

Post-closure Career Paths of Self-Employed Workers[†]

By MINSUB KIM*

This study documents self-employed workers' characteristics associated with their career paths after a business closure in order to improve employment insurance for such workers. Utilizing work history data from the Korean Labor & Income Panel Survey, a competing-risks regression model is adopted in order to study how self-employed workers' career paths after unemployment (i.e., business closure) vary according to their characteristics. The findings suggest that the post-closure career paths of self-employed workers are associated with (i) their revenue and income, (ii) the individuals' demographic characteristics, and (iii) the industry in which they operate. Several policy implications for employment insurance that better caters to the needs of self-employed workers are derived from the empirical results.

Key Word: Self-Employment, Unemployment,
Employment Insurance, Career Path
JEL Code: J64, J65, J68

I. Introduction

The economic shock triggered by COVID-19 has underscored the necessity of enhancing employment insurance for self-employed workers. In response, both domestic and international considerations to reinforce social safety nets for self-employed workers are underway (Lee *et al.*, 2021; ILO and OECD, 2020; Schoukens

* Associate Fellow, Korea Development Institute (E-mail: minsubkim@kdi.re.kr)

* Received: 2024. 5. 26

* Referee Process Started: 2024. 5. 26

* Referee Reports Completed: 2024. 8. 8

[†] This paper is an extension of Chapters 2 and 3 from MinSub Kim and Jiyeon Kim, 2022, *Providing Social Protection for Self-Employed Workers*, Policy Study 2022-07, Korea Development Institute (in Korean). I would like to thank Jinkook Lee, Joseph Han, Jiwoon Kim, ShinHyuck Kang, and two anonymous referees for their valuable comments and suggestions. I am also grateful for Songyi Shin's assistance in organizing the data. All remaining errors are mine.

and Weber, 2020). The Korean government has initiated discussions on expanding employment insurance for self-employed workers, including the announcement of the “National Employment Insurance Roadmap” in December of 2020. Likewise, the OECD continues to recommend the provision of mandatory employment insurance for self-employed workers as a means to address gaps in employment insurance coverage in South Korea (OECD, 2018; 2022).

Although policy discussions on the topic of providing employment insurance for self-employed workers have intensified, economic research to support such discussions is severely lacking. Existing employment insurance policies have already been shown to be limited with regard to their scope and coverage. In South Korea, the number of self-employed workers has reached approximately 5.51 million, representing about 20.2% of the total workforce,¹ but only 0.56% of them are enrolled in employment insurance.² Unlike employed workers, self-employed workers are highly heterogeneous in terms of their economic and demographic characteristics. Nevertheless, current employment insurance policies fail to account for such diversity, rendering the system unattractive and thereby ineffective.

In this context, the importance offering carefully designed employment insurance policies that cater to the needs of diverse beneficiaries looms large for policymakers. Existing employment insurance mainly focuses on a single post-unemployment track, which is finding a new job as an employee; however, self-employed workers have shown to take multiple career paths after a business closure. It is therefore crucial to analyze how the probability of a business closure and job transition paths can vary depending on the specific characteristics of self-employed workers.

In order to provide policy implications for employment insurance, this study conducts an empirical analysis of how the probability of a business closure and career transition paths can vary according to the characteristics of self-employed workers. To explore self-employed workers’ characteristics and how they are related to their business closure and subsequent career transition paths, I estimate a competing risks model that considers various career transition paths after a business closure. Unlike conventional survival analysis models that consider only one event of interest (i.e., business closure), my model accounts for three post-unemployment job paths as mutually exclusive competing events: (1) restarting a new business after closure, (2) transitioning to wage employment, or (3) transitioning to unemployment or economic inactivity.

The data used in this paper are from the “Korean Labor & Income Panel Survey (KLIPS),” a nationally representative longitudinal survey of individuals residing in urban areas. Annually tracking respondents for over 20 years, the KLIPS provides comprehensive information on individuals’ demographic characteristics and labor market outcomes. Another strong point of this survey is its detailed information on the work history of each individual, enabling the tracking of every job transition. Utilizing the work history data, individual-job level data are compiled, consisting of 2,928 observations for self-employed individuals who started a business in 2000 or later.

The empirical findings suggest that the post-closure career paths of self-employed

¹Statistics Korea, The Economically Active Population Survey.

²According to the Ministry of Employment and Labor, there were 30,629 self-employed workers enrolled in employment insurance in 2020. See Section II for more details.

workers are associated with their economic characteristics, demographic characteristics, and the industry in which they operate. First, in terms of economic characteristics, revenue and income are associated in different ways with the probabilities of the post-closure career paths of the self-employed. Specifically, revenue is negatively correlated with the probability of becoming an employee, whereas income shows a stronger negative correlation with both the probability of transitioning to wage employment and the likelihood of unemployment or economic inactivity. The number of employees is another critical economic characteristic: self-employed workers with one or two employees have a lower probability of becoming unemployed or leaving the labor force compared to solo self-employed workers.

Next, among the demographic characteristics of self-employed workers, gender, marital status, and age are significant factors associated with their post-closure career paths. Compared to their male counterparts, female self-employed workers have a lower probability of transitioning to wage employment and a much higher probability of becoming unemployed or economically inactive after closure. Additionally, self-employed individuals with a spouse are less likely to participate in the labor market following a business closure. Age also plays a crucial role in that the probabilities of restarting a business and becoming an employee decrease at a greater age.

Furthermore, the post-closure career paths of the self-employed vary by industry. The probability of restarting a business is relatively high in the wholesale & retail trade, accommodation & food services, finance, real estate activities, and arts/sports/recreation services, compared to the manufacturing sector. Conversely, the probability of transitioning to wage employment after a business closure is relatively low in the transportation & storage industry. Finally, the likelihood of being unemployed or economically inactive post closure is relatively high in the accommodation & food services, real estate activities, and educational services sectors.

From the perspective of policymakers overseeing employment insurance, a potential limitation of this study is the inability of the study to identify the deliberateness of closures, as only insured workers who close their businesses for involuntary reasons are eligible for unemployment benefits. To alleviate this concern, I implement two additional analyses. First, I consider the starting of a new business post closure as a continuation of running a business, and I estimate a model with only two competing risks: (1) transitioning to wage employment and (2) transitioning to unemployment or economic inactivity. Second, based on the assumption that closures due to economic reasons (e.g., bankruptcy, low sales or income, lack of work to be done) are arguably more involuntary than those due to non-economic reasons, I estimate a competing risks regression model considering only closures due to economic reasons as events. The results do not change significantly in a qualitative sense, except for the importance of business income: the association between income and the post-closure career path becomes stronger for closures due to economic reasons, which are presumably more involuntary, as mentioned above.

This paper proceeds as follows. Section II discusses the institutional backgrounds and existing literature on this subject. Section III provides descriptive statistics for the analysis, and Section IV describes the econometrical model used to estimate competing risks related to business closures by self-employed workers. Section V presents empirical results, and Section VI concludes by providing policy implications on the topic of employment insurance for self-employed workers.

II. Institutional Background and Literature Review

A. Institutional Background

Among developed nations, South Korea's high proportion of self-employed workers stands out as a characteristic of its labor market composition. This is illustrated in Figure 1, which shows the proportion of the self-employed relative to the total employed population among OECD member countries. As of 2019, the share of the self-employed in total employment stands at 24.6% in South Korea, ranking it the sixth highest among OECD countries.

Since the 2000s, South Korea has witnessed a continuous decrease in the proportion of the self-employed relative to total employment due to a steady increase in the number of employees. This phenomenon, in which wage employment increases and the proportion of the self-employed decreases as the economy grows, is commonly observed in OECD countries (Lee *et al.*, 2020). However, as shown in Figure 2, it is important to note that there has not been much change to the overall number of self-employed workers in South Korea. As of 2021, there are approximately 5.51 million self-employed workers, with no significant changes observed since the 2010s. Furthermore, it should be noted that both the number and proportion of solo self-employees, i.e., self-employed workers without any employees, have increased rapidly since the pandemic. Generally, solo self-employed workers operate small businesses, have higher closure rates, and tend to have lower educational levels, making them economically and socially vulnerable. There are approximately 4.21 million solo self-employed—their number being three times larger than that of self-employed workers with employees, which stands at 1.31 million.

