

*Labor Force and Income
Estimates for
Selected Age and Sex Groups:
2007-2034*

by

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Abstract: This paper's purpose is to prepare estimates of civilian labor force (CLF) and income for 45 year old and 64 year old males and females; estimates of CLF for males and females ages 46 and 65; estimates of male and female CLF for 51 and 70 year olds; and estimates of CLF for males and females 54 and 70 years old from 2007 to 2034. To do this a three and four stage process is used to prepare individual income estimates for the four age and two sex groups. Four figures demonstrate how, over time, the aging and attrition of the numbers of males from employment and participation in the labor force takes its toll on the size of the total male CLF and their income, particularly at the upper end (65 and over). The results are presented in figures and tables. Policy implications are presented.

Objectives

The objectives of this paper are to first, to make civilian labor force estimates from lagged live birth data, survival rates, and labor force participation rates. This was done for the following ages and sexes.

- Group I
 - a. Males and Females 45 years of age
 - b. Males and Females 64 years of age
- Group II
 - a. Males and Females 46 years of age
 - b. Males and Females 64 years of age
- Group III
 - a. Males and Females 51 years of age
 - b. Males and Females 70 years of age
- Group IV
 - a. Males and Females 54 years of age
 - b. Males and Females 75 years of age

Four figures demonstrate how, over time, the aging and attrition of the numbers of males from employment and participation in the labor force takes its toll on the size of the total male CLF and their income, particularly at the upper end (65 and over).

The civilian labor force was calculated as follows:

$$(LB_{MT}) (p_{MAT}) = POP_{MAT}$$

$$(POP_{MAT}) (LFPR_{MAT}) = CLF_{MAT}$$

LB = live births

M = males

F = females

A = age

p = probability of surviving until age A

POP = population

LFPR = labor force participation rate

CLF = civilian labor force

T = time (in years)

Civilian labor force data will be presented later in a series of four figures.

Table 1.1 presents the ranges for male and female Labor Force Participation Rates for 45 and 64 year age groups. The Labor Force Participation Rates (LFPR) varied greatly by age, they are too extensive to be presented here. There are some general conclusions that can be mentioned.

Table 1.1: Male and Female Labor Force Participation Rates (LFPR) and Ranges 45 and 64 Years of Age: 2007-2034

	Males 45 Years	Males 64 Years	Females 45 Years	Females 64 Years
LFPR	.865 - .898	.532 - .583	.775 - .816	.463 - .537

Source: Bureau of Labor Statistics

Table 1.1 demonstrates the fact that labor force participation rates for both males and females decline between 45 years of age and 64 years of age. Male rates of labor force participation exceed female rates of labor force participation at both ages. The multiplication of labor force

participation rates estimated for male populations 45 and 64 year olds reveals that the resulting civilian labor force for each year is larger for 45 year olds than for 64 year olds (see Figure 1.1).

In Figure 1.1 the number of males aged 45 years remains well above the number of males 64 years old. This difference is due both to attrition out of live births and to differences in labor force participation rates. The number of individuals 45 years old in the civilian labor force starts at 1.915 million. This cohort originated in 1962. The male 45 year old civilian labor force reaches a low of 1.395 million individuals in 2020, remains near that level in 2021, and then increases to a high of 1.79 million in 2034. In no year during the 2010 to 2034 period does the male 45 civilian labor force number exceed that of the year 2007 (1.915 million).

