Berlin Institute for Population and Development

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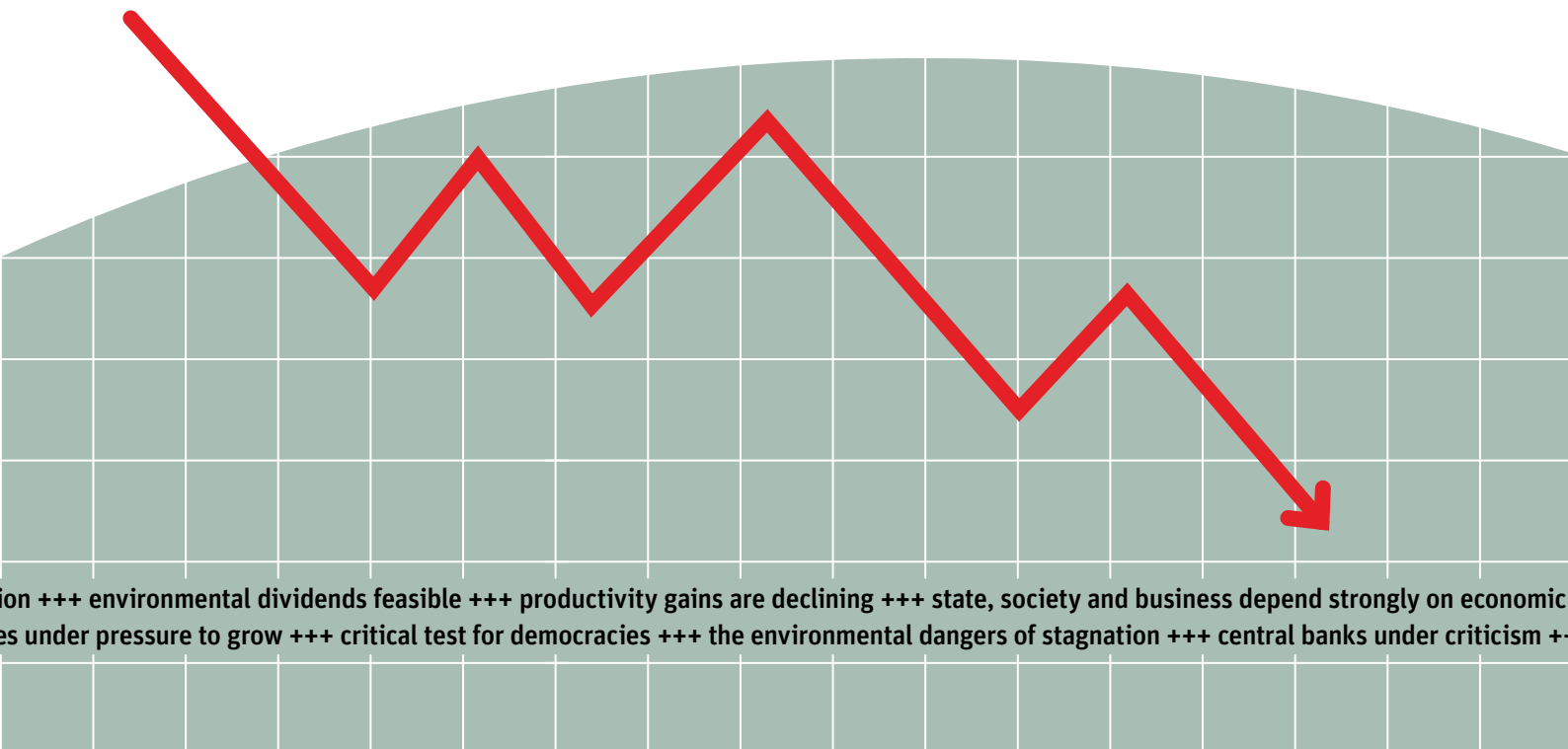
Is economic growth over?

Why state, citizen and business may be facing a New Normal



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WHEN CERTAINTIES FADE

Are we witnessing a turning point in history? Crises are piling up. Conflicts are once again on the increase across the globe. Terrorism is spreading. Climate change is altering our planet. Old truths and certainties, alliances and coalitions are increasingly being called into question.

All these developments evoke a diffuse feeling of uncertainty among many people, but identifying the underlying causes is often rather difficult. Germany is no exception in this regard – a country that is today perceived as a haven of stability by international standards, with high government revenue, political stability, functioning institutions and low unemployment rates.

Fears and worries are taking hold in Germany too. Comprehending underlying developments may be difficult because noticing creeping change is seldom an easy task. Research institutes, the International Monetary Fund and the World Bank have all made projections emphasising a global economic upswing, yet growth rates in developed countries have already entered a lasting downward trend. These countries' economies are in fact yielding ever lower relative welfare gains, a pattern that becomes discernible if viewed over the course of several decades.

As growth vanishes, so too does the possibility of enabling broader segments of society to partake in their share of increasing welfare. Belief in the idea that future generations will be better off is beginning to waver. This is a fundamentally new experience for societies suffering from diminishing economic growth, as growth is all they have ever known. Systems have evolved accordingly and are dependent on growth in many areas. This dependency is in fact so strong that the provision of adequate pensions, proper infrastructures and debt repayment are hardly conceivable without growth. As Chancellor Angela Merkel once put it, in a statement that is as fitting as it is fatalistic: "Growth is not everything that is true. But without growth everything is nothing".[1]

Are we witnessing a "secular stagnation"?

The question is whether economic stagnation will be dispelled by new inventions, technologies and the spread of data and robots – as "Industry 4.0" predicts. Or whether we are in fact witnessing a secular stagnation in the manner US-American economist Lawrence Summers has described: a very long-lasting period of anaemic growth.

