

Demographic Structure And The Financial Markets

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A state of uncertainty prevails about the likely course of the financial markets as a result of an unprecedented rise in the number of people approaching retirement. This is because a heavy and persistent sale of financial assets by the aging baby boomers has a potential to exert a downward pressure on financial assets prices. If that happens, the financial wealth of the retirees and those approaching retirement would decline. Furthermore, the decline in the young labor force could lead to a slower economic growth. The concern is based on the works of numerous scholars who have examined likely changes in risk aversion together with preference for liquidity among the elderly during 2015-2025. Meanwhile, the relative proportion of the population within the age of 40-64 that has consistently accounted for substantial holdings of common stock has remained quite stable during the past 30 years and it is projected to remain the same within the next three decades. The relative stability of this population group is important since it has shown a positive correlation with changes in stock prices. Other studies show that people in the age group above 65 years of age tend to maintain a good portion of their common stock investments. Although the empirical results are somewhat inconclusive, it appears that a slight decline, perhaps about one percent, in annual total returns on common stock may occur as a result of liquidity needs of the retiring baby boomers.

INTRODUCTION

An important decision for a relatively large cohort of the population approaching retirement is how to finance their consumption expenditures during the next two or three decades. The relative increase in the size of the young individuals after 1945 has formed a generation that is known as the baby boomers. It is hypothesized that these gainfully employed younger individuals saved and subsequently invested in real and financial assets over their employment horizon. Meanwhile, a sustained high level of production and the subsequent rise in demand for capital and labor had led to the appreciation of their respective prices. In addition, the accumulation of money by the baby boomers in their pension investment portfolios appears to have led to higher prices for real and financial assets. This is reflected in the rise in real estate prices in the early stage of the baby boomers during the decades of 1950's to 1960's. It is further asserted that the superior performance of the financial markets during the decades of 1980's and 1990's was the

result of heavy investments by the baby boom generation since they were in the 40-65 age group for whom the level of saving is at its peak.

This line of reasoning has further led to the conclusion that the aging of the population is a potential threat to both pension plans and the financial markets. Because a heavy and persistent sale of financial assets by the aging baby boomers is hypothesized to exert a downward pressure on financial assets prices since the old age group is perceived as non-savers and sellers of common stock. If that happens, the financial wealth of the retirees and those approaching retirement would decline. This together with the decline in the young labor force would cause a decline in economic growth. Numerous empirical studies are in support of this theory known as the life cycle hypothesis.

While there is not much of a divergence of opinion regarding the direction of movements in prices of financial assets as a result of demographic change during the decades of 2020's through 2030's, there is a substantial amount of disagreements about the magnitudes of changes in stock prices. Some of the hypotheses are demand oriented. This is because a substantial amount of sale of common stock, bonds and real estate investments by the baby boomers could reduce market prices. Other theories are about the likelihood of changes in risk aversion as the individual gets older, or are tied to structural relationships between financial and real variables. It should be taken into account however that baby boomers will start retiring in 2008 on a gradual basis during a time span of 20-30 years. Furthermore, while it is useful to examine the impact of one variable, such as population, on the value of financial assets it is necessary to consider all pertinent factors affecting return on assets.

This issue is important for those who have already retired or are approaching the retirement spending phase. If their portfolio of financial assets rapidly suffers from a substantial decline in prices, their retirement income will be much lower than expected. This issue further plays an important role for those who are planning for retirement in the early stage of employment if the historical long term returns do not extend into the future. Section I covers the households' wealth profile and section II provides information regarding the relationship between households' wealth profile and their age. Section III explains probable causes for changes in common stock prices and section IV discusses as to how common stock prices may react to changes in demographic structure.

Households' Investments Profile

The baby boomers maintain a larger share of the population based on estimates provided by The Government Accountability Office (GAO). About 78 million people were born between 1946 and 1964 and according to the 2004 Survey of Consumer Finances they hold \$7.6 trillion worth of financial assets, excluding retirement plan, that are highly concentrated as approximately about two thirds are owned by the top 10 percent of this group. Within the remaining 90 percent of the baby boomers about one third does not own any financial assets. Accordingly, 90 percent of the baby boomers collectively own about \$2.5 trillion in financial assets and given the total value of financial assets of \$36.81 trillion, the percentage of financial assets for sale is 6.79 percent ($2.5/36.81$). Given the market value of common stock traded on New York Stock Exchange of about \$16 trillion, this ratio is 15.63 percent ($2.5/16$). An implicit assumption however is that wealthy individuals would have no liquidity needs for a rapid sale of their financial wealth.