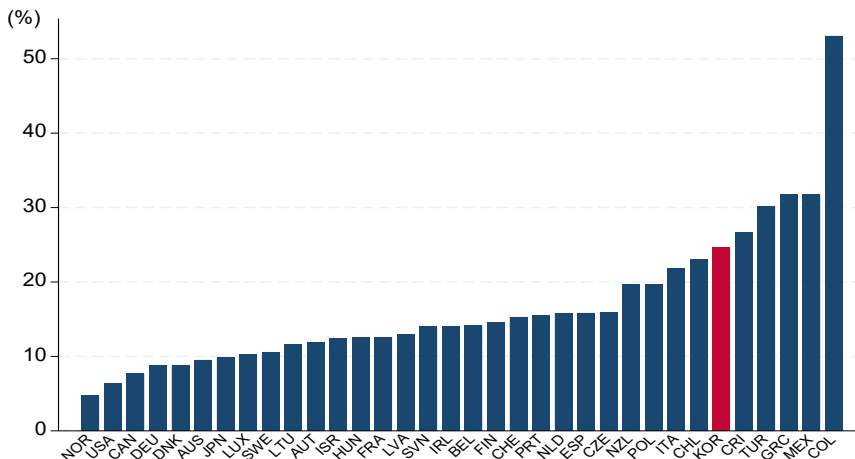


FIGURE 1. SELF-EMPLOYMENT RATES IN OECD COUNTRIES

Note: The self-employment rate is the ratio of self-employed workers to the total employed population. Note that the OECD's definition of self-employment includes unpaid family workers.

Source: Organization for Economic Co-operation and Development (OECD).

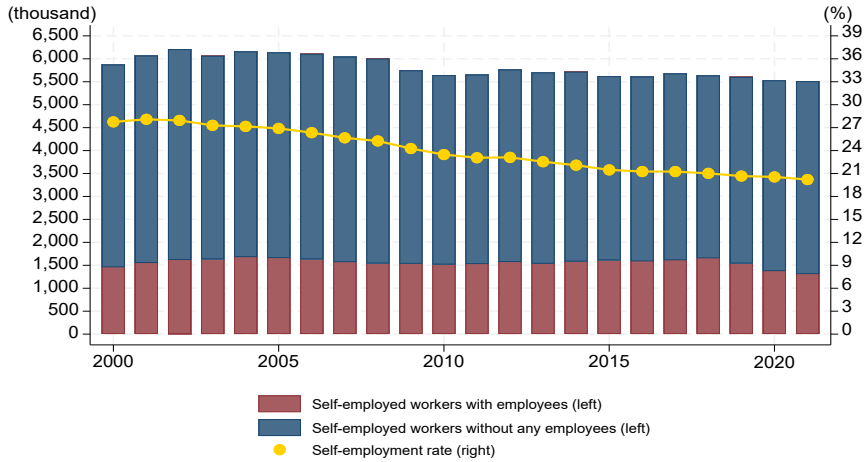


FIGURE 2. SELF-EMPLOYMENT RATE IN THE REPUBLIC OF KOREA OVER TIME

Note: The self-employment rate is the ratio of self-employed workers to the total employed population.

Source: Statistics Korea, The Economically Active Population Survey (EAPS).

TABLE 1—NUMBER OF SELF-EMPLOYED WORKERS COVERED BY EMPLOYMENT INSURANCE

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Newly Covered	24,829	5,820	4,918	4,802	5,619	4,245	7,279	10,050	16,251
Total	20,864	17,908	16,985	16,404	16,772	16,455	18,265	22,529	30,629

Source: Ministry of Employment and Labor.

Traditionally, employment insurance has been designed for employees rather than self-employed workers. However, the necessity of employment insurance is not limited to employees. Compared to employees, self-employed workers typically experience more significant income fluctuations due to economic and seasonal variations. This exposes them to constant economic risks such as debt accumulation and business closure, underscoring the need for robust social safety nets. For these reasons, while the South Korean government has been offering employment insurance to them since 2012, employment insurance for the self-employed in its current state is virtually nonexistent, as the enrollment rate is drastically low. As of 2020, only 30,629 self-employed workers were shown to be covered by employment insurance (Table 1), which is a mere 0.56% of the total self-employed population (5.53 million).

There are several reasons for such a low coverage rate. First, unlike employees, self-employed workers are not mandated to enroll in employment insurance. Second, compared to employment insurance for employees, insurance for self-employed workers entails a higher contribution level despite a lower benefit level. The Korean government is endeavoring to promote employment insurance coverage by subsidizing contributions for solo self-employed workers, but the impact remains minimal.

An additional, less highlighted and therefore all the more problematic reason is that current employment insurance fails adequately to take into account the heterogeneity of and among self-employed workers. First, existing employment services provided by employment insurance are tailored to employees, most of whom seek another paid working position after experiencing unemployment. Thus, such services fail to meet the needs of a significant number of self-employed workers who choose to start a new business after a business closure. Second, self-employed workers are a highly heterogeneous group in terms of their demographic and economic characteristics, meaning that their economic risks and their preferences for such risks are also very different. Consequently, insurance premiums, benefit amounts, and incentives such as but not limited to subsidizing insurance premiums need to be differentiated according to their characteristics, which is not the case under the current employment insurance program.

Hence, this study analyzes the various post-closure paths of self-employed workers and thereby highlights the limitations of current employment insurance plans, which fail to consider the heterogeneity of the self-employed workforce. By examining these characteristics of self-employed workers, I explore directions for improving employment insurance for this group, specifically by analyzing how their career paths after unemployment (i.e., business closure) vary according to their characteristics. Based on empirical results, I derive policy implications that better cater to the needs of individual self-employed workers.

B. Literature Review

This paper contributes to the body of literature documenting the demographic and economic characteristics of self-employed workers associated with business closures in South Korea. First, Ahn and Sung (2003) conduct an early study analyzing the factors associated with the duration and closure of self-employment ventures in South Korea. Using data from the Korean Labor & Income Panel Survey (KLIPS) spanning from the first year (1998) to the fourth year (2001), they estimate a Cox proportional hazard model. They found that age, education level, marital status, parental self-employment status, industry, revenue, and income are significant variables explaining the business closure risk of self-employed workers. Particularly, public vocational training experience is identified as a positive factor with regard to the duration of self-employment.

Nam (2017) also explores the factors related to self-employment closures in various sectors, including wholesale & retail trade, accommodation & food services, and other personal service industries. He investigates a wide range of variables related to the market environment that could affect the survival of self-employed businesses. Based on data from the Census on Establishments and Cox's proportional hazard model, he finds that certain business characteristics (e.g., tenure and size), economic factors (e.g., regional GDP and the consumer price index), cost factors (e.g., rent, loan interest rates, and fixed labor costs), and regional characteristics (e.g., population, per capita income, and the number of similar businesses in the area) are significantly related to self-employed business closure.

Choi (2018) investigates the factors affecting self-employment closures among middle-aged and elderly individuals (aged 45 and above) using data from the Korean

Longitudinal Study of Aging (KLoSA), ranging from the first survey in 2006 to the fifth survey in 2014. Similar to previous studies, Choi (2018) employs Cox's proportional hazard model, finding that gender, age, education level, industry, and job satisfaction are correlated with the risk of business closure for self-employed workers.

Moon and Park (2020) also focus on middle-aged and elderly self-employed workers, utilizing the KLoSA data from the first survey in 2006 to the sixth survey in 2016. Unlike previous studies, their study employs a competing risks regression model to distinguish between reasons for exiting self-employment, specifically managerial difficulties versus other reasons. Their results suggest that exits from self-employment among middle-aged and elderly self-employed workers are associated with gender, age, the presence of children, education level, net income, and employment status. However, regarding exits due to managerial difficulties, tenure in the same industry is related more strongly to a lower exit risk level compared to other factors such as gender, age, and education. Furthermore, middle-aged and elderly individuals who leave self-employment due to managerial difficulties are less likely to re-enter the labor market.

Lim and Kim (2021) use extensive administrative data primarily sourced from the Statistical Business Registers (SBR). Employing a time-dependent Cox model, their study investigates factors linked to the risk of business closure. Their findings indicate that the risk of closure is negatively associated with having a joint venture partner, owning a franchise outlet, employing a larger number of workers, and generating higher revenue.

