Changing Industrial Structure and Economic Activity of Older Males in Korea: 1980-2000

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This article examines how long-term changes in the industrial structure in Korea affected the economic activity of older males. The structural shift in industry between 1980 and 2000 greatly lowered the average labor market survival rate, a measure of employment stability, for male workers aged 55 and older. In particular, the relative decline of the agricultural sector fully explains the observed impact of the sectoral shift on the employment of the elderly. The labor force participation rate of older men would have been much higher if the percentage of the labor force employed in agriculture had remained unchanged since 1980. It is estimated that the shrinkage of agriculture explains 84% of the actual decline in the labor force partici- pation rate of men aged 55 to 69 between 1985 and 2000. These results suggest that changing industrial structure, especially the decline in agriculture, could produce a further decline in the labor market activity of older men in the near future. It also points out the limitations of the recent government labor-market policies to boost the employment of older workers, because it is highly difficult, and sometimes undesirable, to alter the course of long-term structural economic changes that diminish the economic activity of the elderly.

Keywords: Aging, Employment, Industrial Structure, Retirement

JEL Classification: J11, J26, J3

I. Introduction

Population aging is one of the most important economic and social issues in many countries today. Owing to the fall in the fertility rate and the rise in life expectancy, the proportion of older persons among the population at large greatly increased in the majority of nations, especially over the last several decades. Korea, too, is currently transforming to an aged society at an astonishing speed. The percentage of the population aged 65 and older in Korea increased from 5.8% in 1980 to 7.9% in 2002, and is projected to reach 20% by 2026. It is feared that the rapid aging of the population will bring adverse economic impacts in the future, such as diminished productivity, labor shortage, and serious financial pressure on various social insurance programs.

Along with the aging of the population, the decline in the labor force participation rate (referred to as the LFPR, hereafter) among the elderly population is another most remarkable demographic change that many developed countries have experienced during the last several decades. In the countries that industrialized first, the long-term decrease in labor market activity of the male elderly began even earlier. In the U.S., nearly four out of five men aged 65 and older were gainfully employed in 1880. Today, less than 20% of males at those ages participate in the labor market.[1] Similar time trends in the LFPR of older men are observed for Great Britain and Germany for the same period (Costa 1998).

Early retirement, defined as leaving the labor force permanently before reaching age 65, also became common in most OECD countries over the last four decades. In Germany, Belgium, the Netherlands, and France, the LFPR of men aged 60 to 64 fell from over 70% in the 1960s to around 20 to 30% in 1995. Other countries such as the U.S., Sweden, Spain, and Italy experienced a relatively modest but still substantial rise in early retirement during the same period. Japan is an exception among the OECD countries, showing a stable LFPR for men aged 60 to 64 over time (Gruber and Wise 1999).

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[1] For discussions of the long-term trend in the labor force participation rate of older males prior to 1940, see Durand (1948), Long (1958), Moen (1987), Margo (1993), Carter and Sutch (1996), and Lee (1998b).

As the increase in the relative size of the aged population has accelerated, this changing retirement behavior has become a major social issue in developed countries. It is feared that the fall in the labor market activity of this growing age group will aggravate the problems anticipated to arise from population aging such as labor shortages and financial pressure on pension funds.[2] A key policy measure proposed in response to the potential labor-market problems associated with the aging of society is to boost the employment of older workers. A better understanding of the labor market behavior of older individuals will provide a useful basis for making effective policies.

Naturally, the causes of the secular decline in the LFPR of older men have attracted attention from many economists in recent years. The economics literature so far has focused mainly on the effects of supply-side factors, especially the implementation and expansion of social insurance programs such as Social Security. Unfortunately, the results of these studies are greatly mixed (Boskin 1977; Parsons 1980, 1991; Hurd and Boskin 1984; Krueger and Pischke 1992; Lee 1998a; Gruber and Wise 1999, 2004; and Krueger and Myer 2002). Only a few studies have examined the retirement effects of demand-side changes, such as shifts in the industrial structure, job characteristics, and technology (Greabner 1980; Hurd and McGarry 1993; Friedberg 2001; and Lee 2002, 2004a, 2005). These studies have suggested that the sectoral shift and the spread of new managerial as well as production technologies did have strong impacts on the labor-market status and the timing of retirement of older workers.

In Korea, research on the labor-market status of older persons has been growing over the last decade, reflecting the rising interest in the economic impacts of population aging. Huh and Juhn (1998) have provided the LFPR of males aged 55 to 64 from 1980 through 1996, and suggested that the economic activity of aged men was influenced by business cycle to some extent. Chang (2002) has reported that the average retirement age of Korean males increased by two years from 1987 to 1997, before it began to decrease after the Financial Crisis in 1998. Her study also analyzed the

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[2]According to the estimate of Lee (2001), the expected length of male retirement in the U.S. has increased by seven-fold since 1850, representing up to 30% of the remaining life of the current labor-market cohort.

determining factors of retirement based on data from the *2000-1 Korea Labor Institute Panel Survey* (KLIPS). According to the results, the odds of retirement were associated negatively with health and educational attainment, and positively with real estate wealth. Recent studies, especially those based on the KLIPS data, provide useful information on for how older Korean workers exit the labor market. Since the data only cover the years after 1997, however, it is difficult to determine whether the results can be viewed as part of a long-term tendency. Furthermore, recent studies based on micro panel data, such as KLIPS, are subject to limitations arising from the relatively small sample size of the elderly population.

Lee (2004b) has recently estimated the LFPR of older males in Korea from 1955 through 2000, and analyzed the effects of several determining factors on labor-force participation decisions at older ages, based on the 2% micro samples of the 1980-2000 censuses. This study found that the LFPR of men aged 60 and older in Korea increased substantially from the mid-1960s to the late-1990s. This pattern is in sharp contrast to the historical experiences of most other OECD countries, where the LFPR of older males declined rapidly over the last century. The rise in the LFPR of older males in Korea between 1965 and 1995 was largely explained by the dramatic increase in the labor-market activity of the rural elderly population. The results of regression analyses suggest that the acceleration of population aging in rural areas, due to the selective out-migration of younger persons, was the major cause of the sharp increase in the LFPR of older males.

The purpose of this study is to investigate how long-term changes in the industrial structure in Korea affected the economic activity of older males. As noted above, the existing literature is concerned largely with the issue of how individual characteristics, such as age, education, and place of residence, affected retirement decisions. The influences of demand-side factors, such as changing industrial structure, have not been investigated yet. It is well known that the employment status of older workers differs by industry. Such differences are in part attributed to differences in hours and intensity of work, work environment, employment relationship, and human capital requirements across industry, stemming from disparities in production technology and industry-specific labor market conditions. For instance, the self-employed, such as farmers, tend to remain in the labor force longer because

they are less subject to the pressure toward involuntary exit from the labor market, and because the flexible nature of their jobs allows them to cope with the influences of aging by adjusting the amount and intensity of their work. On the other hand, older workers employed in industries, characterized by a greater demand for physical strength and rapid technological changes, would face greater difficulties in maintaining their employment. Therefore, the long-term shift in the industrial structure may have brought changes in the overall pressure on retirement by altering the share of favorable and unfavorable jobs for older workers.

The impact of sectoral shift on labor force participation of older male workers was indeed strong in the United States during the Industrial Era. Lee (2002) reported that farmers were less likely to retire than nonfarmers prior to 1940, and that the decrease in the labor force employed in farming accounted for more than 20% of the fall in the LFPR of men 60 and older between 1880 and 1940 This study also suggested that the decline in the labor-market activity of aged men who were employed in nonfarm occupations explains a larger fraction of the entire decline of the LFPR of older males during the same period. Lee (2005) found that men who had better occupations in terms of economic and work conditions were less likely to retire than were those with poorer jobs in the early twentieth century, by comparing the hazard of retirement across more narrowly defined occupational categories. Based on the pattern of the shifts in the occupational structure that occurred between 1880 and 1940, this study also suggested that industrialization had brought a growth of the sectors in which the pressure toward departure from employment at old ages was relatively strong.

II. Data and Classification of Industry

This study is based on the 2% random samples of the population and housing censuses for 1980, 1985, 1990, 1995, and 2000 provided by the National Statistical Office of Korea (Korea National Statistical Office 1980, 1985, 1990, 1995, 2000). The age distribution of workers employed in each industry and the industrial distribution of the employed in each age group, the key variables required for this study, have been computed from these sources.

The micro samples of the censuses have an advantage over other widely used micro labor data, such as the *Economically Active Population Survey* (EAP, hereafter), in terms of the large sample size. The advantage is crucial for studying the labor-market behaviors of older workers whose number is relatively small. For years prior to 1988, EAP included only 17,500 households. Given that the percentage of the population that was aged was much smaller than it is today, the sample size of older male workers in EAP, the focus of this study, may not be large enough to generate a reliable estimate of the variables this study examines. This potential problem of EAP should have been mitigated to some extent after 1988, when the number of sample households increased to 32,500. Still, the sample size of the recent samples is too small to apply a fine industrial classification for older workers. As will be shown later, the number of employees aged 60 and older is small for quite a few industries even if the 2% sample of the entire population is used. For this reason, the census is the only data source to satisfy the sample requirements of this study.

