

# FUNDAMENTALS

## Investing in a changing world

The world is changing and how it looks in five years' time will be very different to today. A long-term perspective is the key to success.

We have always believed in extending investment time horizons, focusing on structural changes and their significant market impact. Now, more than ever, we think that investors should adopt such a philosophy, and we offer our insights and conclusions to help navigate future transformations.

### MARKETS STRUGGLE WITH COMPLEX CHANGE

Capital markets generally do a good job of extrapolating linear trends and discounting known information in the short term. However, complex change is much harder to process efficiently. For example, oil is influenced by factors as diverse as shale technology and the driving habits of millennials. What does this mean for the future price of energy? How will the auto sector reinvent itself? And what will the next generation buy instead?

### LEVERAGING OUR EXPERTISE

To answer complex long-term questions, we combine our specialist research capabilities across different asset classes. Breaking down such traditional silos allows us to access information sources and expertise that are not efficiently used by other market participants, providing us with invaluable and often unique insights.

For our long-term research, we focus on three areas: demographics, technological change and energy.



But analysing the interconnectivity of these topics provides the most powerful insights and helps us to engage with companies to bring about positive change.

### FOCUS ON NON-CONSENSUS VIEWS

To deliver genuine value, our research must lead to non-consensus investment conclusions. For example, even though credit markets had recovered their poise at the start of 2010, our structural analysis suggested that the subprime mortgage collapse was a symptom of a broader debt problem. Of course, the euro crisis started a few weeks later and market valuations dramatically caught up with the underlying stresses.

### WHAT WE WILL DELIVER

We will deliver regular investment insights combining our topics of demographics, technology and energy. Our approach will help you, as an investor, put these big structural shifts into perspective and take advantage of long-term trends. To whet appetites, we can already make some important observations.

# Demographics:

## Population pyramid schemes

Fewer workers are having to support an increasing number of elderly retirees. This has huge implications for long-term returns, sustainability of public finances, political conflict, inflation and interest rates.

We all know that ‘Ponzi’ or ‘pyramid schemes’ are bad. Early investors, who recruit more members to pay into the scheme, can do very well out of them. However, late investors inevitably suffer as the scheme runs out of new members and collapses.

The term ‘population pyramid’ is also well known. This describes a chart showing the distribution of populations by age groups. There is typically a large base of younger people at the bottom of the pyramid supporting a narrowing group of older people at the top. Such pyramids form the basis of many pension systems.

This system works well so long as the pool of income generators remains larger than the number of retirees. But what if fertility rates decline? And what if life expectancy increases? Instead of a population pyramid, we get a population skyscraper, or even worse, a mushroom shape distribution. This is happening across many developed countries.

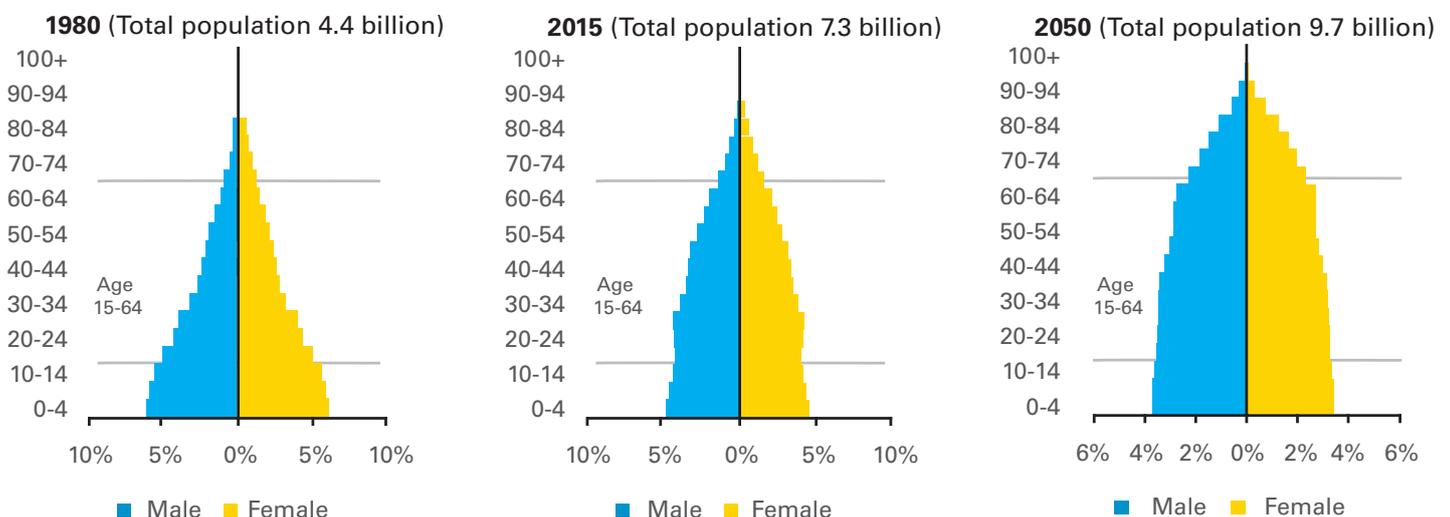
As an example, when the UK ‘old age’ pension scheme was first introduced in 1908, it was only for people aged over 70. But the life expectancy of a 50-year old back then was a little under 70. In other words, most people weren’t even expected to collect a pension. By contrast, the life expectancy of a 50-year old today is about 83, well above formal retirement ages. So the cost of pension provision has clearly increased.