The aforementioned studies generally focus on exploring factors related to the duration of self-employment and the occurrence of a closure. However, considering policymakers aiming to implement employment insurance for self-employed workers, it is necessary to analyze not only closures but also various career paths *after* the closures (such as restarting a business, transitioning to wage employment, unemployment, or remaining out of the labor force). Therefore, in this analysis, I aim to document how post-closure career transition states vary according to the characteristics of self-employed workers ultimately to derive policy implications for providing self-employed workers with an employment safety net.

III. Data and Descriptive Statistics

In this paper, I utilize data from the Korean Labor & Income Panel Survey (KLIPS) to document the career transitions of self-employed workers after their businesses close. The KLIPS is a nationally representative longitudinal survey of individuals aged 15 and older residing in urban areas. It has been tracking respondents annually since its inception in 1998, enabling researchers to construct individual-level panel data spanning over 20 years. Furthermore, the survey offers comprehensive information on individuals' (and households') demographic characteristics and labor market outcomes, such as their employment, work status, income (and revenue for self-employed workers), and industry characteristics.

Another benefit of the KLIPS is that it provides the work history of each individual in the survey, enabling the tracking of job transitions. Exploiting work history data combined with individual data and household data from the first to the twenty-third waves (which correspond to the years 1998 to 2020), I construct individual-job level data for self-employed workers aged 15 to 64 who were self-employed in a business in 2000 or later. Employers with 50 or more employees are excluded because the main interest of this paper is small businesses. Given that individuals may hold multiple jobs simultaneously, only the primary job reported at least once by the respondent is included in the analysis data. Therefore, in cases where two or more primary jobs are observed simultaneously, all primary jobs are included in the sample.³ Given the need here to identify self-employed workers' career transitions in subsequent years after their businesses close, the most recent observations in the survey year 2020 are excluded from the analysis. See Table A1 for details pertaining to the sample construction process.

The descriptive statistics of the sample are presented in Table 2. The dataset comprises a total of 2,928 individual-job observations. When self-employed workers are grouped according to whether they have any employees, 1,981 are categorized as solo self-employed workers (i.e., having 0 employees) and 947 as employers with 1 or more employees. Both the annual revenue and monthly income of self-employed workers are positively correlated with having any employees; while the average annual revenue for the entire sample is approximately 89.3 million won, the revenue of solo self-employed workers averages about half of this, at approximately 49.3 million won. Regarding average monthly income, solo self-employed workers and employers have figures of 1.92 million won and 3.23 million, respectively.

When considering the demographic characteristics of self-employed workers, the proportion of women is 39% and the overall average age is 44. It appears that self-employed workers with a spouse or more family members are more likely to hire employees. In terms of education level, the proportion of those with a high school diploma or less is larger among solo self-employed workers (60%) than employers (46%). Conversely, the proportion of those with at least a college degree is smaller for those without any employees.

Regarding the distribution of industries, wholesale & retail trade (22%) and accommodation & food service activities (17%) account for the largest proportions, followed by education (9%), transportation & storage (8%) and manufacturing (7%). Compared to employers, solo self-employed workers take up a higher proportion in agriculture & forestry, wholesale & retail trade, transportation & storage, finance, as well as education. Conversely, among employers, there is a higher proportion in manufacturing, accommodation & food service activities, business services, and health & social welfare services compared to solo self-employed workers.

In the sample, there are 1,430 observations whose closures are observed once during the period of analysis. In the KLIPS work history questionnaire, respondents for which a job status change was observed were asked why they left/quit their jobs. Using this information, Table 3 summarizes the reasons behind the business closures of the self-employed workers in the sample according to their post-closure career

³There are relatively few individuals with multiple primary jobs; only seven individuals are observed in the sample here, which includes 2,928 individual-job observations.

TABLE 2—DESCRIPTIVE STATISTICS ACCORDING TO THE NUMBER OF EMPLOYEES

Variables	0 Employees		1 or More Employees		Total	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Annual Revenue (million won)	49.3	(110.1)	172.9	(349.5)	89.3	(225.9)
Monthly Income (million won)	1.92	(1.84)	3.23	(3.67)	2.34	(2.65)
Number of Employees	0.00	(0.00)	3.24	(4.45)	1.05	(2.95)
Female	0.42	(0.49)	0.34	(0.47)	0.39	(0.49)
Age	44.14	(10.36)	42.76	(9.10)	43.69	(9.99)
Spouse	0.76	(0.42)	0.82	(0.38)	0.78	(0.41)
Number of Family Members	3.29	(1.25)	3.49	(1.19)	3.36	(1.24)
Education Level						
high school diploma or less	0.60	(0.49)	0.46	(0.50)	0.56	(0.50)
associate degree	0.17	(0.38)	0.16	(0.37)	0.17	(0.38)
bachelor degree	0.20	(0.40)	0.35	(0.48)	0.25	(0.43)
master's degree or more	0.02	(0.15)	0.03	(0.16)	0.02	(0.15)
Industry						
manufacturing	0.05	(0.22)	0.10	(0.30)	0.07	(0.25)
agriculture & forestry	0.08	(0.27)	0.01	(0.12)	0.06	(0.23)
fishing	0.01	(0.08)	0.00	(0.05)	0.01	(0.07)
construction	0.05	(0.21)	0.05	(0.22)	0.05	(0.22)
wholesale & retail trade	0.23	(0.42)	0.18	(0.39)	0.22	(0.41)
accommodation & food services	0.13	(0.33)	0.27	(0.44)	0.17	(0.38)
transportation & storage	0.10	(0.30)	0.03	(0.16)	0.08	(0.26)
information & communication	0.01	(0.09)	0.01	(0.09)	0.01	(0.09)
finance	0.05	(0.21)	0.01	(0.10)	0.03	(0.18)
real estate activities	0.04	(0.20)	0.03	(0.18)	0.04	(0.19)
business services	0.04	(0.19)	0.07	(0.26)	0.05	(0.22)
education	0.10	(0.31)	0.06	(0.23)	0.09	(0.28)
health & social work activities	0.00	(0.06)	0.04	(0.20)	0.02	(0.13)
arts/sports/recreation services	0.03	(0.18)	0.05	(0.22)	0.04	(0.19)
other personal services	0.09	(0.28)	0.08	(0.27)	0.08	(0.28)
Observations	1,981		947		2,928	

Note: Standard deviations (S.D.) in parentheses. The sample is from the Korean Labor & Income Panel Survey (KLIPS). It includes self-employed workers who are aged 19 to 64 and run a business for a specific period between 2001 and 2019. There are 2,928 individual-job observations.

paths, revealing that these closures are mainly due to economic reasons: 59.09% result from a bankruptcy, low sales, low income, or a lack of work to be done. Family-related or personal reasons (17.2%) and searching for a better job (15.87%) are correspondingly the second and third most commonly cited reasons.

The reasons for closures are distributed differently across post-closure career paths. First, the share of the self-employed who close their original businesses to start a new business is largest among those who *actually* restart a business post closure (22.86%). This implies that a significant portion of closures could be voluntary, and this is more the case for those who restart new businesses after closing their old business. Second, the percentage citing economic reasons is greater for those who become an employee post closure than those on other career paths. This suggests that the decision to be an employee post closure is less likely to be voluntary.