A drawback of the census data is that the method of classifying industries has changed over time, making a comparison across different years difficult. For instance, the 1980 census classifies industries into 36 groups, whereas the 2000 census provides 193 distinct industrial categories. To study the long-term changes in the industrial structure on the employment of older workers based on these sources, it is therefore necessary to create a new industrial classification comparable across different years. Since the census classification of industries became increasingly fine over time, the standardization should be done based on the industrial division of the earlier census. Accordingly, I reclassify the industrial classifications of the censuses from 1985 through 2000 into the 36 industrial categories of the 1980 census.

The method of this reclassification is reported in the appendix. In addition to this baseline industrial classification, I use the industrial classification of the 1985 census that includes 78 categories. The advantage of using the 1985 classification is that we can look into more narrowly defined industries, avoiding potential aggregation errors. However, this advantage can be gained only at the price of limiting the period under study to the years between 1985 and 2000. The balance of this paper will mainly present the results based on the industrial classification of the

1980 census. I will also discuss only occasionally below how using the alternative classification affects the results.[3]

In standardizing the industrial classification, I have done my best to maintain the homogeneity within a given industrial category over time. However, owing to long-term changes in the nature of a given industry as well as the rise of new industries, it is difficult to make the industrial classification perfectly comparable across different years. For instance, it is not always clear in which industrial category some newly emerging industries should be included. Some examples of such new industries are "software consultancy and supply," "database activities and on-line information provision services," and "specialized design service," which first appeared in the census industry list in 2000. I determine the industrial categories for these industries based on the matching of their industry codes and their general characteristics. For instance, "software consultancy and supply" and "database activities and on-line information provision services" were included in the category of "computer and information" in the 1985 classification, and "business service" in the 1980 classification. In case of "other public service," there are no industries in the 1985 census that can be matched to that category. Accordingly, where the 1980 industrial classification is used, this industrial category is excluded from the analysis. In spite of these flaws, which are unavoidable in a study covering a long period of time, I believe the common industrial classification used in this study is quite reasonable. Another problem associated with using the censuses is that the 2% sample of the 1990 census does not provide three-digit codes for the industry in which each individual was employed.[4] For this reason, the variables for 1990 had to be excluded where a detailed industrial classification is required.

[3]The method of reclassifying industries based on the standard of the 1985 census and tables containing the detailed results based on this classification can be obtained from the author.

[4]According to a telephone interview with the official in charge of providing public-use data at the National Statistical Office, the three-digit industry codes should have been omitted in the course of making the public-use sample.

III. Changing Industrial Structure and Employment of Older Male Workers

As in other industrialized nations at the stage of rapid economic growth, the industrial structure in Korea has greatly changed since 1980. Table 1 presents the percentage of the male labor force employed in each industry from 1980 to 2000 for the entire labor force and for those aged 50 and older. The most remarkable change in the industrial structure over the two decades is the decline in the relative size of agriculture. The percentage of the labor force employed in agriculture had decreased from 31% in 1980 to only 11% by 2000. For the labor force aged 50 and older, the share of farmers had dropped from 60% to 32% during the same period. Forestry, fishery, and mining, which accounted for a very small fraction of the labor force from the beginning of the period under study, had shrunk further over the two decades. The relative size of manufacturing industries, though considerably different from one industry to another, had slightly declined or remained stable in general.[5] In contrast to these rather traditional industries, a majority of service industries had expanded remarkably since 1980. In particular, the proportion of the work force employed in wholesale, restaurant and accommodation, public administration, finance, insurance, business service, and education and welfare industries had dramatically increased during the two decades.

As noted in the introduction, this radical shift in the industrial structure should have exerted a strong impact on the labor market status of older workers by altering the relative proportion of jobs favorable or unfavorable to the employment of aged persons. For instance, the percentage of older workers has been particularly high in agriculture, forestry, fishery, and coal mining since 1980. In 1995, for example, the fraction of the workers aged 50 older among those employed in these industries were, respectively, 61%, 43%, 33%, and 29%. If the high proportion of aged workers is regarded as an indicative of a favorable labor market environment for the

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[5]Among the labor force aged 50 and older, the relative importance of manufacturing industries in the share of employment had increased by 2000. It is likely that this phenomenon resulted from the fact that manufacturing workers have been getting older on average as younger workers increasingly avoid manufacturing jobs.

TABLE 1

THE PERCENTAGE OF THE LABOR FORCE EMPLOYED
IN PARTICULAR INDUSTRIES: 1980-2000

	All Ages				Age 50 and Older			
	1980	1985	1995	2000	1980	1985	1995	2000
Agriculture	30.87	25.50	12.44	10.82	58.91	53.62	35.62	31.62
Forestry	0.12	0.07	0.02	0.05	0.15	0.11	0.05	0.10
Fishery	1.98	1.66	0.91	0.80	1.95	1.49	1.40	1.33
Coal mining	0.66	0.70	0.11	0.06	0.23	0.27	0.15	0.09
Crude petrol and natural gas	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00
Metal mining	0.06	0.05	0.01	0.00	0.03	0.02	0.01	0.00
Other mining	0.28	0.17	0.16	0.13	0.19	0.15	0.17	0.12
Food and tobacco	2.09	1.84	1.75	1.62	1.40	1.22	1.52	1.46
Textiles	4.68	4.69	4.09	3.10	1.34	1.39	2.33	1.94
Wood and lumber	1.53	1.25	0.47	0.36	0.57	0.51	0.48	0.35
Pulp and paper	1.56	1.61	1.77	1.60	0.74	0.72	1.06	0.98
Chemical goods	2.07	2.19	2.41	2.29	0.58	0.80	1.22	1.23
Nonmetallic products	1.20	1.12	0.20	0.96	0.49	0.48	0.10	0.68
Primary metal	1.29	1.51	1.14	1.12	0.22	0.42	0.63	0.72
Metallic machine assembly	5.92	7.13	11.51	10.95	1.48	1.64	3.84	4.11
Furniture and other manufacturing	0.83	1.09	1.72	0.61	0.26	0.38	0.80	0.27
Electricity and gas supply	0.40	0.64	0.56	0.57	0.09	0.20	0.30	0.33
Service water	0.07	0.07	0.09	0.07	0.03	0.06	0.10	0.07
Construction	4.69	7.49	0.23	5.47	3.17	5.98	0.21	5.51
Construction engineering	2.66	1.63	12.11	5.35	1.94	0.90	9.86	3.66
Wholesale	2.20	3.00	7.18	8.25	1.33	2.06	3.91	4.77
Retail	10.14	9.97	9.38	8.21	8.38	8.08	7.77	7.37
Restaurant and accommodation	2.34	2.75	3.78	4.34	1.54	1.78	2.79	3.25
Transportation	5.40	6.52	6.61	7.04	2.48	3.14	5.43	6.92
Telecommunication	0.58	0.63	0.94	1.39	0.25	0.30	0.58	0.51
Finance	0.84	1.17	1.68	1.73	0.44	0.53	0.89	0.76
Insurance	0.22	0.35	1.09	1.16	0.12	0.22	0.48	0.56
Real estate	0.75	0.93	1.47	1.87	1.92	2.06	3.82	4.76
Business service	0.68	1.01	3.28	5.09	0.77	0.76	2.22	3.32
Entertainment and cultural services	5.26	0.87	1.32	1.94	1.88	0.51	0.88	1.12
Household	0.07	2.73	0.05	0.03	0.03	1.71	0.04	0.03
International and foreign institution	4.77	0.19	0.09	0.07	4.45	0.39	0.19	0.13
Public administration	0.55	3.86	4.90	4.91	0.34	2.31	4.09	3.67
Hygiene services	3.00	0.18	0.21	0.95	1.94	0.19	0.24	1.31
Education and welfare	0.22	5.43	5.39	6.70	0.32	5.59	5.80	6.49
Other public services	0.00	0.00	0.92	0.37	0.00	0.00	1.04	0.43

Sources: The 2% samples of the 1980, 1985, 1995, and 2000 censuses.

elderly, the relative decline of these sectors over the two decades should have diminished the overall employment prospect for older workers. The balance of this section will address this question quantitatively, based on a measure of labor market status at older age.

The industry-specific labor-market survival rate (referred to as "the labor market survival rate," or simply "survival rate," hereafter), defined as the probability that aged employees of a given industry remain in the same industry after a given length of time, is one of the widely used measures of the employment stability of older workers hired in that sector. A low labor market survival rate implies either a high hazard rate of retirement or a high probability of moving to another industry. It is acknowledged that aged workers in Korea, especially those younger than age 60, retire or move to a different job more often than not involuntarily (Chang 2003). Empirical studies on the United States have reported that the labor market survival rate among older males was lower in the sectors where the incidence of long-term unemployment of older male workers was higher (Lee 2005). In these lights, the labor market survival rate may be regarded as an index of the fragility of the labor market status of older male workers.

It would be ideal to use panel data to estimate industry- and age-specific labor market survival rates. Unfortunately, panel data that could be used for the purpose of this study, such as the KLIPS, are available only for the period after 1997. Furthermore, as noted above, these panel data do not provide reliable labor market survival rates for each fine category of industries because of the small sample size. On the other hand, it is impossible to compute the labor market survival rate directly from cross-sectional data, such as the censuses used in this study, because they do not report information on the employee's former job. Accordingly, I use a relative measure of the labor market survival rate for each industry that can be calculated from cross-sectional data.