Bucks, Kennickell, and Moore (2004) observing the results of the Survey of Consumer Finances during 1995-2004 found that as of 2004, retirement accounts consisted of 32 percent of

households' financial assets. Meanwhile, stocks, bonds and pooled investment funds accounted for 45.6 percent of the financial assets, and the rest consisted of financial assets in the form of bank accounts. Retirement accounts held by households exclude employer sponsored pension plans in the survey. Consequently about three quarters of households' direct financial wealth, excluding company sponsored pensions, is invested in common stock and bonds. In other words about a quarter of the households' wealth is in the form of ready cash with no negative impact on the stock market and about one third is in retirement plans for a gradual distribution over 20-30 years. A surprising outcome of the survey by Weicher (1997) is that most of the households' wealth is in the form of unincorporated business or real estate properties with no direct relationship with publicly traded shares of common stock. Furthermore, during 1983-1992 the wealthiest 1 percent of U.S. population owned one third of the wealth and the top 1 percent of households had received 10 percent of total income. In effect, as of 1992, unincorporated business accounted for 43.5 percent and real estate for 21.2 percent, while financial assets had a weight of 23.8 percent in the wealth of the top 1 percent of the wealthy. Tracy and Schneider (2001) review the flow of funds accounts produced by the Federal Reserve Bank of New York and note that common stock accounted for about 13 percent of households' wealth portfolio as of 1990, but it rose to 33 percent in 1999 mainly due to the rise in financial assets prices. These statistics, in part, are in support of a sustained holding of financial wealth among households.

Attitude towards investment in common stock at a higher level of age has been a subject of controversy. Curcuru (2005) provides extensive review of the surveys of Consumer Finances, Health and Retirement, as well as Asset and Health Dynamics Among the Oldest Old, and finds that as of 2001 the high net worth households greater than 65 years of age maintained half of their net worth in financial assets, which is an increase of about 7 percent from 1989. Meanwhile, the low net worth within the same age group showed a rise in their holdings of financial assets from 14 percent to 18 percent, however with a small investment in common stock. Furthermore, common stock represented about 50 percent of financial assets in 2001 for the high net worth households as compared with about 22 percent in 1989. Curcuru thereby views this as a case of decreasing risk aversion combined with a willingness to invest in higher risk assets among seniors. It appears that seniors prefer financing their needs through borrowing rather than selling their financial assets during retirement.

Poterba (2001) does not find a substantial decline in the households' wealth portfolio at an old age. In particular investors tend to maintain their holdings in the stock market beyond the age of 65. In addition he does not observe any statistically significant relationship between the rise in age and changes in the degree of risk aversion. Furthermore, Bergantino (1998) does not find the existence of any relationship between age and the degree of risk aversion during 1946-1997. The opposite view is reached by simulation results performed by Brooks (2000) and extensive testing by Bakshi and Chen (1994) supporting the rise in risk aversion and its associated rise in the required risk premium with age during 1946-1990.

Demographic Variables as a Factor Affecting Common Stock Prices

The changing demographic structure is a factor in determination of securities prices as it may affect the rate of growth in productivity, demand for financial assets as well as willingness to invest and maintain risky assets. Corporate profitability is expected to rise with the growth in productivity of the capital which in turn depends on technology and the supply of trained labor at a reasonable cost. Feyrer (2002) finds that workers within the age 40-49 have a strong positive effect on productivity which it partially explains the high productivity in the U.S. during 1990's

and its slowdown during the 1970's. In the U.S., a 5 percent increase in the population 40-49 years of age over a ten-year period leads to 1.7 percent higher productivity in each year of this decade. The 40-49 age groups explain 17 percent of the productivity growth rates across 108 countries. Beaudry, Collard and Green (2005), also show that economic performance across countries during 1960-2002 is strongly tied to their demographic structure.