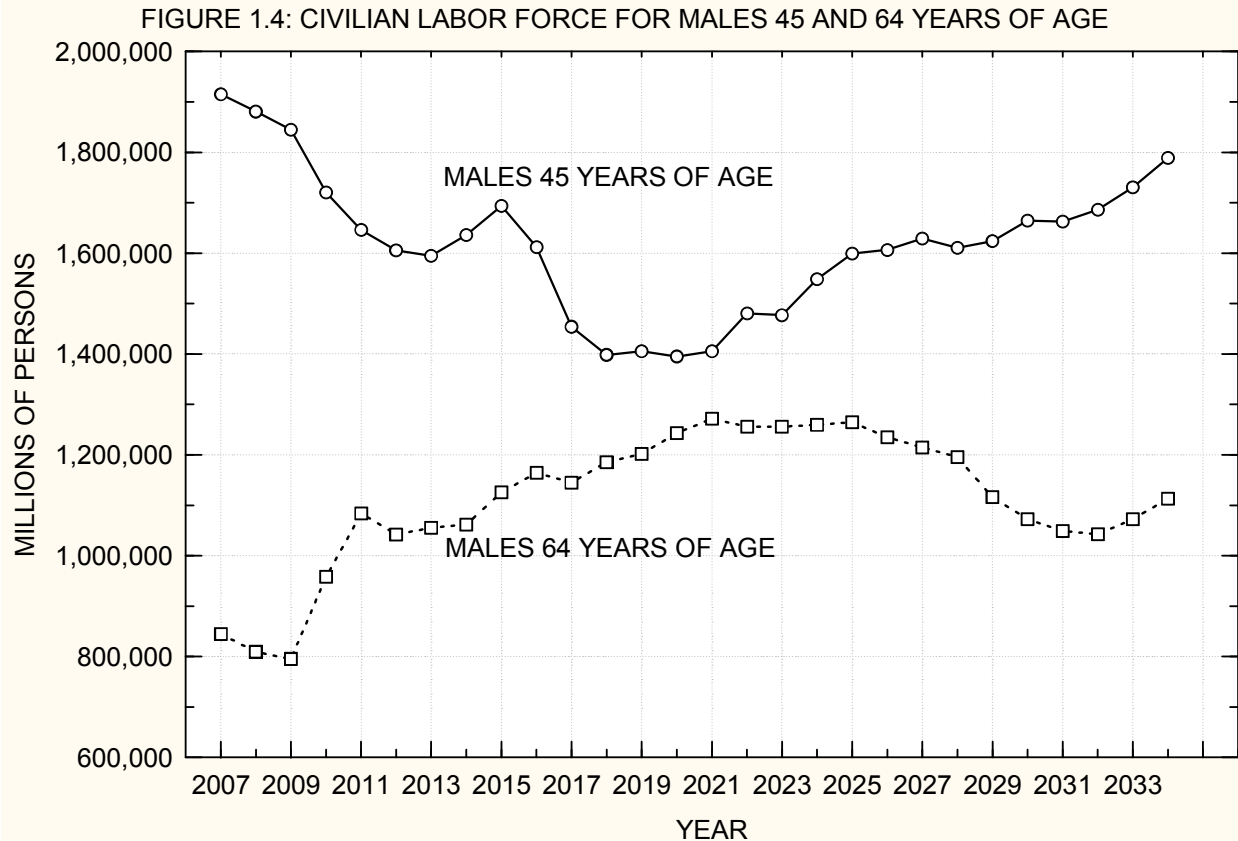
The male 64 year old civilian labor force line (the dashed line) is .845 million individuals in 2007. There is a decline to .796 million males in 2009. From 2009 there is a general trend upwards to 1.272 million males 64 years of age in 2021. There is a leveling off the number of males 64 years of age for four years. From 2025 through 2026 a downward trend starts and continues until 2032 when the civilian labor force is 1.043 million. In 2033, the civilian labor force contains 1.072 million males. That value increases to 1.113 million males in 2034.

In the correlation matrix, males lagged 45 years and males lagged 64 years are correlated $r = -.81$, $p=.000$ ($N=28$). Females lagged 45 years and females lagged 64 years are correlated $r = -.58$, $p=.001$ ($N=28$). When the live births found in 1962 are lagged 45 years they end up in 2007. When live births in 1943 are lagged 64 years they are found in 2007.

Table 1.2: Correlation matrix, (N=28)