Increased life expectancy is compounded by falling fertility rates (the average number of children likely to be born per woman of child-bearing age). From a peak of 3 in the early 1960s, UK fertility rates have fallen to 1.8 today, just below the replacement rate of roughly 2.0. It is even lower in some other countries, 1.6 in China for example and as low as 1.4 in Germany, Italy and Japan.

Demographics is always seen as a long-term problem. But big changes are occurring now.

We estimate that the growth in the global working-age population has already dropped by around 0.75% per year as a result of falling birth rates. This is a significant decline, representing about a quarter of the 3% annual growth rate of the global economy in volume terms in

**Figure 1. From pyramids to skyscrapers - Population distribution (Global)**



Source: UN WPP 2015

recent decades. Weaker growth generally means lower earnings and weaker tax receipts. It implies fewer contributions into pension schemes and weaker revenue growth for fully invested schemes. In addition, liabilities are increasing as an expanding number of retirees are living longer.

Ageing demographics therefore threaten the sustainability of public finances. How will governments keep their promises to elderly voters, not just regarding pensions but also healthcare? Will younger workers accept the necessary tax burden? Or will budget deficits spiral out of control, perhaps leading to an old fashioned 'inflation tax' on older savers?

As the gruel is spread more thinly and living standards stagnate, we have already witnessed a trend towards populism. Inter-generational conflict also seems likely to become a feature of politics.

The impact on interest rates is not straightforward to forecast, with weaker growth and demand applying sustained downward pressure, but we could witness periods of upward stress as retirees reduce their savings and accelerate consumption.

Policymakers are looking to fight against the trend, with one potential solution to work longer. Japanese men already work into their 70s despite the official retirement age being 65. The UK government is increasing retirement ages. But does this resolve the problem or just postpone it by a few years?

Of course, not all countries are suffering from deteriorating demographics, with countries across Africa, Latin America and parts of Asia providing beacons of hope. The key is finding attractive investment opportunities that benefit from such a demographic dividend.

Demographic trends are a key input to the way we consider market valuations, from corporate earnings to inflation and from the healthcare sector to insurance companies. In our first article, we look at workforce growth and find that the retirement of baby boomers is reducing trend growth by around 0.75%. This is negative for the return on risky assets and applies downward pressure on interest rates. This is a crucial factor to consider for both pension schemes and for individual savers.

# Technology:

Change is the only constant

Technology change has been a constant of industry evolution, and disruption. From the spinning jenny and the steam engine, to the wireless and the Ford Model T, there are countless examples of small innovations that have ushered in profound social and economic change.

The challenges for investors are multiple: which technologies are disruptive, which are incremental; what is the time frame of adoption; who benefits, who doesn't; and when has market optimism (or pessimism) got ahead of the change itself?

## INVESTING IN TECHNOLOGY CHANGE

"We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run" is the observation of Roy Amara, a researcher and scientist who worked at Stanford.

The 'hype cycle' introduced by Gartner, the technology consultancy, provides a framework for investors. In essence, it maps a curve that describes the way new technologies become adopted by the market over time.