According to all available statistics, diminishing economic growth has become a consolidated phenomenon over the past decades. It is enduring and structural in nature. Put briefly, stagnating economic growth is the consequence of the success of people living in highly developed countries: because these individuals are enjoying more education and are better off, they have fewer offspring and live longer. As a consequence, population growth is coming to a halt. This process of demographic change is considered one of the main causes of shrinking economic growth. According to this view, stagnation is a system-immanent consequence of socio-economic progress, and will become the most pressing issue of the 21st century. For this developmental trajectory is not only

applicable to industrial nations but also to emerging countries, from China to Brazil, where it will materialise with a significant delay, yet its impact will come at a higher pace and with greater force. All countries on a course of development will be subject to this same trajectory. Naturally, whether emerging countries are in fact going through or will soon face a secular stagnation cannot be determined at present.

This study puts forward the following thesis: it is highly improbable that the industrial nations will return to the high economic growth of the past. This is precisely why we are not seeking ways to restore old conditions. Rather, we are examining the deeper causes of stagnation and their impact on state, business and society. In doing so, we find that policy-makers have so far not been able to devise a recipe for dealing with long-term and structurally caused economic stagnation. What is more, waning growth does not necessarily lead to less environmental damage either. In fact, attempts to revive growth against all odds may push aside environmentally-friendly yet initially costly technologies and production processes. That is to say, economic stagnation, whether as a by-product or by itself, cannot fulfil environmentalists' long-standing dream of ending economic growth for good.

A future without a plan B

Highly developed societies have so far not genuinely worked out a "plan B" that would address the question of how to ensure the welfare of people in the face of shrinking or completely absent economic growth. Most politicians, economists and perhaps even citizens regard growth as a natural law. Should this projection turn out to be an illusion, we have no strategy whatsoever. We have never dealt with the possibility of a life without growth, despite many indications that we might have to. The sciences of Ecology and Physics, for example, have long been explaining that permanent economic growth – that is, an ever-growing amount of goods and services in a closed system such as planet Earth – is not feasible. It runs against the second law of thermodynamics, which states that any transformation of matter leads to an increase in entropy. Entropy is a measure of disorder and therefore indirectly also of environmental destruction.[2]

This sobering realisation has so far not led to a shift in global thinking, to a victory of reason. Instead, an end to growth for structural reasons is in the making, by the back door. Initiating a debate about this development is an uncomfortable political and societal task. It requires admitting that we can change little about the fact that the golden era of "ever more" is coming to an end. It requires realising that society needs to negotiate a new contract for the distribution of wealth. It means nothing else than comprehending the gradual demise of growth not as a loss, but accepting it as a new normal.

Both for economists and for ecologists, this realisation is a bitter pill to swallow. Most economic analysts would need to break with a central dogma, since growth stands at the forefront of many of their theories. And environmentalists would have to concede that it was not the well-informed warnings that they have been issuing for decades about the extinction of species, pollutant emissions and climate change that paved the way for an era of post-growth. Rather, an end to growth is simply the normal course of socio-economic development.

At the same time, secular stagnation does not represent the only way of reconciling the interests of the economy and ecology. Business analysts and natural scientists should get together and explore how sustainable life in highly developed countries can be organised under these new conditions. And they should swiftly move to ensure that all of society participates in the debate. For a world with less growth, or no growth at all, will differ fundamentally from the one we have hitherto known and learned to live in.

Berlin, June 2017

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EXECUTIVE SUMMARY

Diminishing growth

At international summits, in economics, in the German constitution or in the manifestos of almost all political parties, we find one and the same goal: economic growth. Yet how realistic is the idea of eternal growth that also serves humankind? In all industrial nations, growth has already drastically declined. Take Germany, for instance: While the ten-year average growth rate in the 1950s amounted to roughly eight per cent, the very same figure halved in the 1960s, reaching merely 1.5 per cent on average between the years 2011 and 2016.

Japan has experienced a particularly sharp and rapid decline: While its economy grew by approximately 10 per cent per year in the 1960s, growth rates have sunk substantially, amounting to average figures of around 1 per cent after 1990. Economists such as the US-American Lawrence Summers, former Chief Economist of the World Bank, speak of a secular stagnation in developed countries – weak economic growth persisting over a long time. Meanwhile the first emerging countries, too, are experiencing a trend towards diminishing growth.

Obstacles to growth are intensifying

Declining growth in the industrial nations is the result of structural changes in developed societies. The most important drivers of growth are losing momentum: firstly, population growth is coming to a halt; secondly, innovation potential and productivity are only increasing slowly, despite globalisation and digitalisation; thirdly, inequality is mounting and limits the consumption potential of lower income groups; and fourthly, environmental damage is exerting a decelerating effect on economic development.

The slowdown in growth is largely the result of socio-economic developments that are in fact positive and desirable: modern medical care, less strenuous working conditions, functioning social systems and more education all help increase welfare and life expectancy – and reduce the fertility rate. As a result, many societies are ageing, and some are even beginning to shrink. Consumption is not spreading as fast as in the past. In sum, as people are becoming better off economic growth is slowing down.

Conventional economic policy instruments are failing

In order to boost economic growth, governments and central banks have previously resorted to classic economic policy instruments. Governments borrowed money and increased public spending. They created subsidies or reduced taxes as a means to stimulate consumption. Central banks lowered interest rates and flooded the market with cheap money to facilitate public and private investments. In many cases these measures helped to bring the economy back onto a growth track.

However, in a structurally-caused economic recession such as secular stagnation, those instruments are becoming less effective. Neither fiscal nor monetary policy can solve fundamental problems such as demographic change or inequality. And yet governments and central banks, particularly those of Japan and Europe, continue to resort to the old methods.

The consequence: debt levels are rising, but old growth rates are not returning. Above all, the money is not properly funnelled into growth-stimulating investments but is instead increasing the danger of yet another financial market bubble – similar to the one preceding the economic crisis of 2007/08. To date, there have been no attempts made at adapting society to a structurally-caused decline in growth.