I begin with an illustration of the method of computation to be used. Let N_x and N_x^j denote, respectively, the total number of a cohort in the labor force aged x and the number of the cohort at the same age who were employed in industry j. The number of the cohort who are employed in industry j at age $x+1(N_{x+1}^j)$ is determined by the probability of dying between x and $x+1$ (denoted d_x^j), the probability of retirement at age $x+1$ conditional on

surviving until age $x+1(r^j_x)$, and the probability of net entry from other industries conditional on remaining in the labor force (m^j_x), as given in the following equation.

$$N^j_{x+1} = N^j_x(1 - d^j_x)(1 - r^j_x)(1 + m^j_x) \tag{1}$$

Using the above equation, the change in the share of a cohort employed in industry j between x and $x+1$ can be presented as follows:

$$\frac{N^j_{x+1}}{N_{x+1}} - \frac{N^j_x}{N_x} = \frac{N^j_x(1 - d^j_x)(1 - r^j_x)(1 + m^j_x)}{N_x(1 - d_x)(1 - r_x)(1 + m_x)} - \frac{N^j_x}{N_x}$$

$$= \frac{N^j_x}{N_x}\left(\frac{(1 - d^j_x)(1 - r^j_x)(1 + m^j_x)}{(1 - d_x)(1 - r_x)(1 + m_x)} - 1 \right) \tag{2}$$

If it is assumed that the age-specific mortality is the same for all industries, that is, $d^j_x = d_x$ for all j, the labor market survival rate between x and $x+1$ conditional on remaining alive can be defined as follows:

$$S^j_x = (1 - r^j_x)(1 + m^j_x) \tag{3}$$

Denote the share of a cohort aged x who are employed in industry $j(N^j_x/N_x)$ by ω^j_x. Inserting equation (3) into equation (2), and applying the above notation, we get the following relative index of the labor market survival rate (referred to the relative labor market survival rate or the relative survival rate), denoted by ϕ^j_x:

$$\phi^j_x = \frac{\omega^j_{x+1} - \omega^j_x}{\omega^j_x} = \left(\frac{(1 - r^j_x)(1 + m^j_x)}{(1 - r_x)(1 + m_x)} - 1 \right) = \left(\frac{S^j_x}{S_x} - 1 \right) \tag{4}$$

As indicated by the second term in equation (4), this index is the rate of change in the proportion of a cohort aged x who are employed in industry j. The last term in equation (4) shows that this index is determined by the relative size of the labor market survival rate of industry $j(S^j_x)$ as compared to the overall labor market survival rate (S_x). If this index for a particular industry is

greater than the average labor market survival rate for the entire industries. Although this index does not provide the absolute size of the labor market survival rate, it does allow us to compare the probability of remaining in the labor market for a given length of period across industries.

Table 2 presents the computed relative labor market survival rates for four age groups, ages 45-49, 50-54, 55-59, 60-64 during three time periods, 1980-85, 1985-95, and 1995-2000. For instance, the estimate for ages 50-54 during the period between 1980 and 1985 shows the five-year relative labor market survival rate from 1980 to 1985 of the birth cohort who were aged 50 to 54 in 1980. The relative survival rate of workers aged 60 to 64 is not computed for the period from 1985 to 1995, because it is difficult to calculate accurately the number of employees aged 70 to 74 for narrowly defined industries. Before presenting the results, it should be noted that the estimated percentage of the labor force employed in particular industries (reported in Table 1) and, accordingly, the relative index of labor market survival rates computed based on it (presented in Table 2), are subject to errors arising from either the small sample size for some minor industries or possible incorrect reclassification of industries. It is probably for this reason that the estimated relative labor market survival rates for some industries show substantial year-to-year and age-to-age variations. To interpret the results properly, therefore, it is important to consider whether the estimated survival rate of a particular industry is stable across different periods and age groups.

The results presented in Table 2 suggest that the relative labor market survival rate was consistently high in agriculture, insurance, real estate, and business services. In case of agriculture, the relative survival rate is positive for the entire periods and all age groups, except for males aged 45 to 49 during the period between 1985 and 1995, for which the index was estimated as marginally negative (−0.04). In particular, the size of the relative survival rate is large for the labor force aged 50 and older. For example, the five-year relative labor market survival rate of the cohort aged 55 to 59 in 1995 was 0.41. Similarly, the relative survival rates in insurance and real estate were stably positive in sign and large in magnitude.[6] As noted above, agriculture, real

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[6]Exceptions are found for the period between 1995 and 2000 when the

employees. In 2000, the proportion of the labor force aged 50 anc. older was 68% in agriculture, 59% in real estate, and 15% in business services. For these industries, the large fraction of older workers should be in part attributable to the stable labor market status of the aged, indicated by their high relative labor market survival rates.[7]

For the majority of mining and manufacturing industries, the relative labor market survival rates are negative. In particular, the consistently negative relative survival rates, observed for textiles, wood and lumber, pulp and paper, and primary metal, suggest that male workers employed in these industries began to face strong pressure to leave the labor force from as early as age 45. In case of service industries, on the other hand, the labor market survival rates are generally positive until ages 45 to 49 or age 50 to 54, and then turn to negative thereafter. For example, it appears that men employed in retail, restaurant and accommodation, transportation, telecommunication, and finance begin to be pushed out of their jobs from ages 50 to 54. In the wholesale industry, such a transition in the labor market status seems to take place at ages 55 to 59.[8]

The above results confirm that the employment stability at old age, indirectly measured by the relative labor market survival rate,

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[6]Exceptions are found for the period between 1995 and 2000 when the relative labor market survival rate was negative for men aged 60 to 64 who were employed in the insurance industry and those aged 60 to 64 employed in real estate.

[7]Of course, the rise in the percentage of older workers in these industries, especially agriculture, may have been due to the decrease in the entry of younger workers, too.

[8]Though not presented here, I also computed the relative labor market survival rate for each industry from 1985 through 2000, based on the 1985 census industry classification. The results provide generally similar implications as the ones provided in the present paper. Some minor additional insights, obtained from employing a finer industrial classification, are as follows: First, within retail trades, the employment stability at old age is greater for general retail than for ordinary retail. Second, while the pressure for departure from the labor market at old age was relatively strong in each of transportation industries, such as land, sea, and air, other transportation services provide a relatively high job security at old age. Finally, within professional services, the job stability at old age is relatively high for law and accounting services, construction and engineering services, advertisement and other business services, and education.

TABLE 2

RELATIVE INDEX OF LABOR MARKET SURVIVAL RATE FOR EACH INDUSTRY

Industry	Ages 45-49			Ages 50-54			Ages 55-59			Ages 60-64	
	1980-1985	1985-1995	1995-2000	1980-1985	1985-1995	1995-2000	1980-1985	1985-1995	1995-2000	1980-1985	1995-2000
Agriculture	0.04	-0.04	0.11	0.14	0.21	0.23	0.15	0.26	0.41	0.09	0.32
Forestry	-0.14	-0.56	5.00	-0.21	-0.33	3.33	0.27	-0.36	2.75	-0.75	0.38
Fishery	-0.22	-0.12	-0.02	-0.29	-0.21	-0.05	-0.36	-0.35	0.09	-0.42	0.01
Coal mining	-0.31	-0.81	-0.21	-0.72	-0.83	-0.64	-0.60	-1.00	-0.73	-0.38	-1.00
Crude petrol and natural gas	-0.50	-	-	0.00	-1.00	-1.00	-	-1.00	-	-1.00	-
Metal mining	-0.60	-0.83	0.00	-0.60	0.00	0.00	-0.25	-1.00	-1.00	-	-1.00
Other mining	-0.30	0.21	0.00	-0.46	-0.10	-0.07	-0.50	-0.33	-0.65	-0.75	-0.42
Food and tobacco	-0.23	-0.15	0.02	-0.30	-0.21	-0.30	-0.38	-0.48	-0.15	-0.33	-0.19
Textiles	-0.12	-0.16	-0.19	-0.23	-0.03	-0.34	-0.38	0.01	-0.39	-0.17	-0.53
Wood and lumber	-0.39	-0.48	-0.20	-0.23	-0.26	-0.45	-0.38	-0.60	-0.41	-0.08	-0.47
Pulp and paper	-0.20	-0.13	-0.12	-0.24	0.05	-0.25	-0.20	-0.26	-0.27	-0.27	-0.37
Chemical goods	-0.05	-0.16	-0.08	-0.29	-0.26	-0.16	0.04	0.07	-0.15	-0.34	-0.55
Nonmetallic products	-0.26	-0.90	4.44	-0.45	-0.95	3.60	-0.39	-0.95	5.00	-0.50	4.25

(Table Continued)

