Q-Series

What will demographics mean for growth and stock market returns?

Equities

Global
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What will outperform over the next eight years?

The answer lies in the demographic DNA. In an environment where across the developed world populations are ageing, fertility rates are declining, longevity is increasing, and most importantly the 'Baby Boomers' are retiring, our models suggest that demographic shifts are likely to provide a headwind to growth for years to come. We do not believe that this is fully priced into the market.

Demographics drive growth lower over the next eight years

Demographics drive growth which is likely to remain structurally lower until 2025 as the effect of the Baby Boomers exiting the workforce continues to weigh upon labour, capital and productivity. At the same time, the increase in demand for low risk, income producing assets is likely to keep yields across asset classes suppressed. The demographic effect suggests lower growth and inflation, which lowers investment, which in turn lowers the neutral cash rate. Lower interest rates are still stimulatory, but with a smaller effect. Please note, this is a long term thematic and is likely to be affected by short term drivers. For a comprehensive overview of the economy, please refer to the UBS Economics team.

Interactive Models

We have created a number of interactive models to assist investors with their own analysis. Click on the links to access: (1) growth forecasts by country, (2) sector implications by country, (3) evaluate your own Macro scenario with our Macrosense model.

Stock market: High Quality Growth and High Quality Income are likely winners

From a style perspective: High Quality Growth and High Quality Income equities are likely to outperform. The likely outperforming sectors are those that cater for an ageing population such as Entertainment and Healthcare, defensive sectors that are likely to perform well in a low growth environment such as Utilities and Consumer Staples, and those that drive productivity enhancements such as Information Technology, or are able to capitalise on emerging market opportunities, such as Consumer Goods.

Introduction

How to position your portfolio over the next eight years? The answer lies in principal driver of the economy, the demographics. Ultimately, it is the demographic structure and change in demography that drives both the overall growth of the economy as well as demand across and within asset classes.

It is the demographic structure that drives both the overall growth of the economy as well as demand across and within asset classes

How does this work? The Production Function holds that growth is a function of labour, capital and productivity. In practice these variables are interdependent, as increases in the size and age of the labour force are likely to lead to increases in capital and improvements in productivity. As a consequence, understanding the demography of an economy, its trading partners and potential investors allows us to assess both the likely growth of the economy as well as the demand across asset classes.

Demographic data: We have used demographic data provided by the United Nations. The future estimate data includes estimates of fertility, mortality and international migration.

Across most of the developed markets the labour force has been increasing in both size and age since the early eighties. As a consequence, we have enjoyed the benefits of above trend growth for an extended period. In a high growth environment, risky asset classes such as equities are likely to outperform as earnings growth rates are pushed higher and risk premia fall. The demographic tailwind has subsequently ended, and we have entered into a period of structurally lower growth as 'Baby Boomers' retire. In a low growth environment such as this, defensive income producing assets are likely to outperform as growth rates remain low and risk premia rise.

The demographic tailwind has ended, and we have entered into a period of structurally lower growth and bond yields

However, the second driver of returns is demand. Specifically, each demographic cohort has a different demand profile across asset classes. As a consequence, the relative size and change in size of each cohort affects demand across and within asset classes. This is further complicated through international investment, as a small open economy such as Australia, with a relatively high dividend yield, becomes an attractive proposition for international investors seeking income.

Where to from here? Developed world populations are ageing, fertility rates are declining, longevity is increasing, and most importantly the 'Baby Boomers' are retiring. In this environment our models suggest that demographic shifts are likely to provide a headwind to economic growth and inflation for years to come.

What does this mean for asset classes? In a slow growth environment low growth is normally offset by higher yields. However, with policy makers likely to hold cash rates lower in an effort to stimulate growth, the yield differential across asset classes is likely to prevent an 'asset meltdown'. We do, however, expect equity risk premia to rise as Baby-Boomers age and prefer defensive assets over riskier assets.

