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ABSTRACT

This paper utilizes historical information to explore the relationship between labor force participation of middle aged and old people and the disability program in Japan. In particular, we explore the time series dimension to identify what has determined the trend in disability program participation over time and relate it with the labor supply. We find that mortality and health measures have been largely unrelated to the disability program participation rates. While major revisions to the disability program have slightly expanded the eligibility for DI programs, the program participation is still very low; thus, the effect on labor force participation is very limited in Japan, which is in contrast with some European countries that have high take up rates, inducing early retirement.

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1. Introduction

In Japan and other developed countries, disability pension programs commonly have a long history in public pension programs. The Japanese disability pension program, which started in 1944, has gradually expanded over several major revisions and has contributed to improving the living standards of the disabled. Indeed, the eligibility criteria have been generally eased, and the number of program recipients has shown a trend of modest increase. In contrast to some European countries (Börsch-Supan, 2005), however, the disability pension program is rarely related with labor force participation (of the elderly) in Japan.

However, the fact that the disability pension program has so far been unlikely to be detrimental to labor force participation in Japan does not imply that the disability pension *will not be* relevant for retirement decisions in Japan. Indeed, the number of recipients of disability pension benefits has increased in recent years. It has been established that the aging population in Japan is growing at a remarkable speed, and the proportion of the elderly aged 65 and over in the total population had reached 20 percent in 2005 and will reach 30 percent in 2025 and approximately 40 percent in 2050 (National Institute of Population and Social Security Research, 2007). In the future, together with the historically lower fertility rate, population aging will cause a decline in the numbers of the labor force, and the situation might be exacerbated by expanding disability program participation. From this aspect, it is worthwhile to investigate the reason for the low take up rate in Japan, focusing on a distinction between institutional aspects (i.e., tight eligibility conditions) and non-institutional ones (i.e., better health conditions), which have not been sufficiently explored in Japan.

To this end, this paper utilizes historical information to explore the relationship between the disability pension program and labor force participation in Japan. In particular, we examine the time series data to identify what has determined the trend in disability program participation. Specifically, this paper performs two-fold analyses to separate institutional factors from non-institutional factors accounting for program participation.

First, we provide historical information on mortality and health status measures in Japan. A change in health status is sure to affect participation in disability insurance programs even without any revisions. Hence, understanding the trends in health status over time is critical to distill the effect of health conditions on the program participation. This task is not easy, however, because there is no "true" measure of health status. Thus, we must explore, over time, the relationships among representative measures of health, mortality rates, and subjective health status.

Second, we attempt to understand the relationship between changes over time in the disability program and program participation. We identify three major revisions of the program in the post-war period and examine the relationship between these changes and the program participation rate so that we identify how trends in the disability program have been related with institutional revisions.

Our discussion proceeds as follows. Section 2 provides a historical overview of the disability program in Japan, focusing on major revisions that are to be examined in later sections. Section 3 investigates historical representative data on health status, i.e., mortality, subjective health status, and other measures and relates them with each other in Japan. Section 4 describes the development of labor force participation, examines the relationship with program revisions, and quantifies the effect of the disability program revisions on "activity" measured by labor force participation rate. The last section concludes.

2. Disability Program and other social security program reforms

2. 1 Historical overview

This section gives an overview from a historical perspective of the disability program and other related reforms to the social security program in Japan. At the outset, we need to clarify that what is often referred to as the "disability insurance (DI) program" in other countries corresponds to the "disability pension program" in Japan; the program was constructed in the public pension scheme, and all revisions to the disability program have been linked to those to the core pension programs. Among several programs to assist the disabled, the disability pension plays the most important role in terms of income compensation; therefore, we will focus on the description of the disability pension program and briefly mention related programs at the end of this section.

The Japanese public pension program consists of three programs: the Employees' Pension Insurance (EPI; *Kosei Nenkin*) whose pensioners are private employees; the National Pension Insurance (NPI; *Kokumin Nenkin*) whose pensioners are self-employed or agriculture, forestry, and fishery cooperative employees; and the Mutual Aid Insurance (*Kyosai Nenkin*) covering employees in the public sector and private schools. In terms of the number of pensioners, the EPI and the NPI contribute to the total by slightly less than half, respectively, and the MAI occupies the remaining small portion.[1] We will describe below the revisions of the disability pension program over time, focusing on the EPI and NPI (**Table 1**).

[1] See Oshio, Shimizutani, and Oishi (2010) for a detailed description of the Japanese public pension program and its historical development.

When the EPI was launched in 1944 as the first social insurance style public pension program, it contained the disability pension program.[2] The initial program rated the disabled using two grades (Grade 1 and Grade 2) once qualified. The grading depended on functional ability to perform activities of daily living, rather than on loss of earning ability. Grade 1 referred to a condition in which a person was unable to perform activities of daily living (e.g., severe disability affecting both hands or complete blindness). Grade 2 referred to a condition in which a person faced very severe limitations in performing activities of daily living (any severe disability affecting either hand). We need to pay attention to the fact that the program insured persons with mental disorders from the beginning, via the EPI. The revision of 1954 introduced Grade 3 to cover more disabled persons with less severe conditions than those in Grade 2.[3]

After establishment in the EPI, the disability pension program has expanded in some ways. To date, there have been four major revisions during its development. We will consider them, focusing on who has been most affected in each revision. The first revision was the introduction of the NPI effective in 1961. The NPI began to insure those who were not covered by the EPI, i.e., self-employed workers and agricultural, forestry, and fishery sector workers. The introduction of the NPI was important, as it launched the universal pension system in the Japanese public pension program. The NPI drastically expanded the coverage of the disability pension program to more groups than just employees in the

[2] A brief review of development of the disability pension program was provided by the Ministry of Health, Labour and Welfare (2009). The previous program of the EPI, which was called the "Workers Pension Insurance (Roudou Sha Nenkin Hoken Seido)" was launched in 1941 and covered only male and non-office workers. In 1944, the name of the program was changed to the EPI, and it began to cover office workers or females; this was very similar to the current system in terms of coverage.

[3] The EPI had only a single layer of a wage proportional benefit before 1954 in the old-age pension program and was reconstructed to a double tier structure (fixed rate part as the first tier and a wage proportional part as the second tier) in 1954. Even after 1954, however, the disability pension program had a single tier structure until the 1985 revision.

private sector. Unlike the EPI, the NPI had not covered mental disease at the time of its introduction.

The NPI had two types of disability programs for recipients with premium contribution and for those without. The first was the "Disability Pension Program (Shogai Nenkin)," which was designed for those who contributed the premium. The NPI was motivated by the spirit of social insurance and thus required the recipients to contribute the insurance premium to receive benefits. The second was the "Disability Welfare Pension Program (Shogai Fukushi Nenkin)," which was designed for those who did not make premium contribution. Eligibility to receive disability pension benefit was judged at the time of the first doctor's visit to survey the extent of the disease that made the person disabled. Thus, those who had received the first visit before reaching the age of 20 (the minimum age for NPI participation is 20) or before 1961 were not insured by the disability pension program under the NPI. They were covered by the disability welfare pension program, which was financed by the government. The eligibility for this program was means-tested, and the amount of benefit was lower than that of the disability pension program.

The second revision took place in 1974. It called for expanding the coverage for mental disease. The NPI began to insure mental disorders in 1964 and mental deficiency in 1965.[4] However, the coverage for mental disability was very limited. While those who paid the premium were eligible to receive the disability pension benefits once qualified as Grade 1 or 2 (note that there was no Grade 3 in the NPI), the disability welfare program insured the disabled only if rated as Grade 1. In 1974, the disability welfare program began

[4] In 1966, the NPI began to cover all diseases including liver and kidney diseases among other internal disorders.

to cover Grade 2 as well, and many patients with mental disorders or deficiencies became eligible to receive the benefit.

The third revision was implemented as a part of the major revision of core public pension programs in 1985 (effective from 1986). This revision was most drastic in recent years, as it harmonized all the public pension programs into an integrated form (see Oshio, Oishi, and Shimizutani, 2010). It reduced the benefit multiplier and flat-rate benefit in the old age pension program for the first time, aiming to restrain an increase in total pension benefits. Three revisions were implemented with respect to the disability pension programs.

First, a double tier structure was introduced. The NPI pensioners, both with and without premium contributions, were entitled to receive (1) the flat rate "Disability Basic Pension (Shogai Kiso Nenkin)" benefit as the first tier, which was linked to the Basic Pension Benefit, and (2) the wage proportional "Disability Employees' Pension (Shogai Kosei Nenkin)" program as the second tier. The Disability Welfare Pension, which was funded by the government before the revision, was replaced by the Disability Basic Pension, which was funded by the government and premium contributions of the NPI pensioners.

Second, the benefits for the disabled without premium contribution were raised to be at the same level as those for the disabled with premium contribution in the NPI. Both groups of the disabled were entitled to receive the same Disability Basic Pension benefit, and the amount doubled for the recipients of the disability welfare pension benefit. This is a remarkable revision for those who received the disability welfare pension, given that the 1985 revision reduced old age pension benefits in general.

Third, grading of disability conditions was harmonized across programs. Before the revision, there was disparity in qualification criteria for the disabled even if the disability condition was the same. However, even after the harmonization of the grading, the

Disability Basic Pension covered the disabled only in Grades 1 and 2. The EPI program covers the disabled in Grade 3 too and provides "disability compensation" for a disabled pensioner with a disability less severe than Grade 3 if the disabled condition is fixed.[5]

Lastly, the government allowed the Disability Basic Pension recipients aged 65 years or above to additionally receive EPI benefits if they had made any EPI contributions in the past. This revision became effective as of 2006, most probably providing the elderly with incentives to apply for disability pension benefits.

In sum, the disability pension programs in Japan have a long history starting in 1944. The disability pension program for private firm employees (EPI pensioners) was introduced relatively early and was generous in that it covered mental diseases as well as patients who were less severely disabled. The coverage of the disability pension has expanded. From 1961, NPI pensioners were entitled to receive the disability pension benefits, a move that included the self-employed. From 1974, the disabled without premium contribution were entitled to receive the benefits if rated as Grade 2, thus including many persons who were mentally deficient or had mental disorders. From 1986, the disabled without contribution were entitled to receive the disability basic pension benefit, which was same as for those with contribution. Finally, the Disability Pension Benefit recipients with any EPI contributions were entitled to additionally receive EPI benefits in 2006.

Despite the domestic expansion, however, the size of the disability pension benefit is still relatively small in terms of economic size and public expenditure from an international perspective. According to OECD's Social Expenditure Database, the share of the expenditure on disability pension benefits out of GDP was 0.3 percent in Japan in 2005,

[5] Since the EPI pensioners were required to join the NPI in the 1985 reform, the entitlement to receive disability pension became contingent on the grading of the NPI (Disability Basic Pension), even if a disabled person had been approved to receive disability pension benefits in the EPI or MAI program. The MAI program has a Grade 3 as well.

much lower than that in Denmark, Sweden, and the UK, which register about 2 percent. Further, the share of the expenditure on disability pension benefits out of total public expenditure is about 2 percent, which is again much lower than that in other countries.

2-2 Current scheme

Under the current scheme, a person who visited a doctor for the first time for consultation about the cause of the disability when he/she was under the age of 20 or when he/she was an NPI pensioner is entitled to receive the Disability Basic Pension benefit. Note that there is no limitation in terms of age for receiving disability pension benefits, unlike in some other countries where the recipients of disability pension benefits are converted to eligibility to receive old age pension benefits after attaining the eligible age (i.e., age 65). The formula to compute the benefit is as follows.

Grade I = Basic Pension benefit × 1.25 + additional benefit for dependent children.

Grade 2 = Basic Pension benefit + additional benefit for dependent children.

The amount of the Basic Pension benefit is 792,100 yen per year and that of additional child benefit is 227,000 yen each for the first and second children and 75,900 yen each for the third and subsequent children.

In addition to the Disability Basic Pension, a person who consulted a doctor to identify the cause of the disability when he/she was an EPI pensioner is entitled to receive wage-proportional Disability Employees' Pension benefit or Disability Mutual Aid Pension benefit (for the MAI recipients). The formula to compute the benefit of the second tier is as follows.

Grade 1 = Wage proportional benefit × 1.25 + Additional benefit for a spouse.

Grade 2 = Wage proportional benefit + Additional benefit for a spouse.

Grade 3 = Max [Wage proportional benefit, 594,000 yen].

The amount of additional benefit for a spouse is 227,900 yen per year.[6]

Figure 1 reports the number of the recipients who received the disability pension benefits between 1970 and 2006.[7] The data source is the *Annual Report of Social Security Administration* (Shakai Hoken Jigyo Nenpo) published by the Social Security Agency. Unfortunately, there is no data available by gender or age. The number of recipients was about 0.5 million in 1970 and increased to 2.0 million in 2006; it expanded four times over 36 years. As seen from the figure, the dominant recipients are the NPI pensioners, who share about 80 percent of the total. Because most of them are self-employed, their labor supply is less likely to be associated with the generosity of the disability pension program and its institutional changes. In contrast, the EPI recipients have occupied less than 20 percent of the total. As discussed below, their labor supply is likely to be affected by institutional changes in eligibility of the disability pensions but their proportion is relatively small. Finally, the number of MAI pensioners to receive the disability pension, who are also likely to be affected by institutional factors, has been very small, 2–3 percent in all years.[8]

[6] Momose (2008) used the purchasing power parity to compare the amount of benefits in Japan with that in the US and Sweden. While the amount of benefits of the disability employee pension (Grade 1 or 2) is larger than that in the US and Sweden, that of the disability basic pension (Grade 1) is much smaller and that for Grade 2 is a half of the standard benefit in US and Sweden.

[7] The fiscal year starts in April and ends in March in Japan. The figures are measured as of the end of the fiscal year.

[8] The number of MAI pensioners to receive the disability pension is not available; that of MAI pensioners eligible to receive the benefits is available in the *Annual Report on Social Security Statistics* (Shakai Hoken Tokei Nenpo) compiled by the National Institute of Population and Social Security Research. We compute that the number of MAI pensioners to receive the disability pension, assuming the proportion of those to receive out of those eligible, both of which are available in the *Annual Report of Social Security Administration*, is the same for the EPI and the MAI programs.

The impact of past revisions to disability pension programs on DI participation are illustrated more clearly in **Figure 2**, which shows the growth rate of disability pension recipients. We observe three jumps: in 1974–75, 1985–86, and 2005–06. As described in Section 2-1, the 1974 revision added a Grade 2 level for the NPI Disability Pension program. The 1985 revision raised the benefit for the NPI pensioners without premium contributions (i.e., Disability Welfare Pension recipients) to the level for those with contribution. Finally, the 2006 revision allowed Disability Basic Pension recipients to receive the EPI benefit as well, if they had made EPI contributions. These jumps, albeit with limited impact on the total labor force, confirm that the DI participation is affected more directly by institutional changes than they are by changes in health status.