Industry	Ages 45-49			Ages 50-54			Ages 55-59			Ages 60-64	
	1980-1985	1985-1995	1995-2000	1980-1985	1985-1995	1995-2000	1980-1985	1985-1995	1995-2000	1980-1985	1995-2000
Primary metal	-0.02	-0.20	-0.06	0.08	-0.57	-0.27	-0.05	-0.88	-0.47	1.38	-0.19
Metallic machine assembly	-0.12	0.18	-0.18	-0.29	0.05	-0.26	-0.04	0.07	-0.38	-0.49	-0.39
Furniture and other manufacturing	0.15	0.43	-0.74	0.29	0.23	-0.72	0.00	0.25	-0.69	0.50	-0.84
Electricity and gas supply	-0.06	-0.44	0.00	-0.06	-0.76	-0.35	0.00	-0.71	-0.74	2.50	-0.75
Service water	0.25	0.50	0.11	0.00	-0.80	-0.21	0.50	-1.00	-0.93	-	-1.00
Construction	0.49	-0.97	21.44	0.50	-0.99	26.32	0.26	-0.98	15.56	-0.17	17.82
Construction engineering	-0.53	6.57	-0.65	-0.67	5.00	-0.66	-0.73	3.26	-0.76	-0.70	-0.85
Wholesale	0.26	0.53	0.04	0.18	0.15	-0.01	0.04	-0.12	-0.12	0.53	-0.03
Retail	-0.10	-0.19	-0.19	-0.12	-0.35	-0.14	-0.19	-0.32	-0.13	-0.28	-0.23
Restaurant and accommodation	0.12	0.13	0.01	0.16	-0.03	-0.03	-0.10	-0.37	-0.09	-0.42	-0.08
Transportation	0.03	-0.02	0.08	-0.18	-0.32	0.10	-0.51	-0.55	-0.22	-0.23	-0.22
Telecommunication	0.14	0.18	0.12	-0.50	-0.55	-0.40	-0.82	-0.63	-0.78	-0.50	-0.72
Finance	0.20	0.00	-0.29	-0.45	-0.34	-0.45	-0.21	0.00	-0.63	-0.21	-0.23
Insurance	0.13	0.80	0.01	0.24	0.93	0.14	0.64	0.92	0.02	0.50	-0.56

(Table Continued)

Industry	Ages 45-49			Ages 50-54			Ages 55-59			Ages 60-64	
	1980-1985	1985-1995	1995-2000	1980-1985	1985-1995	1995-2000	1980-1985	1985-1995	1995-2000	1980-1985	1995-2000
Real estate	0.37	2.23	0.89	0.17	2.18	1.20	0.20	1.36	0.74	0.20	-0.03
Business service	0.38	1.62	0.43	0.01	1.99	0.71	-0.12	1.54	0.78	-0.35	0.14
Entertainment and cultural services	-0.88	0.08	0.05	-0.87	0.08	-0.02	-0.66	0.20	0.16	-0.47	0.12
Household	16.58	-0.99	0.50	40.00	-0.99	0.00	21.83	-0.93	0.00	63.5	0.33
International and foreign institution	-0.91	0.03	-0.36	-0.92	-0.66	0.07	-0.96	-0.95	-0.21	-1.00	-0.75
Public administration	7.02	-0.10	0.06	3.46	-0.56	-0.36	0.15	-0.64	-0.71	0.19	-0.69
Hygiene services	-0.88	-0.04	4.70	-0.95	-0.43	3.61	-0.95	-0.64	3.00	-0.98	4.00
Education and welfare	10.37	0.05	0.44	11.67	-0.04	0.30	10.32	-0.55	-0.18	28.13	-0.47

Sources: The 2% samples of the 1980, 1985, 1995, and 2000 censuses.

remarkably differs across industry, and therefore, a shift in the industrial structure would change the overall rate of labor market activity of the elderly population. I conduct the following exercise to examine the magnitude of the impact the sectoral shift between 1980 and 2000 had on the overall pressure for leaving the labor force at old age. First, I chose the average age-specific relative labor market survival rate between 1985 and 1995 as a baseline measure of the pressure toward departure from the labor market for the entire period from 1980 to 2000.[9] By doing so, I assume that the relative labor market survival rate for the 10-year period represents the general employment stability at old age.

I then calculated the weighted average of the estimated the labor market survival rates, using the percentage of the labor force employed in each industry in each year as the weight. This weighted average of the relative survival rate for a cohort aged x, computed based on the industry weights for year $t(S_x^t)$ can be presented as

$$S_x^t = \sum_j \omega_x^{j,t} S_x^{j,85\text{-}95}$$ (5)

where superscript t denotes the baseline year, $\omega_x^{j,t}$ the weight of industry j in year t, $S_x^{j,85\text{-}95}$ the relative labor market survival rate of industry j for the period 1985-95. This is a counterfactual labor market survival rate that would have resulted if the industrial structure in a given year remained unchanged throughout the period under study. The results of these computations present how the average labor market survival rate changed as a result of changing industrial structure. Suppose, for example, the average survival rate, computed based on the industrial composition as of 2000, is lower than the average survival rate, calculated using the 1980 industry weights. This indicates that the industrial structure had shifted during the two decades in a direction to decrease the relative size of industries favorable to the employment of older workers.[10]

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[9] I chose this sub-period because it is located in the middle of the entire period under study. Moreover, variations in the results across different age groups are much smaller for this ten-year period than for the five-year sub-periods, 1980-5 and 1995-2000. Finally, the results for the period between 1995 and 2000 are inappropriate for studying the general pattern because it includes the Financial Crisis of 1997.

TABLE 3
COUNTERFACTUAL AVERAGE LABOR MARKET SURVIVAL RATES
BETWEEN 1985 AND 1995

Baseline Year	Entire Industries		Non-Agricultural Industries	
	Ages 50-54	Ages 55-59	Ages 50-54	Ages 55-59
1980	0.0313	0.0525	-0.1191	-0.2311
1985	0.0110	0.0320	-0.1203	-0.2174
1995	0.0222	-0.0019	-0.0204	-0.1128
2000	0.0281	-0.0036	-0.0007	-0.0814

Notes: The weighted average of the labor market survival rate for each industry, reported in Table 2. The share of male workers employed in a particular industry in the baseline year is used as the weight.

The results of this analysis are presented in Table 3, separately for all industries and the nonagricultural industries, and two age groups, 50-54 and 55-59, for each category. The counterfactual average labor market survival rates for all industries suggest that the shift in the industrial structure severely degraded the labor market prospect for male workers aged 55 and older. The average labor market survival rate, computed based on the 1980 industrial composition is 0.0525, whereas the survival rate, calculated by applying the 2000 industry weights, is −0.0036. The impact of the sectoral shift on the measure of average employment stability at old age was particularly strong for the two early sub-periods, 1980-5 and 1985-95. The magnitude of the effect was relatively weak for the period from 1995 to 2000. The results for ages 50 to 54 provide a somewhat different picture. Between 1980 and 1985, the structural changes in the industrial composition greatly diminished

[10]Construction and construction engineering were excluded from the analysis. These two industries exhibit very radical changes in the share of the labor force between 1985 and 2000. That is, the percentage of workers aged 50 and older employed in construction drastically fell from 6% in 1985 to 0.9% in 1995, and then rebounded to 5.5% by 2000. In contrast, the fraction of the work force engaged in construction engineering jumped from 0.9% in 1985 to 9.9% in 1995, and declined to 3.7% by 2000. Though the source of this volatility is not entire clear, it may have been caused by a change in the classification of these two industries. For this reason, it is unlikely that the estimated relative labor market survival rates of these industries between 1985 and 1995 are representative.

the average labor market survival rate for this age group. After 1985, however, the industrial structure shifted in a direction to lower the pressure to leave the labor force for men at these ages.

The results for nonagricultural industries demonstrate how the changes in the industry composition within the nonagricultural sector had affected the old-age labor market. According to the outcomes, the average labor market survival rates at old age would have been much lower had it not been for agriculture. For males aged 55 to 59, for example, the average survival rate for non-agricultural sector, calculated based on the 1985 industrial composition, was 25% points lower than same measure for all industries. This suggests that the existence of agriculture tremendously increased the chances that male workers as a whole remained in the labor market at old age at a point of time. Once agriculture is excluded from the analysis, more significantly, the sectoral shift from 1980 to 2000 turned out to increase the average labor market survival rates. For men aged 55 to 59, the labor market survival rate, derived based on using the 1980 industrial composition, was -0.2311, in contrast to -0.0814 that came out of the computation using the 2000 industry weights. The results for men aged 50 to 54 are similar. This suggests that the adverse impact of the sectoral changes on the employment of older workers, observed for all industries, can be completely attributed to the effect of the shrinkage of the agricultural sector.

IV. Agricultural Decline and the Labor Force Participation of Older Males

Agriculture has been the predominant employer of older male workers, accounting for more than half of the employment of male workers aged 50 and older by mid-1980s. The results provided above suggest that, among aged workers, the labor market survival rate was relatively higher for agriculture than for the rest of the industries. That is, agriculture provides a highly favorable environment for the employment of the elderly. It has also been found that the negative impact of the shift in industrial structure on the employment of older labor since 1980 is fully explained by the relative decline of agriculture. Thus, the decrease in the relative importance of farming should have played a powerful role to lower

the overall labor force participation rate of older males.

Regarding the question of how the decline of agriculture affected the labor force participation rate of older men in Korea, only indirect evidence has been suggested so far. Lee (2004) found that the labor force participation rate of older males was much higher in rural areas than in cities throughout the period from 1960 to 2000. This study also reported that the percentage of farmers in a given city or county (gun) had a strong positive correlation with the probability of labor force participation of older males who resided in the place. However, it is unknown how the hazard rate of retirement differed between farmers and non-farmers and how such an occupational disparity in economic activity has changed over the long-term. In the balance of this section, I will estimate the absolute, not relative, labor market survival rates of farmers and non-farmers, based on the proportion of farmers among each birth cohort and age-specific labor force participation rates, obtained from the censuses. Using these figures, I will analyze how the decline in the percentage of the labor force employed in agriculture from 1980 to 2000 had affected the overall labor force participation rate of older males.