	CLM _{M45}	CLF _{M64}	CLF _{F45}	CLF _{F64}
CLM _{M64}	-.81	--		
CLF _{F45}	.90	-.58*	--	
CLF _{F64}	-.77	.89	-.71	--

* $p=.001$, all others $p = .000$

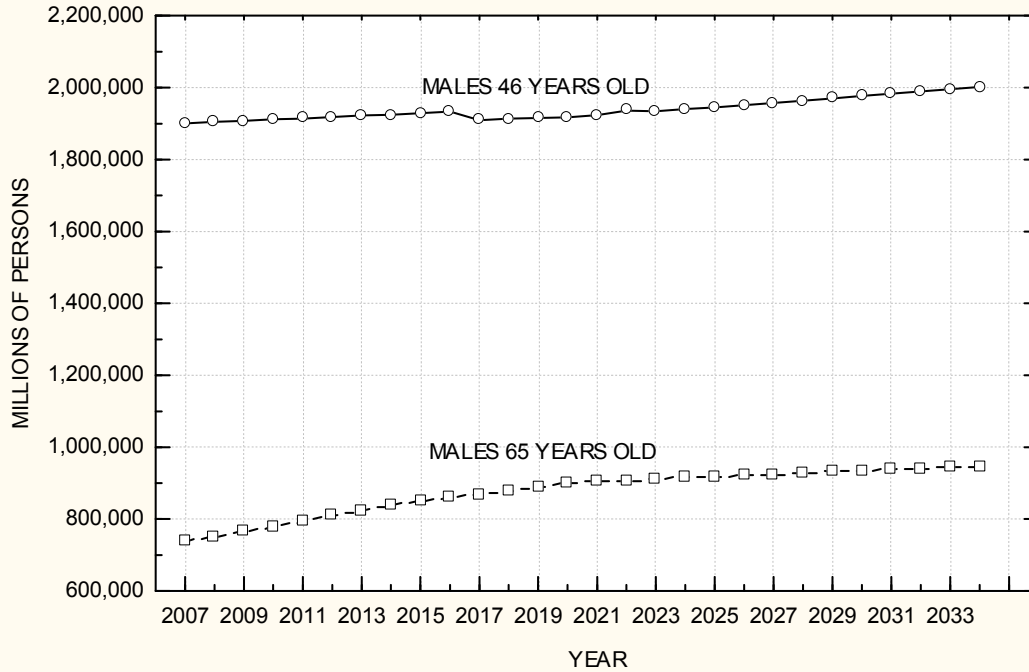


SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS, CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

In Figure 1.1 the male 45 year old CLF starts at 1.915 million in 2007. The number of males 45 years of age in the civilian labor force decreases steadily to 1.395 million in 2020 and then steadily increases to 1.789 million persons in 2034. The annual average number of 45 year old males in the civilian labor force is 1.619 million. At age 64 the annual average number of males in the civilian labor force from 2007 to 2034 is 1.112 million. This is an annual average difference of .507 million males or a total difference between the two male age groups of 14.184 million males over the 2007-2034 period.

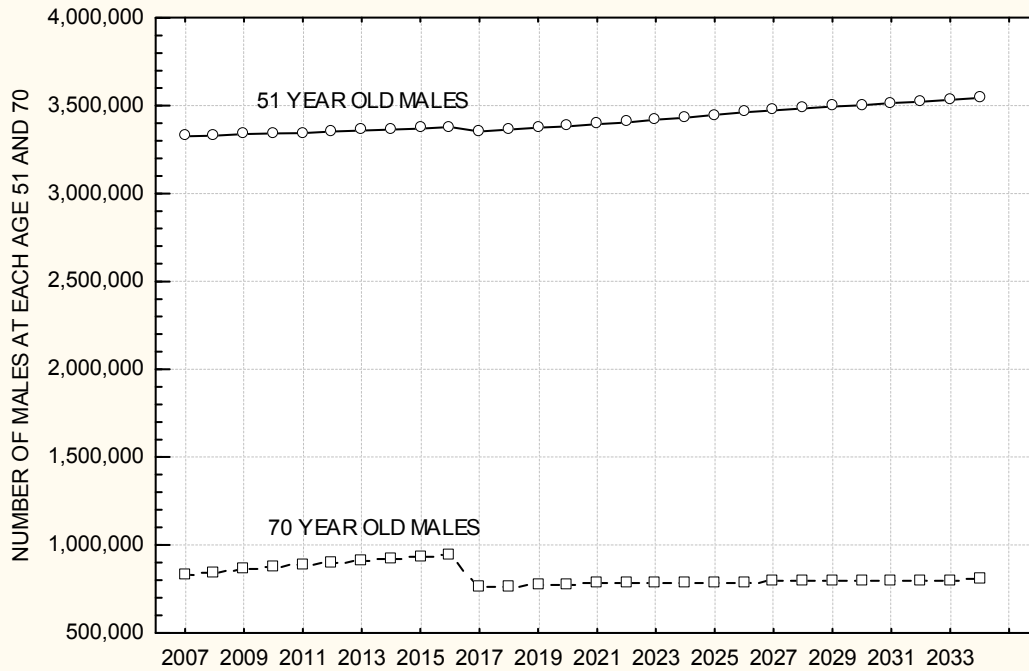
In Figure 1.2, the male 46 year old CLF starts at 1.901 million in 2007. The number of males 46 years of age in the civilian labor force increases steadily to 1.918 million in 2022 and 2.002 million in 2034. The annual average number of 46 year old males in the civilian labor force is 1.939 million. At age 65, the average number of males in the civilian labor force is .875 million. This is an annual average difference of .875 million males or a total difference of 29.783 million persons over the 2007 to 2034 year period.

FIGURE 1.2: CIVILIAN LABOR FORCE FOR MALES 46 AND 65 YEARS OLD



SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS, CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