The GAO study (2006) however concluded that demographic variables explained only about 1-8 percent of the variance in common stock returns during 1948-2004. Demographic variables included in the GAO study were proportion of U. S. population within 40-64, and the ratio of population age 40-49 to population age within 20-29. It was further observed that during 1948-2004 about 47 percent of the variance in return for the S&P 500 stock index was explained by four factors. These included changes in industrial production, dividend yield, the shape of the yield curve, and the confidence index as estimated by the difference in yields between a corporate and government bond. Interestingly, the GAO findings show that about half the variance in the S&P 500 stock index return was not associated with either economic or demographic variables during 1948-2004.

Other factors and trends in the economy and their impacts on the financial markets have been studied by Bordo and Wheelock (2007) during 1970-2006 and it is noted that the median growth rates in real GDP as well as productivity growth were about the same as their long run average. Furthermore, during the post 1970 stock market booms the nominal and real money supply growth rates were below average, implying that excessive liquidity were not the cause of the appreciation in prices of financial assets. They conclude that booms were caused by a sustained low level of inflation and that high inflation was the main cause for ending the booms. A further support for Bordo and Wheelock's conclusion is that Bernanke and Kuttner (2005) observe that during 1989-2002 an unanticipated $\frac{1}{4}$ percent rise in the federal funds rate can lead to a 1 percent decline in common stock prices. The decision by the Federal Reserve Bank in raising the rate of interest is for the purpose of controlling inflationary expectations.

Risk premium is the reward for taking the risk involved in investments in common stock. A higher required risk premium on the part of investors would lead to a lower price for a share of common stock. Changes in the required risk premium through time as the individual gets older play an important role in the determination of the likely impacts of demographic variables on stock prices. The required risk premium on the part of investors is a function of risk aversion. Campbell and Shiller (1998) explain that higher returns on common stocks during the past two decades were as a result of a decrease in risk aversion and baby boomers willingness to pay higher prices for common stocks. In particular, given a stable dividend policy by publicly traded companies, the decline in dividend yield is perceived by them as a result of the continuous rise in stock prices. As shown by Campbell (2001) the dividend yield on S&P 500 has declined from 4.7% in 1972 to 1.4% in 2001. That is, the price to dividend ratio has risen from 21.28 to 71.43 during 1972-2001. Given this historical information what would happen if the baby boomers dispose of their financial assets in their old age within the next two decades.

Curcuru (2005) finds a decreasing risk aversion combined with a willingness to invest in higher risk assets among seniors. It appears that seniors prefer financing their needs through borrowing rather than selling their financial assets during retirement. Bergantino (1998) found no impact on risk premium during 1946-1997. Poterba (2004) found that during 1926-2003 the rise in the population within the 40-64 years of age decreased short term government bond return, however it had no impact on stock returns.

The opposite conclusions are reached by Bakshi and Chen (1994) who found that the rise in population age predicted a higher risk premium during 1946-1990. Simulation results by Brooks are in support of Bakshi and Chen (1994) regarding the rise in risk aversion and risk premium with age. The risk premium for common stock during 1889-1978 has been estimated to be about 6 percent by Mehra and Prescott (1985) and as shown by Fama and French (2002) it has varied widely during the 1950's-1990's. Table 1 shows that the range in observed real risk premium during the past five decades has been 2.42-14.27 percent. Furthermore, there is a wide margin of error between the predicted and observed real risk premium.

TABLE 1
INFORMATION REGARDING TOTAL RETURN ON COMMON STOCK, 1950-2000

	Inflation	Real Return on Commercial Paper	Real Dividend Yield	Earnings Growth Estimate of Real S&P 500 Return	Realized Real S&P 500 Return	Realized Real Risk Premium	Real Equity Risk Premium Estimated by the Earnings Growth Model
1951-1960	1.79%	1.05%	4.68%	5.30%	15.32%	14.27%	4.24%
1961-1970	2.94	2.27	3.21	5.27	5.9	3.63	3.01
1971-1980	8.11	-0.3	4.04	7.5	2.12	2.42	7.8
1981-1990	4.51	5.32	4.19	4.56	9.59	4.28	-0.75
1991-2000	2.68	2.61	2.36	9.94	15.16	12.54	7.32

Source: Adapted from Fama and French (2002). Average real estimated equity risk premium during 1951-2000 is calculated by geometric averaging as follows.