I begin with a conceptual framework for estimating the labor market survival rate for farmers and non-farmers. Applying equation 1, the ratio of the labor-force share of farmers (N^F_{x+1}/N_{x+1}) to that of non-farmers (N^N_{x+1}/N_{x+1}) for the cohort aged $x+1$ in a given year is presented as

$$\frac{N^F_{x+1}/N_{x+1}}{N^N_{x+1}/N_{x+1}} = \frac{N^F_{x+1}}{N^N_{x+1}} = \frac{N^F_x(1-d^F_x)(1-r^F_x)(1+m^F_x)}{N^N_x(1-d^N_x)(1-r^N_x)(1+m^N_x)} \qquad (6)$$

where superscript F and N stand for farmers and non-farmers, respectively. By assuming that the age-specific mortality rate is the same for farmers and non-farmers, and by applying the definition of the labor market survival rate, presented in equation (3), the ratio of the labor market survival rate of non-farmers to that of farmers, denoted α, is given as

$$\alpha = \frac{S^N}{S^F} = \frac{(N^N_{x+1}/N^F_{x+1})}{(N^N_x/N^F_x)} \qquad (7)$$

TABLE 4

THE PROPORTION OF FARMERS AMONG MALE WORKERS
BY BIRTH COHORT. 1980-2000

Birth Year	1980	1985	1990	1995	2000
1946-50					0.136 (50-54)
1941-45				0.184 (50-54)	0.226 (55-59)
1936-40			0.284 (50-54)	0.296 (55-59)	0.416 (60-64)
1931-35		0.387 (50-54)	0.404 (55-59)	0.480 (60-64)	0.632 (65-69)
1926-30	0.456 (50-54)	0.520 (55-59)	0.567 (60-64)	0.656 (65-69)	
1921-25	0.575 (55-59)	0.663 (60-64)	0.713 (65-69)		
1916-20	0.713 (60-64)	0.776 (65-69)			
1911-15	0.789 (65-69)				

Note: In parenthesis is the age of each birth cohort in particular year.
Source: The 2% samples of the censuses from 1980 through 2000.

The labor market survival rate for the entire labor force can be calculated as the weighted average of the survival rates for farmers and non-farmers as follows:

$$S = \omega^F S^F + (1 - \omega^F) S^N \tag{8}$$

If we impose a rather strong assumption that the rate of net transitions between agriculture and non-agriculture is zero (that is, $m^F = m^N = 0$), S is the hazard rate of labor force participation within a given period.[11]

The parameters α, S, and ω^F are available from the census data. Table 4 presents the share of farmers among male workers in each

[11]Occupational changes are quite common among aged males in Korea. In particular, aged men who leave the formal sector involuntarily often switch to self-employed jobs as an intermediate step to the permanent retirement (Chang 2002). However, such job changes between farming and non-agricultural jobs should not be frequent, given the very different characteristics of the two sectors.

TABLE 5

HAZARD RATE OF LABOR FORCE PARTICIPATION
WITHIN EACH PERIOD, 1980-2000

Period	S_{50-54}	S_{55-59}	S_{60-64}	a_{50-54}	a_{55-59}	a_{60-64}
1980-1985	0.958	0.889	0.812	0.774	0.688	0.717
1985-1990	0.891	0.788	0.718	0.932	0.827	0.792
1990-1995	0.936	0.854	0.818	0.943	0.734	0.687
1995-2000	0.773	0.681	0.669	0.772	0.590	0.537

Notes: S_{50-54}, for example, denotes the hazard rate of remaining in the labor force at the end of the period for male workers at ages 50 to 54 at the beginning of the period. a_{50-54} stands for the estimated ratio of farmers' hazard rate to that of nonfarmers.

Source: Computed using the share of farmers (reported in Table 4), and the labor force participation rate of males in each cohort calculated from the 2% samples of the censuses from 1980 to 2000.

five-year birth cohort between 1980 and 2000. The result shows that the proportion of farmers among each cohort increased as they aged. According to equation (6), this indicates that the hazard rate of labor force participation was greater for farmers than for non-farmers for all birth cohorts. A comparison across cohorts suggests that the secular decline in agricultural employment is largely a cohort phenomenon.

Table 5 provides the hazard rate of labor force participation for the entire labor force as well as the ratio of the hazard rate of non-farmers to that of farmers during each five-year period from 1980 to 2000. The subscripts attached to each variable denote the age of each cohort at the beginning of the period. S_{50-54}, for example, denotes the hazard rate of remaining in the labor force at the end of the period for male workers at ages 50 to 54 at the beginning of the period. Similarly, a_{50-54} stands for the estimated ratio of farmers' hazard rate to non-farmers'. According to the result, the hazard rate of labor force participation of older male workers (S) was relatively high in the years from 1980 to 1985, relatively low during the next five-year period, and then high again between 1990 and 1995. During the period between 1995 and 2000, which includes the severe recession following the Financial Crisis of 1997, the hazard rate of labor force participation at old age was particularly low, presumably due to the mass departure of aged non-agricultural workers in the course of large-scale corporate

TABLE 6

HAZARD RATE OF LABOR FORCE PARTICIPATION FOR FARMERS
AND NONFARMERS WITHIN EACH PERIOD, 1980-2000

Period	$S^F_{50\text{-}54}$	$S^N_{50\text{-}54}$	$S^F_{55\text{-}59}$	$S^N_{55\text{-}59}$	$S^F_{60\text{-}65}$	$S^N_{60\text{-}65}$
1980-1985	1.092	0.845	1.025	0.705	0.884	0.634
1985-1990	0.930	0.867	0.859	0.711	0.783	0.620
1990-1995	0.981	0.925	1.015	0.745	0.946	0.650
1995-2000	0.950	0.773	0.957	0.565	0.881	0.473

Notes: $S_{50\text{-}54}$, for example, denotes the hazard rate of remaining in the labor force at the end of the period for male workers at ages 50 to 54 at the beginning of the period. Superscripts F and N denote, respectively, farmers and nonfarmers.

Source: Computed using the share of farmers (reported in Table 4), and the labor force participation rate of males in each cohort calculated from the 2% samples of the censuses from 1980 to 2000.

restructuring, along with other changes in the labor-market that the crisis caused.

Table 6 presents the hazard rates of labor force participation of farmers (S^F) and non-farmers (S^N) within each five-year period, calculated by solving equations (7) and (8), and using the parameters reported in Tables 4 and 5. For example, $S^F_{50\text{-}54}$ is the probability that a cohort aged 50 to 54, who were employed in agriculture, remained in the labor force five years later. The result confirms that farmers were more likely to remain in the work force at old age than non-farmers. For most of the five-year periods, more than 95% of farmers aged 55 to 59 continued to participate in the labor market five years later.[12] In contrast, less than three quarters of non-farmers at the same age remained in the work force five years later. The difference in the hazard of labor force participation between farmers and non-farmers was particularly large between 1995 and 2000. Of farmers aged 55 to 59 in 1995, 96% were still working in 2000, whereas only 57% of non-farmers did so. The large occupational disparity in the late 1990s is, again,

[12]For the periods 1980-5 and 1995-2000, farmers aged 55 to 59 recorded a hazard rate of labor force participation higher than 100%. It is presumably due to the fact than some old males newly moved into farming from other occupations, contrary to the assumption that the rate of net transitions between the two occupations is zero.

probably due to the differential labor market impact of the Financial Crisis, during which non-agricultural employees were the major victims of the economic hardship.

The above analysis suggests that the decrease in the population employed in agriculture should have led to a decline in the labor force participation rate of older males between 1980 and 2000. To see the size of this potential effect of sectoral shift, I estimate a counterfactual LFPR of older males that would have resulted had there been no decline in the share of farmers in the male labor force since 1980. A comparison of this counterfactual figure with the actual LFPR will provide the fraction of the change in the LFPR of older men that is explained by the effect of sectoral shift.

For this purpose, I first calculate a counterfactual hazard rate of labor force participation (S^*) that would have resulted if the percentage of farmers in the male labor force remained unchanged since 1980. This counterfactual figure can be obtained by calculating the weighted average of the hazard rates of farmers and non-farmers, applying the farmers' share in 1980 as the weight. Since the percentage of farmers among the cohort aged 55 to 59 in 1980 was 57.5%, for example, the counterfactual hazard rate for any given cohort at these ages can be calculated as

$$S^*_{55\text{-}59} = (0.575 \times S^F_{55\text{-}59}) + (0.425 \times S^N_{55\text{-}59}) \tag{9}$$

The columns titled "estimate" in Table 7 report the counterfactual hazard rates of participation for the three age groups for each five-year period from 1980 to 2000. Because farmers were at a lower risk of leaving the labor force compared to non-farmers, the overall hazard of participation would have been higher if the relative size of agricultural sectors had not declined over time. In the columns titled "ratio" is the ratio of the counterfactual hazard rate of participation to the actual rate for each of the five-year periods. Since the counterfactual rate was calculated by replacing the farmers' share in the initial year of each period by the farmers' proportion in 1980, the counterfactual figure for 1980-5 is the same as the actual rate. The result suggests that the hazard of participation of older men would have been much higher had it not been for the decline of agriculture. For men aged 55 to 59, the counterfactual hazard rate was greater than the actual rate by 16% during the period between 1995 and 2000, and by 3.7% between

TABLE 7

COUNTERFACTUAL HAZARD RATE OF LABOR FORCE PARTICIPATION.
1980-2000

Period	$S^*_{50\text{-}54}$		$S^*_{55\text{-}59}$		$S^*_{60\text{-}64}$	
	Estimate	Ratio[+]	Estimate	Ratio[+]	Estimate	Ratio[+]
1980-1985	0.765	1.000	0.710	1.000	0.687	1.000
1985-1990	0.896	1.006	0.796	1.010	0.736	1.011
1990-1995	0.950	1.015	0.886	1.037	0.861	1.053
1995-2000	0.832	1.076	0.790	1.160	0.764	1.142

+ This column displays the ratio of the counterfactual hazard rate of
participation to the actual rate for each period from Table 6.