Strong dependency on growth

The consequences of a weak economy or even economic stagnation are manifold and impact state, business and society, since growth has so far been vital to these areas in developed economies. On the one hand, developed states need to reduce government debt. On the other hand, they are facing the enormous challenge of maintaining functioning social systems for an ageing society whilst at the same time suffering from shrinking government revenues. Some of the crisis-stricken southern European countries have already reached the limits of their ability to act upon these challenges.

For businesses, shrinking growth is causing considerable problems, too. They need to lower profit expectations and investment needs and anticipate that technological progress will continue to slow down. The greatest threat would be massive job losses.

Increasing unemployment coupled with a weak economy may undermine people's trust in the promise that they are going to be better off than preceding generations. What helped democracies emerge and survive is the broad distribution of wealth – which itself stems from growth – across different strata of society. In the face of ever-decreasing growth, however, the likelihood of political crises is increasing and populist forces are on the rise. Open and free society as we know it is under threat.

Less growth, more sustainability?

Since the rise of the environmental movement over 50 years ago, it has become a well-established fact that economic growth can also bring problems. A lot has happened in terms of sustainability since then, on the national and international stage. However, assessing progress in 2017, there appears to be no escaping the conclusion that the overall state of the planet has significantly worsened.

Does this mean that a structurally caused reduction in economic growth in the industrial countries and in some emerging countries is occurring just at the right time? Does the equation "more economic growth = more environmental damage" also hold if we substitute "less" for "more"?

Until today, global recessions have typically led to a reduction in environmental pollution – albeit only temporarily, as governments have often taken ecologically questionable steps in order to create stimuli for growth: they have reneged on environmental agreements, revitalised old technologies such as coal combustion, invented energy subsidies or a "scrappage premium" for old cars.

In order to convert the weak economic situation into a considerable "ecological dividend", not only would growth rates have to sink; resource consumption per unit GDP would have to decline as well. Politics and business would need to focus growth on those areas – such as renewable energy supply – that clearly help to improve the environmental situation. Ecologically undesirable industries such as the coal industry would need to disappear as quickly as possible by means of "creative destruction".

Where do we go from here

If economic growth slowly wanes in the context of secular stagnation, developed countries will need to carry out fundamental macroeconomic transformations. They will have to come to terms with the new situation and refrain from taking countermeasures using old instruments that no longer work. They would have to introduce austerity measures where socially feasible, forego taking on new debt and seek alternative ways to obtain government revenues.

In an economy which is increasingly based on "smart" machines it would make sense to levy taxes on them. For such a tax not to hinder technological progress, the tax should be imposed on the respective business owners or shareholders and not on the equipment per se. Generally speaking, the factor labour should not be rendered more expensive. This is possible to achieve, for instance, through socio-ecological tax reforms. Such taxes sanction environmentally damaging behaviour, such as the consumption of fossil energy resources, and reduce non-wage-labour costs – for example by decreasing pension contributions.

Refraining from increasing costs related to the factor labour becomes all the more pressing, as less economic growth means less work. Some experts therefore demand an unconditional basic income, which provides people with social security even in the absence of a paid job. Others, observing declining working hours, see a post-growth society in the making; one which is characterised by less income but more "wealth" in terms of leisure time. The question of which scenario will materialise – by itself or in combination, or whether humankind will need to work even more in a world with less growth in order to make ends meet – remains completely open.

1 EVERYONE WANTS THE SAME THING: GROWTH

When the group of the 20 most important industrial and emerging countries come together in Hamburg for the G20 summit under the German Presidency in July 2017, they will deal with topics such as terrorism, migration or Africa, and with one central question: how do we achieve, individually and on a global level, more economic growth?

At summits such as these, high-level politicians from 7, 8 or 20 states as well as experts from international organisations meet for informal talks to discuss the most relevant global issues. One point that is almost invariably on the agenda is the demand for economic growth. For instance, during their meeting in Pittsburgh in 2009, the G20 made a commitment "to ensure a strong, sustainable and balanced growth of the world economy".[1] The G20 agenda from 2014 in Australia set the goal of increasing global economic growth by 2 per cent in order to create "millions of new jobs".[2] At the G7 summit 2015 in Elmau, Bavaria, the participants vowed "to continue their efforts to ensure growth for everyone".[3] In the same year at the G20 summit in Turkey, government officials met to adopt "joint measures for a strong, sustainable and balanced growth in order to increase the wealth of our citizens".[4]

Though these bold statements may often sound like empty exhortations, official communications assert that they are based on a worthy goal: growth is needed to reduce poverty and inequality and to create high-quality skilled jobs – preferably everywhere in the world. However, underlying this objective is not only the desire to create better living conditions; governments are also seeking legitimation. They need growth because the basis on which governments are judged is how well they manage to finance social security systems and infrastructures – ranging from road construction and the security apparatus to schools and universities. And they depend on growth in order to pay the interest accruing on debt, or if possible even reduce the level of debt. Out of these necessities has emerged the global understanding that the yardstick for a successful economy is a constant rate of increase in Gross Domestic Product (GDP).[5]

But what are the requirements for constant growth rates? Such growth is only achievable if the population of a country produces more and businesses increase their investments year by year. As a result, the increase in GDP itself increases; that is to say, GDP increases in absolute terms and in a self-accelerating manner, meaning exponentially. Consequently, citizens are getting richer, at least if one takes GDP as an indicator of a society's wealth, as is common in economics, the media and politics. Most of the people in industrial nations, and increasingly also in the emerging countries, have been socialised with these growth patterns. They are expecting no less than a continuous further development in the future. These patterns are so entrenched that the absence of growth – meaning a stagnation – is typically glossed over as zero growth and a recession is euphemised as negative growth. The "pursuit of more" – more wealth, income, and material goods – is part and parcel of the fundamental principles of a market-oriented society. The goals and demands of the G7 or G20 summits follow the expectations of their respective domestic publics. In democracies, governments are regularly judged in terms of whether they meet these goals.