We expect equity risk premia to rise, and expect high quality growth, and high quality dividend yielding companies to outperform

From a style perspective, traditional risk factors such as value and small caps tend to outperform in a high growth environment where investors' risk appetite is increasing. However, in a low growth environment, where risk aversion is increasing and investors require income, high quality growth, and high quality dividend yielding companies are likely to outperform.

From a sector perspective, outperformance is likely to come from: defensive sectors such as Utilities and Consumer Staples, sectors that cater directly to an ageing demographic such as Entertainment and Healthcare; and finally, sectors that drive productivity enhancements such as Information Technology, or are able to capitalise on emerging market opportunities, such as Consumer Goods.

Sectors that are likely to outperform are: Utilities, Consumer Staples, Entertainment, Healthcare, Information Technology, and Consumer Goods

Theory behind demographics

The Production Function (and hence growth) is a function of labour, capital and productivity. In this note we focus on demographics and highlight that ultimately the demographic structure of a nation is a core driver of growth and hence returns across asset classes.

$$Y = A\int(K, L)$$

Y: is output (real GDP)

A: measure of productivity

K: is the stock of capital

L: labour

In practice these variables are interdependent. Increases in the size and age of the labour force are likely to lead to increases in capital and improvements in productivity. An increasing and ageing labour force (L) is likely to drive up demand for capital (K) which will in turn drive up the price assuming supply remains constant. However, as the population ages and the workforce shrinks (relative to the total population), the demand for capital is likely to fall causing the price to fall. Correspondingly, changes in the aggregate age of the workforce are significantly correlated with changes in aggregate productivity (A) (Freyrer, 2005).

As a consequence, understanding the demography of an economy, its trading partners and potential investors allows us to assess both the likely growth of the economy as well as the demand across asset classes.

Which demographic trends matter?

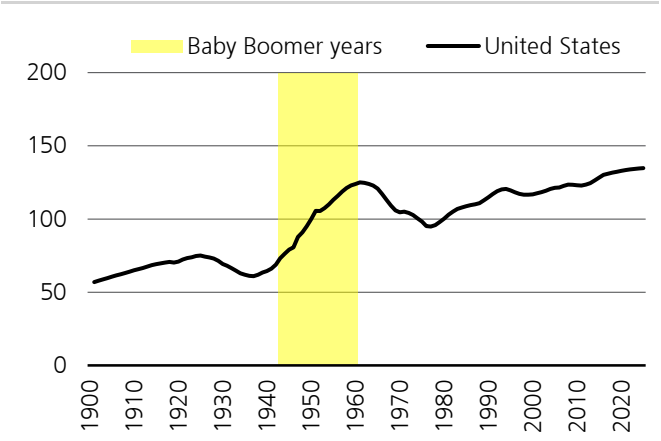
Birth rates are remarkably stable through time, with two exceptions: firstly, the Great Depression cohort is particularly small, and secondly, the Baby-Boomer cohort is particularly large. (See figure 1 below). This distortion in birth rates has given rise to three key demographic trends that are impacting growth, yields and returns which we discuss in this paper.

(1) **The size of the working population**: this has been increasing dramatically as a result of the Baby-Boomers entering the workforce. However, as they retire (this began in 2008), the workforce continues to grow, but at a slower pace. (Figure 2)

(2) **The average age of the working population**: Similarly, the average age of the workforce has been increasing as the Baby-Boomers have aged. However, as the Baby-Boomers retire, the average age has begun to decline. (Figure 3)