Note: The counterfactual hazard rates of remaining in the labor force within
the period that would have occurred had the farmers' share in the
male work force remained unchanged since 1980.

Source: Calculated using the parameters reported in Tables 5 and 6. See
the text for the method of calculation.

1990 and 1995. For males aged 60 to 64, the counterfactual figure
was higher than the actual figure by 14.2% between 1995 and
2000, and by 5.3% between 1990 and 1995.

Now, I extend this counterfactual analysis to the LFPR in order
to examine what percentage of the change in the LFPR of older
males between 1980 and 2000 can be attributed to the decline in
the relative size of agriculture. The LFPR at a certain age (P_{50+k})
can be presented in terms of the LFPR at the initial age, defined as
50 here (P_{50}), and the hazard rate of participation within each age
interval (S_i), as seen in the following equation

$$P_{50+k} = \prod_{i=50}^{50+k-1} P_{50} S_i \tag{10}$$

Applying the counterfactual hazard rate (S_i^*) to equation (10), instead
of the actual rate, I estimate the counterfactual LFPR of each
cohort at ages 55-59, 60-64, and 65-69 that would have resulted
had the share of farmers in the labor force remained unchanged
since 1980. An underlying assumption of this exercise is that the
LFPR of men at ages 50 to 54 would have been unaffected by the
sectoral shift. This assumption is reasonable for the following
reasons. First, relatively few men in Korea leave the labor force
permanently before age 50. Second, as can be inferred from the
relatively similar hazard of participation of farmers and non-farmers

TABLE 8

ACTUAL AND COUNTERFACTUAL LABOR FORCE PARTICIPATION RATES OF MEN
AGED 55-69, 1985-2000

Year	$P_{55\text{-}59}$	$P^*_{55\text{-}59}$	$P_{60\text{-}64}$	$P^*_{60\text{-}64}$	$P_{65\text{-}69}$	$P^*_{65\text{-}69}$	$P_{55\text{-}69}$	$P^*_{55\text{-}69}$
1985	0.815	0.815	0.679	0.679	0.531	0.531	0.703	0.703
1990	0.817	0.822	0.642	0.649	0.494	0.500	0.689	0.695
1995	0.853	0.865	0.698	0.728	0.525	0.559	0.732	0.755
2000	0.719	0.774	0.581	0.684	0.467	0.556	0.607	0.688

Notes: P_a denotes the actual labor force participation rate at age a. P^*_a
stands for the estimated counterfactual labor force participation rate
at age a that would have occurred had the farmers' share in the
male work force remained unchanged since 1980.

Sources: Actual figures are calculated from the 2% samples of the censuses
from 1980 to 2000. Counterfactual figures are estimated using the
actual labor force participation rate at ages 50-54 and
counterfactual hazard rates of labor force participation presented
in Table 7. See the text for the estimation method.

at ages 50-54 reported in Table 6, farmers and non-farmers should
not have differed greatly in terms of the hazard of participation
prior to age 50.

Table 8 reports the actual and counterfactual LFPR of males at
ages 55-59, 60-64, and 65-69. The final two columns compare the
actual and counterfactual LFPR of males at ages 55 to 69. These
rates are the weighted averages of the participation rates for the
above three age groups. Since the counterfactual hazard rate of
labor force participation between 1980 and 1985 is the same as the
actual rate by design, as explained above, the actual and
counterfactual rates for 1985 are identical. The result suggests that
the decline of agriculture had a strong negative effect on the overall
LFPR of older men. The LFPR of men aged 55 to 69 increased by
2.9% points from 1985 to 1995. If there had been no agricultural
decline, it should have increased by 5.2% points. Owing to the
sharp decline in the LFPR of older men between 1995 and 2000,
the participation rate of men aged 55 to 69 fell by 9.4% points
between 1985 and 2000. The magnitude of the decline would have
been only 1.5% points if the relative size of agriculture remained
unchanged.

The gap between the actual and counterfactual LFPRs is greater
for the older old than the younger old. For men aged 65 to 69, the

actual LFPR declined from 53.1% in 1985 to 46.7% in 200C, whereas the counterfactual rate rose to 55.6% during the same period. For those aged 60 to 64, too, the LFPR would have slightly increased from 67.9% to 68.4% between 1985 and 2000 if the relative agricultural employment had not shrunk. In reality, it declined to 58.1%. On the other hand, the LFPR of men aged 55 to 59 should have declined, though the magnitude of the decline would have been smaller, even if the share of farming remained constant after 1980.

I am now ready to answer the question of how much of the change in the LFPR of older males from 1980 to 2000 can be accounted for by the decrease in the relative size of the agricultural sector. Between 1985 and 1995, during which the actual LFPR of older men rose, the sectoral shift played a powerful role of offsetting the increase. From 1995 to 2000, it was the major factor in the sharp decline in the LFPR of older men. A comparison of the changes in the actual and the counterfactual LFPRs, - 12.5% points and -6.7% points, respectively, suggests that nearly half (46%) of the fall in the labor market activity of men aged 55 to 69 is explained by the decline of agriculture.[13] If the entire 15-year period from 1985 to 2000 is considered, the effect of the shrinkage of agriculture explains 84% of the actual fall in the LFPR of men aged 55 to 69 (9.6% points). This result strongly suggests that the relative decline in the population employed in agriculture was probably the single most important cause of the overall decline in the labor force participation rate of older men in Korea since 1980.[14]

V. Conclusions and Some Implications

This study has investigated how long-term changes in the industrial structure in Korea affected the economic activity of older

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[13]Since the decline in the LFPR would have been 6.7% points if there had been no agricultural decline, the fall in the participation rate that can be explained by the sectoral shift is 5.8% points (12.5%-6.7%), 46% of the actual decline in the LFPR (12.5% points).

[14]This result confirms the study by Lee (2004) that indirectly estimated the retirement effect of the decline in agricultural employment, based on the share of the labor force employed in agriculture in each city or county.

males, based primarily on the 2% random samples of the population and housing censuses for 1980, 1985, 1990, 1995, and 2000. Since 1980, the percentage of the labor force employed in agriculture has greatly declined. The relative sizes of most manufacturing industries have fallen slightly or remained stable. In contrast to these rather traditional industries, a majority of service industries have expanded remarkably since 1980. If the degree of disadvantages associated with old age in the labor market differs across industries, such a radical shift in the industrial structure should have exerted a strong impact on the overall pressure toward leaving the labor force at old age by altering the relative proportion of jobs favorable or unfavorable to the employment of aged persons.

By estimating and comparing the relative labor market survival rate from 1980 to 2000 across industries, I found that the strength of pressure to leave the labor market at old age greatly differed across industries. Employment at old age was relatively stable for those who were employed in agriculture, insurance, real estate, and business services, as indicated by the positive sign and relative large size of the relative labor market survival rate for those sectors. In contrast, the male workers employed in the majority of manufacturing industries, especially textiles, wood and lumber, pulp and paper, and primary metal, began to face a strong pressure to leave their jobs beginning as early as age 45. Men engaged in a number of service sectors, such as retail, restaurant and accommodation, transportation, telecommunication, and finance, began to be pushed out of the labor market from ages 50 to 54.

I quantitatively examined the effect of the sectoral shift on the employment of older workers by calculating the counterfactual average labor market survival rate that would have resulted if the industrial composition in a given year remained unchanged over time. The result suggests that the structural shift in the industry between 1980 and 2000 severely lowered the labor market prospect for male workers aged 55 and older as a whole. I also found that the adverse impact of the sectoral change on the employment of older workers can be entirely attributed to the effect of the shrinkage of the agricultural sector.

Based on the result highlighting the importance of the agricultural sector in the employment of older males, I further examined how the long-term decline of agriculture affected the labor force participation rate (LFPR) of older men between 1980 and

2000. For this purpose, I compared the actual LFPR and the counterfactual LFPR that would have resulted had there been no relative decline in agriculture since 1980. The result suggests that the LFPR of older men would have been much higher if the percentage of the labor force employment in agriculture remained unchanged. I found that the shrinkage of agriculture explains 84% of the actual decline in the LFPR of men aged 55 to 69 between 1985 and 2000.