2-3 Other programs for the disabled

In addition to the disability pension, there are some other programs to assist the disabled. One is employers' compensation for employees who were injured, diseased, disabled, or killed during work-related activities, including a disaster while commuting. Even a firm employing one employee is required to join the insurance scheme by law at the firm's cost. The benefits include compensation for the treatment, labor in absence, and a disabled status after a treatment as well as benefits for family members if the employee is killed. While the employers' compensation covers the mentally disabled, the eligibility is very limited, and the number of those approved for the mentally disabled benefit, which is relevant to the rapid increase in the number of the recipients of the disability insurance in Europe, has been small.[9]

[9] According to The Current Condition of Work Disaster Compensation for Mentally Disabled (Seishin Shougai nado no Rousai Hoshou Jyokyo) annually released by the Ministry of Health, Labour, and Welfare, the number of the approved was

Another program is public assistance. While eligibility does not require a disabling condition to receive public assistance, the proportion of those who receive public assistance is larger for the recipients of the disability pension, suggesting that the disability pension benefits are not sufficient to compensate for the minimum living standards. This is particularly the case for those with mental disorders, and the share of the disabled to receive public assistance has increased for the physically disabled and those with mental disorder.[10]

3. Historical data on health

This section reviews some long-term time series data on representative measures of health status. First, the trend of mortality in Japan is examined. Second, another measure of health status, a subjective health status is used to describe the development of health status in Japan. Third, we will relate the two measures—mortality and subjective health status in Japan.

3-1 Mortality

Mortality trends are of course not identical with health status, and thus with disability trends, but are probably the only historical measure available in Japan and that comparable with other countries. We present the mortality trends in three ways. **Figures 3-1 and 3-2** illustrate the ages of equal mortality probability for males and females, respectively. The

very small (9 between 1983 and 1996 (14 years)) but increased to 100 in 2002 and around 270 in 2007 or 2008 (http://www.mhlw.go.jp/bunya/roudoukijun/rousaihoken04/090316.html).

[10] Momose (2008) remarked that 250,000 persons received an additional allowance (Shougai Sha Kasan) for the disabled among the public assistant recipients in 2006 and the number has substantially increased, compared to 100,000 in the mid-1990s. According to a survey by the Tokyo Metropolitan Government ("Shougai Sha no Seikatsu Jittai"), the proportion of the recipients of public assistance is 6.4 percent (in 2003 and 7.0 percent in 2008) for the physically disabled, 3.4 percent (in 2003 and 2.7 percent in 2008) for the mentally retarded, and 25.7 percent (in 2003 and 31.0 percent in 2008) for those with mental disorders, all of which are larger than the average proportion of the public assistance recipients. The high proportion of the mentally disabled is accounted for by the low employment rate, the high rate of remaining single, and the high rate of non-recipient of pension benefit.

historical data on mortality by age and gender in every year from 1960 to 2007 is available in "Simplified Life Table (Kan-I Seimei Hyo)."[11] We set the mortality at age 60 and 65 in 1960 as the reference points in the base year and computed the corresponding figures in the subsequent years, assuming the mortality increases linearly with the ages. As seen in Figure 3-1, for males, the mortality at age 60 in 1960 corresponds to that at age 71.1 in 2007 (11.1 years extension), and the mortality at age 65 in 1960 does so to that at age 75.6 in 2007 (10.6 years extension). Those results show that the mortality in Japan drastically declined over 50 years. Figure 3-2 reveals that the extension is more remarkable for females. The mortality at age 60 in 1960 corresponds to that at age 74.0 in 2007 (14.0 years extension), and the mortality at age 65 in 1960 does so to that at age 78.1 in 2007 (13.1 years extension). On a closer look, it can be observed that the tempo of extension for males has accelerated in the 1970s and has become slightly stagnant in the 1990s. A similar pattern is observed for females too, but the weak trend in the 1990s is less evident.

Figure 4 presents the mortality trends in a different manner. It shows the two-year mortality rates by age and gender in 1960 and 2005. If we take the 5 percent level of morality, the corresponding age for males in 1960 and 2005 was 68.7 and 78.9, respectively, while that for females in 1960 and 2005 was 72.5 and 84.0, respectively. The gap in the two years is larger for males probably because the starting age in the initial year is lower than that for females. This figure also demonstrates that the mortality rate has substantially declined over 45 years.

Figures 5-1 and **5-2** report the mortality rates at ages 55, 60, and 65 in every year for males and females, respectively. This again shows that the mortality rate has declined over half a century. The mortality has been monotonically declining and has always been lower

[11] Unfortunately, data is available only for every five year since 1995. We interpolated a linear trend for the 5 years to obtain the data in every year.

for females than it has been for males. As observed in Figure 4, the decline in the male mortality rate is greater in the 1970s but slower in the 1990s, while that for the female mortality rate is linear.

3-2 Self-rated health

Next, we move on to discussing other health measures. A representative measure of health status is a self-rated health status, which has been widely used to stand for the state of progress of the condition. While there are some critiques for the measure because of its subjective nature, it is accepted as a popular aggregate health measure that is easily obtained at a low cost. A standard version of self-reported health status is the North American version with five answer categories ranging from “excellent” to “poor.” Another is the European version with five answer categories ranging from “very good” to “very poor.” The North American version is more popular and employed in some large data sets in Japan, including the Comprehensive Survey of Living Conditions of People (CPSLCP) compiled by the Ministry of Health, Labour, and Welfare starting in 1986 and JSTAR (Japanese Study of Ageing and Retirement), which is internationally comparable to HRS/ELSA/SHARE (Ichimura, Hashimoto, and Shimizutani, 2009), starting in 2007. We utilize the data of self-rated health on a five-point scale from the CPSLCP—“excellent,” “very good,” “good,” “fair,” and “poor.”

Figures 6-1 and **6-2** illustrate the developments of the self-rated health status in males and females, respectively—the shares of those assessing their heath conditions “excellent” or “very good and those assessing them as “very good” or “good”—as well as the shares of respondents reporting subjective symptoms and of those who visit a hospital/clinic among those aged 55–64 (per thousand persons), along with the mortality

rate for the same age group over the period between 1986 and 2007. The CPSLCP began in 1986 and is performed every three years. While the morality rate has been steadily declining, the share of those reporting good health increased up to the middle of the 1990s, although it has displayed a declining trend to date. With no clear trend observed from the other two health measures, it suggests that there is a negligible relationship between the health measure and the decline in mortality.

3-3 LFP and DI versus mortality

This section examines the relationship between LFP and DI in comparison to mortality. To this end, we first collected data of the number of DI recipients by age group and gender from the Review of Public Pension Finances (Zaisei Saikeisan), which the Ministry of Health, Labour, and Welfare releases almost every five years. Next, we linearly interpolated the figures for other years with some adjustment.[12] **Figures 7-1** and **7-2** show the trends of employment and disability along with the mortality rate for those aged 60–64 for males and females, respectively. While the mortality rate has been declining steadily, the trend of the employment rate has been slightly downward for males and almost flat for females, with some cyclical movements for both. More importantly, the share of DI recipients has remained very low for both males and females, albeit with a slight upward trend, and had no clear co-movements with the employment rate and the mortality rate.

[12] In the Review of Public Pension Finances, the number of recipients by age and gender for EPI pensions is available in 1979, 1983, and 1986 and that of the eligible is in 1991, 1996, 2001 and 2007. We use the shares of the recipients (or the eligible) by gender and age group (multiplied by the total number available in the Annual Report on Social Security Administration) to estimate the number of the recipients in those years. We assume that the shares for MAI pensioners are identical with those of EPI pensioners. The number of recipients of NPI pensioners under the old program before 1985 is available in 1978, 1981, 1986, 1991, 1996, 2001, and 2007 and those under the new program after 1985 in 1986, 1991, 1996, 2001 and 2007 (the number of the eligible instead of the number of recipients since 1991 for both). We applied the same method to compute the number of recipients in those years. After those computations, we performed linear interpolation.

Figures 8-1 and **8-2** show the relationships between the employment rate and age and between the employment rate and mortality risk for males, where mortality risk is one-year mortality rate at a given age. The employment rate by age declined slightly from 1980 to 2005 but that by mortality risk declined more substantially. More specifically, the employment rate was 50 percent at an approximate age of 70 in 1980 and at an approximate age of 66 in 2005, while it was 50 percent at the mortality rate of about 3.5 percent in 1980 and only about 1.4 percent in 2005. Although the mortality rate declined substantially over the past 25 years, the elderly have become more inclined to retire. See **Figures 9-1** and **9-2** for females. The employment rate by age shifted upward up to age 60 and remained almost unchanged beyond that between 1980 and 2005. The mortality-employment curves skewed to the vertical axis, and the level of the mortality rate that corresponds to a 50 percent employment rate stayed approximately 0.5 percent over the same period.

4. Historical data on activity and program participation rates

This section explores the historical relationship between labor force participation and disability pension programs.[13] The goal is to assess the effect of each revision in the disability pension program on the labor market by discovering trends that may be explained by the revisions.

4.1 Historical labor force data

Figures 10–12 examine the long-term trends in the labor force, focusing on the rates of

[13] It would be excellent if direct data were available on pathways to retirement but unfortunately, no such data is available in Japan.

employment, unemployment, and not being in the labor force for three age groups: 40–44, 50–54, and 60–64 over 1970–2010 for males and females. For males, the employment rate shows cyclical movements with a slightly downward trend for those aged 60–64, while it has remained stable at a high level for the younger two age groups. Correspondingly, the oldest age group shows clearer cyclicality of the rates of those unemployed and of those not in the labor force as compared to the other age groups. For females, the rates of those employed and of those not in the labor force show a modest uptrend and downtrend, respectively, for the two younger age groups, while they are stable for those aged 60–64. The unemployment rate has been moving almost the same way across age groups.

4.2 Historical DI data

Figures 13-1 and 13-2 present long-term trends of the shares of DI beneficiaries in total population for three age groups: 40–45, 50–54, and 60–64 for males and females, respectively, between 1970 and 2010. The figures also indicate the three major revisions in 1974, 1986, and 2006. We observe that the share of DI recipients has been modestly increasing for all the age groups in both males and females, though the share remains low. For males, the share is 1–2 percent for those aged 40–45, whereas that for those aged 50–54 and 60–64 increased from 1–2 percent in 1970 to 3-4 percent in 2010.

Taking a closer look, we see that there are small jumps in 1974–75, 1985–86, and 2005–06—albeit not for all age groups—consistent with Figure 2. All of them are caused by the revisions to disability pension programs. In particular, for both males and females aged 60–64, we observe a remarkable increase in the DI beneficiaries following the 1975 revision and the jump in 2006. In 1974, the disability welfare program began to cover Grade 2 as well, and many patients with mental disorders or deficiencies became eligible to receive the benefit. The 2006 revision allowed Disability Basic Pension recipients aged 65

or above to additionally receive EPI benefits, providing the elderly with more incentives to apply for Disability Basic Pension. However, these trends in the DI participation rates are unrelated to those in the unemployment rates in all age groups (see Figures 11-1 and 11-2), suggesting that there is no trade-off between DI and unemployment benefit receipts.

4.3 Historical data on DI participation versus mortality and health

Next, we try to relate the DI participation and health measures. **Figures 14 and 15** present long-term trends in mortality at age 45 and 60 and DI participation rates at ages 40–44 and 60–64 for males and females. It is clear that there is no reasonable relation between the two series in each figure. Instead, we observe a contradicting pattern: the DI participation rate has increased despite the lower mortality implying that people have become healthier. Figures 14–15 show that there are two small bumps in the DI participation rate after the 1974, 1985, and 2006 revisions, which are evident for males aged 50–54 and 60–64. In contrast, there is no jump in the mortality rate in the same period, reinforcing the idea that the small increases in the DI participation rate were motivated by the DI program revisions. This justifies the observations that there is no discontinuity in the DI participation rate after some disturbances in the mortality rates in the second half of the 1990s and the beginning of the 2000s, which is the case for both males and females.

Figures 16–18 illustrate long-term trends of self-rated health status at age 55–64 and DI participation rates at age 60–64 for males and females, respectively. Figure 16 shows that there is little correspondence between DI participation and the shares of those who reported their health was “excellent” or “very good” and those who reported it as “fair” or “good.” The share of the latter group increased until the mid 1990s but declined from the end of the 1990s, while the share of the former remained virtually the same. However, the DI participation rate showed an uptrend. This is the case for both males and females.

Figure 17 also shows little association between DI participation and the share of those who reported bad health ("poor" or "very poor"), which is again the case for both males and females. The share of people suffering from bad health declined until the mid 1990s but increased slightly from the end of the 1990s, while the DI participation rates continued to increase.

Figure 18 computed a score of self-rated health status, which assigns "five" to the best of the five choices and "one" to the worst. Again, there is no clear relationship between DI participation and the score of self-perceived health status. These figures show that the trend of DI participation is unrelated with self-rated health status, the same as for the relationship between DI participation and mortality, although we need to be careful in interpreting the comparison of self-rated health status across individuals and time.

5. Concluding remarks

This paper investigates historical information to explore the relationship between labor force participation of middle aged and old people and the disability program in Japan. In particular, we explore the time series dimension to identify what has determined the trend in disability program participation over time and relate it with the labor supply.

We find that the mortality and other health measures have been largely unrelated with the disability program participation rates. While major revisions of the disability program have slightly expanded the eligibility for the DI program, the program participation is still very low; thus, the effect on labor force participation is very limited in Japan, in contrast to some European countries with a high take up rate inducing early retirement.