$$((1+0.0424)(1+0.0301)(1+0.078)(1-0.0075)(1+.0732))^{1/5} - 1 = 4.2771 \text{ percent.}$$

Average real return on commercial paper during 1951-2000 is calculated by geometric averaging as follows. $((1+0.0105)(1+0.0227)(1-.003)(1+.0532)(1+0.0261))^{1/5} - 1 = 2.173 \text{ percent.}$

The Life Cycle Hypothesis

Modigliani and Brumberg (1954) provide an elegant theory explaining the saving and investment behavior of individuals during their lifetime. According to this theory the gainfully employed younger individuals tend to save and subsequently invest in real and financial assets over their employment horizon. At the early stage of employment most of the saving would be directed towards housing, leading to a rise in real estate prices. At a later stage during the ages of the mid 40's to mid 60's substantial amount of excess saving would be invested in share of common stock. In this manner the baby boomers might have had wages and salaries outpacing inflation and had accumulated money in their pension investment portfolios as well as investing in real assets and properties, leading to higher prices for real and financial assets. This is reflected in the rise in real estate prices in the early stage of the baby boomers during the 1950's and 1960's and the rise in the stock prices with the rise in their age during 1960's to the 1990's. On the contrary, the old age group, as non-savers and sellers of common stock, tend to negatively impact its return.

Ample empirical findings are in support of the life cycle hypothesis. Bakshi and Chen (1994) find support for the life cycle hypothesis in investment in the post 1945 time horizon. They observe the rise in real estate prices in the early years during the baby boom time horizon and the

rise in common stock prices with the rise in their age. Furthermore, the rise in their average age is expected to increase their pension expenses for both the government and their employers that could result in a rise in interest rates and a decline in stock prices. They also present a life cycle risk aversion hypothesis stating risk aversion rises with age. Ferson and Harvey (1991) also assert that heavy withdrawals from retirement accounts would reduce saving and the supply of capital that might raise the interest rates. They use the average age of the U. S. population 20 and older and as such the rise in this group is used as a measure of the aging population. The observed pattern is as follows: During 1945-1965 the aging of population had a positive impact on real stock prices due to educational expenses. During 1965-1980 the real house prices rose due to the need for housing and in the 1980's the real stock prices rose because of the rise in investments of their retirement funds. They also found that the rise in the population age is positively tied to the required risk premium. Ferson and Harvey further state that the variations in stock returns and business cycles are strongly tied to the changes in the required risk premium. Yoo (1994) finds a large and statistically significant negative correlation between the rise in average age of the population and capital asset returns. Data are taken from 1983 Survey of Consumer Finances. Arnott and Casscells (2003) predict a selling pressure in the stock market during 2013-2015 when the ratio of retirees to workers peak. Abel (2003) also finds support for the life cycle hypothesis by finding a positive link between the baby boom and national saving and investment. This in part would result in a rise in the price of capital and a rise in stock prices.

Brooks (2002) formulates an overlapping generation model including childhood, young and old working age, as well as retirement and concludes that the aging of the baby boomers would lead to about 1 percent lower return for common stock as compared with the past. Goyal (2004) examines the impacts of changes in the supply of common stock and the population age structure on the return on common stock. He finds support for the life cycle hypothesis implying that the middle age groups are the buyers of securities due to their higher savings. On the contrary, the old age group, as sellers of common stock, tends to negatively impact its return. The time period 2000-2025 is hypothesized to be as years with substantial outflows in the stock market. However, outflows during 2000-2050 appear to remain the same as in those during 1930's to 1990's. Goyal further states that as the proportion of middle-aged population increases, the aggregate savings in the economy would rise. As the baby boomers grow older there would be a tendency for a decline in aggregate savings and a rise in risk premium. His time series analyses predict an increase in outflows from the stock market during 2005-2025.