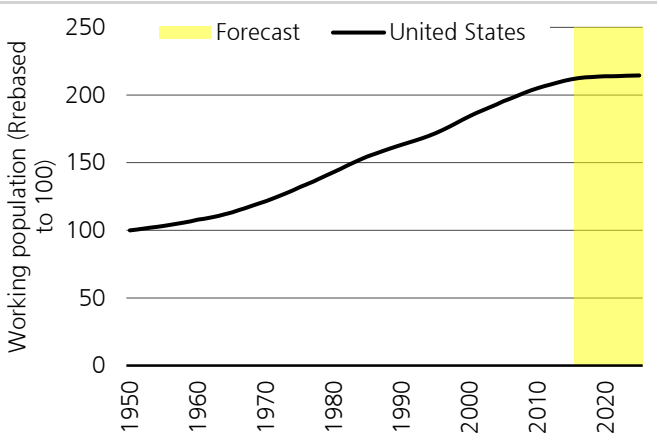
(3) **The increase in the percentage of the retiree population**: This is increasing dramatically as the Baby-Boomers (the single largest cohort of the population) are now moving into retirement phase. (Figure 4)

Figure 1: Birth rates proxied by the size of the 0-4 cohort: US(rebased to 100 in 1950)



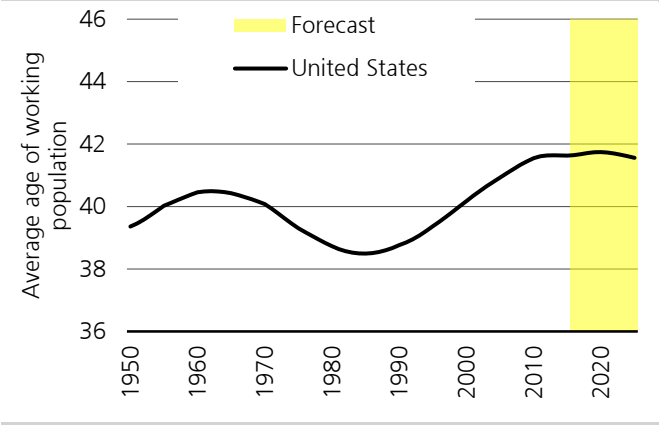
Source: Haver, UBS

Figure 2: Size of the working population



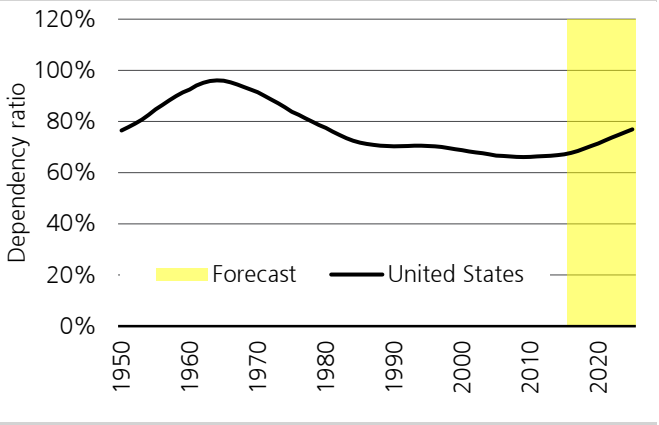
Source: Haver, UBS

Figure 3: Average age of the working population



Source: Haver, UBS

Figure 4: Dependency ratio



Source: Haver, UBS

Demographics drive growth

In the remainder of this paper we assess the outcome for the United States. We use the US as it is the source of the highest quality long term data. However, the demographic headwinds that face the US are likely to impact the remainder of the developed world in a similar fashion.

Understanding Growth

The dependency ratio is often used as a guide to future economic growth. It is argued that increases in the number of workers will increase labour, capital and productivity, and hence place upward pressure on GDP, whilst increases in the number of dependents leads to higher social and healthcare costs, which in turn leads to increases in tax rates and downward pressure on GDP. Consequently, increases in the dependency ratio are likely to reduce the long run trend rate of economic growth. This falls in line with the research conducted by Freyrer (2005).

We extend this concept by weighting demographic cohorts by their level of expenditure

We extend this concept, however, we recognise that not all workers are equal in terms of their incomes or their expenditures. As a consequence, in order to model growth we create an overlapping generational model weighted by the expenditure distribution. The theory being that expenditure is a reasonable proxy for demand. As a consequence the model should generate a more intuitive output of suggested growth.