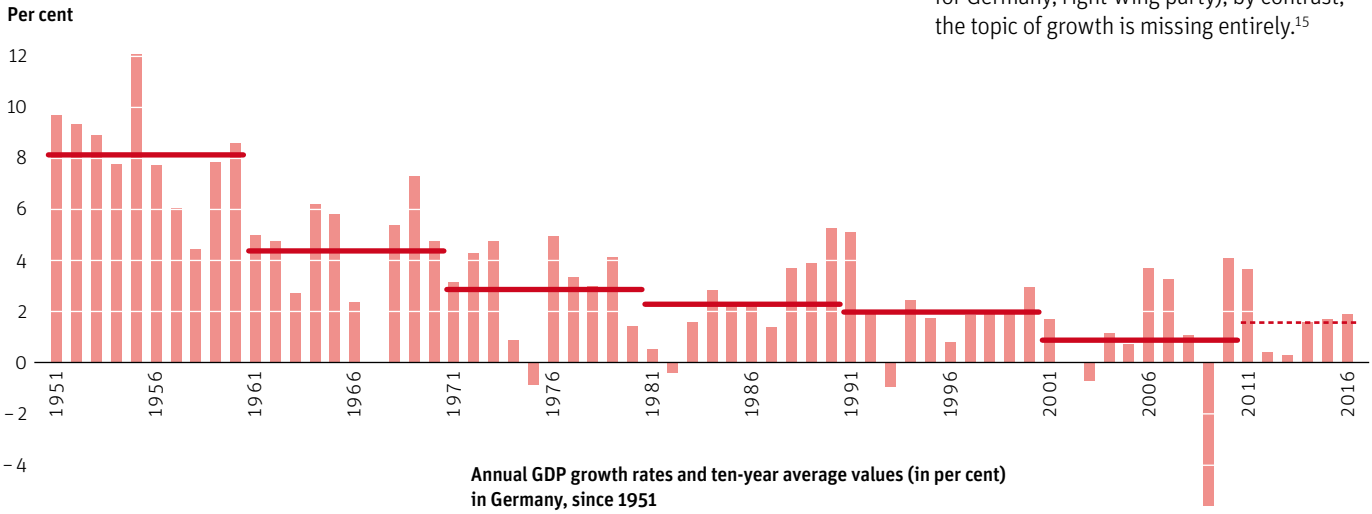
These expectations are reflected in practically all economic schools of thought. Be it neoclassical, Keynesian or Marxist, all deem growth a key condition for the functioning of economies. That is to say, growth is understood as a basic property of societies. This is an assumption that is applied across the board. On closer examination, however, it becomes evident that the assumption only fits modern "consumption societies" that are geared towards accumulating excessive wealth. Without growth, it is hard to imagine how these societies would go about increasing wages and maintaining stable welfare systems and public finances.[6] If a company seeks to invest capital in order to remain competitive, it typically does so by borrowing money. That money can be used, for instance, to buy new machines or to finance researchers to develop new products. Paying back these loans and their interest in turn requires growth. Some scientists, including Harvard Economist Benjamin M. Friedman, regard economic growth as an indispensable condition for tolerance and openness in society – and for the emergence and survival of democracies. In the event that the "robust growth" of the past disappears, Friedman sees social stability endangered and predicts the demise of highly developed societies such as the USA, Germany or France.[7]

The German constitution goes as far as to legally stipulate the necessity of economic growth. Paragraph 1 of the "Economic Stability and Growth Law" of 1967 obliges the federal and state governments to devise their economic and financial policy in such a way that they "promote price stability, higher employment rates and external economic balance by ensuring constant and appropriate economic development".[8]

It is hardly surprising that all major political parties in Germany mention these objectives in their party or election manifestos. The CDU/CSU (Christian Democratic/Social Union) vows in its government program 2013-2017 "to ensure the requirements for a stable currency, growth and secure jobs".[9] The SPD (Social Democratic Party), according to its government program, wishes to provide "impulses for growth and jobs".[10] In its 2017 federal parliamentary election program, the Green Party speaks of "green growth" and goes to great lengths to substitute growth-centred terminology with terms such as "prosperity". In its 2013 election manifesto, however, the party also pointed out that "in the absence of growth there is a threat of big distributional conflicts and recessions".[11, 12] The Left party is keen on abandoning the path of "socially and ecologically blind growth fixation" while at the same time vowing for "higher mass incomes" and "great public future and investment programmes for education, for social, ecological, and barrier-free transport infrastructure".[13] The FDP writes in its party manifesto from 2012: "growth gives us power to renew our country and strengthen our liberal democratic order".[14] In the case of the AfD (Alternative for Germany, right-wing party), by contrast, the topic of growth is missing entirely.[15]

Declining economic growth in Germany...

Everything used to be better. This applies at least to Germany's economic growth since the Second World War. During the economic miracle Germany celebrated growth rates resembling those of contemporary emerging countries. Over the course of time, however – looking at ten-year average figures – growth rates have steadily declined (red line). The current decade is necessarily incomplete and therefore of little significance (dashed line).



Annual GDP growth rates and ten-year average values (in per cent) in Germany, since 1951
(Data sources: Penn World Table[22], German Federal Statistical Office (as of 2015) [23], own calculations)

Are there limits to growth?