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Table 1 Development of Disability Pension Program in Japan

	National Pension Insurance (Self Employed, agricultural, forestry and fishery Sector)		Employee Pension Insurance (Private firm employees)
	Disability Pension (with contribution)	Disability Welfare Pension (without contribution)	
1944			Grade 1 and Grade 2 (including mental diseases)
1954			Grade 3 was added
1959	Grade 1 and Grade 2	Grade 1	
1964-65	Covered mental diseases		
1974		Grade 2 was added	
1986-	Merged to Disability Basic Pension		Disability Basic Pension + Wage Proportional Benefit

Figure 1. The number of recipients of disability pension benefits

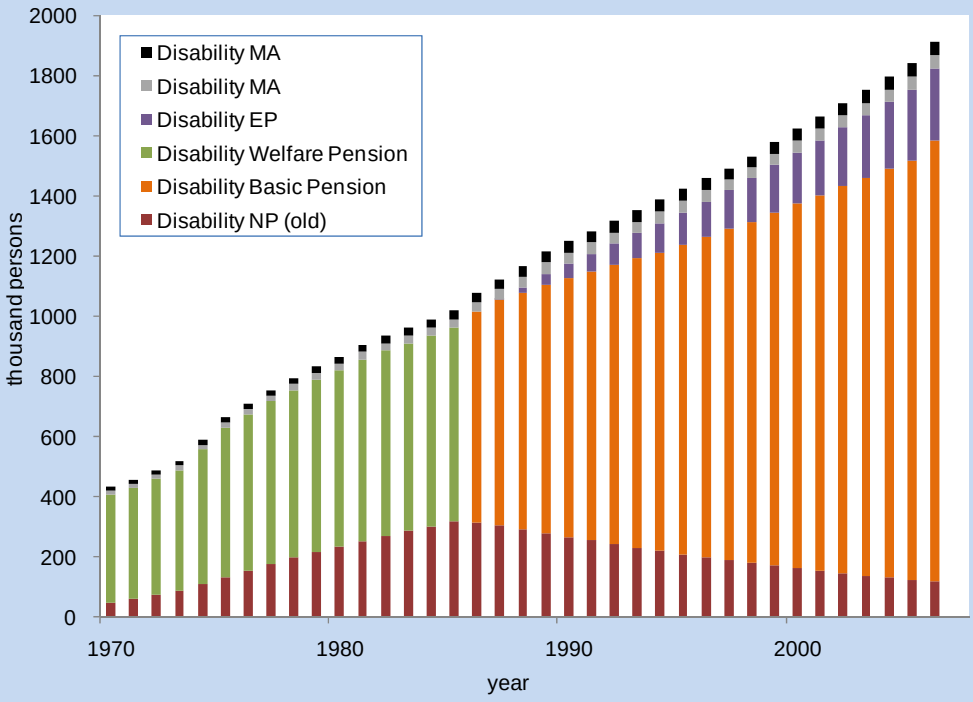


Figure 2. Growth rate of disability pension recipients

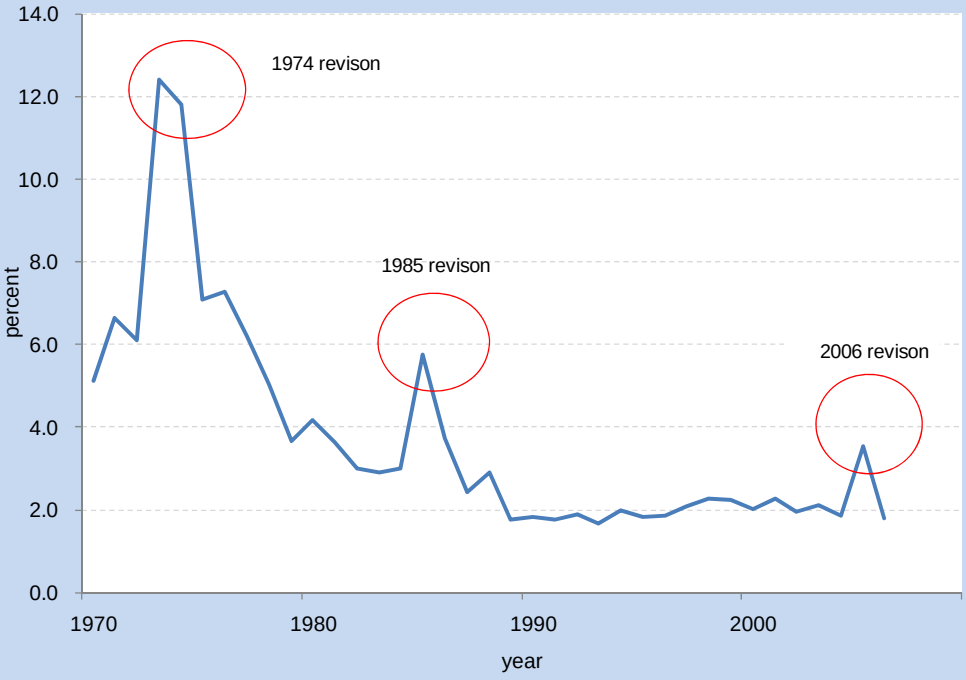


Figure 3-1. Ages of equal mortality probability for men

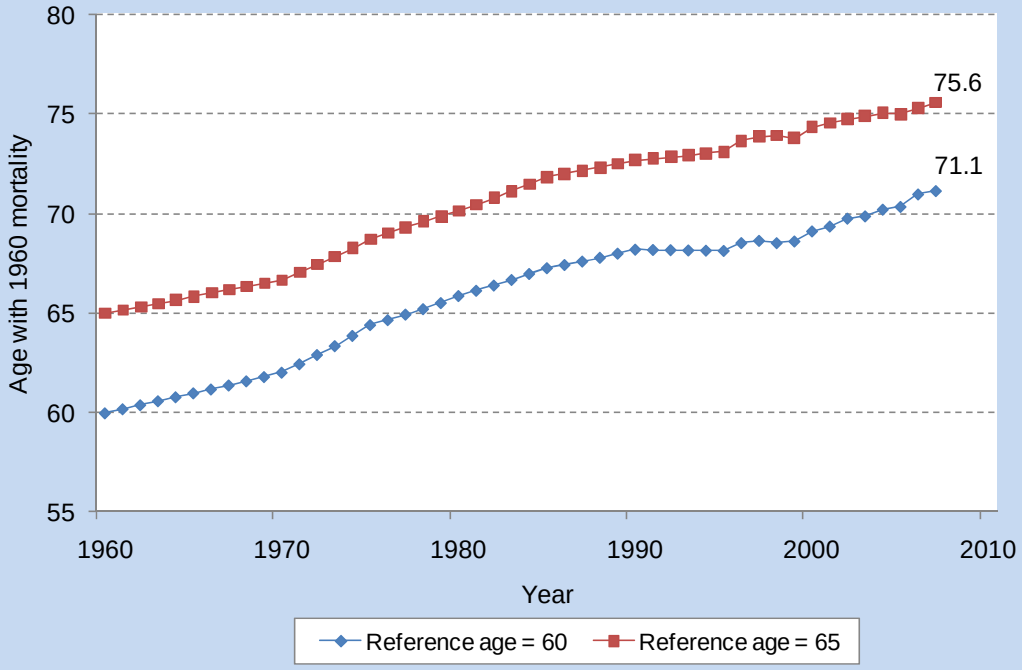


Figure 3-2. Ages of equal mortality probability for women

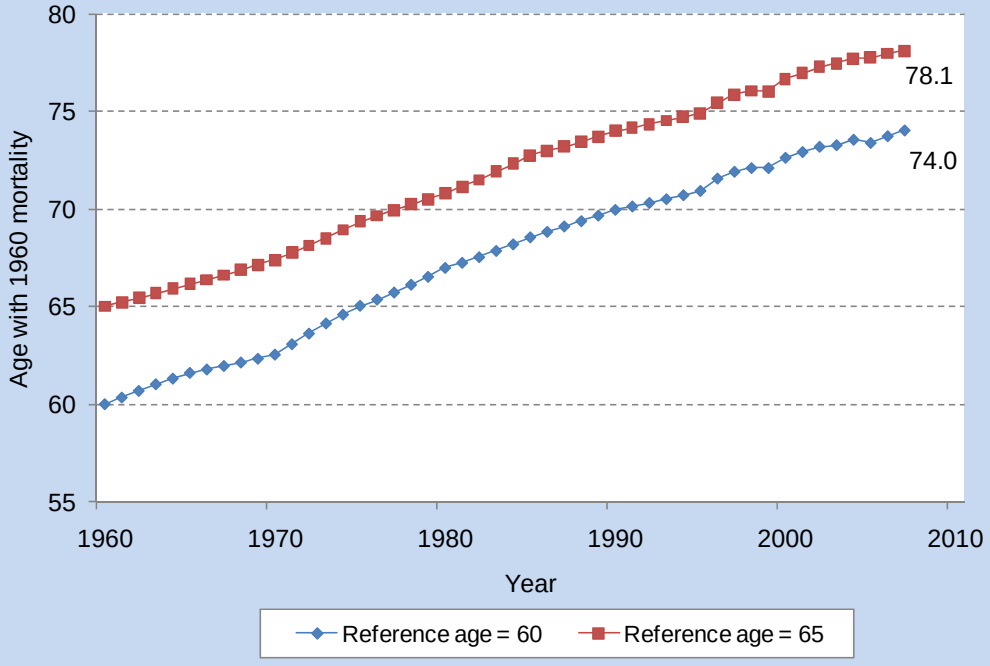
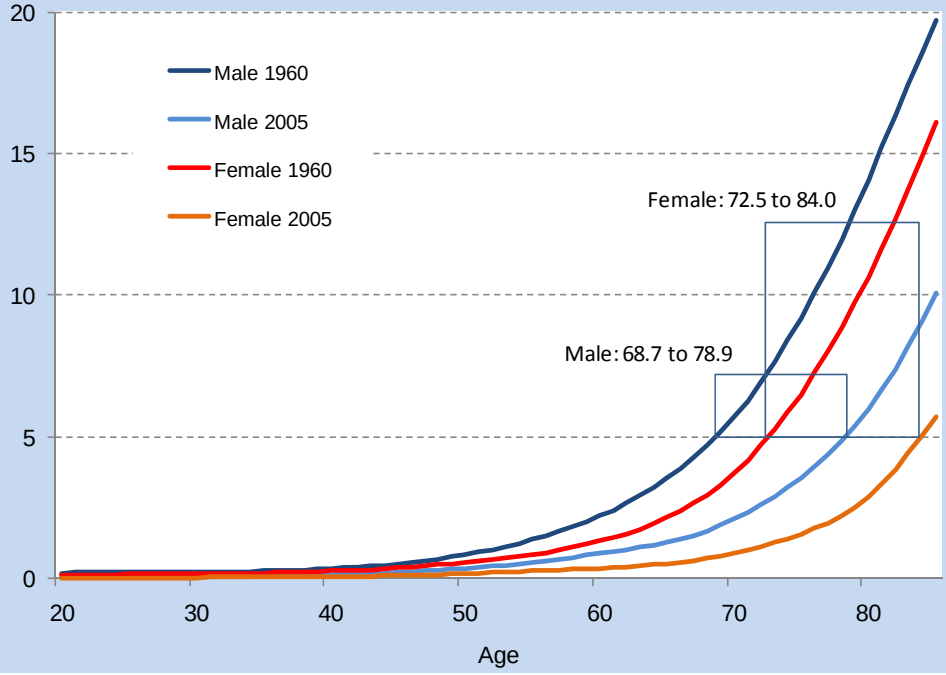


Figure 4. Two-year mortality rates by age and gender, 1960 and 2005



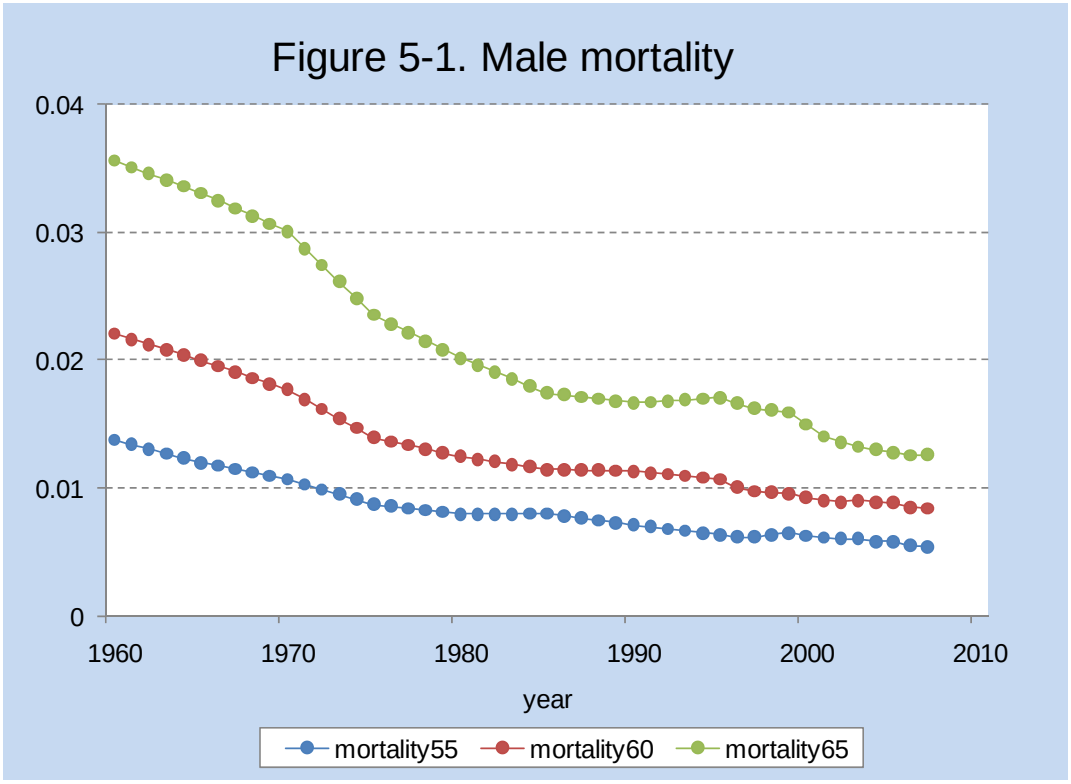


Figure 5-1. Male mortality
0.04
0.03
0.02
0.01
0
1960
1970
1980
1990
2000
2010
year
mortality55
mortality60
mortality65