The results of this study suggest that Korea's changing industrial structure, especially the decline in agriculture, could produce a further decline in the LFPR of older men in the near future. Given that the share of the labor force engaged in farming has decreased to less than 10%, of course, it is unlikely that future decline in agriculture will be as dramatic as the shrinkage that took place in the past decades. However, the agricultural sector in Korea today still accounts for one third of the labor force aged 50 and older. The vast majority of the agricultural labor force today is composed of very old persons who will soon have to leave the labor force one way or the other. The additional opening of the agricultural markets, which is likely to take place, will further damage the already troubled sector. All things considered, it is possible that, in a decade or two, the agricultural population in Korea will be reduced to a very small minority in the economy, as is the case in other advanced countries Other things being equal, the additional shrinkage of agriculture will decrease the overall LFPR of older men. In the long-run, however, it is anticipated that the LFPR of older males will be more strongly influenced by the changes in the labor market status of the elderly within a given industry, especially in the growing service sector, rather than the sectoral shift.

This study also provides some implications for the labor-market policy prepared for the coming of the aged society. To mitigate the potential adverse economic impacts of the aging of the labor force, the government has recently implemented various measures to boost the employment of older workers. For example, large firms with 50 and more workers are required by law to maintain a minimum percentage (currently 3%) of employees aged 50 and older. There are also a number of wage subsidy programs for aged workers. The evidence provided here casts some doubt about the long-term effectiveness of these programs to encourage the

employment of the elderly. A large fraction of the decline in the LFPR of older men since 1980 has resulted as a consequence of the long-term transformation of the industrial structure. Even the relatively small intra-industry changes in the labor market status of older men, not taken up in this study, could be attributed, as least partly, to technological or product market changes. It is highly difficult, and sometimes undesirable, to alter the course of these long-term structural changes.

CLASSIFICATION OF INDUSTRIES BASED ON THE 1980 INDUSTRIAL CATEGORIES

	Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
1	Agriculture	11	Agriculture. Hunting. Trapping and Game Propagation	11	Agriculture. Hunting. Trapping and Game Propagation	01	Agriculture. Hunting. Trapping and Game Propagation Including Related Service Activities	011	Growing of Crops. Market Gardening. Horticulture
								012	Farming of Animals
								013	Growing of Crops Combined With Farming of Animals: Mixed Farming
								014	Planting for Landscape. Agricultural and Animal Husbandry Service Activities. Except Veterinary Activities
								015	Hunting. Trapping and Game Propagation Including Related Service Activities
2	Forestry	12	Forestry	12	Forestry	02	Forestry and Logging Related Services	020	Forestry
3	Fishery	13	Fishing	13	Fishing	05	General Fishing; Operation of Fish Hatcheries and Fish Farms; Services Incidental to Fishing	051	Fishing and Gathering of Marine Materials
								052	Operation of Fish Hatcheries and Fish Farms; Services Incidental to Fishing

	Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
4	Coal Mining	21	Mining and Agglomeration of Coal and Lignite, Extraction of Peat	21	Mining and Agglomeration of Coal and Lignite, Extraction of Peat	10	Mining and Agglomeration of Coal and Lignite, Extraction of Peat	101	Mining and Agglomeration of Coal and Lignite, Extraction of Peat
5	Crude Petrol and Natural Gas	22	Extraction of Crude Petroleum and Natural Gas	22	Extraction of Crude Petroleum and Natural Gas	11	Service Activities Incidental to Oil and Gas Extraction, Excluding Surveying	102	Extraction of Crude Petroleum and Natural Gas, and Related Services
6	Metal Mining	23	Mining of Metal Ores	23	Mining of Metal Ores	12	Mining of Uranium and Thorium Ores	103	Mining of Uranium and Thorium Ores
						13	Mining of Metal Ores	111	Mining of Iron Ores
								112	Mining of Non-ferrous Metal Ores, Except Uranium and Thorium Ores
7	Other Mining	29	Other Mining	29	Other Mining	14	Other Mining	121	Quarrying of Stone, Sand and Gravel
								122	Mining of Other Industrial Non-Metal Ores, Except Fuel
8	Food and Tobacco	31	Manufacture of Food Products and Tobacco	31	Manufacture of Food Products and Tobacco	15	Manufacture of Food Products and Beverages	151	Production, Processing and Preserving of Meat, Fishes, Fruit, Vegetables, Oils and Fats

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
					16	Manufacture of Tobacco Products	153	Manufacture of Grain Mill Products, Starches and Starch Products, and Prepared Animal Feeds
							154	Manufacture of Other Food Products
							155	Manufacture of Beverages
							160	Manufacture of Tobacco Products
9 Textiles	32	Industries of Textiles, Apparel and Leather Production	32	Industries of Textiles, Apparel and Leather Production	17	Manufacture of Textile Products	171	Preparation and Spinning of Textile Fibers
					18	Manufacture of Wearing Apparel and Fur Articles	172	Weaving of Textiles
					19	Tanning and Dressing of Leather, Manufacture of Luggage and Footwear	173	Manufacture of knitted and crocheted fabrics and articles
							174	Dyeing and Finishing Textiles
							179	Manufacture of Other Made-Up Textile Articles, Except Apparel
							181	Manufacture of Sewn Wearing Apparel, Except Fur Apparel

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							182	Dressing and Dyeing of Fur, Manufacture of Articles of Fur
							191	Tanning and Dressing of Leather
							192	Manufacture of Luggage, Handbags and the Like, Saddlery and Harness
							193	Manufacture of Footwear
10 Wood and Lumber	33	Manufacture of Wood and of Products of Wood and Cork, Including Furniture	33	Manufacture of Wood and of Products of Wood and Cork, Including Furniture	20	Manufacture of Wood and of Products of Wood and Cork, Except Furniture	201	Sawmilling and Processing of Wood
							202	Manufacture of Products of Wood, Cork, Straw and Plaiting Materials
11 Pulp and Paper	34	Manufacture of Paper and Paper Products; Publishing and Printing	34	Manufacture of Paper and Paper Products; Publishing and Printing	21	Manufacture of Pulp, Paper and Paper Products	211	Manufacture of Pulp, Paper and Paperboard
					22	Publishing, Printing and Reproduction of Recorded Media	212	Manufacture of Articles of Paper and Paperboard
							221	Publishing
							222	Printing and Service Activities Related to Printing
							223	Reproduction of Recorded Media

	Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
12	Chemical Goods	35	Manufacture of Chemicals and Chemical, Petrol, Coal, Rubber and Plastic Products	35	Manufacture of Chemicals and Chemical, Petrol, Coal, Rubber and Plastic Products	23	Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	231	Manufacture of Coke and Related Products
						24	Manufacture of Chemicals and Chemical Products	232	Manufacture of Refined Petroleum Products
						25	Manufacture of Rubber and of Plastics Products	233	Processing of Nuclear Fuel
								241	Manufacture of Basic Chemicals
								242	Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products
								243	Manufacture of Other Chemical Products
								244	Manufacture of Man-Made Fibers
								251	Manufacture of Rubber Products
								252	Manufacture of Plastic Products
13	Nonmetallic Products	36	Manufacture of Other Non-metallic Mineral Products, Except Coal and Petrol Products	36	Manufacture of Other Non-metallic Mineral Products, Except Coal and Petrol Products	26	Manufacture of Other Non-metallic Mineral Products	261	Manufacture of Glass and Glass Products
								262	Manufacture of Ceramic Ware

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							263	Manufacture of Cement, Lime and Plaster and Its Products
							269	Manufacture of Other Non-metallic Mineral Products
14 Primary Metal	37	Manufacture of Basic Metals	37	Manufacture of Basic Metals	27	Manufacture of Basic Metals	271	Manufacture of Basic Iron and Steel
							272	Manufacture of Basic Precious and Non-ferrous Metals
							273	Cast of Metals
15 Metallic Machine Assembly	38	Manufacture of Fabricated Metal Products, Machinery and Equipment	38	Manufacture of Fabricated Metal Products, Machinery and Equipment	28	Manufacture of Fabricated Metal Products, Except Machinery and Equipment	281	Manufacture of Structural Metal Products, Tanks, Reservoirs and Steam Generators
					29	Manufacture of All Other Machinery and Equipment n.e.c.	289	Manufacture of Other Fabricated Metal Products and Metal Treating services
					30	Manufacture of Office Appliances	291	Manufacture of General Purpose Machinery

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
					31	Manufacture of Electrical Machinery and Apparatuses n.e.c.	292	Manufacture of Machine-tools
					32	Manufacture of Radio, Television and Communication Equipment and Apparatuses	293	Manufacture of Other Special Purpose Machinery
					33	Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	294	Manufacture of Weapons and Ammunition
					34	Manufacture of Motor Vehicles, Trailers and Semitrailers	295	Manufacture of Other Domestic Appliances
					35	Manufacture of Other Transport Equipment	300	Manufacture of Office Appliances
							311	Manufacture of Electric Motors, Generators and Transformers
							312	Manufacture of Electricity Distribution and Control Apparatuses

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							313	Manufacture of Insulated Wires and Cables, Including Insulated Code Sets
							314	Manufacture of Accumulators, Primary Cells and Primary Batteries
							315	Manufacture of Electric Lamps and Lighting Equipment
							319	Manufacture of Other Electrical Equipment
							321	Manufacture of Semiconductor and Other Electronic Components
							322	Manufacture of Television and Radio Transmitters and Apparatuses for Line Telephony and Line Telegraphy
							323	Manufacture of Television and Radio Receivers, Sound or Video Recording or Reproducing Apparatuses, and Related Goods