The life cycle hypothesis further asserts that the baby boomers raised the growth in the level of savings in the economy and consequently the growth in equity values. Thereby, the consumption needs of the now aging population may result in a reduction of savings and deterioration of the growth in equity values. This is because the assets of private pension system are expected to decline exerting downward pressure on prices of stocks and bonds. This hypothesis is supported by numerous researchers. Empirical evidence produced by Schieber and Shoven (1994), predict that assets of the private pension system will gradually decline exerting downward pressure on prices of stocks and bonds by the early 2020's. They study the impact of demographics on pension plans and asset prices over a 75-year time span. Using data that are taken from the 1992 survey, they show that real savings of the private pension system amounts to 3.71 percent and is expected to decline to zero in 2023 and to -3.94 percent by 2065. Private savings were measured as contributions to retirement plans less benefits received, plus inflation adjusted capital gains. Lim and Weil (2003) have estimated that the sell off by baby boomers

could at most reduce annual stock return by 0.87 percentage points. Given their estimate of average return of 8.7 percent for the stock market since 1948, this would imply 10 percent decline in annual returns ($0.87 / 8.7$).

Feyrer (2005) provides the relationship between demographics and aggregate productivity and finds that productivity growth rate is correlated with proportion of workers between the ages of 40-49. A 5 percent increase in the number of workers between the ages of 40-49 over a 10-year time interval is associated with a 1-2 percent rise in productivity growth. In effect, the rise in aggregate productivity is a by-product of return on human capital reflected in the experience of the workforce within the age of 40-49. Erb, Harvey, and Tadas (1996) find that real equity returns and average age growth are correlated during 1970-1995. The highest correlation was found for those within 28-46 years of age with a positive correlation with common stock returns. The results suggest a statistically significant positive relation between next year's U.S. dollar real returns and this year's average age, in which a 0.1% increase in average age induces 0.73% in extra real annual returns.

Empirical Evidence Contrary to the Life Cycle Hypothesis

Various empirical works cast doubt on a heavy sale of financial assets by the baby boomers at their old age. For example, a thorough study by The Government Accountability Office in 2006 concludes that this group is expected to maintain its portfolio of financial assets due to its strong finances and flow of income. Tracy and Schneider (2001) by observing changes in share of common stock ownership by age note that aging does not change the overall weight of common stock in households' portfolio and that the aging of the baby boomers had a small role on the stock investment. There are other studies that provide empirical results regarding the likely direction and the magnitude of change in common stock and bond prices that are different from the life cycle hypothesis and do not reveal any important correlations between demographic structure and return on common stock. Empirical evidence contrary to the life cycle hypothesis provided by Poterba (2001, 2004), reveal that the population within the age of 40-64 accounted for 30.1 percent of population during 1970-2000, it is projected to be 33.1 percent in 2010, and 28.3 percent by 2040, which is not outside of the historical range. This population group shows a positive correlation with changes in stock prices. Therefore, no major impact on changes in stock and bond prices would result.

In addition, Poterba (2001) finds that the household's wealth profile remains stable beyond 65 years of age and that investors appear to be maintaining their holdings of common stock after retirement. In effect fluctuations in the stock prices during the past eight decades have no relationship with the households' wealth profiles during the past eight decades. In other words, the behavior of common stock prices has had other causes besides demographic variables. Empirical analyses by The Government Accountability Office show that the changing demographic structure explains about 6 percent of the variance in stock prices (GAO, 2006). Poterba (2004) finds that during 1926-2003, as well as 1926-1946, and 1947-2003, changes in common stock prices do not reveal any statistically significant correlations with the changing demographic structure. He further observes that the population within the age of 40-64 shows a positive correlation with the level of stock prices. The population over age 65 also shows a positive correlation with the level of stock prices, but by half as much as those within the 40-64 age groups. He also uses the Survey of Consumer Finances, 2001 and finds that the probability of stock ownership by the 30-59 age group was greater than 50 percent, but it declines for those in the early 60's, and at older age. He then extrapolates the data as follows: in 2001 those over

the age of 65 accounted for 20.4 percent of all common stock investors which could reach to 31.4 percent of investors in 2040. People with an age of 65 or higher are then projected to hold 48.5 percent of all common stocks in 2040 which is greater than its weight in 2001 of about 30 percent in 2001. Furthermore, those over 65 years of age in 2040 are expected to hold 64 percent of annuity contracts, which is higher from its weight of 50 percent in 2001. Overall, studies by Poterba do not reveal a sharp decline in demand for financial assets as the population ages during 2020-2050 and concludes that the decline in asset prices, if any, would be far less than those predicted by the life cycle hypothesis.