TABLE 3—REASONS FOR BUSINESS CLOSURES

Reason for Leaving/Quitting Job	Restarting a Business	Post-closure Career Paths		Total
		Employee	Unemployment or Economic Inactivity	
<i>Economic Reasons</i>				
Bankruptcy, closing, or shutdown of the workplace	18 (4.52)	66 (11.58)	26 (5.63)	110 (7.69)
Lack of work to be done	53 (13.32)	101 (17.72)	46 (9.96)	200 (13.99)
Low sales	106 (26.63)	169 (29.65)	114 (24.68)	389 (27.20)
Low income	37 (9.30)	60 (10.53)	49 (10.61)	146 (10.21)
<i>Searching for a Better Job</i>				
To start a new business	91 (22.86)	16 (2.81)	13 (2.81)	120 (8.39)
Left for a better job	41 (10.30)	58 (10.18)	8 (1.73)	107 (7.48)
<i>Working Conditions, Skill Match, or Future Prospect</i>				
Temporary work/no future prospect	3 (0.75)	18 (3.16)	6 (1.30)	27 (1.89)
Not matched with ability, knowledge, or skill	2 (0.50)	10 (1.75)	4 (0.87)	16 (1.12)
Undesirable work hours or working conditions	7 (1.76)	8 (1.40)	7 (1.52)	22 (1.54)
<i>Family-Related or Personal Reasons</i>				
Family-related reasons such as marriage, nursing for family members, etc.	8 (2.01)	20 (3.51)	66 (14.29)	94 (6.57)
Health problems or old age	21 (5.28)	20 (3.51)	86 (18.61)	127 (8.88)
To study	1 (0.25)	8 (1.40)	13 (2.81)	22 (1.54)
Military service	1 (0.25)	1 (0.18)	1 (0.22)	3 (0.21)
<i>Other Reasons</i>				
	9 (2.26)	15 (2.63)	23 (4.98)	47 (3.29)
Total	398 (100.00)	570 (100.00)	462 (100.00)	1,430 (100.00)

Note: Frequencies and percentages (in parentheses) of each reason for closing a business. The sample comes from the Korean Labor & Income Panel Survey (KLIPS). Among the 2,928 individual-job observations in the sample of this study (see Table 2), 1,430 observations were found to have ever closed their business.

Last, the share of closures due to family-related or personal reasons is larger for those who become unemployed or economically inactive after the closure compared to those who restart a business or become an employee.

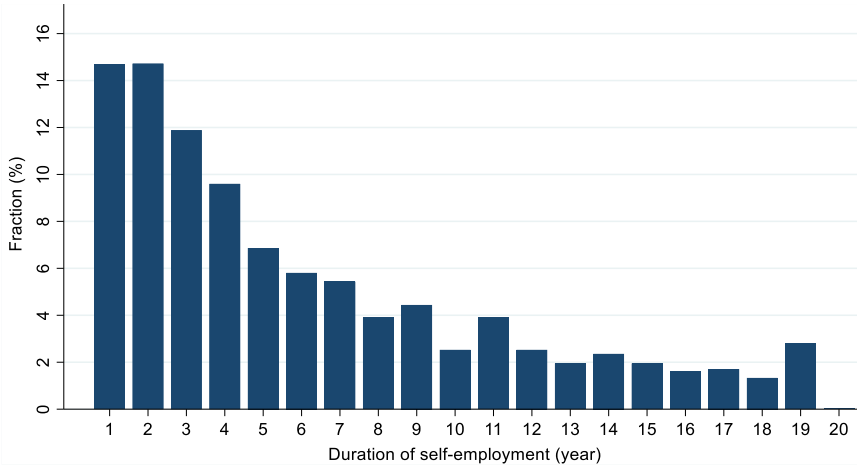


FIGURE 3 DISTRIBUTION OF SELF-EMPLOYMENT DURATIONS

Figure 3 illustrates the distribution of the duration of self-employed businesses in the sample. As is well known, the distribution is right-skewed: the duration for half of the self-employed workers (50.89%) is equal to or less than four years. This reflects the fact that many self-employed workers become unemployed within several years after starting a new business. However, it should be noted that the sample is not limited to self-employed workers who have ever closed their business but also includes those whose businesses are not yet closed: 51.16% of the sample (1,498 observations) is right-censored. Therefore, the results in Figure 3 should not be interpreted as the survival rate of self-employed businesses. Given the right-censored sample, I thus deploy a survival analysis model, as introduced in the next section.

IV. Estimation Model

In this analysis, I estimate a competing risks regression model, which simultaneously considers various post-closure career transition paths, in order to explore factors associated with closures and subsequent career transitions among self-employed workers. Unlike simple survival analysis models that focus solely on the business closure as the sole event of interest, this analysis considers three mutually exclusive post-unemployment job states—restarting a business, transitioning to wage employment, and unemployment or remaining out of the labor force—as pairwise disjoint competing events. Here I denote the duration of self-employment as a random variable T . Additionally, I represent the post-unemployment job state using a random variable, J , with possible values (events of interest) denoted as $j \in \{\text{restarting a business, wage employment, unemployment or remaining out of the labor force}\}$. The hazard of the sub-distribution for an individual competing event is defined as follows (Fine and Gray, 1999):

$$\lambda_j(t) \equiv \lim_{dt \rightarrow 0} \frac{P\{t \leq T < t + dt, J = j | T \geq t \text{ or } (T < t \text{ and } J \neq j)\}}{dt}$$

In other words, the sub-distribution hazard for an event of interest j at time t is the probability that event j occurs at time t for self-employed workers who have either continued their self-employment business up to time t or experienced another competitive event before time t .

Using the sub-distribution hazard defined above, the cumulative sub-hazard $\Lambda_j(t)$, the survival function $S_j(t)$, and the cumulative incidence estimator $CIF_j(t)$ for a specific event j can be derived as follows:

$$\begin{aligned}\Lambda_j(t) &= \int_0^t \lambda_j(u) du \\ S_j(t) &= e^{-\Lambda_j(t)} \\ CIF_j(t) &= 1 - S_j(t)\end{aligned}$$

The competing risks regression model to be estimated assumes the sub-hazard of a specific event as a function of both the baseline sub-hazard $\lambda_{0,j}(t, X_i)$ and the observable characteristics of self-employed workers:

$$\lambda_j(t, X_i) = \lambda_{0,j}(t) \exp(X_i \beta) = \lambda_{0,j}(t) \exp(\beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_K x_{Ki}),$$

where the baseline sub-hazard $\lambda_{0,j}(t)$ refers to the value that the sub-hazard takes when all characteristics of self-employed workers have a value of 0. Because the sub-hazard of a specific event of interest j is the product of the baseline sub-hazard and the exponential function $e^{X_i \beta}$, the value of the sub-hazard increases as the values of self-employed workers' characteristics increase.

To estimate the model, I exploit the semi-parametric approach proposed by Cox (1972), which does not parametrize the specific form of the baseline sub-hazard rate. While the parameters targeted for estimation are the coefficients of observable characteristics (β), I report the sub-hazard ratios (SHR), which are exponentiated coefficients, for ease of interpretation:

$$SHR_{k,j} \equiv \frac{\lambda_j(t, X_i | x_{ki} = \bar{x}_{ki} + 1)}{\lambda_j(t, X_i | x_{ki} = \bar{x}_{ki})} = \exp(\beta_k)$$

Given certain values of the characteristics of self-employed workers $\bar{X}_i = (\bar{x}_{1i}, \bar{x}_{2i}, \dots, \bar{x}_{Ki})$, the sub-hazard ratio of a characteristic for a specific event is defined as the ratio of the sub-distribution hazard when the value of that characteristic increases by one unit to the original sub-distribution hazard. Therefore, if the sub-hazard ratio is greater than 1, it indicates a positive correlation between that characteristic and the probability of the event. If it is less than 1, it indicates a negative correlation.

It should be noted that the sub-hazard ratio is not for comparisons between different competing events. For example, if the sub-hazard ratio $SHR_{k,j}$ takes a value of 1.05, it means that the probability that event j occurs increases by 5% when characteristic x_k increases by one unit. This does not mean that the probability of event j increases (or decreases) compared to the other competing events.

V. Empirical Results

A. Main Results

Figure 4 displays the cumulative incidence of each competing risk: being an employee, starting a new business, and being unemployed or remaining out of the labor force. For each post-closure career path, the cumulative probability that a self-employed worker will close his/her business increases steadily over the age of the business, but this rate slows down over time. Among the post-closure career paths, self-employed workers are more likely to choose to be an employee than take one of the other paths; the probability of closing the business and then becoming an employee within five company years is about 12.07%. The probabilities are similar between the other two competing risks; the probabilities of starting a new business and being unemployed or economically inactive are approximately 7.43% and 8.33%, respectively.