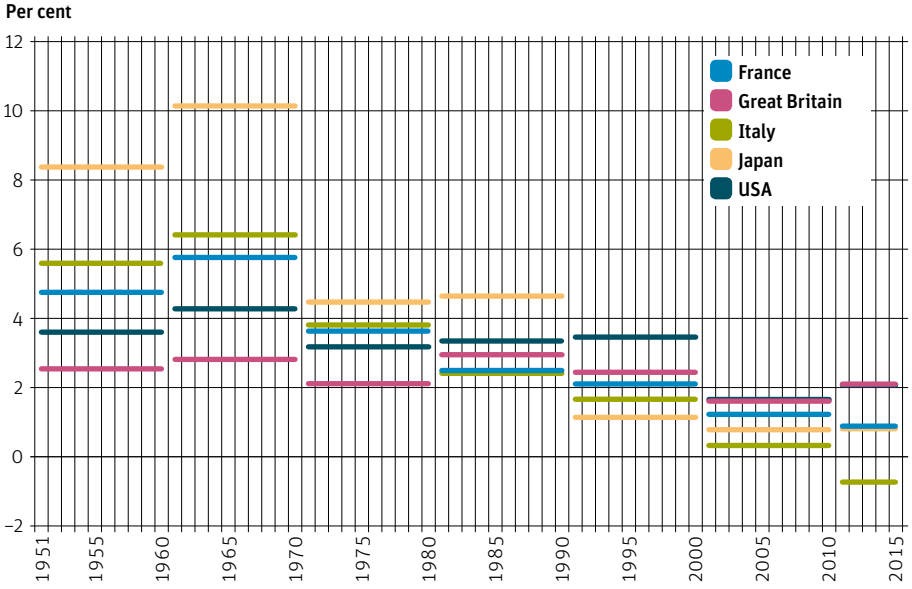
How realistic is the idea of permanent economic growth, one that serves humankind? The question arises for different reasons: For one thing, environmentalists (and sometimes also economists[16, 17]) have been pointing out for some time that infinite growth on a planet with only limited resources will inevitably lead to existential problems; or scientifically put, the economy is operating within the scope of an ecosystem that has limited regenerative capabilities.[18] For another, the fact that the topic of growth is repeatedly discussed at every G7 or G20 summit suggests that economic growth is not materialising in the way its proponents want and expect.

Putting these issues into perspective, it appears that the idea of increasing or even constant growth is rather unlikely – at least in the typical industrial nations that make up the "group of eight" and are considered the core of the most important economies worldwide. Economic growth has been declining in these countries for decades, independently of short-term economic cycles. Similar developments are discernible in the other industrial nations as well as in emerging countries such as China and some of the "Tiger states".[19]

Statistics suggest that in some industrial nations, economic growth – that is, the increase in the value of all goods produced and services provided in a given economy in a given year – has considerably declined over the course of time. Take Germany, for example: calculating the average value for Germany's economic growth from the founding of the Federal Republic (1949) to the present yields 3.6 per cent. The figure for average annual economic growth per

… in other industrial nations …

All industrial nations are exhibiting the same trend: high economic growth is a thing of the past. Nevertheless, there exist considerable differences across countries. While Japan was extremely successful in the 1960s and -70s, its decline was all the more pronounced afterwards. The UK suffered from low growth due to a flawed economic policy from which it somewhat recovered by the end of the 20th century. All the same, the UK, too, has been unable to avoid the general downward trend of the recent past.



Ten-year average GDP growth rates in different countries (in per cent), 1951 to 2015 (Data sources: Penn World Table[24], World Bank (2015)[25], own calculations)

capita is a bit lower, at 2.8 per cent, which is due to the fact that Germany's population has likewise increased since World War II[20] – a remarkable value reflecting the strength of the German economy. However, while the average growth rate for the 1950s, which marks the run-up phase of the so-called economic miracle in Germany, is around 8 per cent (adjusted for short-term economic fluctuations), the figure halved to 4 per cent in the 1960s, further declining to roughly 3 per cent in the 1970s. The figure has shrunk again and again ever since. The average growth rate for the years 2011 to 2016 was as low as 1.5 per cent.[21]

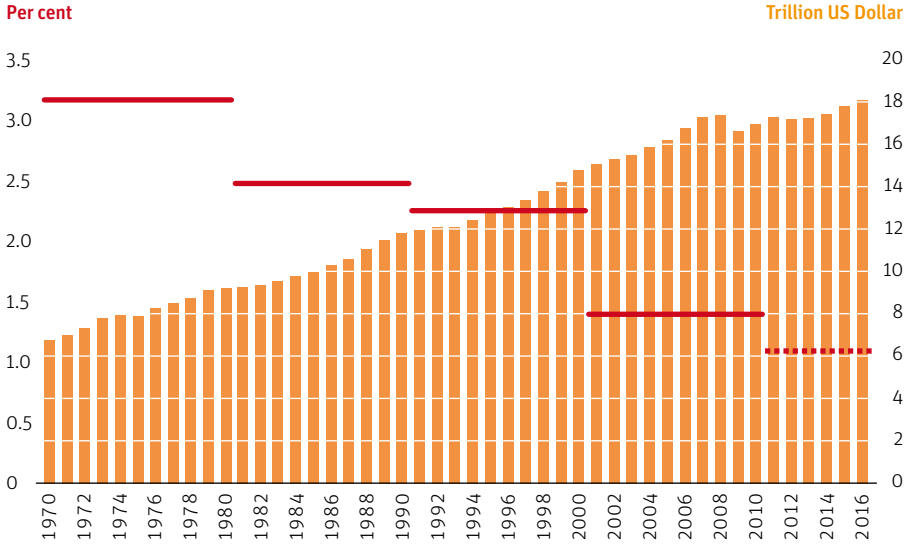
Similar trends can be reported for other countries: in France, economic growth has decreased from 4.7 per cent during the 1950s, to 2.5 and 0.8 per cent over the 1980s up to the present, respectively; in the UK, growth rates have fallen from 2.5 and 2.9 to 2.1 per cent over the same time intervals. Among the countries that have already fallen below the zero line are crisis-stricken European countries such as Spain, Italy and Greece. During the 1980s and 1990s, these states were able to achieve growth rates between 2 and 3 per cent. Over the past decades, however, their average growth rates fell sharply to roughly -0.5 (Spain), -0.5 (Italy), and -2.1 per cent (Greece).[26] For the European Union as a whole, the figures look rather modest: while the community was