Retirees who can collect Social Security income, or income that is supplied through their defined benefit plans, or both, may not be in a rush to aggressively sell their common stock holding at an old age. Meanwhile, retirees depending entirely on their saving would either sell on a gradual basis or could switch to an annuity contract. Due to the fact that most annuity contracts are fully invested in common stock and bonds there should be no major or rapid sell off of financial assets. Carroll (1997) shows that individuals pursue a target ratio of wealth to expected income over time. In this manner, motives for saving would be based on meeting their target wealth in relation to their permanent income. As a result, average consumption growth should equal average income growth. Bernheim, Skinner and Weinberg (2001) conclude that accumulated wealth is not strongly tied to consumption through age however consumption during retirement tends to decline more for those with a lesser amount of pension income. Bosworth, Bryant and Burtless (2004) review findings regarding the relationship between national saving and investments. Theory and empirical evidence by Feldstein and Horioka (1980) explain that national saving and investments are highly correlated and that a large share of savings remains at home.

Integration of international capital markets however is as yet an unresolved issue. It appears that investors prefer to hold as much as 90 percent of the wealth in their home country's capital markets. (Feldstein and Horioka, 1980, French and Poterba, 1991.) Mitchel, Piggott and Yow (2006) state that structural differences in demographics between the rich and poor countries could influence the flow of capital between the two, however they find no conclusive evidence for a great impact on financial markets as a result of the changing demographic structure.

Information Regarding Financial Assets Prices

Studies in support of the life cycle hypothesis have found that the relatively large size of the middle age group of baby boomers with the age of 45-60 had led to lower yields on bonds due to their investments in such fixed income securities. Such continued low levels of interest rates have had a positive impact in determination of common stock prices. The opposite could then be true when the baby boomers retire.

The opposite view is provided by Poterba (2004) who provides information regarding the level of wealth by age based on the 2001 Survey of Consumer Finances. The average level of wealth is greater than the median for all age groups implying that a smaller percentage of households maintain a larger amount of wealth. In particular, net financial wealth is the same for those 55-74 years of age, and there is no substantial decline in holdings of financial assets even for ages 75 and up. This means that individuals are not necessarily disposing of their holdings of financial assets at older ages. Poterba further shows historical as well as forecasted percentage of population within various age groups. The percentage of population within the 40-64 age grouping is of particular importance since this is the group with a concentrated holding of financial assets. While this ratio is at its peak during 2000-2020 at about 30.5 percent, its

forecasted values of 28, 27.9 and 27.6 percentages during the decades of 2020 through 2050, albeit lower, are greater than those observed during 1920-1990.

Table 2 provides historical returns during 1926-1945 with an average annual real return on common stock of 10.74 percent and average annual return of 3.58 percent for medium term government bonds. The standard deviations are 27.36 percent and 6.38 percent respectively for common stock and bonds. This time interval included a deflationary period as well as inflation.

TABLE 2
HISTORICAL RETURNS IN PERCENT, 1926-1945

	Common Stock	Bonds	T. Bills	Inflation
Nominal Return	10.94 % (28.34)	3.77 % (2.93)	1.08 % (1.47)	0.19 % (4.99)
Real Return	10.74 (27.36)	3.58 (6.38)		

Values in parentheses are standard deviations. Raw data are taken from Morningstar (2007).

Table 3 shows historical returns during 1946-2006, known as the baby boom era, with an average annual real return of 8.73 percent for common stock and 2.47 percent for medium term government bonds. The average annual real return for bonds during this period was 2.47 percent.

TABLE 3
HISTORICAL RETURNS, 1946-2006

	Common Stock (%)	Bonds (%)	T. Bills (%)	Inflation (%)
Nominal Return	12.80 (16.80)	6.54 (7.54)	4.65 (3.00)	4.08 (3.54)
Real Return	8.73 (18.13)	2.47 (7.82)		

Values in parentheses are standard deviations. Raw data are taken from Morningstar (2007).

Table 4 shows historical returns during 1926-2006 with an average annual real return of 9.22 percent for common stock and 2.74 percent for medium term government bonds.

TABLE 4
HISTORICAL RETURNS, 1926-2006

	Common Stock (%)	Bonds (%)	T. Bills (%)	Inflation (%)
Nominal Return	12.34 (20.08)	5.86 (6.79)	3.77 (3.11)	3.12 (4.26)
Real Return	9.22 (20.62)	2.74 (7.46)		

Values in parentheses are standard deviations. Raw data are taken from Morningstar (2007).