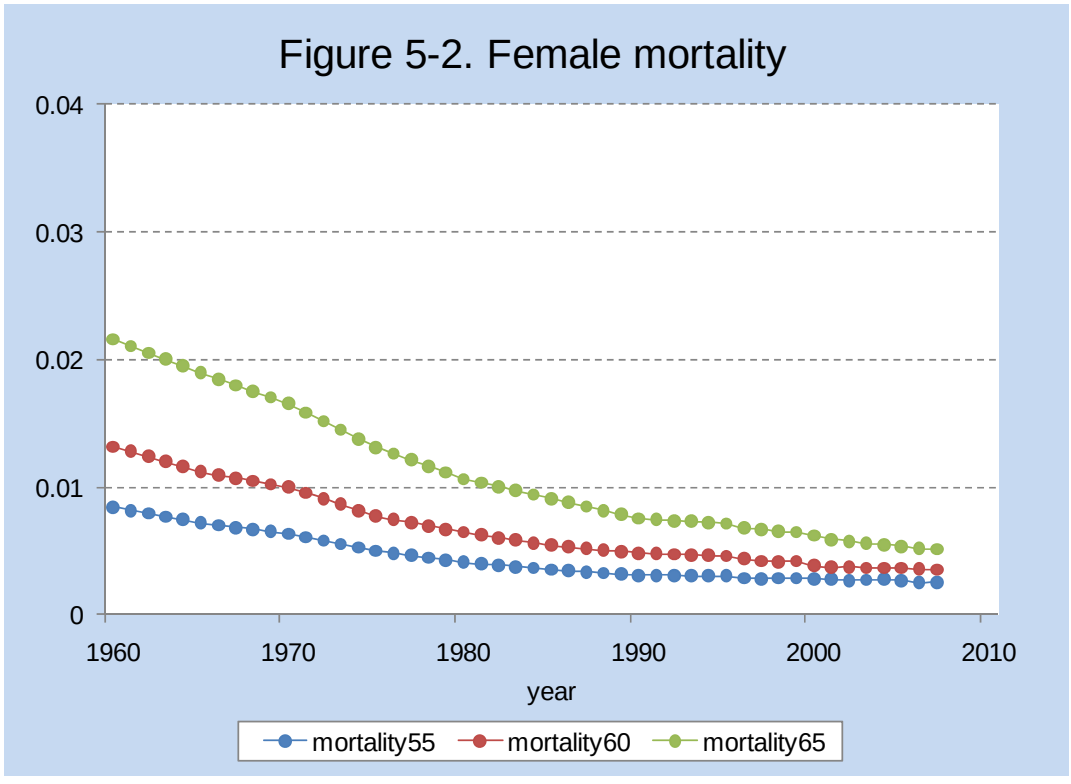


Figure 5-2. Female mortality
0.04
0.03
0.02
0.01
0
1960
1970
1980
1990
2000
2010
year
mortality55
mortality60
mortality65

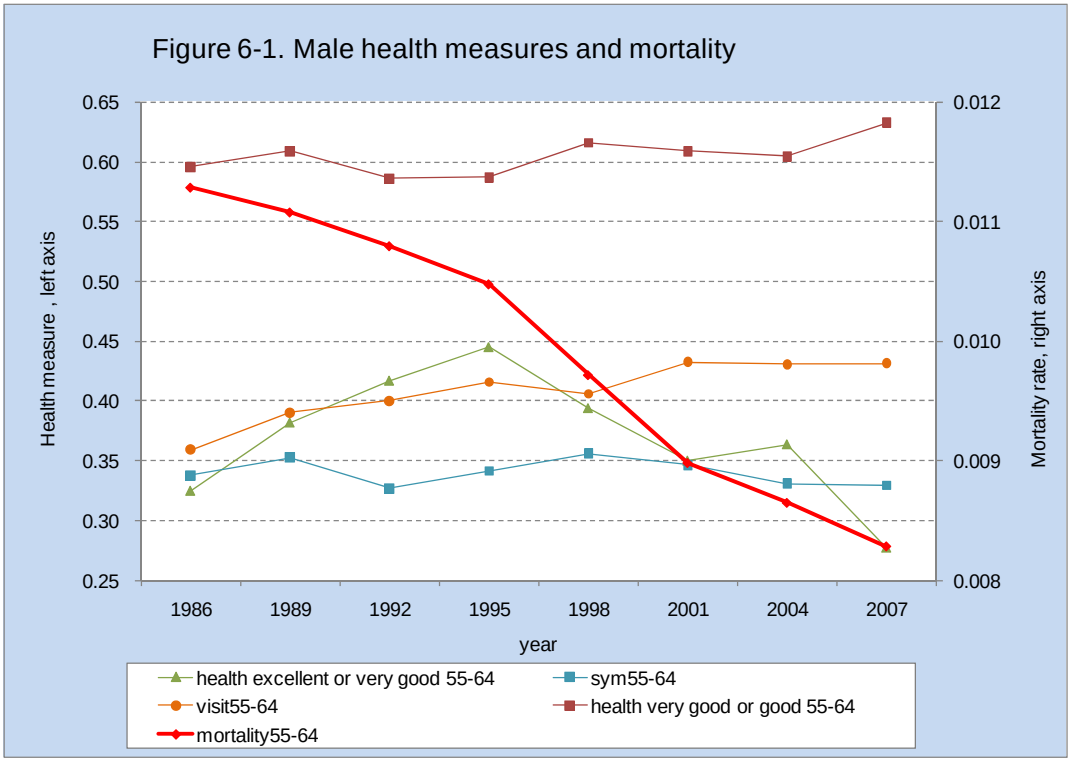


Figure 6-1. Male health measures and mortality
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
Health measure , left axis
0.012
0.011
0.010
0.009
0.008
Mortality rate, right axis
1986
1989
1992
1995
1998
2001
2004
2007
year
health excellent or very good 55-64
sym55-64
visit55-64
health very good or good 55-64
mortality55-64

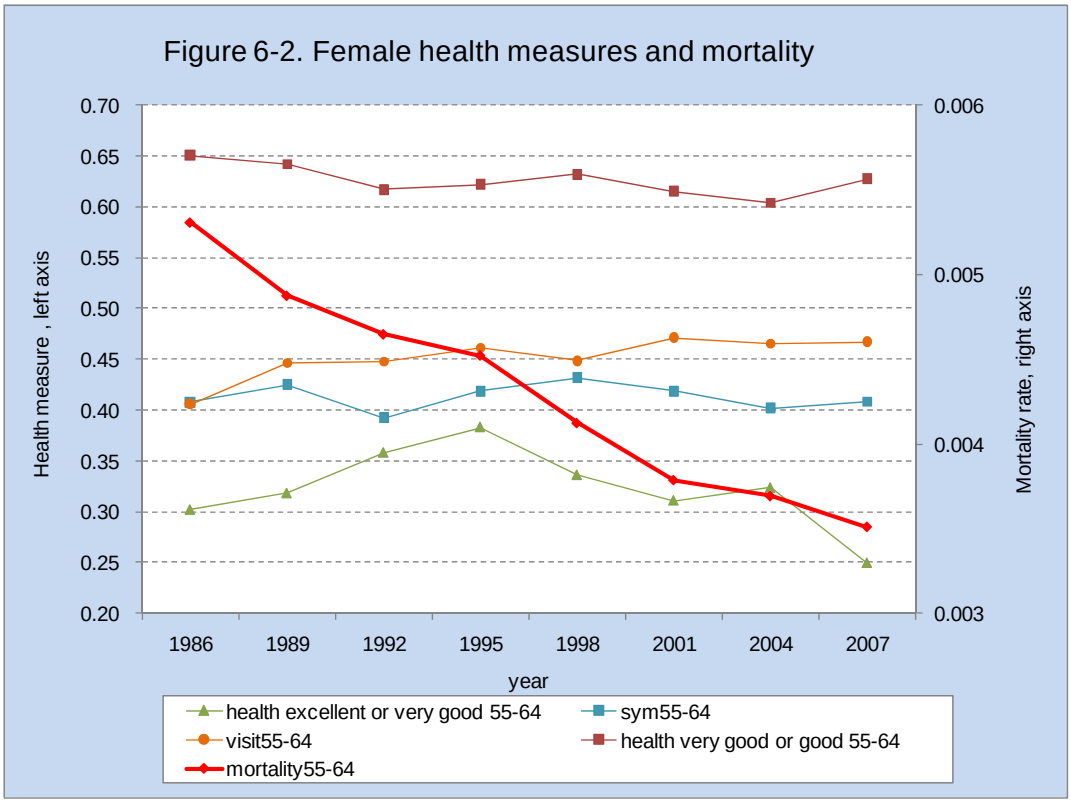


Figure 6-2. Female health measures and mortality
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
Health measure , left axis
0.006
0.005
0.004
0.003
Mortality rate, right axis
1986
1989
1992
1995
1998
2001
2004
2007
year
health excellent or very good 55-64
sym55-64
visit55-64
health very good or good 55-64
mortality55-64

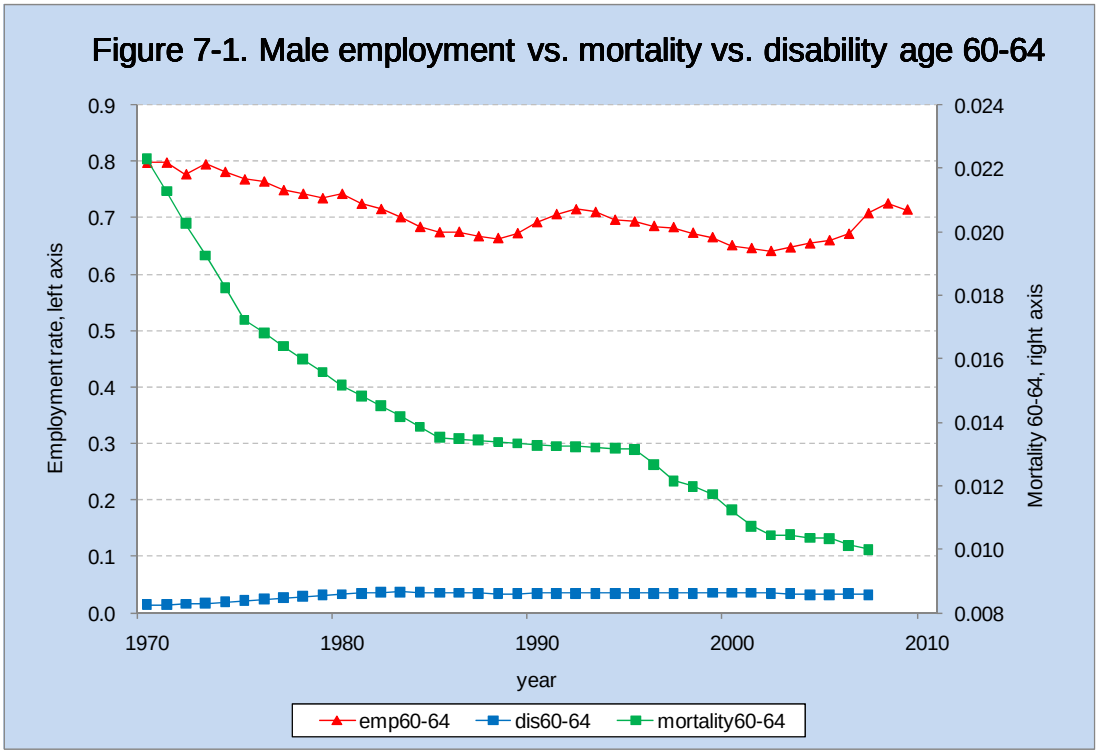


Figure 7-1. Male employment vs. mortality vs. disability age 60-64
Employment rate, left axis
Mortality 60-64, right axis
year
emp60-64
dis60-64
mortality60-64

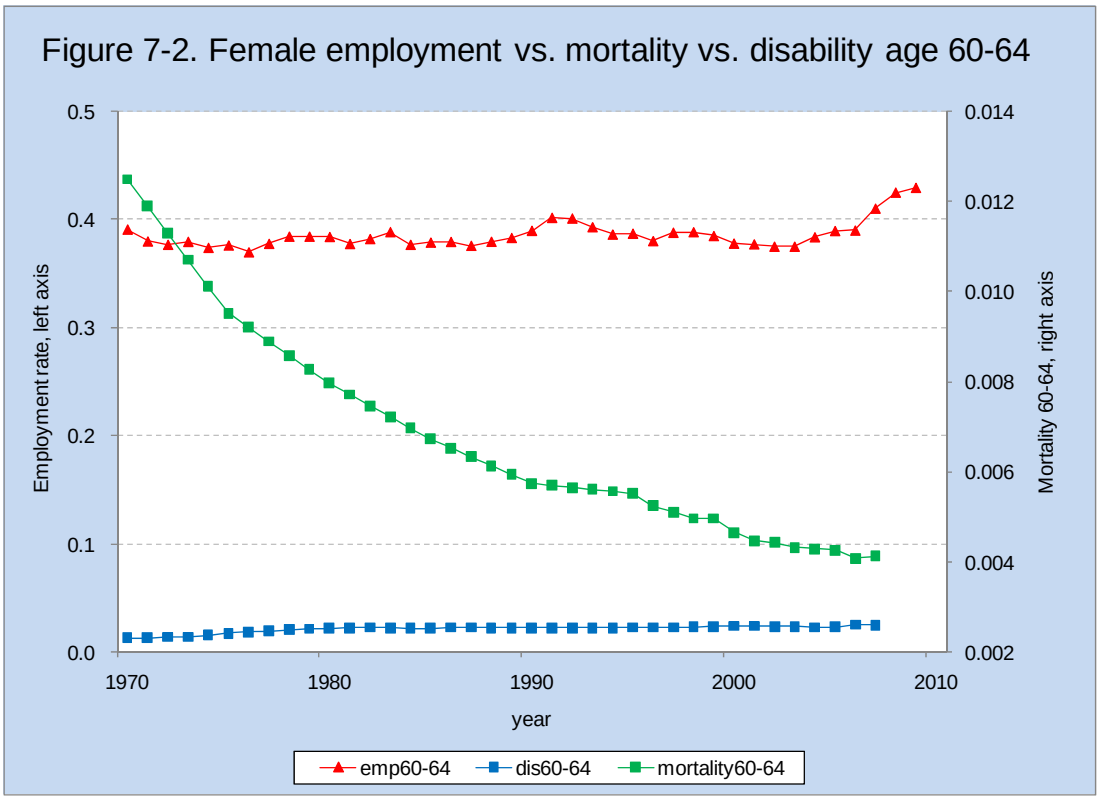


Figure 7-2. Female employment vs. mortality vs. disability age 60-64
Employment rate, left axis
Mortality 60-64, right axis
year
emp60-64
dis60-64
mortality60-64