able to achieve relatively high growth rates of between 2.4 and 1.4 per cent in the wake of the enlargements to the south (1980s), north (1995) and east (2004), growth has slowed down ever since, remaining at around 1 per cent for the past ten years. The overall economic situation had been bleak for years, it even worsened for certain strata of society. Only recently, it appears that growth is gaining new momentum. The fact that Germany achieved growth rates above average can be explained by efficient businesses, and the fact that the country is growing at the expense of other Euro-states. Germany is benefiting from the common currency, which facilitates its exports yet at the same time impedes those of the crisis countries. Because states such as Greece cannot devalue their currency in order to increase competitiveness, they lack tools to attract foreign investors, such as creating comparatively cheap conditions of production.

It is nevertheless difficult to speak of shrinking wealth as long as the latter is measured in terms of GDP. For even declining growth rates occurring against a high baseline generate a considerable macroeconomic value added. While Germans obtained an average per capita income of 1,900 Euros per year (inflation-adjusted) in the 1950s, this figure increased to 21,000 Euros in 1990 – at the time of Germany's reunification – and even reached 38,000 Euros in 2016. Put differently, Germans have become twenty times richer over this period, and due to the social market economy that is in place, this wealth is fairly distributed compared to many other countries – a clear victory of welfare capitalism, where successful companies contribute to decreasing social inequality.[27, 28]

… in the European Union…

EU-wide GDP has hardly moved at all since the financial crisis of 2007/08. Even if growth figures have picked up recently, the average value for the last couple of years is about one per cent. Such figures are not considered adequate for creating sufficient jobs and funding social systems.



Ten-year average GDP growth rates (in per cent) and annual GDP values (in trillion US Dollar, 2010 price levels) in the European Union (EU 28), since 1970
(Data sources: World Bank[29], IMF (as of 2015)[30], own calculations)

If one projects the trend of declining growth in the industrial nations into the future, some states are moving towards zero-growth and below. Japan experienced this shift in a particularly intense and rapid manner: while the economy in its booming phase during the 1960s grew at a rate of around 10.1 per cent, this figure was already as low as 5 per cent in the 1980s. Since the big crisis of 1990, average economic growth rates in Japan have fallen to around 1 per cent.

It is remarkable that the weakening of economic growth is happening against the backdrop of globalisation, which *The Economist* calls the "greatest business model of the past three decades", despite the liberalisation of global trade, the digital revolution and the increase in foreign direct investment.[31] The early 1990s are considered the golden years of globalisation; at a time when China and the former Eastern bloc countries opened up economically, Europe grew together and multinational corporations brought in huge profits.[32] Globalisation has especially benefited industrial nations such as Germany, bringing with it an economic upswing. This effect, however, was only minor in extent and wore off soon after.[33]

Weak economic growth in highly developed states is therefore not cyclical in nature. It can hardly be reduced to a temporary downward trend or a one-off effect stemming, for instance, from an oil crisis, a financial bubble or political turmoil. Diminishing growth is a phenomenon that has been around for decades and must have structural causes. Despite the fact that upswing and recession take turns in an enduring cycle of ups and downs, the overall trend is clear: downwards.

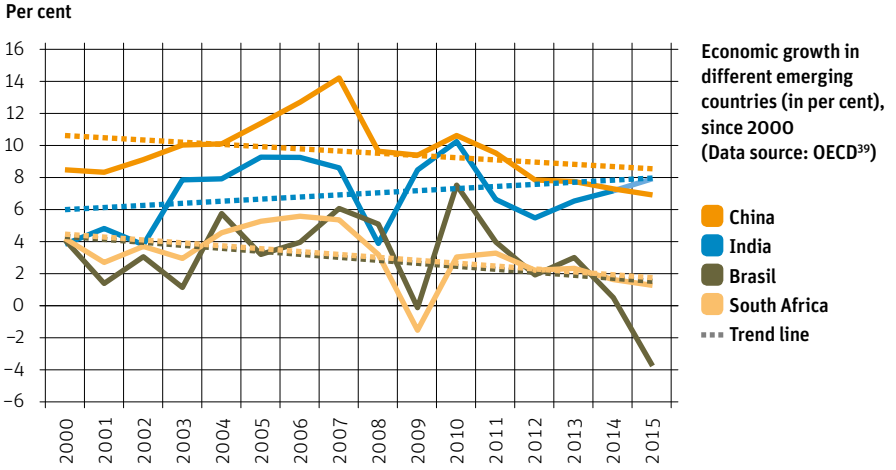
The return of secular stagnation

During a speech before the International Monetary Fund in 2013, the US-American scientist Lawrence Summers, former Chief Economist of the World Bank and US Treasury Secretary, revived the term "secular stagnation" to refer to the phenomenon of persistent slow growth.[34] Summers intended to describe the difficulty the US and world economies had experienced trying to get back up on their feet after the financial crisis of 2007/08. To this end, he resorted to an old concept devised by US economist Alvin Hansen in 1938 who, when confronted with a worldwide recession and persistently high unemployment figures, theorised about the possibility of a long period of stagnation, which, as the name suggests, may become the problem of the century.[35] According to Hansen, the main causes of stagnation back then were the decline of the fertility rate and an investment fatigue. The latter brought about a surplus in savings which, in turn, led to the emergence of unusually low interest rates.[36]

Yet as difficult and enduring as the world economic crisis was, it surely does not qualify as a "secular" stagnation; on the contrary, after the Second World War all warring countries experienced a secular upswing. This caused the world economy to grow at a hitherto unknown rate and initiated a baby boom in practically all states. In addition, Hansen had underestimated technology-driven productivity gains. Many inventions from the pre-war era, ranging from the automobile to electrification, exerted their influence only after WWII. Other later inventions such as the semiconductor and the computer Hansen could not possibly have predicted. His theory mostly fell into obscurity.