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							331	Manufacture of Medical Appliances and Instruments
							332	Manufacture of Instruments and Appliances for Measuring, Checking, Testing, Navigation and Other Purposes
							333	Manufacture of Other Optical Instruments and Spectacle, Photographic Equipment
							334	Manufacture of Watches, Clocks and its Parts
							341	Manufacture of Motor Vehicles and Engines for Motor Vehicles
							342	Manufacture of Bodies for Motor Vehicles; Manufacture of Trailers and Semitrailers

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							343	Manufacture of Parts and Accessories for Motor Vehicles and Engines
							351	Building of Ships and Boats
							352	Manufacture of Railway and Tramway Locomotives and Rolling Stock
							353	Manufacture of Aircraft, Spacecraft and its Parts
							359	Manufacture of Other Transport Equipment
16	Furniture and Other Manufacturing	39	Other Manufacture	39	Other Manufacture	36	Manufacture of Furniture; Manufacturing of Articles n.e.c.	361	Manufacture of Furniture
						37	Recycling	3692	Manufacture of Musical Instruments
								371	Recycling of Metal Waste and Scrap
								372	Recycling of Non-metal Waste and Scrap

(Table Continued)

	Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
17	Electricity and Gas Supply	41	Electricity, Gas, Steam and Hot Water Supply	41	Electricity, Gas, Steam and Hot Water Supply	40	Electricity, Gas, Steam and Hot Water Supply	401	Production, Collection and Distribution of Electricity
								402	Manufacture of Gas, Distribution of Gaseous Fuel Through Mains
								403	Steam and Hot Water Supply
18	Service Water	42	Collection, Purification and Distribution of Water	42	Collection, Purification and Distribution of Water	41	Collection, Purification and Distribution of Water	410	Collection, Purification and Distribution of Water
19	Construction	51	General Construction	51	General Construction	451	Site Preparation	451	Heavy Construction
								452	Building of Complete or Partial Constructions
20	Construction Engineering	52	Special Trade Construction	52	Special Trade Construction	452	Special Trade Construction for Civil Engineering and Buildings	461	Special Trade Construction for Civil Engineering and Buildings
						453	Building Installation	462	Building Installation
						454	Building Completion	463	Electrical and Communication Works

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
					455	Renting of Construction or Demolition Equipment with Operator	464	Building Completion
							465	Renting of Construction or Demolition Equipment with Operator
21 Wholesale	61	Wholesale	61	Wholesale	50	Maintenance, Repair Services and Sale of Motor Vehicles and Motorcycles; Retail Sale of Automotive Fuel	501	Sale of Motor Vehicles
					51	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	502	Sale of Motor Vehicle Parts and Accessories
							503	Sale of Motorcycles
							504	Retail Sale of Automotive Fuel
							511	Wholesale on a Fee or Contract Basis
							512	Brokerage of Industrial Agricultural Raw Materials and Living Animals

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							513	Brokerage of Food, Beverages and Tobaccos
							514	Wholesale of Household Goods
							515	Wholesale of Construction Materials and Hardware
							516	Wholesale of Metal Ores and Basic Metals
							517	Wholesale of Other Intermediate Products, Waste and Scrap
							518	Wholesale of Machinery, Equipment and Supplies
							519	Wholesale of Other Goods
							921	Maintenance and Repair Services of Machinery and Equipment
							922	Maintenance and Repair Services of Motor Vehicles, and Motorcycles

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
22 Retail	62	Retail Sale	62	Retail Sale	52	Retail Sale and Repair Services of Personal and Household Goods	521	Retail Sale in Non-Specialized Stores
							522	Retail Sale of Foods, Beverages and Tobacco in Specialized Stores
							523	Retail Sale of Pharmaceuticals and Medical Equipments, Cosmetics and Toilet Articles
							524	Retail Sale of Textiles, Clothing, Footwear and Leather Goods
							525	Retail Sale of Electrical Household Appliances, Furniture and Household Appliances
							526	Retail Sale in Other Specialized Stores
							527	Retail Sale of Used Goods in Stores
							528	Retail Sale not in Stores
							923	Repair Services of Personal and Household Goods

(Table Continued)

	Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
23	Restaurant and Accommodation	63	Hotels and Restaurants	63	Hotels and Restaurants	55	Hotels and Restaurants	551	Accommodation
								552	Restaurants, Bars and Canteens
24	Transportation	71	Transportation and Warehousing	71	Transportation and Warehousing	60	Land Transport; Transport Via Pipelines	601	Interurban Rail Transportation
						61	Water Transport	602	Transit and Ground Passenger Transportation
						62	Air Transport		
						63	Supporting and Auxiliary Transport Activities; Activities of Travel Agencies	603	Road Freight Transport
								604	Transport Via Pipelines
								611	Sea and Coastal Water Transport
								612	Inland Water Transport
								621	Scheduled Air Transport
								622	Non-Scheduled Air Transport and Airplane Rental with Operator
								631	Cargo Handling
								632	Warehousing

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							633	Activities of Travel Agencies and Tour Operators: Tourist Assistance Activities
							639	Other Services Allied to Transport Agency
25 Telecommunication	72	Post and Telecommunications	72	Post and Telecommunications	64	Post and Telecommunications	641	Postal Services and Couriers
							642	Telecommunications
26 Finance	81	Financial Institutions, Except Insurance and Pension Funding	81	Financial Institutions, Except Insurance and Pension Funding	65	Financial Institutions, Except Insurance and Pension Funding	651	Money-Creating Institutions
							659	Non-Money-Creating Institutions
27 Insurance	82	Insurance	82	Insurance	66	Insurance and Pension Funding, Except Compulsory Social Security	660	Insurance and Pension Funding, Except Compulsory Social Security
					67	Activities Auxiliary to Financial Intermediation	671	Activities Auxiliary to Financial Intermediation, Except Insurance and Pension Funding
							672	Activities Auxiliary to Insurance and Pension Funding

(Table Continued)

	Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
28	Real Estate	83	Real Estate Activities	83	Real Estate Activities	70	Real Estate Activities	701	Real Estate Activities with Own or Leased Property
								702	Activities Related to Real Estate
29	Business Service	84	Service Activities	84	Business Activities	71	Renting of Machinery and Equipment without Operator and of Personal and Household Goods	711	Renting of Transport Equipment
						72	Computer and Related Activities	712	Renting of Machinery and Equipment
						74	Other Business Support Services	713	Renting of Personal and Household Goods
								721	Computer System Design and Consultancy
								722	Software Consultancy and Supply
								723	Data Processing and Computer Facilities Management Services
								724	Database Activities and On-line Information Provision Services

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							729	Other Computer Activities
							741	Legal, Accounting and Tax Preparation Services
							742	Market Research and Management Consulting Services
							743	Architectural, Engineering Services
							744	Scientific and Technical Services
							745	Advertising
							746	Specialized Design Services
							749	Other Professional, Scientific and Technical Services
							751	Facilities Support and Employment Services
							759	Other Business Support Services
30	Entertainment and Cultural Services	91	Recreational, Cultural Activities	94	Recreational, Cultural and Art Activities	92	Recreational, Cultural and Sporting Activities	871	Motion Picture Industries

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							872	Broadcasting
							873	Performing Arts Industries
							881	News Agency Activities
							882	Library, Archives, Museums and Other Cultural Activities
							883	Sports and Other Recreational Sports Services
							889	Other Recreational Activities
31	Household	92	Private Households with Employed Persons	95	Private Households with Employed Persons	95	Private Households with Employed Persons	950	Private Households with Employed Persons
32	International and Foreign Institution	93	Extra-Territorial Organizations and Bodies	96	Extra-Territorial Organizations and Bodies	99	Extra-Territorial Organizations and Bodies	990	Extra-Territorial Organizations and Bodies
33	Public Administration	94	Public Administration and Defense	91	Public Administration and Defense	75	Public Administration and Defense: Compulsory Social Security	761	Executive, Legislative and General Government Support
								762	Administration of Industrial and Social Policy of Community

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							763	Foreign Affairs and Defense Activities
							764	Justice, Public Order and Safety Activities
							765	Compulsory Social Security Activities
34 Hygiene Services	95	Personal Care and Other Related Services	92	Personal Care and Other Related Services	90	Personal Care and Other Related Services	931	Personal Care Services
							939	Other Service Activities n.e.c.
35 Education and Welfare	96	Social Services	93	Social Services	73	Research and Development	731	Research and Experimental Development On Natural Sciences and Engineering
					80	Education	732	Research and Experimental Development On Social Sciences and Humanities
					85	Health and Social Work	801	Primary Education
					91	Membership Organizations	802	Secondary Education
							803	Higher Education
							804	Schools for the Handicapped and Foreigners

(Table Continued)

Classification	Code	1980 Industry	Code	1985/1990 Industry	Code	1995 Industry	Code	2000 Industry
							809	Adult and Other Education
							851	Human Health Activities
							852	Veterinary Activities
							861	Social Work Activities with Accommodation
							862	Social Works Without Accommodation
							911	Business and Professional Organizations
							912	Labor Organizations
							919	Other Membership Organizations
36 Other Public Services	93	Other Services Activities			901	Sewage, Human and Animal Waste Treatment Services	903	Sanitation and Similar Activities
					902	Waste Collection and Disposal		

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