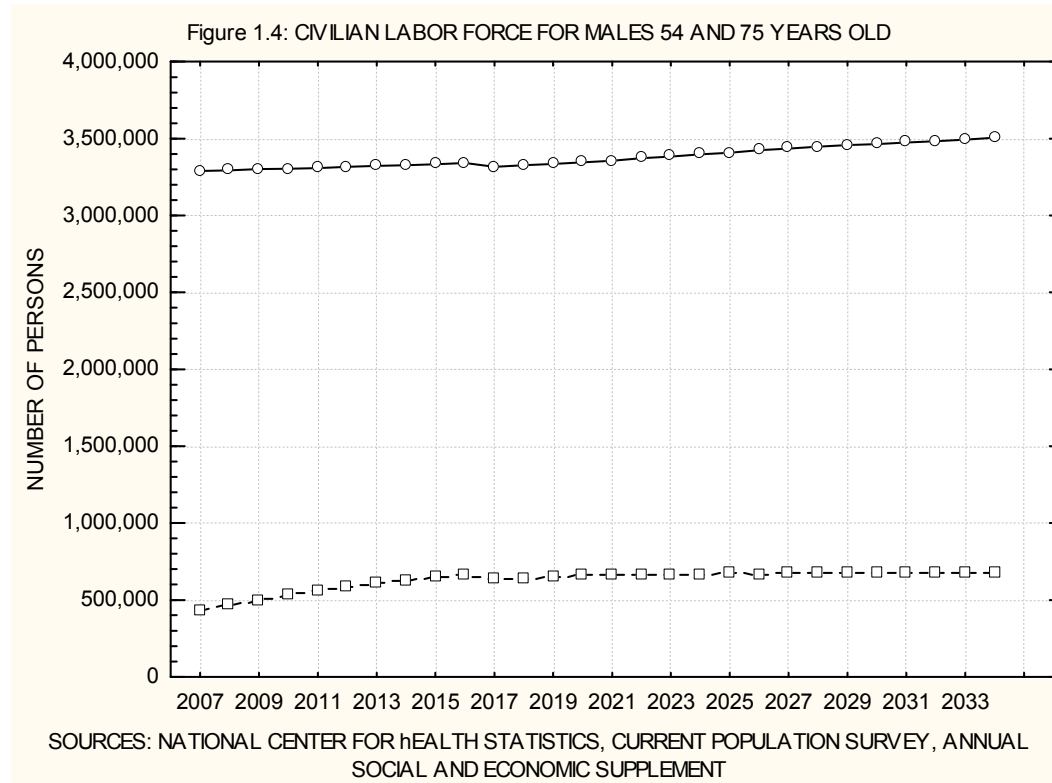
FIGURE 1.3: CIVILIAN LABOR FORCE FOR MALES 51 AND 70 YEARS OLD



SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS, CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

In Figure 1.3, the male 51 year old CLF starts at 3.326 million in 2007. The number of males 51 years of age in the civilian labor force increases steadily to 3.543 million in 2034. At age 51, the

average number of males in the civilian labor force is .956 million. The annual average number of 70 year old males in the civilian labor force is .822 million. This is an annual average difference of 2.592 million males or a total difference of 72.588 million males over the 2007 to 2034 year period.



In Figure 1.4, the male 54 year old CLF starts at 3.290 million in 2007. The number of males 54 years of age in the civilian labor force increases steadily to 3.510 million in 2034. At age 54, the average number of males in the civilian labor force is 3.378 million. The annual average number of 70 year old males in the civilian labor force is .629 million. This is an annual average difference of .629 million males or a total difference of 17.601 million persons from 2007 through 2034.

These four Figures demonstrate how, over time, the aging and attrition of the numbers of males from employment and participation in the labor force takes its toll on the size of the total male CLF, particularly at the upper end (65 and over). Females are not treated herein as they have lower levels of labor force participation and lower salaries compared to men. Their effect on the overall picture can be expected to not as great as that of men.

Incomes

The income values for all age and sex groups were interpolated from data taken from the 2007 Current Population Survey, Annual Social and Economic Supplement (ASEC). The values used are included in the following table:

Table 1.3: Sex and Age Groups and Their Respective Mean Income for Each Sex and Age Group (2006)

Sex and Age Level	Mean Income
Males 45 Years	\$44,165
Males 64 Years	48,327
Females 45 Years	34,785
Females 64 Years	31,564
Males 46 Years	44,547
Males 65 Years	46,549
Females 46 Years	36,148
Females 65 Years	26,269
Males 51 Years	47,999
Males 70 Years	39,190
Females 51 Years	36,040
Females 70 Years	20,988
Males 54 Years	51,458
Males 75 Years	30,623
Females 54 Years	35,015
Females 75 Years	17,999

The annual mean income data were applied to the values for the number employed for each year in each sex and age level. There is a source of error in both the annual income data and the labor force participation data. The annual income data is interpolated between the age midpoints to arrive at the income for the exact age level. The original labor force participation data come in

age group levels. The age group selected to represent each of the above age levels was taken from the age groups that most closely approximated the above age levels and were most narrow in their age range.

Once these data are calculated, a table and four figures will be presented. This table and the subsequent four figures will demonstrate how the incomes for the lowest aged subgroups decline as they become older. For example, the total income for males and females 45 years of age is calculated and graphed (Group I a). All income points on the line are for incomes for males and females 45 years of age. The total annual income for males and females 64 years of age are calculated and graphed on Figure 1.1. The first several data points on Group I a. age to 64 years of age (Graph I b.) and can be found by following the boundaries of the arrows drawn on each of the first two figures. By (1) adding the income data for Group I a., (age 45) from 2007 to 2015 on and between the origins of the arrow, and (2) subtracting the data on Group I b. (age 64) by adding the income data from 2026 to 2034, between the arrow points the loss in employment income can be obtained. Table 1.4 presents this information.