… and meanwhile also in the emerging countries …

Emerging countries have for a long time been the growth engine of the world economy. However, at a certain level of development, economic growth rates have fallen in these states too. India joined the growth trajectory comparatively late and most likely has a longer phase of economic growth ahead.



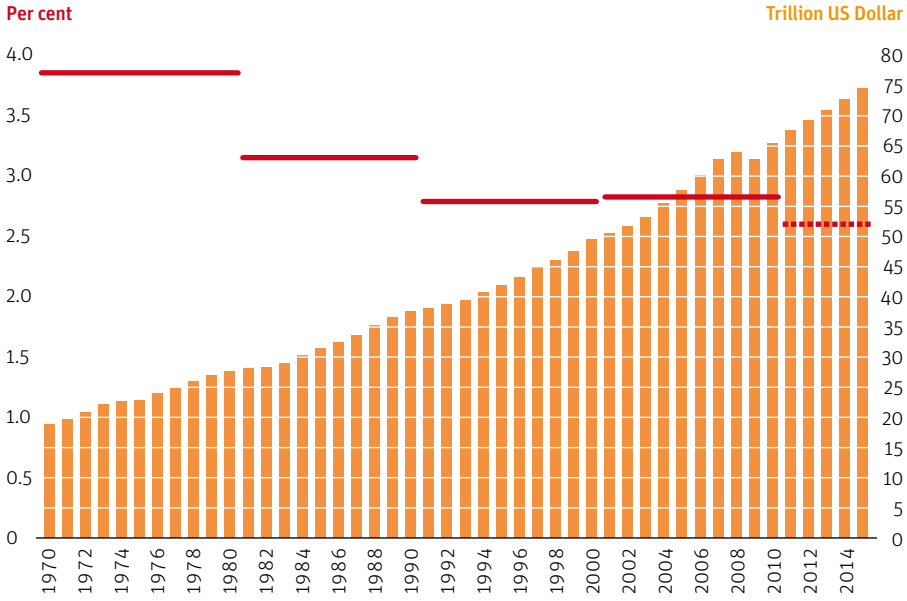
Economic growth in different emerging countries (in per cent), since 2000 (Data source: OECD[39])

Still today, it is only a fairly small circle of experts who are concerned with the issue of secular stagnation, not the broader political community. One reason is that the reported decline in growth is partly offset by the economic upswing of emerging and developing countries, if one takes a global point of view. For a long time, Europe and North America, followed by Japan after the Second World War and South Korea up until the 1980s, accounted for most of global GDP. Since then, China, India and other late developers such as Brazil, Mexico, Turkey or Indonesia have climbed the ranks and are taking over an ever-increasing share of global economic output. While catching up, these countries have obtained growth rates up to ten per cent or more.[37] This is why world GDP has continued to grow by about three per cent per year – albeit here too with a discernible downward trend –, despite overall declining growth rates in the "old" industrial nations.[38]

However, the emerging countries cannot by themselves bring about a durable boost for global economic growth, because with a certain delay they, too, will follow the above-described path that the industrial nations have already taken. Take China, for instance: after the People's Republic had transformed into a "socialist market economy" under its new leader Deng Xiaoping by the end of the 1970s, and following the tumult of the Cultural Revolution, the billion-strong Chinese nation has created a historical precedent by obtaining average growth rates of roughly 10 per cent over the course of three decades, with a peak of 15.4 per cent in the first quarter of 1993. With this upswing, the country was able to lift 800 million people out of poverty.[41] Overall, China's GDP increased twelvefold from the beginning of Deng's reforms to 2015.[42]

Global growth fatigue

Up until the 1970s, global economic growth was largely driven by a post-Second World War upswing and the catch-up effect in industrial nations. However, growth rates have considerably slowed down since then, while emerging countries, most notably China, offset the growth fatigue observed on global scale. Despite the fact that hundreds of millions of people there, and in other Asian and Latin American countries, have moved up to the middle class, globally economic growth rates are sinking, despite globalisation and the digital revolution.



Ten-year average GDP growth rates (in per cent) and annual GDP values (in trillion US Dollar, 2010 price level), since 1970
(Data sources: World Bank[40], own calculations)

But such headlines seem to be a thing of the past. In recent years, the second biggest economy in the world has lost significant momentum: economic growth fell from 10.6 per cent in 2010 to 7.7 in 2013, and 6.9 in 2015.[43] In its current five-year plan (2016 to 2020), the Chinese government set its target at 6.5 per cent.[44] China, a country that accounts for a third of total global economic growth, therefore seems to be following the same trajectory as the industrial nations, only at a much faster pace.[45] Other emerging countries are facing similar challenges, however with much bigger drops in growth rates through recessions. South Africa, Turkey, Indonesia and Brazil are a long way from the successful figures that were once regarded as normal.[46] Because the weakness of the emerging economies causes their demand for goods from industrial nations to increase at slower rates, economic growth in the developed countries is weakened, too.

Nowadays, high growth rates are mostly reserved for states that are at the very beginning of their economic development path: Ethiopia, Ivory Coast, Laos or Myanmar.[47] In these countries, poverty is still widespread. They are in urgent need of growth in order to provide their inhabitants with work opportunities, perspectives and, ultimately, to slow down high population growth. However, these late boomers, too, are likely to follow the downward trend as soon as they have reached a certain level of development. At the latest when the larger countries that are still poor embark upon the same path of economic development as contemporary emerging countries, global economic growth might further slow down in the long run.