Demographic model: Expenditure Weighted (DMEW)

The model is the weighted average of the number of people across age cohorts, with the weights being the proportion of the expenditure of each cohort

$$DMEW = \sum_{c=1}^{N} w_c D_c$$

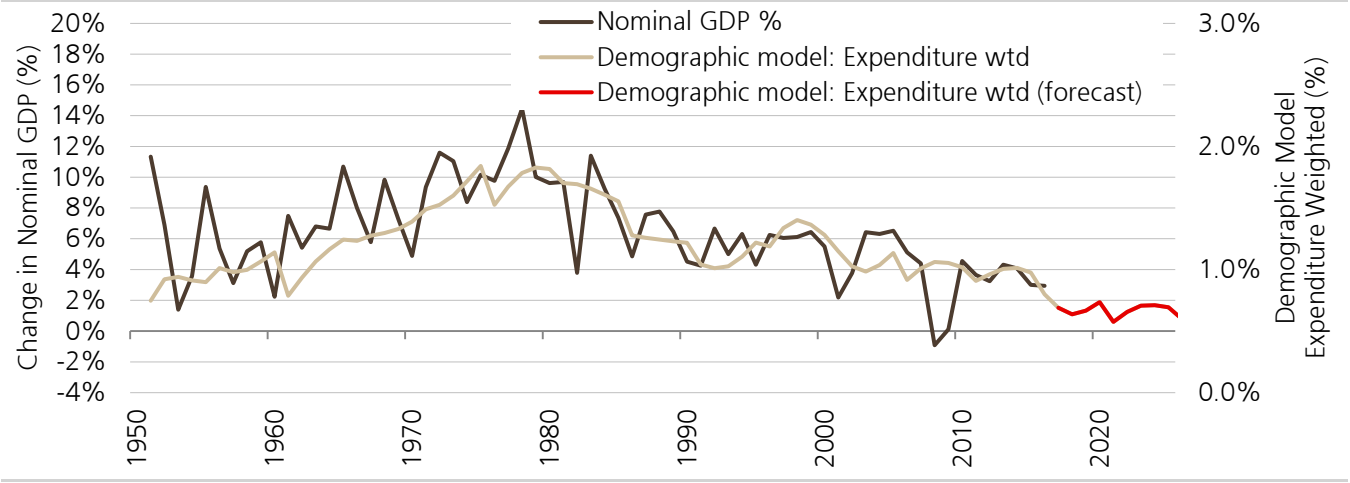
DMEW is the Demographic Model Expenditure Weighted

c is the cohort (20-24, 25-29 …. 65+)

w is the proportion of expenditure of the cohort relative to total expenditure

D is the number of people in the cohort

Figure 5: Demographic Model: Expenditure Weighted



Source: Haver, Factset, UBS estimates

Using our model we can generate a long-term demographic implied growth rate for the market.

Click here for Demographic Model suggested growth rates by country

Overall, the Demographic Model does a good job of describing the longer term aggregate growth rate. However, it does not take into account shorter term market cyclicality. Currently, due to the retiring Baby Boomers, the Model is suggesting that we have entered into a period of structurally lower growth that is likely to last until 2025 as the Baby Boomers retire and exert downward pressure on growth.