Figure 8-1. Male employment rate by age

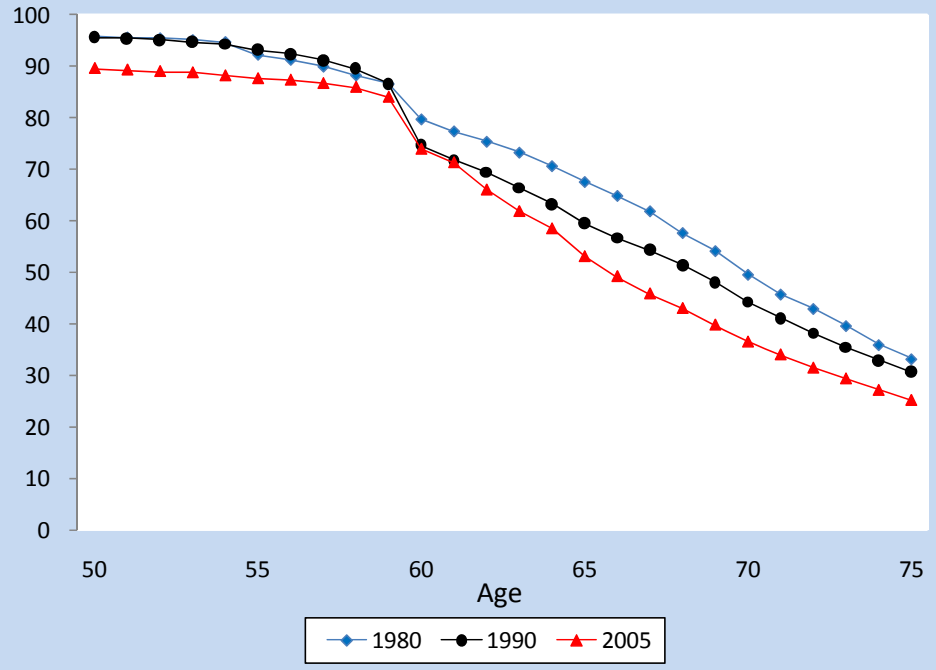


Figure 8-2. Male employment rate by mortality risk

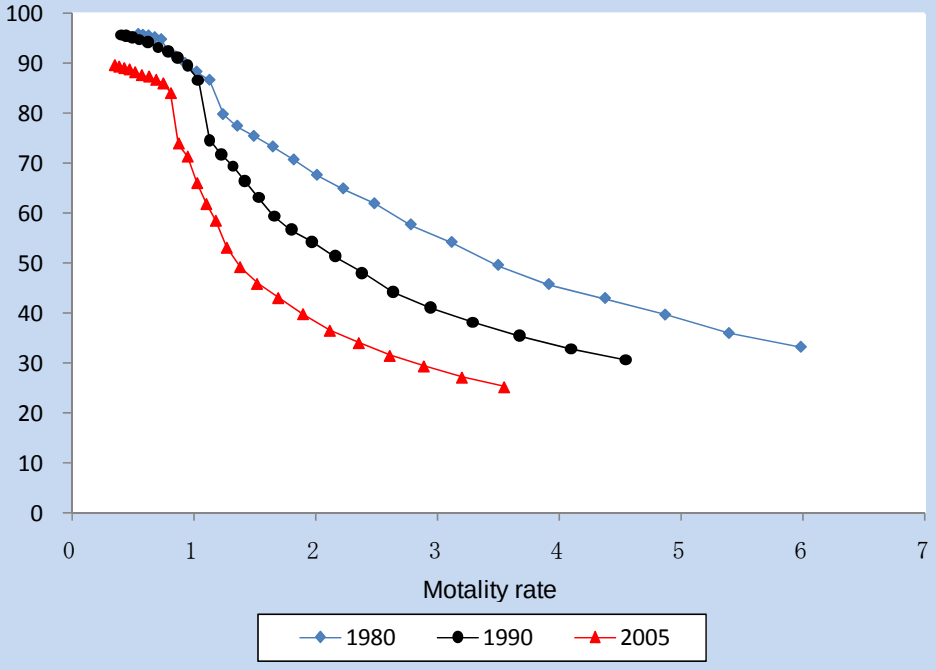


Figure 9-1. Female employment rate by age

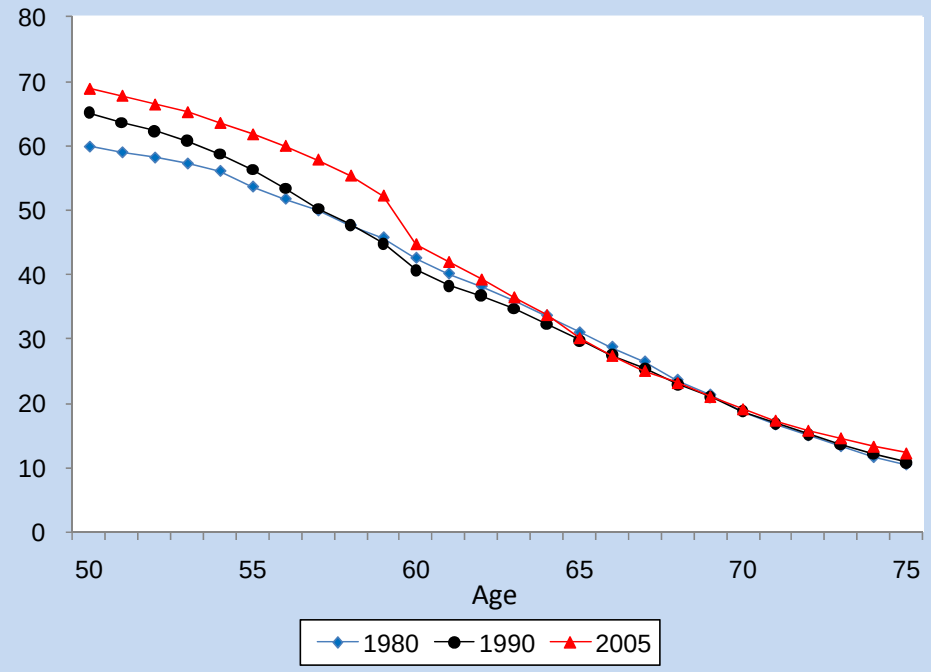
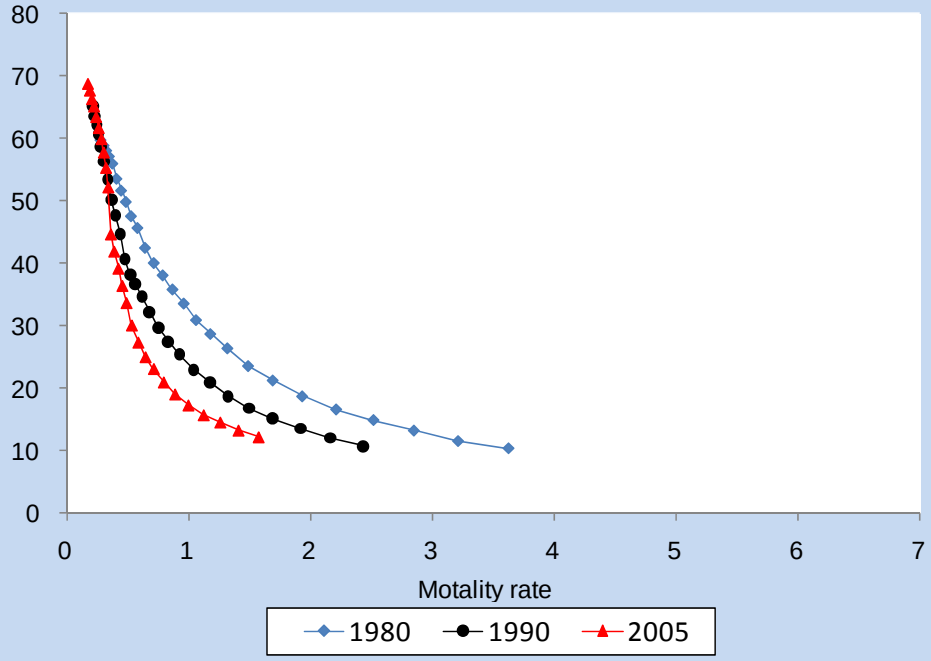


Figure 9-2. Female employment rate by mortality risk



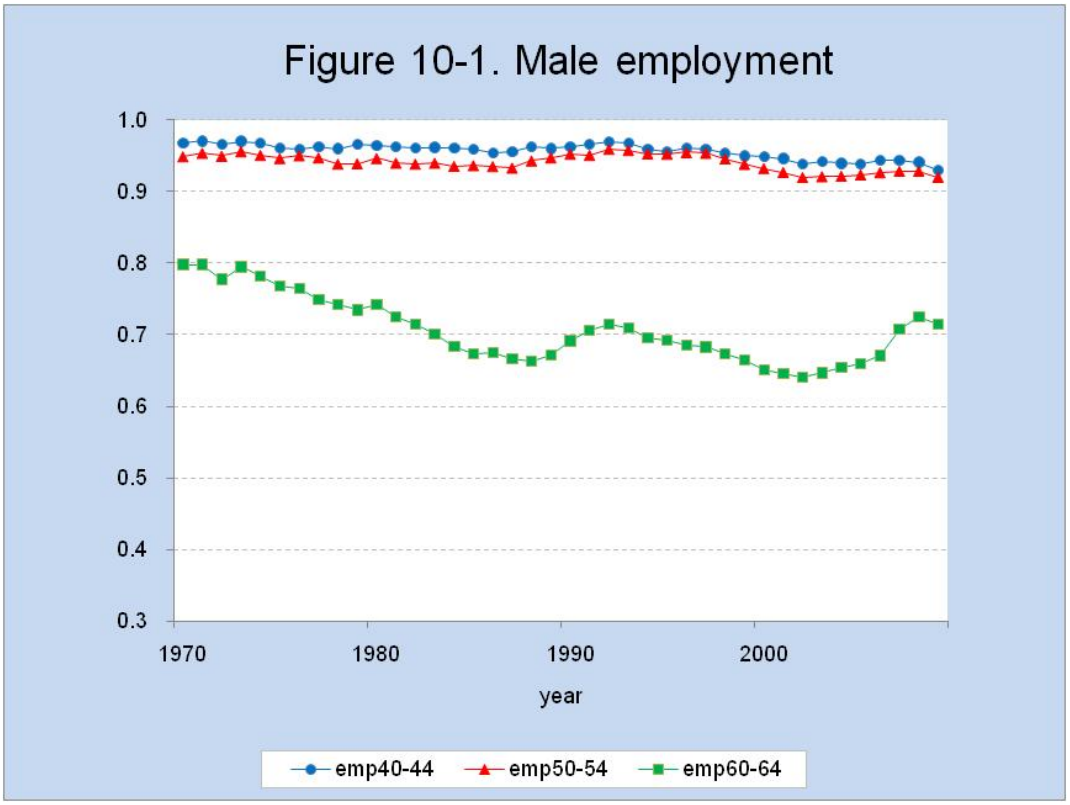


Figure 10-1. Male employment
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1970
1980
1990
2000
year
emp40-44
emp50-54
emp60-64

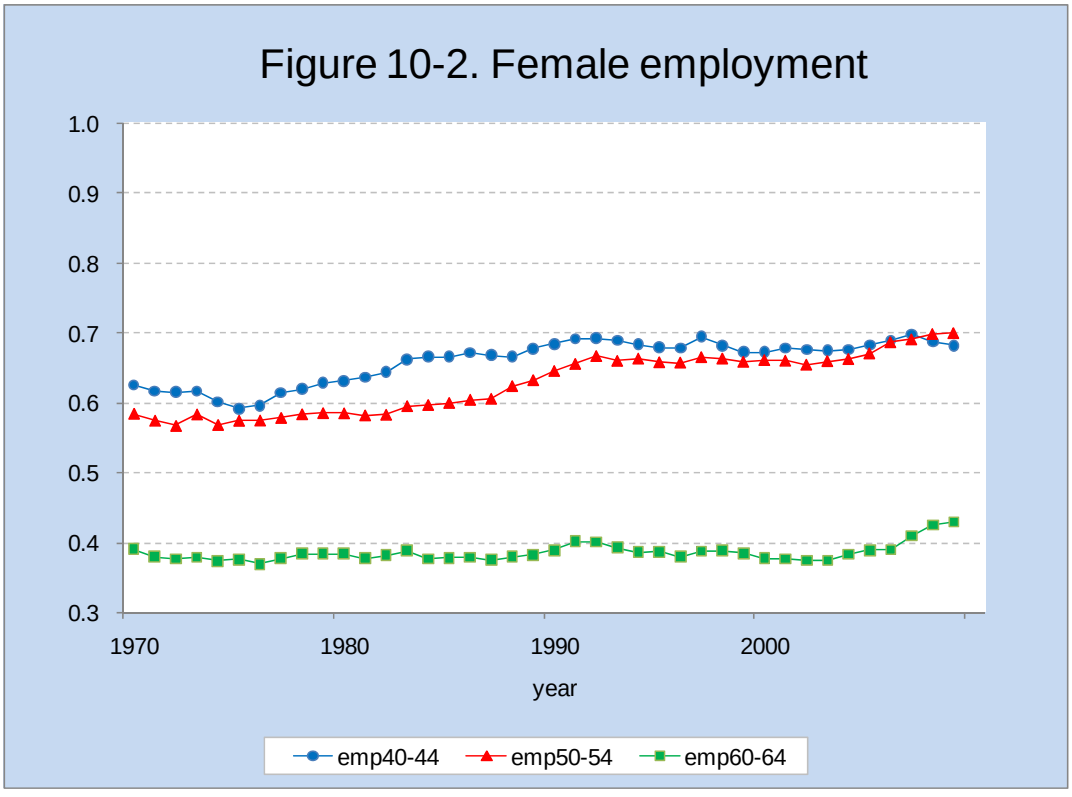


Figure 10-2. Female employment
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1970
1980
1990
2000
year
emp40-44
emp50-54
emp60-64

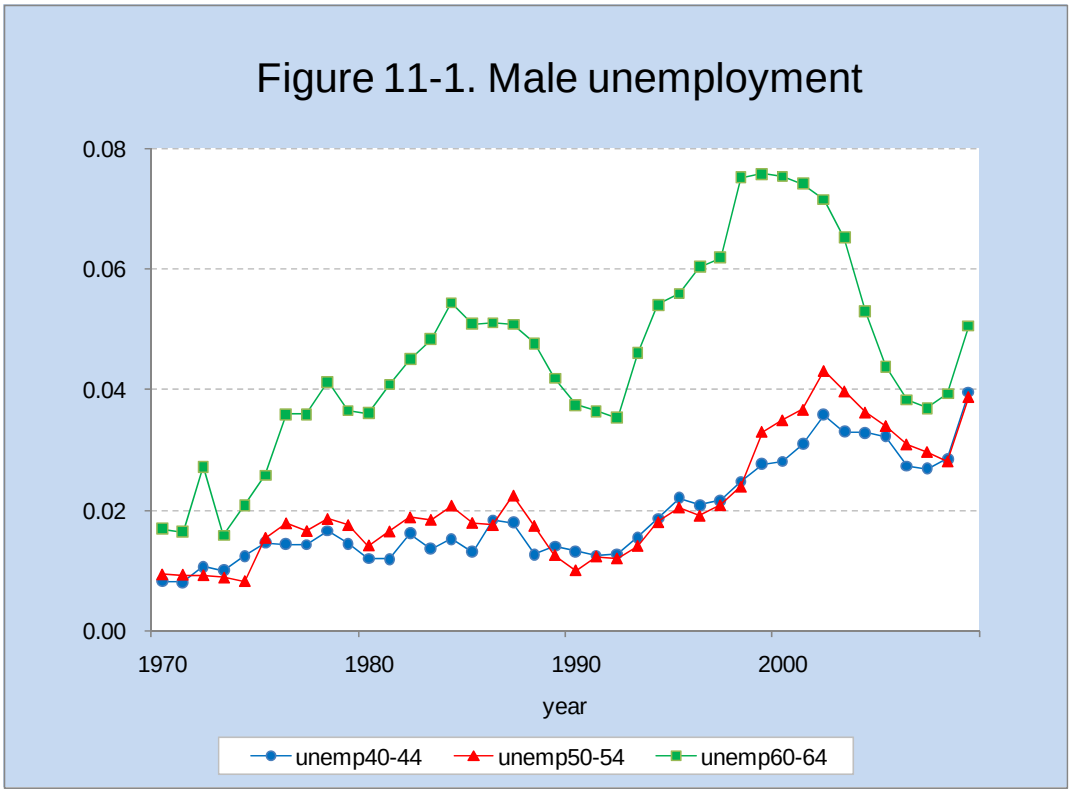


Figure 11-1. Male unemployment
0.08
0.06
0.04
0.02
0.00
1970
1980
1990
2000
year
unemp40-44
unemp50-54
unemp60-64

