7 | .087 | .008 | | | .020 | .986 | | |
| 8 | .070 | .005 | | | .013 | .998 | | |
| 9 | .026 | .001 | | | .002 | 1.000 | | |
| Total | | .387 | 827.479 | <.001 | 1.000 | 1.000 | | |



<Figure 6> Row and column points with symmetric normalization



<Figure 7> Age of employer

<Table 4> Summary on age of employer

| Dimension | Singular Value | Inertia | Chi Square | P value. | Proportion of Inertia | | Confidence Standard Deviation | Singular Value Correlation 2 |
|-----------|----------------|---------|------------|----------|-----------------------|-----------|-------------------------------|------------------------------|
| | | | | | Accounted | Cumulated | | |
| 1 | .274 | .075 | | | .567 | .567 | .028 | .059 |
| 2 | .166 | .027 | | | .207 | .774 | .030 | |
| 3 | .156 | .024 | | | .183 | .958 | | |
| 4 | .075 | .006 | | | .042 | 1.000 | | |
| Total | | .132 | 150.363 | <.001 | 1.000 | 1.000 | | |

3.4. Association between age of employer and reasons for BSL

As seen from <Figure 7>, three reasons for BSL — ‘weakening profitability’, ‘poor sales’ and ‘economic depression’ — can be main ones for all age. Especially, we can get to know that there is a sharp increase in the number of ‘personal reasons’ for the ‘60~69’ and ‘70 above’.

The chi-squared test indicates that there exists highly significant association between age of employer and reasons for BSL (p-value<.001), and the first dimension explains 56.7% and the second accounts for 20.7% of the total inertia (see <Table 4>).

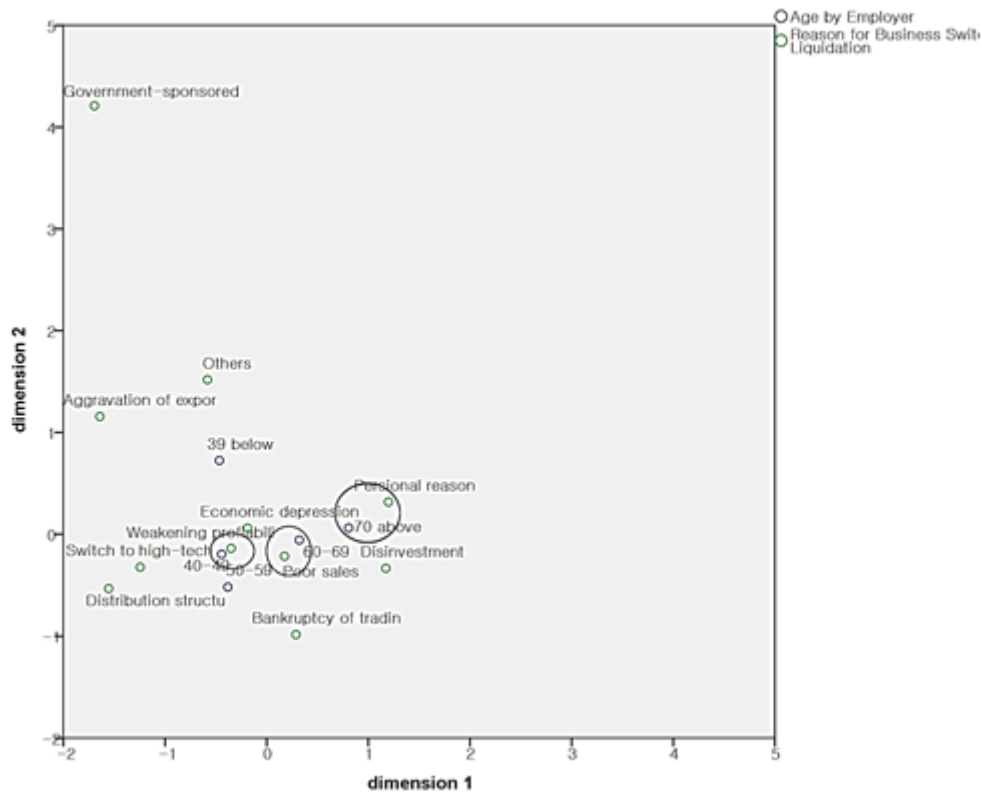
We can get findings, from <Figure 8>, that ‘40~49’, ‘60~69’ and ‘70 above’ have to do with much ‘weakening profitability’, ‘poor sales’ and ‘personal reasons’, respectively. ‘Government-sponsored policy’ is more remote from all age

of employer than any other reasons for BSL.

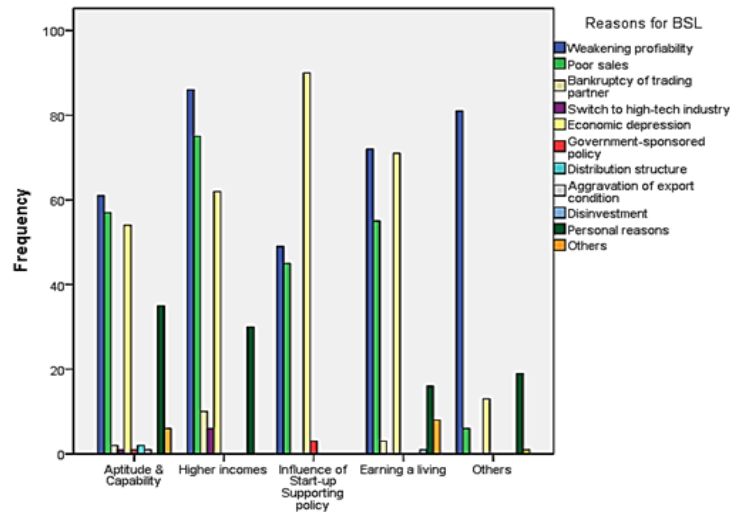
3.5. Association between foundation motivation and reasons for BSL

For most of levels of foundation motivation, ‘weakening profitability’, ‘poor sales’, and ‘economic depression’ are the principal factors to explain reasons for BSL. In particular, ‘weakening profitability’ is the most frequent reason for most of foundation motivation, while ‘economic depression’ is for ‘influence of start-up supporting policy’.