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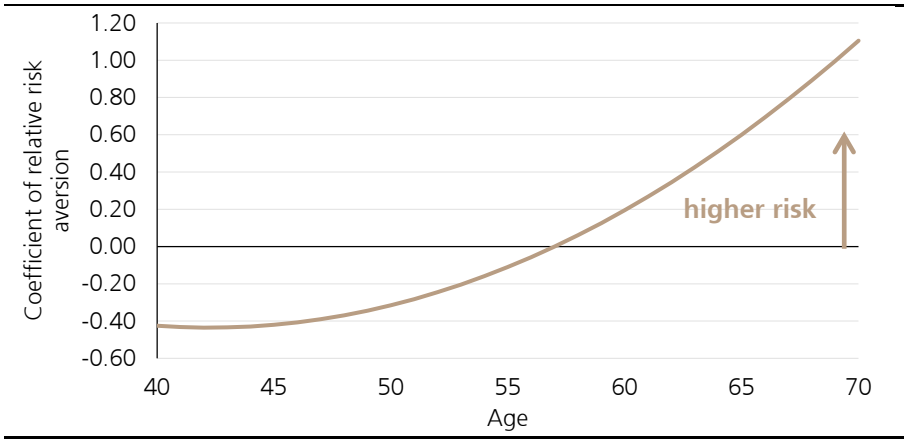
What does low growth mean for financial assets?

Now that we understand the current demographic headwinds and the role they play in the great stagnation of economic growth, we can turn our attention to the less studied impact of these same demographic headwinds on the prices and future returns of financial assets and the implications for portfolio strategy.

At every stage of a population's ageing, the increased demand for safe, yielding assets will promote the performance of defensive assets over riskier assets. At the same time, in a world of structurally low growth and lower returns, assets that deliver above trend growth are likely to command a premium.

As a consequence, high quality (defensive) income producing assets are likely to outperform, as are high quality growth assets.

Figure 6: Coefficient of relative risk aversion rises with age



Source: UBS, Lin (2009)

What about volatility?

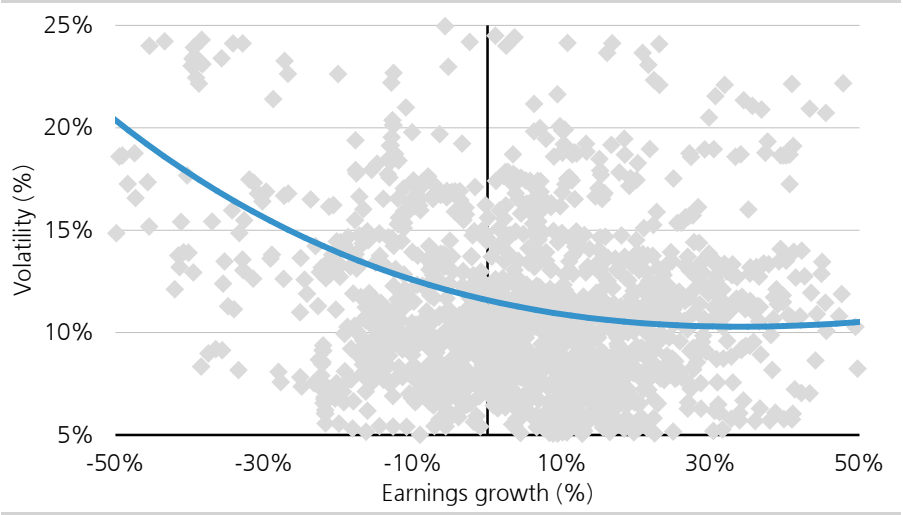
We know that earnings growth rates are correlated with earnings certainty. Similarly, we know that earnings certainty is inversely correlated with volatility. As a consequence, periods of higher earnings growth rates in the market are generally commensurate with periods of low volatility. Conversely, periods of low (or negative) earnings growth rates are commensurate with higher levels of volatility.

Below we demonstrate the relationship between S&P500 earnings growth and volatility from 1874 to 2016. Overall, we find an inverse relationship between earnings growth and volatility. As a consequence, in a world of lower growth we are also likely to witness higher levels of equity market volatility.

This is likely to have a significant impact on asset allocation as investors targeting risk adjusted returns are more likely to favour low risk assets and investment strategies.

For a more detailed discussion on equity market volatility, please see 'Why does increasing volatility matter', Winter et al and 'Surfing the Macro Wave', Wu et al.