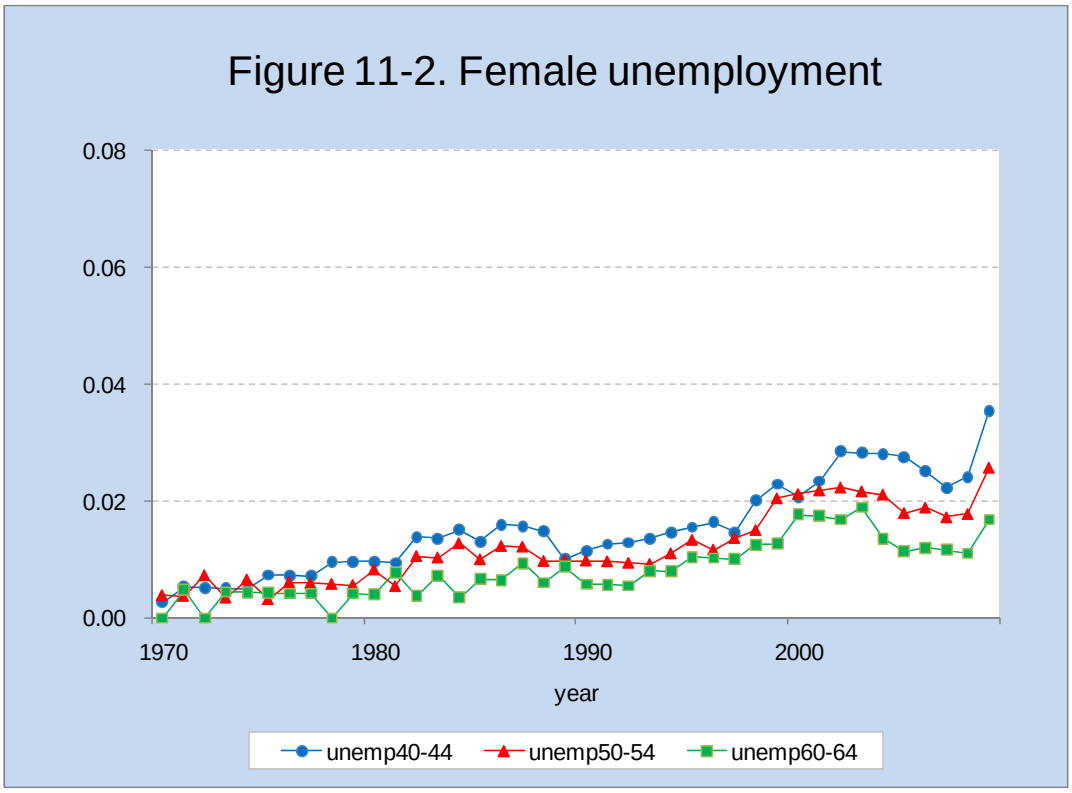


Figure 11-2. Female unemployment
0.08
0.06
0.04
0.02
0.00
1970
1980
1990
2000
year
unemp40-44
unemp50-54
unemp60-64

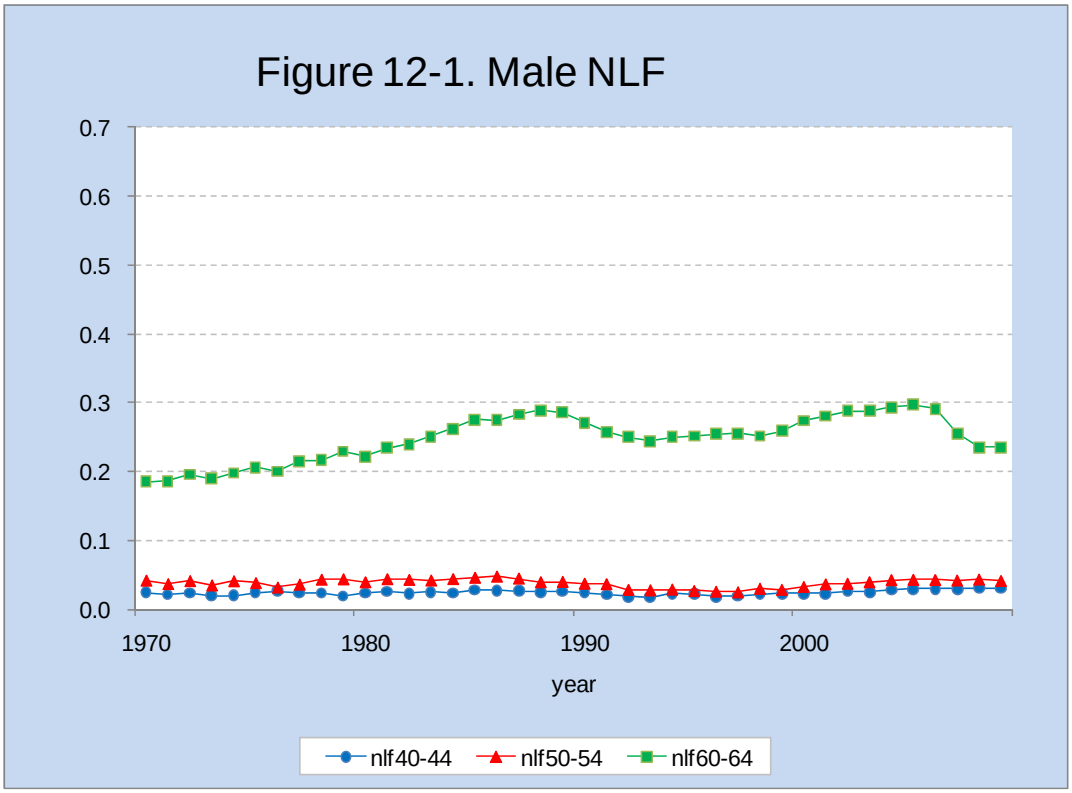


Figure 12-1. Male NLF
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1970
1980
1990
2000
year
nlf40-44
nlf50-54
nlf60-64

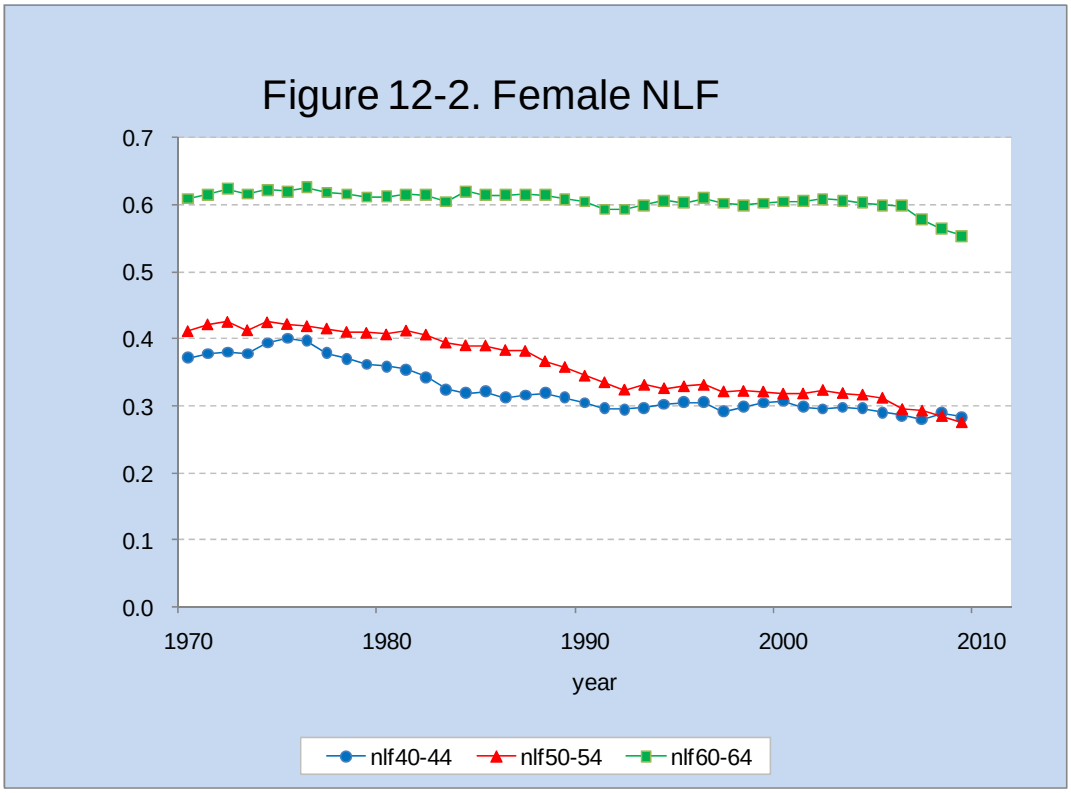


Figure 12-2. Female NLF
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1970
1980
1990
2000
2010
year
nlf40-44
nlf50-54
nlf60-64

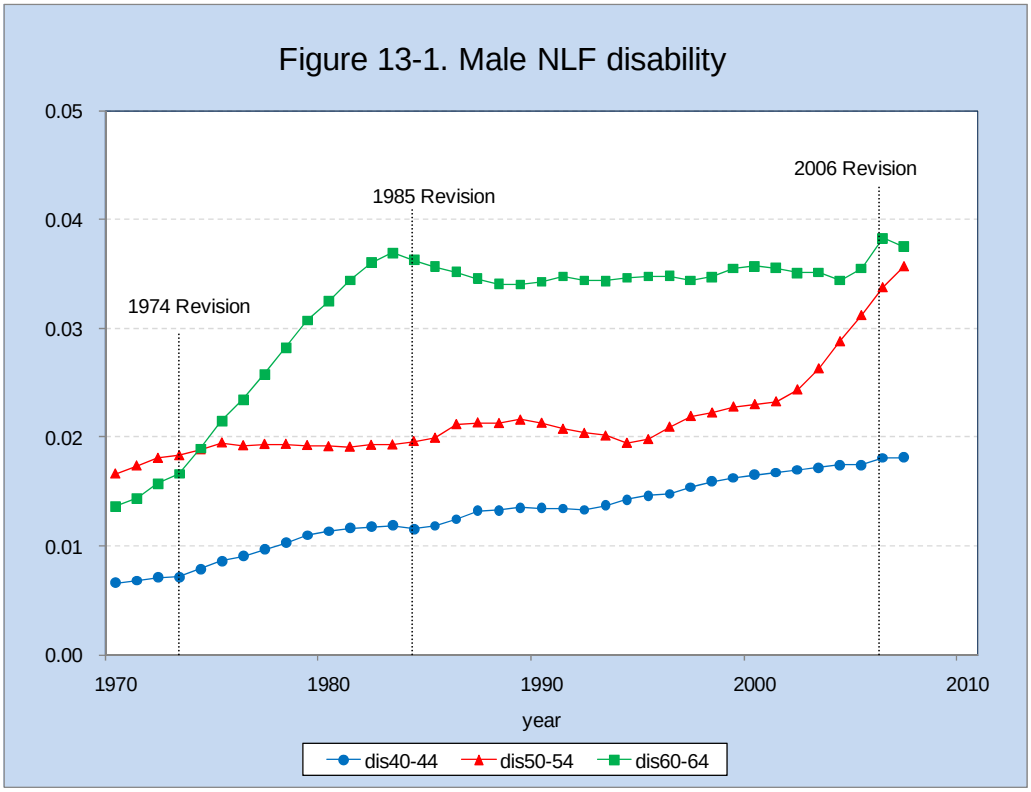


Figure 13-1. Male NLF disability
0.05
0.04
0.03
0.02
0.01
0.00
1974 Revision
1985 Revision
2006 Revision
1970
1980
1990
2000
2010
year
dis40-44
dis50-54
dis60-64

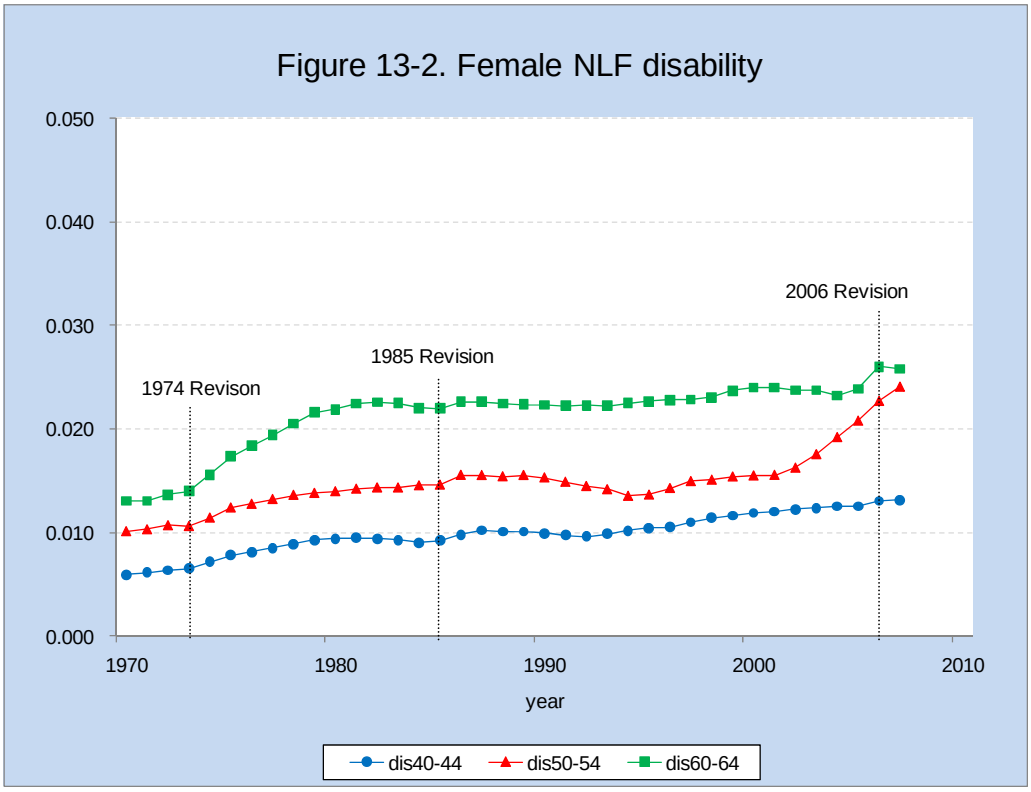


Figure 13-2. Female NLF disability
0.050
0.040
0.030
0.020
0.010
0.000
1974 Revison
1985 Revision
2006 Revision
1970
1980
1990
2000
2010
year
dis40-44
dis50-54
dis60-64