As shown in Table 2 through Table 4 the average annual real return on common stock was the highest during 1926-1945 or the pre-baby boomers generation. However, during each time span of 30-40 years the average annual real return has changed by about 1 percentage point which is in line with the projections made by some scholars for the next 30-40 years of time span. It is also realized that safe investments such as government bonds or Treasury bills provide a very low real rate of return which may not be sufficient for consumption needs during retirement. That is, a well diversified portfolio consisting of common stock, bonds and Treasury bills as prescribed by the modern portfolio theory should be preferred by the baby boomers at retirement.

Poterba (2001) uses the data on the Survey of Consumer Finances during 1983, 1986, 1989, 1992, and 1995. Such a time series-cross sectional data allow for changes in common stock holding as the individual gets older. While the amount of common stock rises with the age of individuals, it remains stable or declines very slightly as the individual grows older. Furthermore, there appears to be no decline for the net financial assets at the individual's older age level. This is neither in line nor suggestive of any meltdown in the stock market during 2020-2030. In particular those with the age of 40-64, tend to form a group with a concentrated common stock holding. The relative size of this group has risen by 4 percentage points during 1970-2000 to 30.4 percent, and is expected to decline by 3 percentage points during 2000-2050. The relative stability of the 40-64 of age further supports persistent demand for common stock throughout 2050. Poterba further examines the behavior of real returns on Treasury bills, long term government bonds and common stock during various time intervals 1926-1999, and finds no relationship between the changing demographic structure and real returns on these financial assets.

How Would Stock Prices Rise or Fall?

Numerous factors appear to impact financial assets prices. During the past three decades substantial attention has been paid to the psychology of the stock market. It is observed that securities prices tend to deviate from their mathematically calculated prices—known as the fair value—for as long as four to five years. Market prices would then approach their fair value satisfying equilibrium conditions. This “reversion to the mean” is as a result of investors' overreaction to information. Dominating theories during the decades of 1950's to 1980's were the efficient market hypotheses as it was believed that common stock prices would fully reflect all available information. Accordingly as a result of expected changes in demographic structure investors should exert downward pressure on stock prices at this time instead of 2020. It is to be noted that the decade of 2020's is expected to be the time horizon during which heavy selling of financial assets may occur. The former hypothesis (behavioral finance) would indicate that stock prices could stay quite high or low for a long time without reflecting demographic changes. In particular, it is shown that while attitude towards risk taking diminishes with age, it does not disappear. That is, while retirees may be more conservative they do maintain a substantial amount of financial assets in their portfolio. This together with the fact that financial assets are concentrated among the wealthy individuals, reveal that stock prices may not be under much of a pressure for changes in demographics.

Other popular theories in finance date back to the 1930's regarding formulation of factors affecting stock values known as the fundamental analysis. This is based on the belief that cash flows resulting from investments of the firm during the long run would determine its equilibrium or fair value. This is in contrast to the Chartists' theories since they believe that stock prices

change slowly and in a predictable pattern over time. That is, investors act in a cohort consisting of the most sophisticated to the least informed. In this manner, securities prices gradually rise as their demand rises. And vice versa, the decline in demand or a rise in the supply of assets would cause a gradual and predictable decline in their prices. According to the latter or the chartists' theories, changes may not occur until the aging baby boomers start their actual transactions and it would be moderate. The former theory, the fundamental analysis of securities valuation, asserts that common stock values would depend on the consumption behavior of the aging baby boomers. For example, suppose that the aging baby boomers would be in need of substantial pharmaceutical products. In that case, the added cash flows would raise prices of drug manufactures by a time lead of about 5 years. This is because financial analysts typically make a projection of company earnings about three to five years hence.