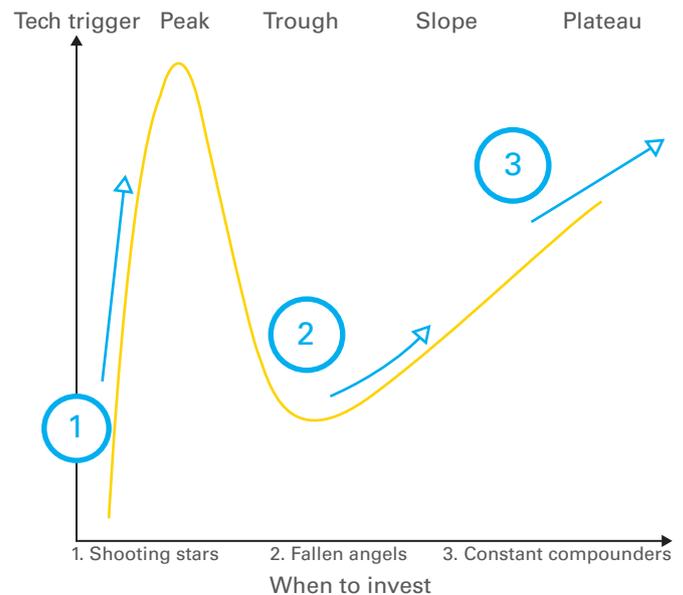
## INNOVATION OR CREATIVE DESTRUCTION?

The first decade of Amazon's existence neatly mimics the hype cycle framework. With the benefit of hindsight, the best times to invest were at the IPO, and post the collapse of the tech bubble. However, if you wind the clock forward, history tells you that even the pre-crisis peak in 2007 would have been a great time to invest. The shares have multiplied eight times since then.

Amazon is clearly an example of survivor bias. There are many more tech bubble failures than Amazons, with research showing that 72% of new innovations fail to meet their financial targets, and often it's not because the technology itself didn't live up to expectations.

As the Amazon juggernaut rolls on, it provides a reminder of the flip side of investing around technology change: avoiding the companies facing creative destruction.

**Figure 2. The Gartner Hype Cycle**



Source: Gartner, LGIM

Dramatic changes in business models and value chains don't happen overnight, but are typically big destroyers of capital. The retailers disrupted by Amazon provide a case in point: high street insolvencies come well after the credit downgrades, share price collapse and store vacancies. Anticipating these changes is therefore essential for fixed income, equity and real estate investors alike, with each providing a different lens on the same trend.

## BYSTANDERS BENEFIT

Another consideration is that the biggest beneficiaries of a technology change are often not the companies that introduced it. In 1981, IBM invented the personal computer, and by 1986 (the year that Microsoft had its IPO) their shares had more than doubled. However, in the decade that followed, as consumers began to adopt personal computing in earnest, the chip manufacturer Intel and the software player Microsoft reaped the rewards: Intel shares gained 2757% between 1986 and end 1996, and Microsoft gained a staggering 10,000%. IBM shares were flat.

**Figure 3. A “Prime” example: Amazon share price from IPO to 2004**



Source: Bloomberg L.P.

In the coming months, we will focus on the big secular trends that cut across industries and geographies such as cloud computing, artificial intelligence, robotics, digital entertainment and autonomous vehicles. What the hype cycle teaches us is that it's important not to lose sight of the tried and trusted indicators of investment success: strong and sustainable cash flows, realistic valuations and organic, self-sustaining growth. In our first article we dive into this topic in more detail and pick out some hype cycle winners.

# Energy:

## Why does it matter?

Energy is a large and vital component in the creation of economic value in modern human societies. Throughout history, the successful application of new cheap sources of energy has enabled significant economic advancement while rendering swathes of the economy obsolete. The link with technology is therefore clear, as are the associated economic and geopolitical implications.

The conversion of energy, much of which is from fossil fuels, is a major contributor to man-made climate change. Unchecked, this could result in enormous future shocks to the global economy from changes to the environment (weather patterns, sea levels and crop yields) as well as the human suffering and conflict these changes could entail.