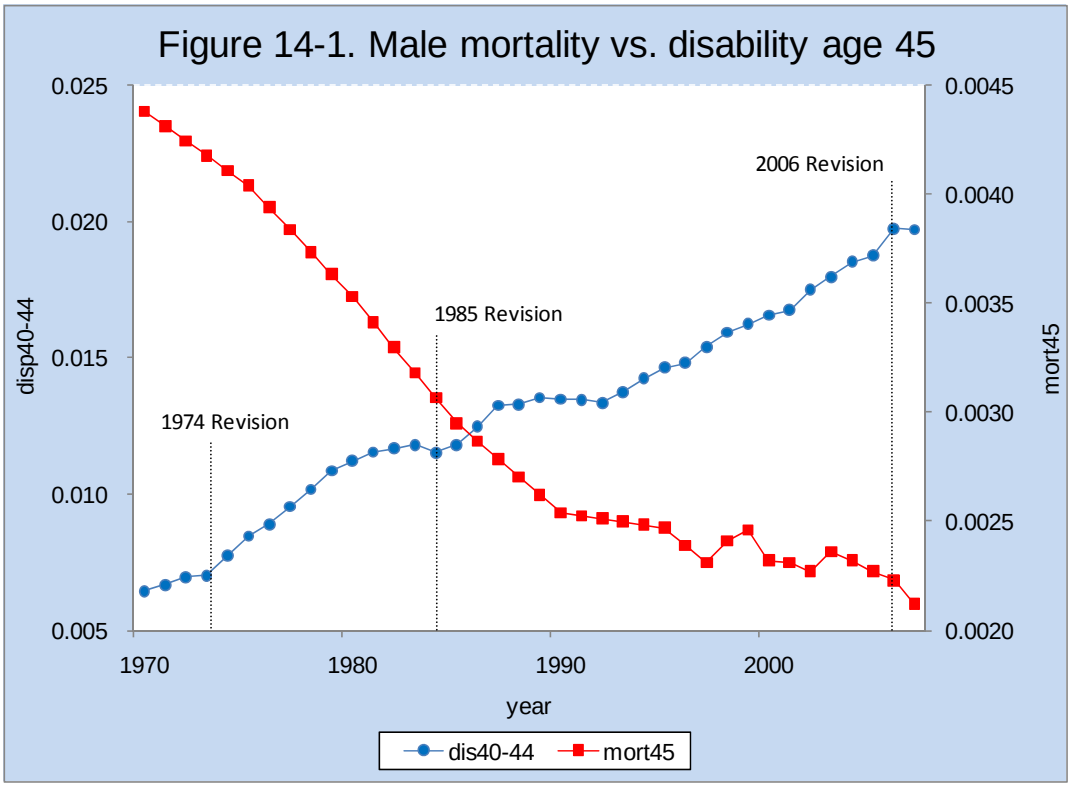


Figure 14-1. Male mortality vs. disability age 45
0.025
0.020
0.015
0.010
0.005
disp40-44
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
mort45
2006 Revision
1985 Revision
1974 Revision
1970
1980
1990
2000
year
dis40-44
mort45

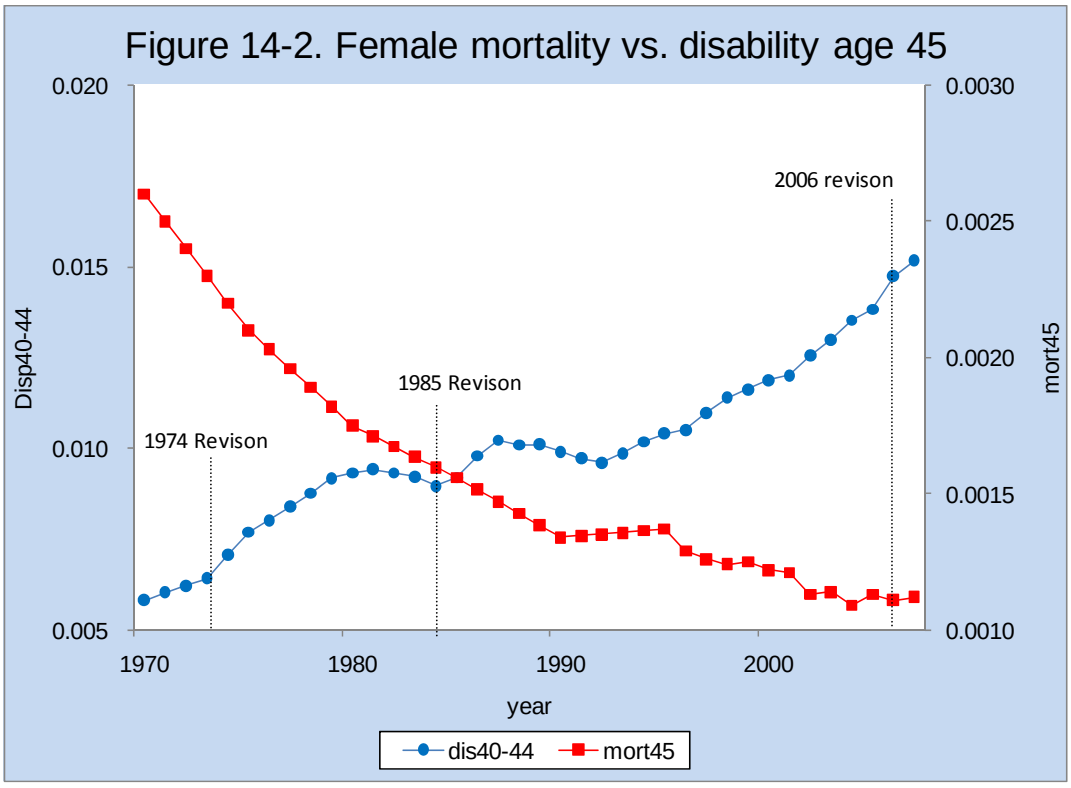


Figure 14-2. Female mortality vs. disability age 45
0.020
0.015
0.010
0.005
Disp40-44
0.0030
0.0025
0.0020
0.0015
0.0010
mort45
2006 revison
1985 Revison
1974 Revison
1970
1980
1990
2000
year
dis40-44
mort45

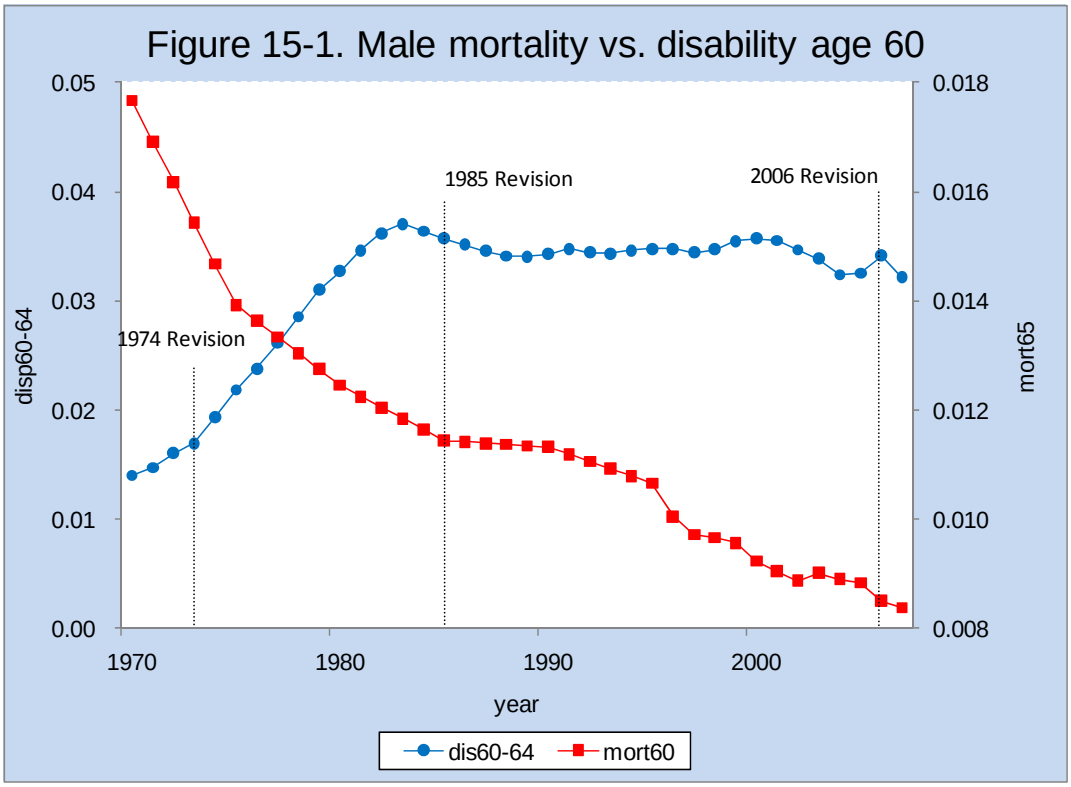


Figure 15-1. Male mortality vs. disability age 60
0.05
0.04
0.03
0.02
0.01
0.00
disp60-64
0.018
0.016
0.014
0.012
0.010
0.008
mort65
1985 Revision
2006 Revision
1974 Revision
1970
1980
1990
2000
year
dis60-64
mort60

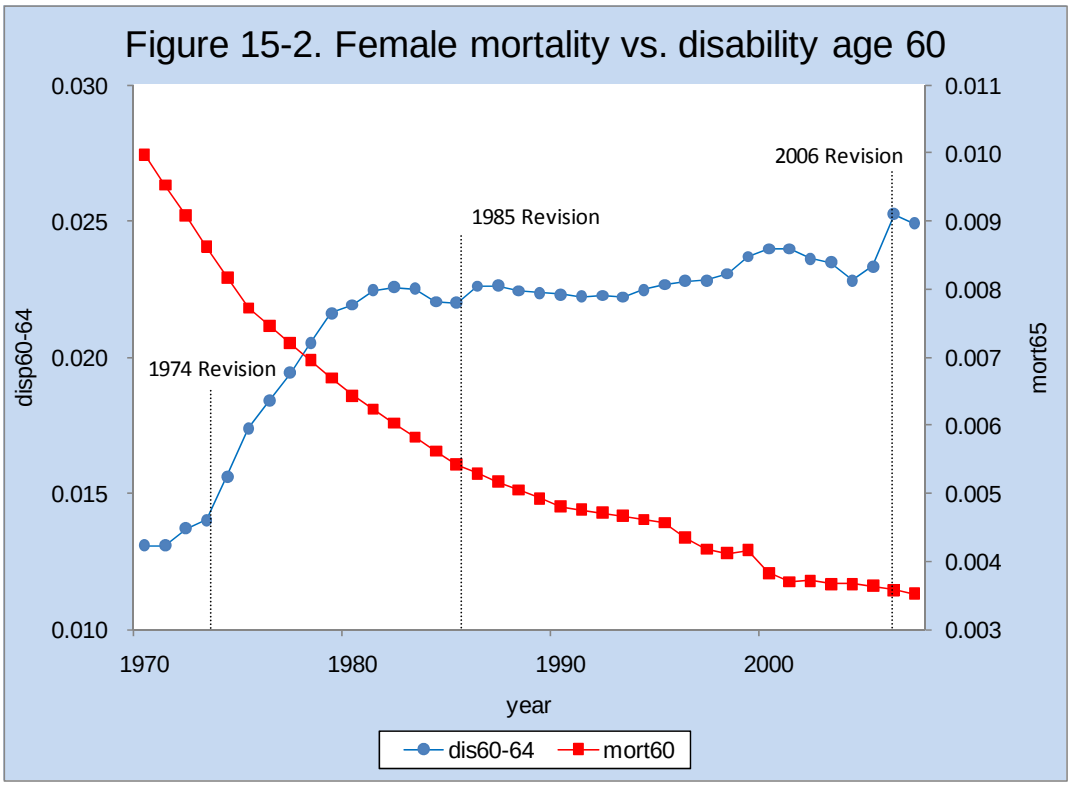


Figure 15-2. Female mortality vs. disability age 60
0.030
0.025
0.020
0.015
0.010
disp60-64
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
mort65
2006 Revision
1985 Revision
1974 Revision
1970
1980
1990
2000
year
dis60-64
mort60

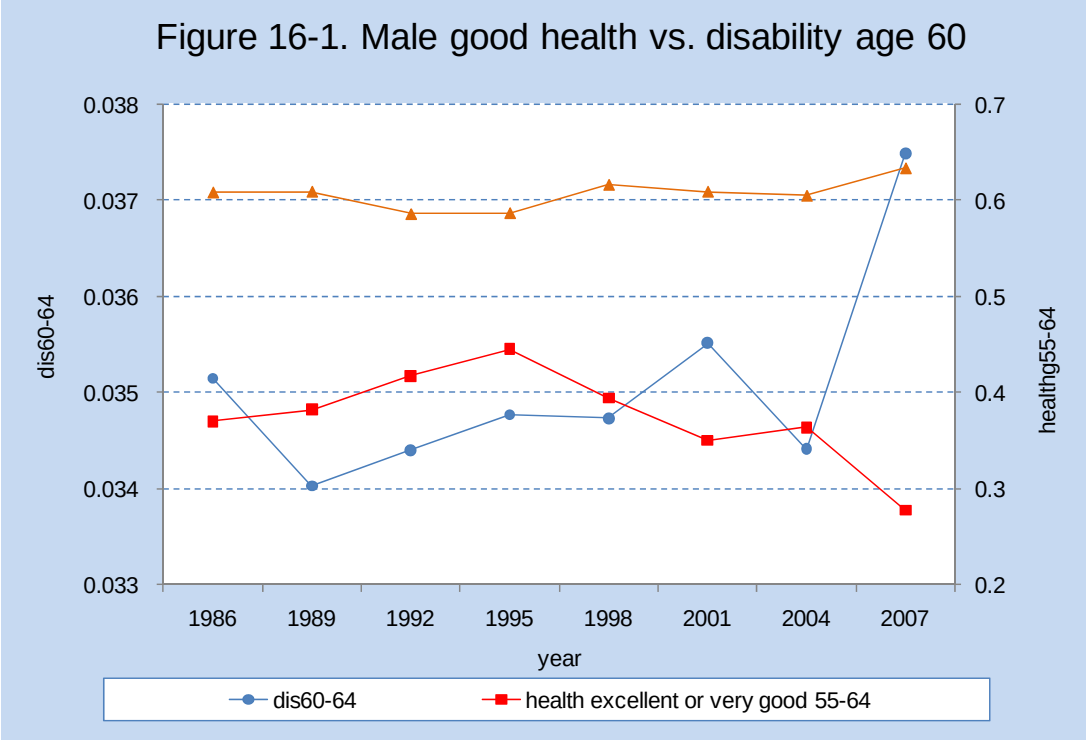


Figure 16-1. Male good health vs. disability age 60
0.038
0.037
0.036
0.035
0.034
0.033
dis60-64
0.7
0.6
0.5
0.4
0.3
0.2
healthg55-64
1986
1989
1992
1995
1998
2001
2004
2007
year
dis60-64
health excellent or very good 55-64