Table 4 presents the estimated results of the competing risks regression model. The first two rows examine the sizes of self-employed businesses in terms of their annual revenue and monthly income, respectively. When the annual revenue increases by one million won, the probability of closing an existing business and

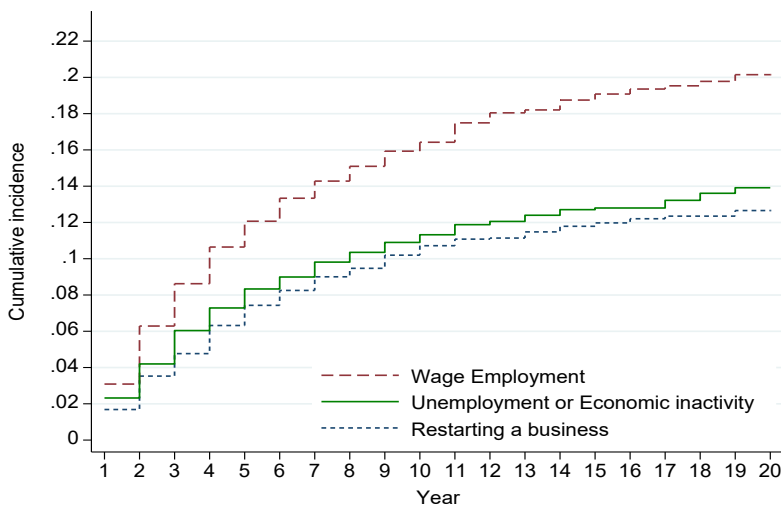


FIGURE 4. CUMULATIVE INCIDENCES OF CAREER PATHS OF SELF-EMPLOYED WORKERS POST-CLOSURE

Note: Cumulative incidence of each competing risk (i.e., career paths after closure) of self-employed workers.

TABLE 4—COMPETING RISKS REGRESSIONS BY POST-CLOSURE CAREER PATH

Variables	Post-Closure Career Paths					
	Restarting a Business		Employee		Unemployment or Economic Inactivity	
	SHR	(S.E.)	SHR	(S.E.)	SHR	(S.E.)
Annual Revenue (million won)	1.002	(0.002)	0.991**	(0.004)	1.000	(0.003)
Monthly Income (million won)	1.010	(0.044)	0.954***	(0.014)	0.958**	(0.017)
Number of Employees						
one or two employees	1.199	(0.152)	0.933	(0.103)	0.653***	(0.083)
three or more employees	1.217	(0.222)	0.829	(0.125)	0.838	(0.144)
Female	0.893	(0.111)	0.784**	(0.077)	2.364***	(0.270)
Age	0.982***	(0.006)	0.973***	(0.005)	1.009	(0.006)
Spouse	0.870	(0.129)	0.759***	(0.079)	1.052	(0.138)
Number of Family Members	1.042	(0.046)	0.981	(0.035)	1.022	(0.043)
Education Level						
associate's degree	0.885	(0.144)	1.159	(0.143)	1.003	(0.157)
bachelor's degree	1.225	(0.169)	1.067	(0.128)	1.143	(0.160)
master's degree or more	0.779	(0.363)	1.231	(0.344)	1.500	(0.422)
Industry						
agriculture & forestry	1.090	(0.415)	0.600	(0.192)	1.375	(0.455)
fishing	0.728	(0.765)	1.434	(0.798)	0.476	(0.512)
construction	1.593	(0.521)	1.305	(0.320)	1.014	(0.375)
wholesale & retail trade	1.987**	(0.527)	1.168	(0.230)	1.461	(0.360)
accommodation & food services	2.362***	(0.636)	1.247	(0.260)	1.809**	(0.451)
transportation & storage	1.557	(0.497)	0.611*	(0.165)	1.219	(0.399)
information & communication	1.381	(0.834)	1.393	(0.508)	1.362	(0.792)
finance	3.699***	(1.218)	1.078	(0.310)	1.070	(0.371)
real estate activities	2.513***	(0.892)	0.718	(0.234)	2.077**	(0.641)
business services	0.697	(0.296)	1.017	(0.268)	1.209	(0.418)
education	0.959	(0.323)	0.909	(0.212)	1.862**	(0.495)
health & social work activities	1.498	(0.721)	1.572	(0.532)	0.596	(0.384)
arts/sports/recreation services	2.268***	(0.702)	1.300	(0.336)	1.623	(0.528)
other personal services	1.549	(0.480)	0.860	(0.206)	1.559	(0.431)
Regional & Year Fixed Effects						
Observations	Y		Y		Y	
	2,928		2,928		2,928	
Chi-Squared Statistics (D.F.=59)	222.07***		1288.88***		689.30***	

Note: The outcome variable is the duration of a self-employed business. SHR indicates the sub-hazard ratio. Standard errors (S.E.) in parentheses. D.F. indicates degrees of freedom. The sample includes self-employed workers aged 19 to 64 and who run a business for a specific period between 2001 and 2019. There are 2,928 individual-job observations. Number of employees, female, spouse, education level, and industries are indicators. The reference group for the indicators are zero employees, male, no spouse, a high school diploma or less, and manufacturing, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

transitioning to wage employment decreases by 0.9%, whereas the probabilities of the other post-closure career paths do not change by statistically significant amounts. These results imply that self-employed workers with larger revenue amounts are less likely to be an employee after an incidence of closure.

Compared to annual revenue, monthly income is a factor more closely associated with post-closure career paths of the self-employed. A one million won increase in monthly income is associated with a 4.6% decrease in the probability of transitioning

to becoming an employee and a 4.2% decrease in the probability of remaining unemployed or economically inactive. On the other hand, the post-closure career path to restart a business is not significantly associated with monthly income.

Regarding the workforce size, employers with employees are less likely to become unemployed or economically inactive. Compared to self-employed workers without any employees, the probability of being unemployed or remaining out of the labor force decreases by 34.7% with one or two employees. Although the estimates of the coefficients for the indicators of having any employees are not statistically significant in the case of transitioning to a new business, their large magnitudes suggest that self-employed workers with larger businesses, in terms of the number of employees, are more likely to start another business – even after the closure.

The rows in Table 4 below denote the demographic characteristics of self-employed workers. Compared to male self-employed workers, female self-employed workers have a lower probability of transitioning to wage employment but show a much higher probability of becoming unemployed or economically inactive after a closure: the probability of being unemployed or economically inactive after a closure is 2.36 times higher for female self-employed workers than for their male counterparts. This may partly stem from the fact that the threshold for finding a job is higher for women, but it is also likely due to them having spouses who engage in income-generating activities. As the estimates show, self-employed workers with spouses are less likely to participate in the labor market after an incidence of closure compared to those without spouses. Age is another significant factor: being one year older is associated with a 1.8% decrease in the probability of restarting a business and a 2.7% decrease in the probability of being an employee. With regard to family size and education level, their associations with post-closure career paths are not statistically significant.

Furthermore, the post-closure career paths of the self-employed vary by industry. First, compared to the manufacturing sector, the probability of restarting a business is higher for those in wholesale & retail trade, accommodation & food services, finance, real estate activities, and arts/sports/recreation services. Next, the probability of choosing wage employment after a closure is significantly lower for those in transportation & storage. Last, the probability of transitioning to unemployment or becoming economically inactive after a closure is relatively high for those engaging in accommodation & food services, real estate activities, and educational services.

B. *Further Analyses*

A potential limitation of this study for policymakers of employment insurance for self-employed workers is that it does not identify the deliberateness of the closures observed in the data (i.e., whether a closure was due to voluntary or involuntary reasons). As insured workers are eligible for unemployment benefits only if they lose their jobs due to involuntary reasons (e.g. being dismissed), it would be more informative for policymakers if involuntary closures (unemployment) were observed.

To alleviate this concern, I implement two additional analyses. First, I re-estimate the competing risks regression model regarding the starting of a new business as a continuation of running a business so that there are only two competing risks:

(i) wage employment and (ii) unemployment or remaining out of the labor force. Arguably, the transition to starting a new business is more likely to be a voluntary decision compared to the transition to wage employment or to being unemployed. The reasons for closures in the sample (Table 3) support this assumption.

The results reported in Table 5 are quantitatively and qualitatively similar to the estimates in Table 4. Although the magnitudes of most estimates are quite similar, several significant differences are observed in industry dummies. Compared to their counterparts in manufacturing, self-employed workers in accommodation & food services are more likely to become an employee after closing their business. Similarly, self-employed workers engaged in wholesale & retail trade, arts/sports/recreation services, and other personal services are more likely to become unemployed or economically inactive. The cumulative incidences of competing risks displayed in Figure A1 are also quite similar to those in Figure 4.