Data and Variables Used

All data used for this paper have their origin in data taken from sources provided by sites on the internet. The data used for this paper start with annual male and female live birth data from 1900 to 2004 (National Center for Health Statistics 2008). Additional required data (the average incomes of males and females by age group, the labor force participation rates by age groups, and the inverse of the unemployment rate) were based on data taken from the Current Population Survey, Annual Social and Economic Supplement (2007).

The following equations are an example of the sequence of four calculations used to arrive at the total income for a given age and sex subgroup. The variable definitions follow the equations.

$$(1-UR_{MAT}) (CLF_{MAT}) = E_{MAT}Y$$

—

$$(Y_{MAT}) (E_{MAT}) = Y_{MA(TOTAL)T}$$

UR = unemployment rate

E = number employed

—
 \bar{Y} = average income for a given sub population

$Y_{(TOTAL)}$ = income total for a given group

T = time

Methods and Results

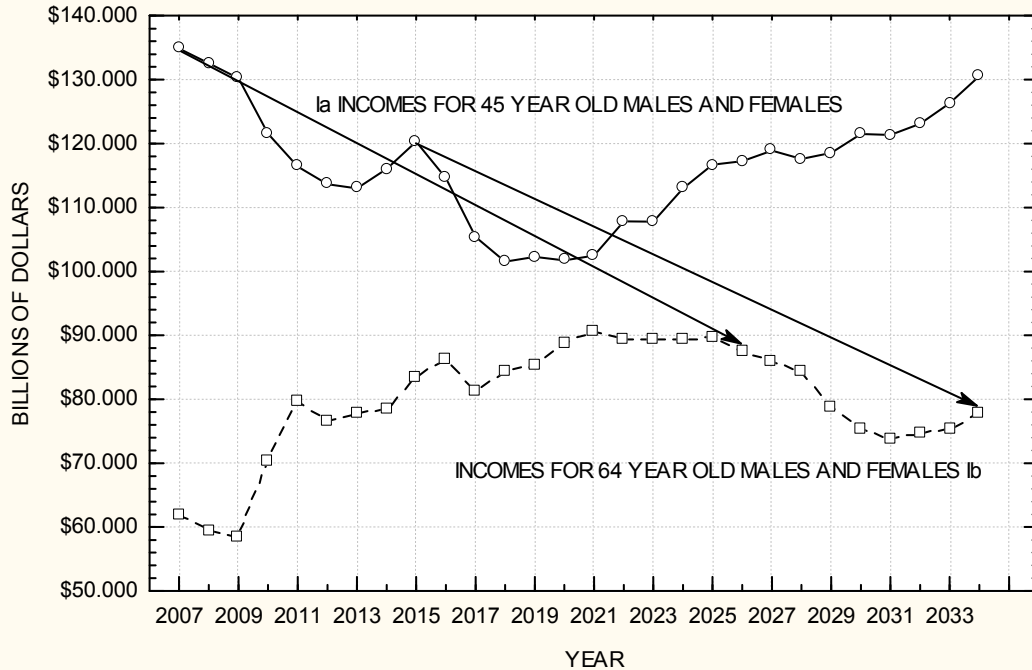
Life tables for the year 2000 (Social Security) contained survival rates used to obtain the survival values for each of the ages and sexes in Table 1.4. The value obtained from that calculation was the civilian labor force. The inverse of the unemployment rate was multiplied times the civilian labor force giving the number employed. The number employed was multiplied by the average income value for a given age. Since the average income included those unemployed, on unemployment compensation, social security, social security disability, pensions, etc. it is expected that the income values are conservative.

One table and four figures will present the preliminary and final results of these calculations.

Table 1.4: Employment Income and Employment Income Differences Due to Aging Groups

	Age	Within Arrow Totals (in billions)	Decline Between Ages (in billions)
Group I	a. 45	\$1098.620	\$452.660
	b. 64	645.960	
Group II	a. 46	1248.207	799.694
	b. 65	448.513	
Group III	a. 51	2065.270	1786.292
	b. 70	278.988	
Group IV	a. 54	1833.093	1584.886
	b. 75	248.207	