Energy is also directly important to the companies that sell it. In Europe, oil, gas and utility sectors make up almost 9% of the main stock index. In addition, many countries are heavily exposed to the revenue they generate from selling hydrocarbons, and many more are sensitive to the cost of importing their energy

Energy markets are now facing a change largely unprecedented in their history. Technology evolution and policy change, alongside demographic factors, means that the energy industry is looking forward to a point in time when global hydrocarbon demand may no longer continue to grow in all forms. In contrast to the historical oil demand shown in Figure 4, oil may be the first market to see 'peak demand'. The implications of this change are going to be dramatic.

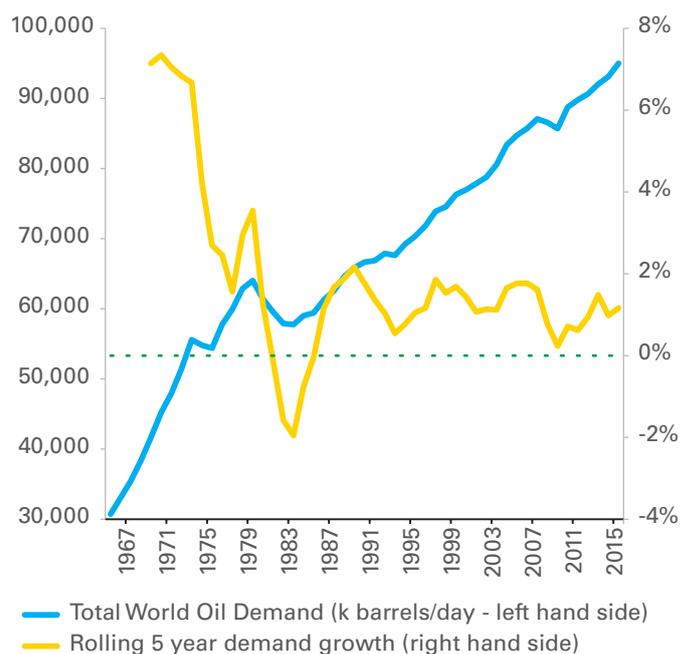
### WHY IS FORECASTING ENERGY MARKETS SO DIFFICULT?

Very few people, even well-resourced experts, have historically been able to accurately forecast energy markets, whether oil, gas or coal. Figure 5 shows analyst forecasts in yellow, which just follow market price movements up and down captured in blue. Forward

market pricing implied by the green futures curves equally provide little value in accurately forecasting future oil prices. To be fair, it is a very difficult job, for three main reasons.

1. Given political influences, neither buyers nor sellers of energy consistently act rationally from an economic perspective.
2. Energy markets have been impacted by substantial changes that have been difficult to foresee, often driven by technology advances. For example, few market participants correctly forecast the emergence of US shale or the impact it would have on both gas and oil markets. The cheapening of solar energy in recent years is another good example, driven by a significant fall in the cost of solar panels.

Figure 4. Historic oil demand



Source: LGIM, BP Statistical Review

3. Energy markets are very susceptible to even relatively small economic shocks. The response can be complicated and even exponential.

We do not think this challenge will ease in the coming years.

**HOW IS OUR APPROACH DIFFERENT?**

First, unlike many forecasters, we are neither an energy producer hoping for rising prices, nor does our business benefit if the price falls. We are therefore free from natural biases.

Second, as a large institutional investor we are able to corroborate findings across a wide variety of sources including companies, NGOs and oil producing governments. Due to structural biases, information is sometimes inefficiently shared between such interested parties.

Third, most forecasters focus on extrapolating known trends while attempting to capture the effects of policy and technology changes. In contrast, by combining our specialist research capabilities across all major relevant asset classes, we are able to view global energy from both a top-down and bottom-up manner, allowing us to uncover inconsistencies in consensus expectations.

Our focus is on establishing where we have a relative advantage, reaching conclusions which are different to consensus. We believe that both the cumulative weight of these non-consensus conclusions, and our understanding of their interactions, provides an invaluable picture of risks and opportunities. For example, in our first article we look at the potential for oil demand to peak in the coming years, a positive scenario for the environment, but destabilising for companies and countries that rely on oil revenues.

**Figure 5. Futures curves and sell side forecasts rarely reflect future prices**



Source: LGIM, Bernstein, Bloomberg L.P.

**BOTTOM LINE**

Demographics, energy and technology change permeate every asset class and industry sector, making it more important than ever to join the dots to analyse the impact of complex trends. We believe our collaboration across asset classes is key to understanding opportunities and risks and we look forward to sharing our insights throughout the year.

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