Second, I document quitting self-employment due to economic reasons to proxy an involuntary closure. More specifically, only closures resulting from economic reasons (in Table 3) are regarded as an event (i.e., failure), while other closures due to non-economic reasons (which are arguably more voluntary closures) are regarded as survived cases. There are two justifications for this: first, in reality, a closure due to economic reasons is highly likely to be involuntary, and second, for self-employed workers, economic reasons such as significant declines in revenue are a core eligibility requirement for receiving unemployment benefits. Although closures due to economic reasons in the data are not an exact measure of eligibility requirements for unemployment benefit, documenting such closures would help to clarify which self-employed workers could be covered by employment insurance.

Figure A2 illustrates the cumulative incidences of career paths after a closure due to economic reasons. Compared to the results in Figure 4, the probability of a closure is lower for every career path, but this is much more the case for the paths of starting a new business and being unemployed or remaining out of the labor force, which suggests that the share of closures due to non-economic reasons is larger for these two paths than for the path of becoming an employee (Table 3).

Despite such a stark difference in the cumulative incidences, the estimation results shown in Table 6 are not much different from the main results in Table 4 in a qualitative sense. The only economically significant difference is found in monthly income. While it is not a significant factor in the path to restart a business after a closure in Table 4, it becomes significantly correlated with the probability of the career path when only closures due to economic reasons are considered: a one million won increase in monthly income is associated with a 4.4% decrease in the probability of starting a new business after a closure. This result implies that income is a factor closely associated with involuntary closures due to economic reasons.

TABLE 5—COMPETING RISKS REGRESSIONS BY POST-CLOSURE CAREER PATH
WITHOUT RESTARTING A BUSINESS

Variables	Post-Closure Career Paths			
	Employee		Unemployment or Economic Inactivity	
	SHR	(S.E.)	SHR	(S.E.)
Annual Revenue (million won)	0.992**	(0.003)	1.001	(0.003)
Monthly Income (million won)	0.936***	(0.014)	0.936***	(0.017)
Number of Employees				
one or two employees	0.926	(0.102)	0.666***	(0.084)
three or more employees	0.844	(0.128)	0.845	(0.145)
Female	0.778**	(0.076)	2.398***	(0.274)
Age	0.971***	(0.005)	1.007	(0.006)
Spouse	0.750***	(0.079)	1.052	(0.139)
Number of Family Members	0.981	(0.034)	1.016	(0.043)
Education Level				
associate's degree	1.168	(0.145)	0.990	(0.156)
bachelor's degree	1.112	(0.131)	1.169	(0.162)
master's degree or more	1.185	(0.332)	1.425	(0.408)
Industry				
agriculture & forestry	0.613	(0.198)	1.374	(0.458)
fishing	1.430	(0.793)	0.469	(0.505)
construction	1.408	(0.347)	1.092	(0.405)
wholesale & retail trade	1.278	(0.254)	1.596*	(0.396)
accommodation & food services	1.427*	(0.300)	2.070***	(0.519)
transportation & storage	0.651	(0.177)	1.291	(0.426)
information & communication	1.541	(0.556)	1.440	(0.833)
finance	1.321	(0.375)	1.240	(0.433)
real estate activities	0.832	(0.263)	2.561***	(0.799)
business services	1.004	(0.267)	1.205	(0.421)
education	0.917	(0.216)	1.899**	(0.511)
health & social work activities	1.705	(0.579)	0.637	(0.411)
arts/sports/recreation services	1.430	(0.374)	1.813*	(0.589)
other personal services	0.911	(0.218)	1.622*	(0.451)
Regional & Year Fixed Effects		Y	Y	
Observations		2,928	2,928	
Chi-Squared Statistics (D.F.=59)		987.05***	612.79***	

Note: The outcome variable is the duration of a self-employed business. SHR indicates the sub-hazard ratio. Standard errors (S.E.) in parentheses. D.F. indicates degrees of freedom. The sample includes self-employed workers aged 19 to 64 and who run a business for a specific period between 2001 and 2019. There are 2,928 individual-job observations. Number of employees, female, spouse, education level, and industries are indicators. The reference group for the indicators are zero employees, male, no spouse, a high school diploma or less, and manufacturing, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

TABLE 6—COMPETING RISKS REGRESSIONS BY POST-CLOSURE CAREER PATH
FOR CLOSURES DUE TO ECONOMIC REASONS

Variables	Post-closure Career Paths					
	Restarting a Business		Employee		Unemployment or Economic Inactivity	
	SHR	(S.E.)	SHR	(S.E.)	SHR	(S.E.)
Annual Revenue (million won)	1.000	(0.003)	0.993*	(0.004)	0.997	(0.006)
Monthly Income (million won)	0.956**	(0.018)	0.945***	(0.015)	0.955**	(0.020)
Number of Employees						
one or two employees	1.117	(0.211)	0.982	(0.128)	0.651**	(0.118)
three or more employees	1.271	(0.306)	0.749	(0.136)	0.770	(0.200)
Female	0.867	(0.140)	0.689***	(0.086)	1.681***	(0.249)
Age	0.985*	(0.009)	0.980***	(0.006)	1.016*	(0.008)
Spouse	0.740	(0.152)	0.779*	(0.102)	0.786	(0.147)
Number of Family Members	1.015	(0.063)	0.980	(0.042)	1.082	(0.065)
Education Level						
associate's degree	0.833	(0.191)	1.119	(0.170)	0.952	(0.219)
bachelor's degree	0.941	(0.184)	1.029	(0.148)	1.031	(0.200)
master's degree or more	0.840	(0.498)	0.955	(0.396)	1.940	(0.793)
Industry						
agriculture & forestry	1.220	(0.628)	0.274***	(0.119)	0.697	(0.326)
construction	1.648	(0.751)	1.213	(0.318)	0.685	(0.326)
wholesale & retail trade	1.910*	(0.696)	1.006	(0.211)	1.422	(0.419)
accommodation & food services	2.281**	(0.835)	1.050	(0.238)	1.621	(0.499)
transportation & storage	0.987	(0.482)	0.436***	(0.133)	0.295**	(0.172)
finance	1.911	(0.945)	0.940	(0.313)	0.888	(0.420)
real estate activities	3.048**	(1.338)	0.674	(0.239)	2.392**	(0.879)
business services	0.310	(0.240)	0.953	(0.273)	0.687	(0.344)
education	0.749	(0.378)	0.589*	(0.176)	0.860	(0.322)
arts/sports/recreation services	2.180*	(0.956)	1.063	(0.306)	1.133	(0.485)
other personal services	1.426	(0.615)	0.534**	(0.151)	0.958	(0.355)
Regional & Year Fixed Effects						
Observations	Y		Y		Y	
Chi-Squared Statistics (D.F.=59)	2,928		2,928		2,928	
	7662.25***		1071.31***		12034.20***	

Note: The outcome variable is the duration of a self-employed business. SHR indicates the sub-hazard ratio. Standard errors (S.E.) in parentheses. D.F. indicates degrees of freedom. The sample includes self-employed workers aged 19 to 64 and who run a business for a specific period between 2001 and 2019. There are 2,928 individual-job observations. Number of employees, female, spouse, education level, and industries are indicators. The reference group for the indicators are zero employees, male, no spouse, a high school diploma or less, and manufacturing, respectively. Estimates for the following industries with few observations are not reported: fishing, information & communication, and health & social work activities. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

C. Heterogeneity by Business Size

Because the economic and demographic characteristics of self-employed workers vary depending on whether or not they have employees (as shown in Table 2), it is important to examine whether the associations between these characteristics and their post-closure career paths also differ based on whether they have any employees. The competing risks regression analysis presented in Table 4 is replicated for self-employed workers without any employees (Table 7) and for those with employees (Table 8).