FIGURE 1.5: MALE AND FEMALE INCOME FROM EMPLOYMENT FOR 45 YEAR OLDS AND 64 YEAR OLDS

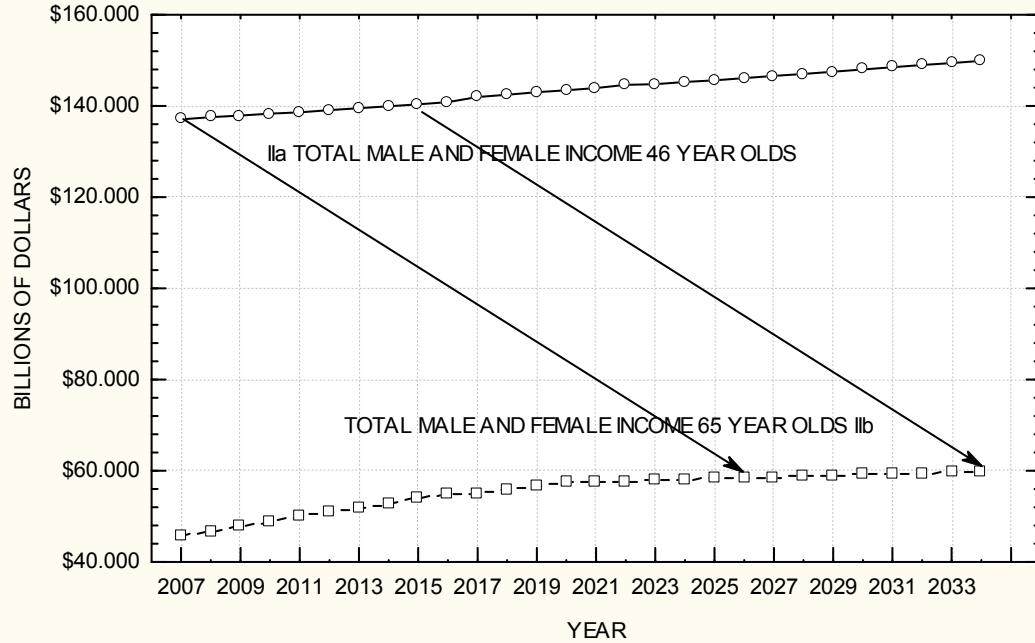


SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS AND CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

The arrows placed on each figure (1.5 through 1.8) were done to demarcate time periods of employment income and amounts of income for each selected age. It is clear from each figure that the graph line representing the youngest age has the highest level of employment income. The two lines are substantiation of the view that the United States is experiencing a period of aging for significant numbers of persons. Accompanying the aging of individuals is their declining numbers, and a definite declining of incomes from employment (see Table 1.3). Increasing levels of unemployment and increasing unemployment rates could make this review an overly optimistic estimate of income from employment.

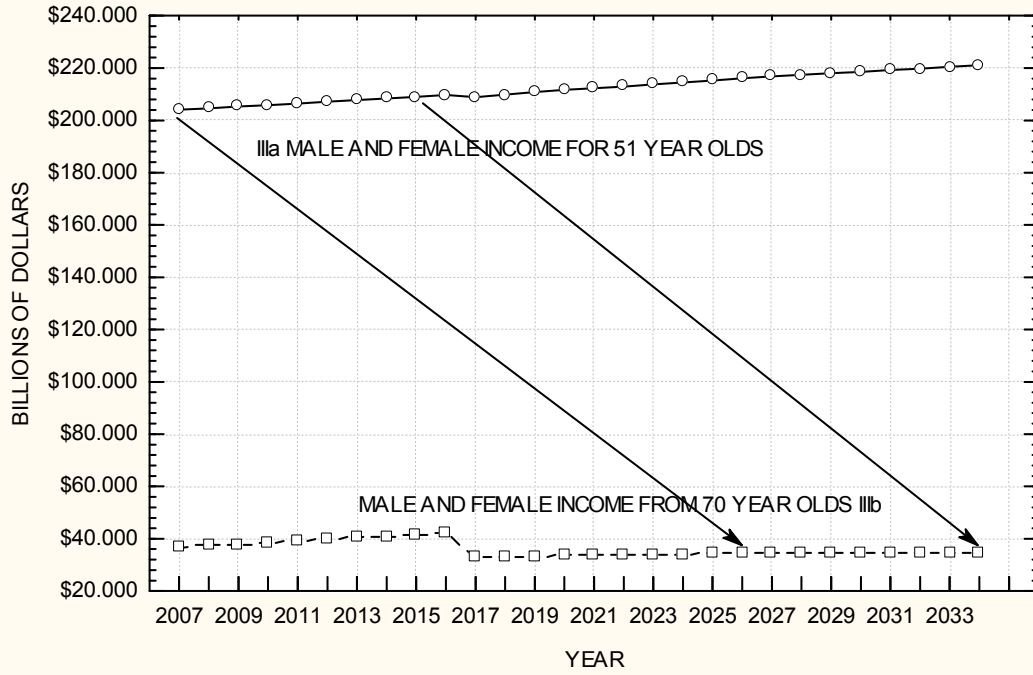
The arrows serve the following function. The two feet of the arrows on the line for the youngest age group on each figure demarcate incomes from that age group. The arrows on the line that features incomes of the oldest aged group marks off a series of data points that represent income of survivors from the youngest age group. The incomes between the feet of the arrows were summed. The data points between the heads of the arrows were summed separately. The results are found in Table 1.2. The difference between the incomes of the youngest age group and the oldest age groups were taken.