Figure 7: Relationship between earnings growth and volatility



Source: Factset, Shiller, UBS

Note: earnings growth rates and investor confidence are not the only drivers of volatility, market structure and liquidity play an important role as well.

Central Bank Policy

The interrelation of central bank policies and demography

Central bank policy is the other key driver of present and future returns. Unfortunately, the feedback loop is likely to compound the demographic effect on lower future returns.

Overall, demographics suggest a lower growth rate. This in turn lowers investment and the demand for capital and hence the neutral cash rate.

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If we consider a simple model of the effect of interest rates on consumption, interest rate cuts are most effective on those in the "borrowing" stage of their life, who are optimising inter-temporally. Their higher levels of consumption mean that interest rate policy is most effective for this group.

Those in the "middle" stages of their life are impacted by two competing effects – lower expected returns mean as they purchase fixed income assets, they are forced to accept lower returns, and experience a negative income effect. Still, lower interest rates shift the balance to more consumption now and less savings. The net effect is decreasing interest rates increase their consumption modestly.

Those who are in the "drawdown" stage of their life, holding fixed income assets, have a reduced lifetime income as they anticipate lower returns. As a consequence wealth effects dominate and consumption is lowered.

From the above, the ageing demographic means quantitative easing can have a perversely contractionary effect on consumption for some groups. Lower interest rates are still likely to stimulate, but with a smaller effect. Central Banks are thus more likely to hit the zero lower bound, extending the period of lower rates.

An exception to this outcome would be if Central Banks mandates were altered to include targeting asset price inflation.

How does this play out?

From a growth perspective, nominal GDP is likely to remain structurally low until such time as the Baby Boomers have exited the workforce. The majority of the downward pressure on growth should dissipate by 2025. This is reflected in income growth resuming.

Downward pressure on growth should dissipate by 2025.

In line with the slower growth rate, volatility is likely to be structurally higher than it has been in the past.

Volatility is likely to increase

What could change the outcome?

What could change the outlook for growth?

Altering the factors of production could in theory change the outcome.

(1) Policy makers could extend retirement ages,

(2) Increasing migration rates (although from a global perspective this is a zero sum game),

(3) Increasing participation rates,

(4) Investment in human capital: both improving the skillset of new workers, but also the reskilling of the workforce in an increasingly automated world,

(5) Improvements in productivity: through significant investment in technology, and incentives to develop industries that drive productivity enhancements,

(6) Industries of the future: investing in industries that cater to globally ageing populations such as healthcare and entertainment; and industries that cater to the emerging markets such as consumer goods.

Can demand from an Emerging Market middle class offset the relative asset class preferences?

We don't believe so. The emerging markets comprise a mere 14% of global financial assets (of which China makes up 9%). As a consequence, the rise of the emerging market middle class is unlikely to be of sufficient magnitude to offset the relative shift within the developed markets over the next eight years.

What about intergenerational wealth effects? When do assets pass from an older cohort to a younger cohort?

Mortality rates are too broadly distributed to have a meaningful impact to the modelling of asset class demand. Mortality rates are broadly distributed between ages 50 and 100. As a consequence, assets are redistributed over a long period of time and the transition is unlikely to have a meaningful impact on asset class demand at any point in time.

So is this going to be like Japan in the 1990s?

This is unlikely to be similar to the Japanese experience. Japan has experienced an internal demand shock based on a shrinking workforce. The developed world is unlikely to face this as working age populations are still growing; they are simply growing at a slower pace than they have in the past.

What to invest in?

We believe the key drivers of investment over the next eight years are likely to be: low nominal growth rates combined with higher levels of volatility. In this environment, high quality income producing equities and high quality growth equities are likely to do well, cyclical, high beta companies are likely to underperform.