TABLE 7—COMPETING RISKS REGRESSIONS BY POST-CLOSURE CAREER PATH, SOLO SELF-EMPLOYMENT

Variables	Post-closure Career Paths					
	Restarting a Business		Wage Employment		Unemployment or Economic Inactivity	
	SHR	(S.E.)	SHR	(S.E.)	SHR	(S.E.)
Annual Revenue (million won)	1.007***	(0.002)	0.992	(0.005)	0.999	(0.010)
Monthly Income (million won)	1.006	(0.037)	0.902**	(0.039)	0.843***	(0.041)
Female	0.914	(0.138)	0.749**	(0.092)	2.229***	(0.306)
Age	0.973***	(0.008)	0.971***	(0.006)	1.006	(0.007)
Spouse	0.823	(0.152)	0.843	(0.106)	1.053	(0.157)
Number of Family Members	1.083	(0.061)	0.977	(0.041)	1.042	(0.051)
Education Level						
associate's degree	0.848	(0.168)	1.236	(0.179)	0.892	(0.159)
bachelor's degree	1.171	(0.195)	1.124	(0.167)	1.048	(0.176)
master's degree or more	0.421	(0.304)	0.864	(0.312)	1.549	(0.476)
Industry						
agriculture & forestry	1.036	(0.466)	0.495*	(0.178)	1.162	(0.425)
fishing	0.727	(0.819)	1.148	(0.681)	0.419	(0.459)
construction	1.469	(0.618)	0.927	(0.290)	0.847	(0.382)
wholesale & retail trade	1.587	(0.545)	1.109	(0.266)	1.292	(0.372)
accommodation & food services	2.066*	(0.771)	1.256	(0.328)	1.506	(0.457)
transportation & storage	1.133	(0.441)	0.603	(0.187)	1.125	(0.413)
information & communication	0.971	(0.721)	1.452	(0.640)	0.971	(0.670)
finance	2.641**	(1.020)	1.145	(0.372)	0.938	(0.364)
real estate activities	2.018	(0.909)	0.855	(0.313)	2.588***	(0.903)
business services	0.249*	(0.185)	0.998	(0.341)	1.058	(0.471)
education	0.594	(0.264)	0.971	(0.270)	1.694*	(0.522)
health & social work activities	2.618	(2.757)	2.027	(1.082)	1.706	(1.717)
arts/sports/recreation services	1.925	(0.828)	0.900	(0.331)	1.089	(0.476)
other personal services	1.082	(0.443)	0.873	(0.247)	1.291	(0.425)
Regional & Year Fixed Effects						
Observations	Y		Y		Y	
	1,981		1,981		1,981	
Chi-Squared Statistics (degree of freedom=57)	796.33***		805.69***		2045.71***	

Note: The outcome variable is the duration of a self-employed business. SHR indicates the sub-hazard ratio. Standard errors (S.E.) in parentheses. D.F. indicates degrees of freedom. The sample includes solo self-employed workers aged 19 to 64 and who run a business for a specific period between 2001 and 2019. There are 1,981 individual-job observations. Number of employees, female, spouse, education level, and industries are indicators. The reference group for the indicators are zero employees, male, no spouse, a high school diploma or less, and manufacturing, respectively. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

A comparison between the estimates in the two tables reveals that the results are qualitatively similar between the two groups, both in terms of economic and demographic characteristics. Although some estimates are not precise enough to be statistically significant, their magnitudes imply that higher revenue levels or incomes are positively correlated with restarting a business but negatively correlated with being an employee or being unemployed or remaining out of the labor force. Such correlations are stronger for solo self-employed workers than for employers. Demographic characteristics are also significant factors. Female or older self-employed workers are less likely to restart a business or to be an employee but more

TABLE 8—COMPETING RISKS REGRESSIONS BY POST-CLOSURE CAREER PATH, SELF-EMPLOYMENT WITH EMPLOYEES

Variables	Post-closure Career Paths					
	Restarting a Business		Wage Employment		Unemployment or Economic Inactivity	
	SHR	(S.E.)	SHR	(S.E.)	SHR	(S.E.)
Annual Revenue (million won)	1.000	(0.004)	0.991**	(0.004)	1.001	(0.002)
Monthly Income (million won)	1.011	(0.075)	0.957**	(0.018)	0.965	(0.022)
Three or More Employees	1.032	(0.200)	0.844	(0.151)	1.368	(0.304)
Female	0.818	(0.172)	0.697*	(0.133)	2.211***	(0.528)
Age	0.997	(0.010)	0.981*	(0.011)	1.012	(0.014)
Spouse	0.973	(0.265)	0.657**	(0.134)	1.165	(0.344)
Number of Family Members	0.991	(0.072)	0.945	(0.067)	0.945	(0.082)
Education Level						
associate's degree	0.869	(0.267)	0.902	(0.225)	1.156	(0.429)
bachelor's degree	1.280	(0.291)	0.966	(0.195)	1.357	(0.352)
master's degree or more	1.805	(1.051)	1.619	(0.656)	1.445	(0.946)
Industry						
construction	1.751	(1.057)	2.758**	(1.116)	1.325	(0.883)
wholesale & retail trade	2.380*	(1.074)	1.378	(0.479)	2.130	(1.056)
accommodation & food services	2.904**	(1.220)	1.473	(0.524)	2.608**	(1.157)
transportation & storage	3.852**	(2.131)	0.587	(0.465)	0.898	(1.028)
information & communication	2.094	(2.117)	2.360	(1.692)	1.952	(2.380)
finance	4.278*	(3.451)	0.577	(0.586)	1.528	(1.539)
real estate activities	2.448	(1.571)	0.598	(0.428)	0.804	(0.822)
business services	1.208	(0.697)	1.129	(0.485)	1.701	(1.029)
education	1.845	(1.019)	0.603	(0.320)	1.793	(1.021)
health & social work activities	1.800	(1.155)	2.070	(1.023)	0.619	(0.546)
arts/sports/recreation services	2.277	(1.172)	2.334**	(0.911)	3.434**	(1.807)
other personal services	2.629*	(1.334)	0.735	(0.352)	2.075	(1.103)
Regional & Year Fixed Effects		Y	Y	Y	Y	Y
Observations		947	947	947	947	947
Chi-Squared statistics (degree of freedom=58)		6694.67***	1639.79***	5417.81***		

Note: The outcome variable is the duration of a self-employed business. SHR indicates the sub-hazard ratio. Standard errors (S.E.) in parentheses. D.F. indicates degrees of freedom. The sample includes self-employed workers (who have one or more employees) aged 19 to 64 and who run a business for a specific period between 2001 and 2019. There are 947 individual-job observations. Number of employees, female, spouse, education level, and industries are indicators. The reference group for the indicators are zero employees, male, no spouse, a high school diploma or less, and manufacturing, respectively. Estimates for the following industries with few observations are not reported: agriculture & forestry, and fishing. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

likely to be unemployed or economically inactive after a closure. Family size and education levels are statistically significant factors for neither solo self-employed workers nor employers.

On the other hand, several differences are observed between the two groups with regard to industry. For self-employed workers engaged in wholesale & retail trade, transportation & storage, and other personal services, the probability of starting a new business after a closure is much higher for employers, but this is not the case for those without any employees. While employers in construction or in arts/sports

/recreation services are positively associated with the post-closure path of entering wage employment, industry is not a significant factor for solo self-employed workers. Finally, the probability of unemployment or economic inactivity is significantly associated with real estate activities or education for solo self-employed workers, but for employers, this probability is more associated with accommodation & food services or arts/sports/recreation services.

VI. Conclusion

In this study, I explore the factors associated with business closures by self-employed workers and the subsequent job transition paths of such individuals, using data from the Korean Labor Panel & Income Survey. The empirical results reveal that the risk of closure and the subsequent career paths for self-employed workers are correlated with various factors, including the business size in terms of revenue and income, as well as demographic factors such as gender and age, and industry.

The empirical findings of this study provide several policy implications. First, it is necessary to use income to determine eligibility for unemployment benefits for the self-employed. In the current employment insurance system for self-employed workers, revenue is used to determine the inevitability of unemployment (business closure) because there is no administrative system in place to assess the business income of self-employed workers accurately. My results suggest that the factor most closely associated with closure and post-closure career paths of the self-employed is income rather than revenue (Table 4). This is more the case for closures due to economic reasons (therefore arguably more involuntary) and for solo self-employed workers (Tables 6 and 7), whose business size is generally small.