FIGURE 1.6: TOTAL INCOME FROM EMPLOYMENT FOR MALES AND FEMALES 46 AND 65 YEARS OLD, 2007-2034



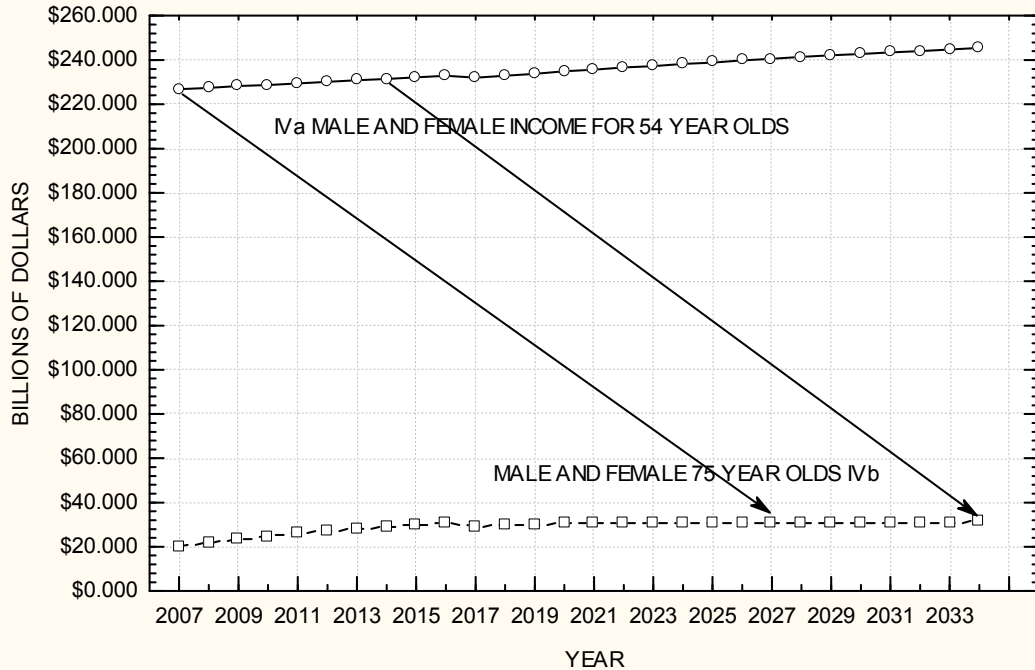
SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS AND CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

FIGURE 1.7: MALE AND FEMALE INCOME FROM EMPLOYMENT FOR 51 YEAR OLDS AND 70 YEAR OLDS



SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS AND CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

FIGURE 1.8: MALE AND FEMALE INCOME FROM EMPLOYMENT FOR 54 YEAR OLDS AND 75 YEAR OLDS



SOURCES: NATIONAL CENTER FOR HEALTH STATISTICS AND CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

Preliminary Conclusions

The data presented in the last column of Table 1.4 show the decline in incomes between the eight age pairs of individuals from the four groups. These data clearly make the case that the distribution of incomes, the labor force participation rate, and the attrition and aging of the population are significant contributors to declining incomes from employment. While the decline occurs over a 20+ year period of time it is only indicative of the trends that are happening in other age groups. The implications of this are that the increasing numbers of male individuals (and also females) aging, especially through their participation in the CLF, brings about a decline in the magnitude of personal income. This decline will lead to recessionary and depression-like conditions in the economy.