Sectors

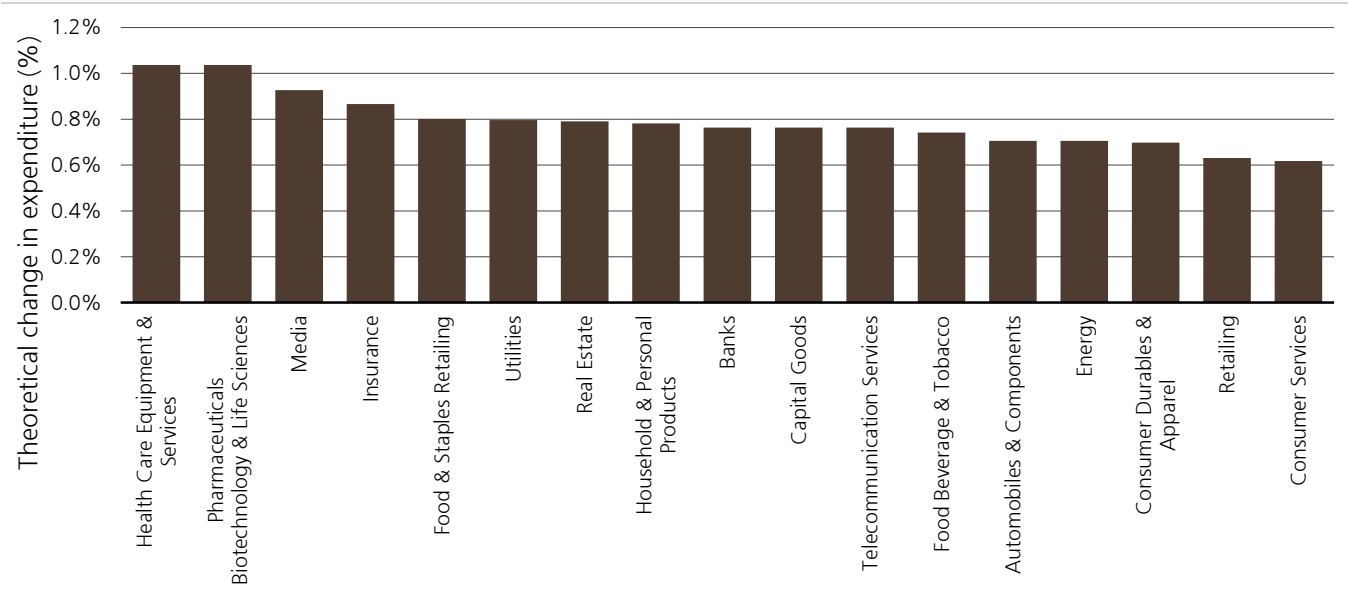
There are two approaches here: the first is to assess sectors that are likely to benefit from an ageing demographic (increasing retirees %), and the second is to investigate sectors that are likely to perform well in a low growth environment.

Sectors that are likely to perform well with and ageing demographic are those that either cater directly to the demographic, such as entertainment and healthcare, or those that are likely to outperform in a world of falling demand such as utilities and consumer staples.

Sectors that are likely to perform well in a low growth environment are those that are able to exploit growth opportunities offshore such as consumer goods, and those that are able to improve productivity domestically, such as information technology. Our results are in line with DellaVigna (2007) who used consumption and demographic data to forecast future consumption demand and found that demand forecasts can predict profitability by sector.

Below, we model the industry effects of changes in the size of demographic cohorts weighted by the expenditure distribution by industry using data from the Bureau of Labor Statistics. Where there are no direct sector implications, we have assigned a zero weight. (Please see the appendix for model details).

Figure 8: Demographic Industry Group implications for the next 12 months (United States)



Source: Bureau of Labor Statistics, Factset, Haver, UBS

For implications for other markets, please see 'Demographic Sector Implications by Country'

Styles

For the purposes of this study we rely on the Kenneth French data going back to 1927[1]. The reason being is that demographic data are slow moving and in order to estimate relationships we need to assess them over a long period. We make the assumption that if the relationship is logical and significant it will hold for other markets. This is particularly true for listed assets with heterogeneous demand.