Examining the results of chi-squared test (p-value<0.001), from <Table 5>, suggests significance, justifying the hypothesis that foundation motivation and reasons for BSL are associated with each other. <Table 5> shows that the first dimension explains 53.5% of the variance accounted for by the considered model.



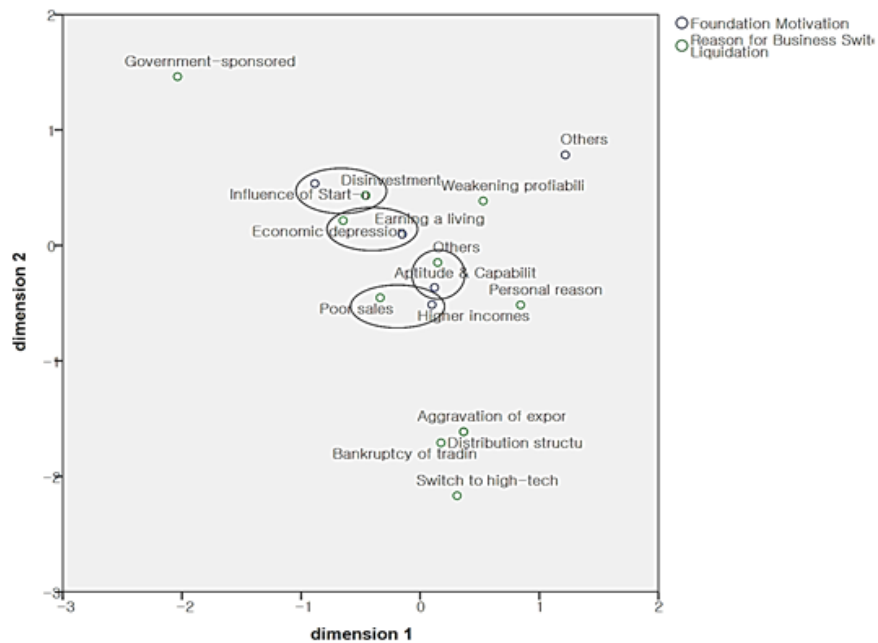
<Figure 8> Row and column points with symmetric normalization



<Figure 9> Foundation motivation

<Table 5> Summary on age of employer

| Dimension | Singular Value | Inertia | Chi Square | P value. | Proportion of Inertia | | Confidence Singular Value | |
|-----------|----------------|---------|------------|----------|-----------------------|-----------|---------------------------|---------------|
| | | | | | Accounted | Cumulated | Standard Deviation | Correlation 2 |
| 1 | .329 | .109 | | | .535 | .535 | .027 | -.017 |
| 2 | .225 | .051 | | | .250 | .785 | .027 | |
| 3 | .174 | .030 | | | .148 | .933 | | |
| 4 | .116 | .014 | | | .067 | 1.000 | | |
| Total | | .203 | 206.997 | <.001 | 1.000 | 1.000 | | |



<Figure 10> Row and column points with symmetric normalization

The following associations of pairs of levels can be epitomized: (earning a living, economic depression), (higher incomes, poor sales), (aptitude & capability, etc.) and (influence of start-up supporting policy, dis-investment) (see <Figure 10>).

Similarly, 'government-sponsored policy' and 'switch to high-tech industry' are more remote from all foundation motivation reasons for BSL than any other reasons for BSL.

4. Concluding Remarks and Limitations

In this study, we analyze and evaluate the close associations between two categorical variables, reasons for BSL and the five different demographics by using chi-squared test and correspondence analysis.

In particular, correspondence analysis is the powerful tool to stick to monitor the associations visually and easily by converting into orthogonal components that optimize the secession between column and row scores.

In summary, reasons for BSL are closely associated with the five different demographics variables – administrative districts, firm age, occupations, age of employer and foundation motivation by the highly significant p-value of chi-squared test.

The findings obtained by correspondence analysis are as follows: 'weakening profitability', 'poor sales' and 'economic depression' are the main reasons among eleven levels for all demographics variables under consideration in this work.

In particular, 'weakening profitability' has to do with a lot metropolitan and Gangwon & Jeju (administrative districts), 1 year below (firm age), 40~49 (age of employer), and 'poor sales' does Honam Province (administrative districts), 10 years above (firm age), other financial support services (occupations), 60~69 (age of employer) and higher incomes (foundation motivation).

In addition, economic depression are closely connected with metropolitan (administrative districts), 6~9 years and 10 years above (firm age), specialty, science & technology services (occupations), and earning a living (foundation motivation). As a small by-product of findings, influence of start-up supporting policy is closely linked to dis-investment among reasons for BSL.

In this work, we think over only five demographics variables such as administrative districts, occupations, firm age, age of employer and foundation motivation for the purpose of mining associations with reasons for BSL. Allowing for more detailed and additional demographics, we can investigate administrative districts based on city or county, more specialized occupations and schooling years of employer, business career of employer and so on in the future.

Ministry of SMEs and Startups and Statistics Korea should provide and develop the accurate statistical data of SMEs, so that the precise and reasonable policy and budget can be performed. Increase in minimum wage is to be taken appropriately and low-income class has to benefit from expanding EITC (Earned Income Tax Credit).

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