The results of simulation performed by Brooks (2000) indicate that the relatively large size of the young workers during the baby boom generation is tied to the rise in risk free rate, and decline of risk premium, as well as the rise in stock prices. In particular, return on common stock rises by half as much as the risk free rate in the simulation process. The reverse is shown to be the case when the baby boomers retire. That is, the risk free return declines, risk premium rises, and stock prices fall. An interesting question however would be as to what may constitute a risk free rate since according to the Standard and Poor's credit ratings services the U.S. government bonds may reach speculative status by 2025 if the budget deficit would not be curtailed. U.S. budget deficits are forecasted to reach 29 percent of GDP in 2050 from about 4 percent in 2006. Meanwhile the forecast for U.S. government debt is 350 percent of GDP by 2050 from about 50 percent in 2006. (*The Wall Street Journal*, Wednesday, June 7, 2006, P C6.)

MANAGERIAL IMPLICATIONS

Overall, empirical analysis shows that the changing demographic structure explains about 6 percent of the variance in stock prices. While by itself this seems to be a very small portion of the variance in returns in common stock prices it should be noted that during 1948-2004 about 47 percent of the variance in return for the S&P 500 stock index was explained by four factors. These factors included changes in industrial production, dividend yield, the shape of the yield curve, and the confidence index as estimated by the difference in yields between a corporate and government bond (GAO, 2006). Empirical research further shows that the potential sell off by baby boomers could at most reduce annual stock return by about one percentage points (Lim and Weil, 2003; Brooks, 2002). This likely percentage decline in annual common stock returns is not surprising since during the past 80 years common stock returns have changed by about the same amount during several sub-time intervals.

Empirical research reveals that the U. S. demographic structure and common stock returns do not show any important correlations during 1926-2002 and that those who are in the over 65 age group are projected to hold 48.5 percent of all common stocks in 2040, up from about 30 percent in 2001. Furthermore, those over 65 years of age in 2040 are expected to hold 64 percent of annuity contracts, up from 50 percent in 2001 (Poterba, 2004). Other studies find a decreasing risk aversion combined with a willingness to invest in higher risk assets among seniors. It also appears that seniors prefer borrowing instead of selling their financial assets at retirement (Curcuru, 2005). Some studies show that not all financial markets are in the same risk class in terms of demographics. In fact many of the developing and emerging financial markets may benefit from the aging of the baby boomers in Europe and the U.S. That is, the proportion of

investments outside of the home country could increase supporting stock prices. Theory and empirical evidence however do not support such a scenario as national saving and investments are highly correlated and that a large share of savings remains at home (Feldstein and Horioka, 1980).

The various empirical studies reviewed in this paper show that: a) the average level of wealth is greater than the median for all age groups implying that a smaller percentage of households maintain a larger amount of wealth. In particular, net financial wealth is the same for those 55-74 years of age, and there is no substantial decline in holdings of financial assets even for ages 75 and up. This means that individuals are not necessarily disposing of their holdings of financial assets at older ages, b) the percentage of population within the 40-64 age is of particular importance since this is the group with a concentrated holding of financial assets. While this ratio is at its peak during 2000-2020 at about 30.5 percent, its forecasted values of 28, 27.9 and 27.6 percentages during the decades of 2020 through 2050, albeit lower, are greater than those observed during 1920-1990, c) during 1926-1945 the average real return on common stock was 10.74 percent, and during 1946-2006 the average real return was 8.73 percent, and during 1926-2006 the average real return was 9.22 percent. That is, the average real return on common stock has been the highest during 1926-1945 or the pre-baby boomer horizon. However, during each time span of 30-40 years the average real return has changed by about 1 percentage point which is in line with the projections made by scholars for the next 30-40 years of time span.

The application of the efficient market hypothesis to the changing demographic structure of The United States asserts that investors should exert downward pressure on stock prices now instead of 2020. However, behavioral finance would indicate that stock prices could stay quite high or low for a long time without reflecting demographic changes. In particular, it is shown that while attitude towards taking risk diminishes with age, it does not disappear. That is, while retirees may be more conservative they do maintain a substantial amount of financial assets in their portfolio. This together with the fact that financial assets are concentrated among the wealthy individuals, reveal that stock prices may not be under much of a pressure solely due to changes in demographics. The chartists or technical analysts would predict that changes in stock prices may not occur until the aging baby boomers start their actual transactions and it would then be moderate. The fundamental analysis of securities valuation would estimate that common stock values would depend on the consumption behavior of the aging baby boomers. If for example, the aging baby boomers would be in need of substantial pharmaceutical products it would raise prices of drug manufactures by a time lead of about 5 years.

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