Next, with reference to the characteristics of self-employed workers, the elderly are relatively less likely to close their businesses. This suggests that they have a high tendency to maintain their business for livelihood purposes. Consequently, it appears to be feasible to set support targets based on demographic characteristics and consider complementary policy support methods, such as but not limited to providing subsidies for employment insurance premiums.

Last, this study finds that post-closure transition paths also vary by industry. Industries such as wholesale & retail trade, accommodation & food services, finance, real estate activities, and arts/sports/recreation-related services have relatively higher closure risk levels. If a phased expansion of employment insurance for the self-employed is considered by policymakers, the aforementioned industries could be prioritized, given their strong demand for an employment safety net.

APPENDIX

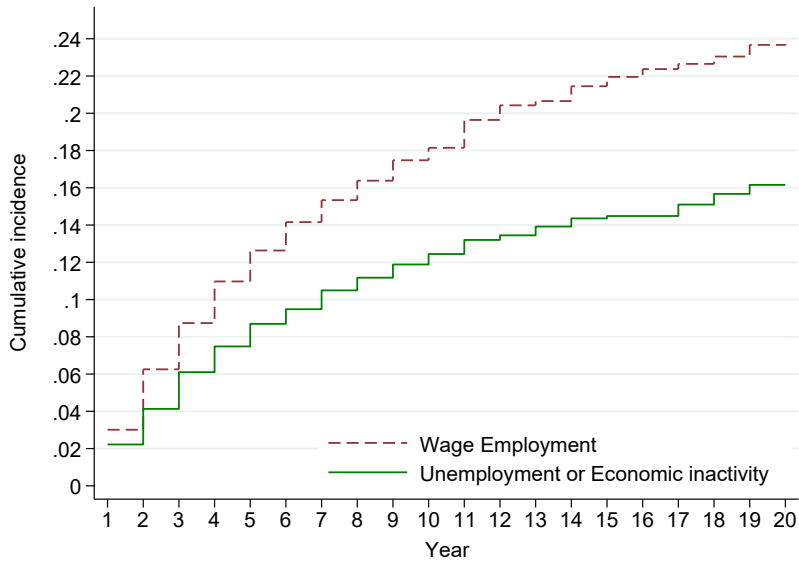


FIGURE A1. CUMULATIVE INCIDENCES OF CAREER PATHS OF SELF-EMPLOYED WORKERS AFTER A CLOSURE WITHOUT RESTARTING A BUSINESS

Note: Cumulative incidence of each competing risk (i.e., career paths after closure) of self-employed workers.



FIGURE A2. CUMULATIVE INCIDENCES OF CAREER PATHS OF SELF-EMPLOYED WORKERS AFTER A CLOSURE DUE TO ECONOMIC REASONS

Note: Cumulative incidence of each competing risk (i.e., career paths after closure) of self-employed workers.

TABLE A1—SAMPLE SELECTION CRITERIA AND SAMPLE SIZE

Step	Description	Remaining Observations
1. Raw data	<ul style="list-style-type: none"> Use the twenty-third wave (year 2020) of the KLIPS work history data: 28,230 individuals, 244,560 observations. The work history data are merged with the individual data and household data from the first to the twenty-third waves (1998-2020). 	244,560
2. Individual-job-year level panel data	<ul style="list-style-type: none"> Remove observations from retrospective responses. Remove persons with missing values in variables, such as but not limited to status in employment and start/end year of a job. Include only primary jobs: jobs reported as a primary job at least once. 	149,667
3. Sample selection	<ul style="list-style-type: none"> Include only jobs started later than 1999 and earlier than 2020. Remove observations with missing values in annual revenue, monthly income, or industry. Remove observations with industries with a small sample size: (1) electricity, gas, steam and air conditioning supply; (2) goods-and services-producing activities of private households for their own use. Include self-employers aged 15 to 64 who have 50 or fewer employees, with a business survived at least one year. 	11,971
4. Individual-job level data aligns with the estimation model	<ul style="list-style-type: none"> Include only the initial observation of each individual-job pair so that the sample aligns with the competing risks regression model in Section IV where observable characteristics are time-invariant. 	2,928

Note: The variables from the work history data include the start/end year, status in employment, industry, annual revenue, monthly income, and the number of employees (if any). The variables from the individual data include gender, age, education level, marriage, region of residence, and region of business. The variable from the household data is the number of household members.

REFERENCES

- Ahn, Joyup and Jaimie Sung.** 2003. "An Empirical Study on the Duration of Self-employment," *Korean Journal of Labor Economics*, 26(2): 1-30 (in Korean).
- Choi, Whayoung.** 2018. "A Study on the Factors Affecting Job Separation by Middle and Old aged Self-Employed using KLoSA Panel," *The Journal of Vocational Education Research*, 37(1): 119-138 (in Korean).
- Cox, David R.** 1972. "Regression Models and Life-Tables (with discussion)," *Journal of the Royal Statistical Society. Series B (Methodological)*, 34(2): 187-220.
- Fine, Jason P. and Robert J. Gray.** 1999. "A Proportional Hazards Model for the Subdistribution of a Competing Risk," *Journal of the American Statistical Association*, 94(446): 496-509.
- ILO and OECD.** 2020. "Ensuring better Social Protection for Self-employed Workers."
- Korea Labor Institute,** Korean Labor & Income Panel Survey.
- Lee, Jinkook, Joseph Han, Jiwoon Kim, Yoonhae Oh, Meeroo Kim, and Joonhyung Bae.** 2020. *Study on Self-Employment and Policy Suggestions*, Policy Study 2020-06, Korea Development Institute (in Korean).
- Lee, Youngwook, Junghyun Kwon, Joseph Han, and Yoonsoo Park.** 2021. *Redesigning Safety Nets as a Response to New Challenges*, Policy Study 2021-02, Korea Development Institute (in Korean).
- Lim, Sung-Hee and Jin-ok Kim.** 2021. "Survival Analysis of Private Start-up Businesses," *Journal of the Korean Official Statistics*, 26(2): 1-30 (in Korean).
- Moon, Sanggyun and Sae Jung Park.** 2020. "A Study on Determinants of the Elderly's Self-employment Exits - Focusing on why they exit from their owned business," *Korean Journal of Labor Economics*, 43(3): 1-31 (in Korean).
- Nam, Yunmi.** 2017. "Analysis on the Determinants of Exit of Self-Employed Businesses in Korea," Bank of Korea WP 2017-5 (in Korean).
- OECD.** 2018. *Towards Better Social and Employment Security in Korea, Connecting People with Jobs*, OECD Publishing, Paris.
- OECD.** 2022. *OECD Economic Surveys: Korea 2022*, OECD Publishing, Paris.
- Schoukens, Paul and Enzo Weber.** 2020. "Unemployment Insurance for the Self-employed: A Way Forward Post-Corona," IAB-Discussion Paper 32.
- Statistics Korea,** The Economically Active Population Survey.

LITERATURE IN KOREAN

- 남윤미. 2017. 「국내 자영업의 폐업을 결정요인 분석」, BOK 경제연구 제2017-5.
- 문상균·박세정. 2020. 「중고령층 자영업 이탈요인 분석: 자영업 이탈 이유를 중심으로」, 『노동경제논집』, 43(3): 1-31.
- 안주엽·성지미. 2003. 「자영업 지속기간의 결정요인」, 『노동경제논집』, 26(2): 1-30.
- 이영욱·권정현·한요셉·박운수. 2021. 『새로운 위험에 대응한 사회안전망 구축』, 연구보고서 2021-02, 한국개발연구원.
- 이진국·한요셉·김지운·오윤해·김미루·배준형. 2020. 『자영업에 관한 종합적 분석과 정책제언』, 연구보고서 2020-06, 한국개발연구원.
- 임성희·김진욱. 2021. 「개인 창업사업체 생존분석: 2010~2018 행정데이터를 중심으로」, 『통계연구』, 26(2): 1-30.
- 최화영. 2018. 「고령화연구조사(KLoSA) 패널을 활용한 중고령 자영업자의 일자리 이탈 요인에 관한 연구」, 『직업교육연구』, 37(1): 119-138.
- 통계청, 「경제활동인구조사」, 각년도.
- 한국노동연구원, 「한국노동패널조사」, 각년도.