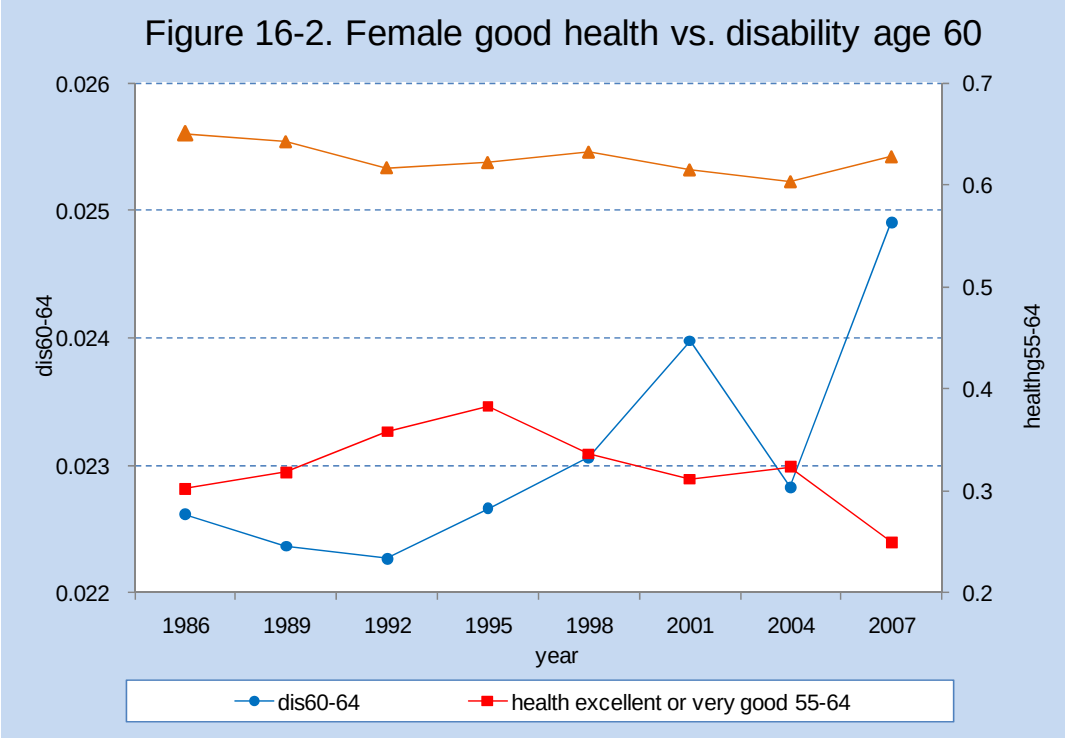


Figure 16-2. Female good health vs. disability age 60
0.026
0.025
0.024
0.023
0.022
dis60-64
0.7
0.6
0.5
0.4
0.3
0.2
healthg55-64
1986
1989
1992
1995
1998
2001
2004
2007
year
dis60-64
health excellent or very good 55-64

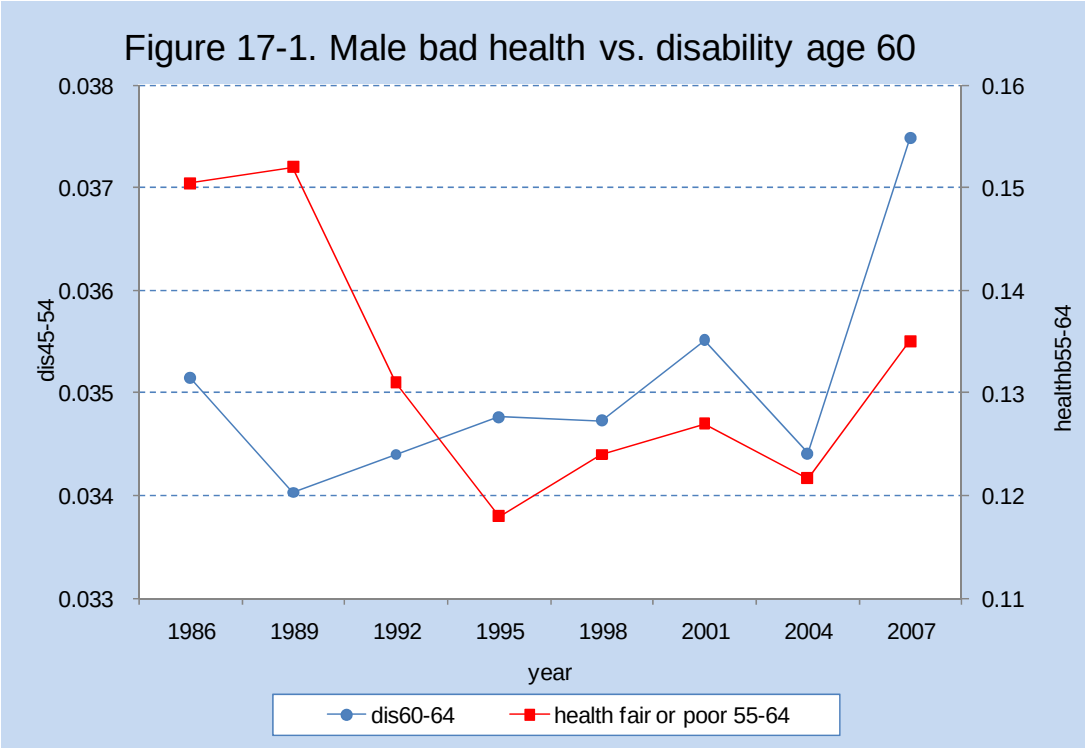


Figure 17-1. Male bad health vs. disability age 60
0.038
0.037
0.036
0.035
0.034
0.033
dis45-54
0.16
0.15
0.14
0.13
0.12
0.11
healthb55-64
1986
1989
1992
1995
1998
2001
2004
2007
year
dis60-64
health fair or poor 55-64

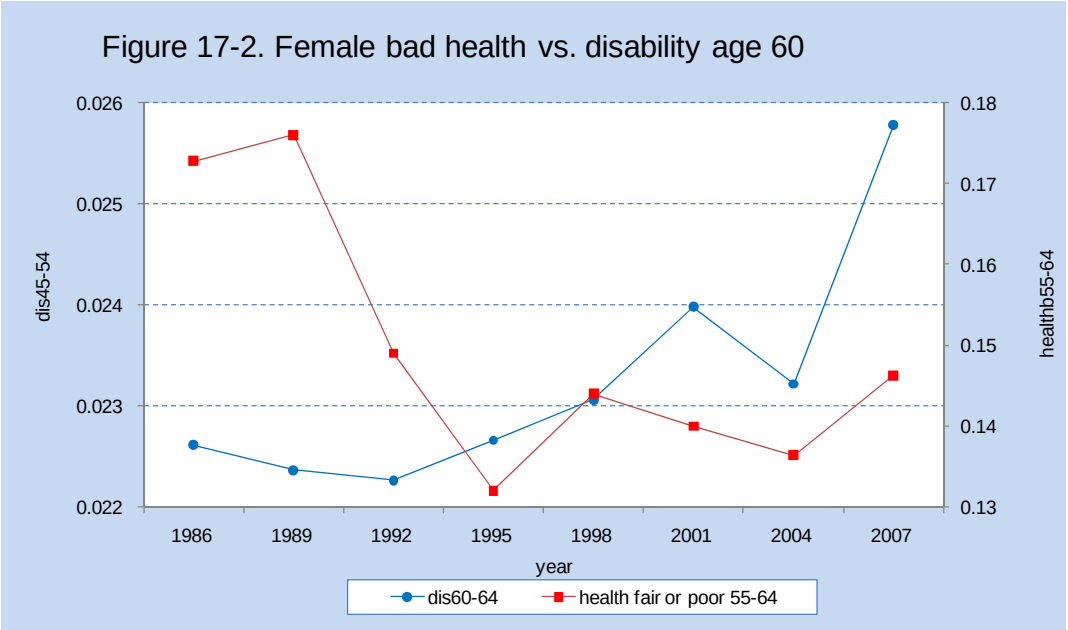


Figure 17-2. Female bad health vs. disability age 60
0.026
0.025
0.024
0.023
0.022
dis45-54
0.18
0.17
0.16
0.15
0.14
0.13
healthb55-64
1986
1989
1992
1995
1998
2001
2004
2007
year
dis60-64
health fair or poor 55-64

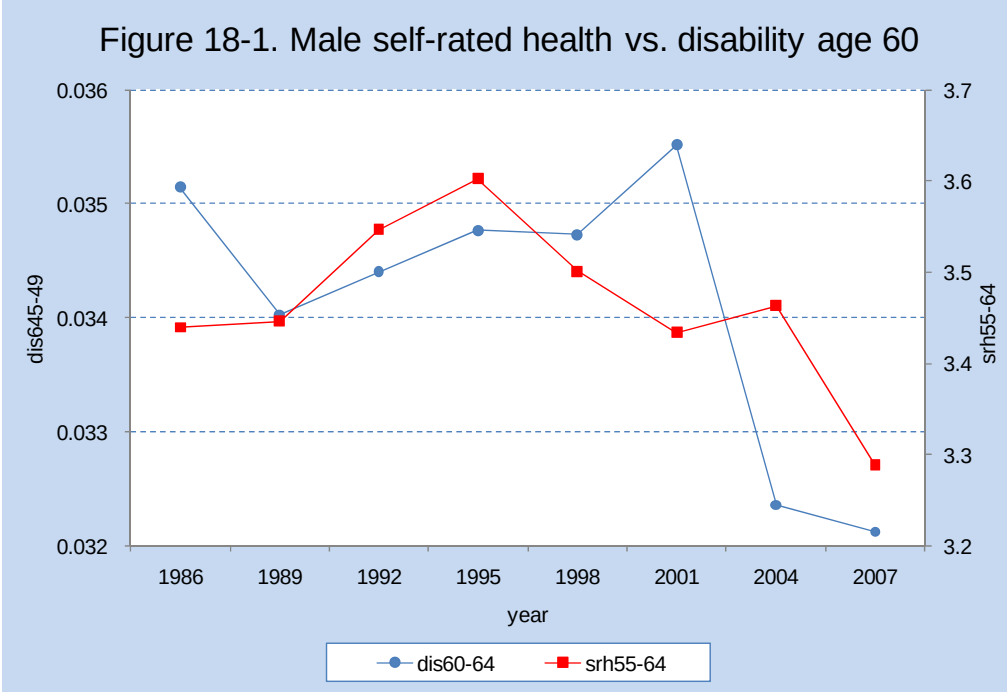


Figure 18-1. Male self-rated health vs. disability age 60
0.036
0.035
0.034
0.033
0.032
dis645-49
3.7
3.6
3.5
3.4
3.3
3.2
srh55-64
1986
1989
1992
1995
1998
2001
2004
2007
year
dis60-64
srh55-64

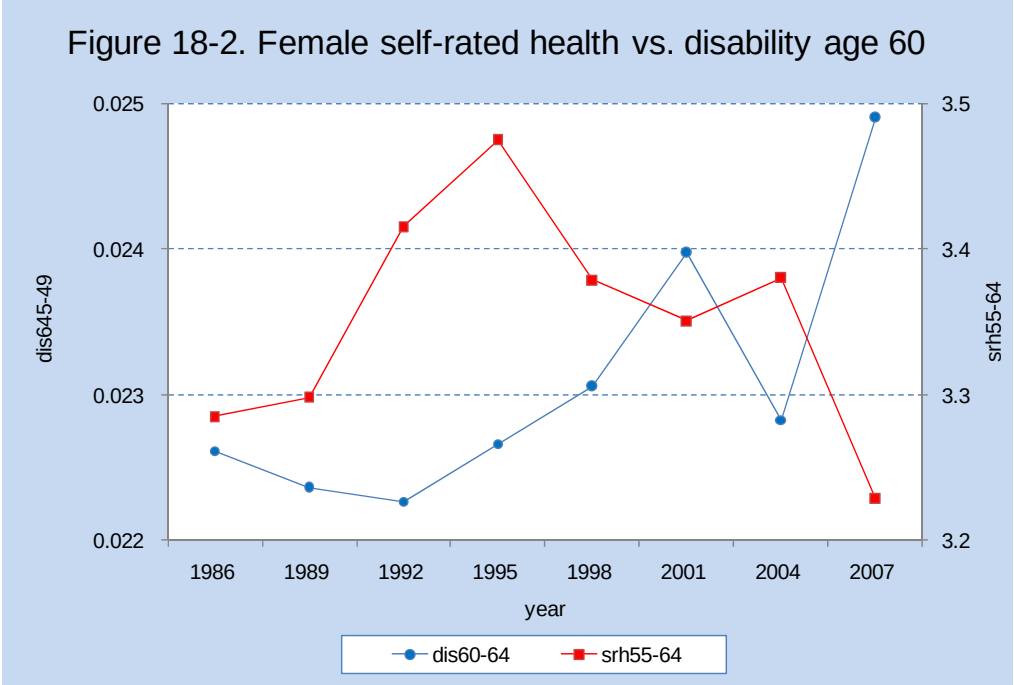


Figure 18-2. Female self-rated health vs. disability age 60
0.025
0.024
0.023
0.022
dis645-49
3.5
3.4
3.3
3.2
srh55-64
1986
1989
1992
1995
1998
2001
2004
2007
year
dis60-64
srh55-64