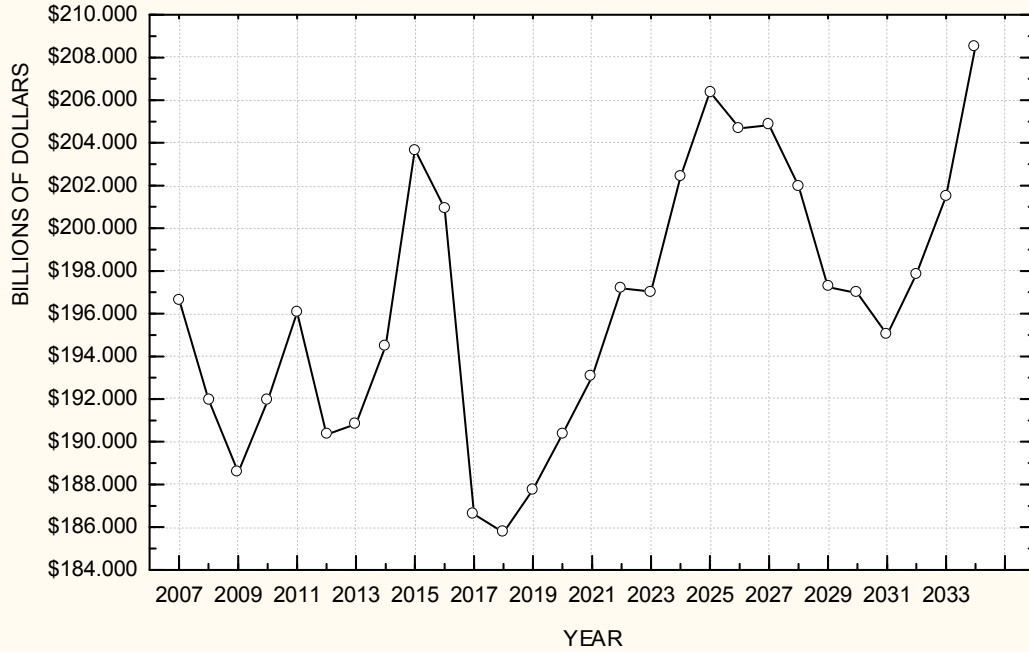
Data Issues

It is appropriate at this stage to issue caution about some data issues. Initially, the number of individuals in each labor force participation age group excludes individuals who are getting pensions, Unemployment Compensation, Aid for Dependent Children for Families and the Unemployed, Social Security, Social Security Disability, and other forms of transfer payments. The incomes applied to the number employed remain consistent throughout the years for which incomes are estimated. No estimates are made of incomes for each year by age and sex. It is not clear, at this time, what impact using mean incomes from 2006 will have on the results. One thing that is clear is that the future values of labor force participation rates can be expected to decline as unemployment increases. A countervailing variable is funds received from sources outside of employment. Finally, the Current Population Survey suffers significantly at the upper end of the income spectrum as it asks only if an individual has 150,000 dollars and above. This results in a significant underestimation of an individual's income when they are at a higher income level.

Income Variation Within Aggregate Totals

Figure 1.9 presents the high degree of variability in total income in four groups: 45 year old males and females, and 64 year old males and females. The variation from 2007 to 2014, the minor peak in 2015 and 2016, the drop in income from employment from 2016 to 2017-2018, the peak in 2025 through 2027, the decline from 2027 to 2031, and the increase from 2031 to 2034 are all signs of the impact of the employed population on income variation. These variations are not obvious to those using aggregate personal income data. It is a matter of importance to policy makers to understand the changes in civilian labor force numbers due to aging of the population, variation in incomes due to fluctuations in live births, and variation in incomes due to aging have profound effects on the U.S. economy.

FIGURE 1.9: TOTAL INCOME FROM EMPLOYMENT FOR MALES AND FEMALES
45 AND 64 YEARS OF AGE



SOURCE: NATIONAL CENTER FOR SOCIAL STATISTICS AND CURRENT POPULATION SURVEY, ANNUAL SOCIAL AND ECONOMIC SUPPLEMENT

Cautions and Conclusions

Not only is the total income from employment important, but the decline to the lowest income values in 2018 through 2020 for 45 and 64 year old males and females forebodes future difficulties of deepening magnitudes. There are a number of age categories for which total income calculations have not been done. Any conclusions about the larger economy would require that these be done.

The increase in Figure 1.9 from 2022 to 2034 does not arrive at 2007 levels in 2030-2031. Overall, there is an income deficit of 73.94 billion dollars in the 28 year period from 2007 through 2034 using 2007 as the standard for income from employment. This amounts to an annual deficit of 6.092 billion belowxxx the 2007 standard of 196.68 billion.

The conclusions of this paper depend on the accuracy of age and sex specific survival rates, labor force participation rates, employment rates, and age and sex specific income levels. Variation in such values will require regular revisions in the estimation process.

In conclusion, income deficiencies should be calculated to obtain the annual consequences for declining incomes and declining tax revenues. The periodic long-term consequences of declining incomes should also be reviewed. The declining numbers of persons in higher wage earning ages will be accompanied by an increasing United States (U.S.) unemployment level and declining

incomes. A cycle is being created that will extend itself at least for the 2008 through 2024 period.

Note: This paper is the final presentation of a group of studies on the causes and income consequences of depressions. Those works consist of a book and three papers:

The Current Economic Crisis and the Great Depression (book)

The Economics (Anatomy) of a Depression: 2007 and Beyond

Economic Crises: Causes and Policy Options

Labor Force and Income Estimates for Eight Age and Sex Groups: 2007-2034

They can be obtained by Googling www.economic-trends.net

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