Value – defensive value likely to outperform cyclical value

We define value as either: the risky end of value, typically stocks with high earnings yields, or the defensive end, stocks with a low price-to-book or high dividend yield.

In a world of slower growth and an increasing proportion of the population retiring, we find that defensive value strategies such as high dividend yield and low price-to-book strategies outperform. However, on the other end of the spectrum, we find that stocks with high earnings yields are more highly correlated with the business cycle. As a result, we conclude that the risky end of value is unlikely to offer the same 'value premium' that it has in the past. We would advocate remaining defensive and instead hold positions in high dividend yielding and low price-to-book stocks.

For a discussion on the value premium, please see 'Investing in Value' Winter et al.

Importantly, in a world of low growth, good quality companies with a policy of paying out profits to shareholders are likely to outperform. In particular, we prefer companies that are able to grow their dividends.

Size - Large caps are likely to perform well

Small caps have outperformed large caps over the past 85 years with few exceptions. However, we know that small caps are more sensitive to the economic cycle than large caps. As a consequence it stands to reason that in a world of structurally low growth and high risk premia, large caps are likely to perform better and small caps carry a smaller premium than they have historically.

For a discussion of the size premium, please see 'Understanding Size Investing'

UBS Recommendations

From a style perspective, in a low growth environment with higher volatility, and investors requiring income, high quality, large cap, dividend yielding companies are likely to outperform. High quality growth companies are also likely to perform well as companies that can grow or drive productivity enhancements are likely to be rewarded.

For a full discussion of Quality, please see 'Investing in Quality' Winter et al.

For a full discussion of Growth, please see 'Investing in Growth' Winter et al.

Given that every portfolio manager has their own macro-economic view, we have created a model that will allow you to insert your own inputs and will calculate the recommended sector exposures.

Please click here to access Macrosense

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Conclusion

What will outperform over the next eight years?

The answer lies in the demographic DNA. Across the developed world populations are ageing, fertility rates are declining, longevity is increasing, and most importantly the 'Baby Boomers' are retiring. In this environment our models suggest that demographic shifts are likely to provide a headwind to economic growth for years to come.

What does this mean for asset classes? In a slow growth environment low growth is normally offset by higher yields. However, with policy makers likely to hold cash rates down in an effort to stimulate growth, the yield differential across asset classes is likely to prevent an 'asset meltdown'.

From a style perspective, in a low growth environment where growth rates are low, and investors require income, high quality, large cap, dividend yielding companies are likely to outperform. High Quality Growth companies are also likely to perform well as companies that can grow or drive productivity enhancements are likely to be rewarded.

From a sector perspective, outperformance is likely to come from: defensive sectors such as utilities and consumer staples, sectors that cater directly to an ageing demographic such as entertainment and healthcare; and finally, sectors that drive productivity enhancements such as information technology, or are able to capitalise on emerging market opportunities, such as consumer goods.

Note, whilst we believe that demographics are a key driver of returns through time, there is much that can be done by policy makers to change the course of history. As a result we suggest using them as a guide only.

Appendix

$$DMEW\ \text{sec}\,tors = \sum_{c=1}^{N} w_c D_c$$

Where:

DMEW sectors is the Demographic Model Expenditure Weighted for sectors

c is the cohort (20-24, 25-29 …. 65+)

w is the proportion of expenditure of the cohort relative to total expenditure

D is the number of people in the cohort

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Research Publications

Monographs, Keys and Q-Series

Title	Date
Systematic strategies for single-stock futures	Oct-16
Irrational asset management	Oct-16
China domestic market – alpha opportunities for quantitative investors	Oct-16
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Are you already timing styles successfully?	Sep-16
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Academic Research Monitor

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Source: UBS. Rating allocations are as of 31 December 2016.
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