While different reasons may exist for the decline of economic growth across countries and time, there are also a number of similarities. Most notably, states that suffer from a weak economy seldom manage to revive their economies in a sustainable manner using conventional policy instruments. In fact, the large number of investment programs in affected countries has for the most part caused rampant debt burdens that become ever more difficult to reduce, because the necessary growth is lacking.

Moving towards a new normality?

Despite statements by politicians and financial markets to the contrary, stable growth does not appear to be a constant feature of highly developed societies. It is perhaps a transitory phenomenon, which occurs or occurred only under specific conditions. Correspondingly, growth as a fixed reality appears to be a thing of the past and will be replaced by stagnation, which experts are already discussing as the new normal.[52]

Against the trend?

As soon as the discussion surrounding the issue of secular stagnation began to reach a broader audience, the International Monetary Fund announced in its prognoses a strengthening of the global economy for 2017 and 2018.[48] The EU Commission is likewise expecting growth in all member states during the period 2016 to 2018 – for the first time in a decade. Unemployment rates in the EU are at their lowest levels since 2009 and stock market prices have increased.[49] Does this mean that fears of a longer-lasting period of weak growth are unfounded?

At this juncture, too, it is imperative not to confuse an economic cycle returning to an overall trend towards growth after years of crises with a structurally-caused trend towards stagnation. Averaging the data over several years in fact does not indicate a stable upswing. Temporarily good figures are not necessarily indicative of long-term economic recovery. They could also be the result of speculative investments. Around the turn of the century, for instance, the dotcom bubble had unrestrainedly overvalued technology-related stocks and when the bubble burst the economy was crippled. As a counter-measure, the US federal reserve bank poured massive amounts of money into the markets, making houses affordable even for people without an income, a job, or any assets to offer as security. This was the origin of the American real estate crisis and the foundation for the next crash in 2007. The British Economist sees alarming signs of an upcoming crisis in the recently increasing levels of private debt in the USA, and even more so in China, where private household debt in terms of GDP has doubled since 2008.[50] So it may be the case that one part of this "new growth" has been bought at a high price, namely at the expense of swelling debt, with states lurching from one crisis to another.

Tellingly, Alvin Hansen published his theory of secular stagnation in 1938. At that time, the US economy had already recovered from the Great Depression of the early 1930s. Nevertheless, it crashed again in 1937. It was not until the Second World War and the armament programs initiated after 1938 that yet another period of economic upswing was set in motion.[51]

The impression of a secular stagnation may turn out to be a misjudgement, as already happened in the 1930s. Economic theories generally have no permanent truth value and for any theory there exist alternative theories. The determinants of growth are diverse and interact with each other, which is why projections are always difficult. It is possible that the weak growth performance of the recent past represented a somewhat longer dormant phase in the context of an overall economic upswing that will in fact continue indefinitely. Perhaps there are unknown innovations still to be made that will improve life, eliminate poverty, solve environmental problems and bring peace to the world.

Nevertheless, a structurally induced and lasting decline in growth is quite probable for highly developed countries. This is why we deem it appropriate to consider what this might imply for the societies affected and how they could react to the negative consequences of this development. Such a fundamental shift in the macroeconomic conditions would have an enormous impact on the financing of state budgets, social equity, political stability and the capacity of nations to innovate. The new normal may even shatter the very foundations of economic democracy. So far the governments of the industrial and emerging countries are completely unprepared for such a future. Political decision-makers should prepare for different future scenarios and equip themselves with a "plan B" for undesirable but probable outcomes.

Ultimately, the question is whether the end of growth is immanent and will bring with it an unintended and involuntary transition to a post-growth economy – a development that environmental activists and organisations have been demanding for half a century, at least since the publication of the report "The Limits to Growth" in 1972, addressed to the Club of Rome.[53]

Will all global environmental problems eventually be solved by themselves, from the pollution of the oceans, to the loss of biological diversity, to climate change, simply because economic growth with all its negative ecological consequences is coming to a structurally-induced end? Or will fading growth rather hamper industrial societies in their transition to sustainable development?

We will discuss these questions over the following pages. But answers at this stage can neither be complete nor conclusive. Precisely because these issues are among the bigger questions of the 21st century they will require long and thorough societal debate before viable solutions can be developed.

2 WHY GROWTH IS FADING

The British weekly *The Economist* is known for bringing topics to a wider audience in a concise manner and with dry humour. In its issue from 19 July 2014, the magazine made declining growth its cover story. The front cover depicted a frustrated jockey, wrapped in an American flag atop a giant tortoise, trying to make the slow animal run. The title read "America's lost Oomph". The article examined the question of why long-term growth in the USA had steadily declined.

This question is no longer only an American concern. As pointed out in the previous chapter, diminishing economic growth can be observed in virtually all industrial nations. The trend does not seem to be the result of a cyclical economic low point that will at some point be followed by a routine recovery phase with growth figures resembling those from the past. Rather, the current situation has structural causes, representing a longer lasting period of economic weakness.

This chapter describes the most important drivers of the economic growth of the past and its decline over the most recent years and decades.

Growth is not a natural law

Over most of its 200.000 year-long history, *Homo sapiens*, like other species, has not experienced any considerable growth. The world economy remained stationary for a long time, and people had only the bare necessities for existence, probably even less. Only with the transition to a production-based economy, with the invention of agriculture, cattle breeding and food storage, did humankind develop the capability to increase productivity. This manifested itself, among other ways, as a notable increase in the number of people that could be fed. This so-called Neolithic revolution took place about 10.000 years ago along the Euphrates and Tigris rivers, along the river Nile and in Southeast Asia.[1] Even during this period, growth was modest. In the approximately 8000 years from the beginning of the Neolithic revolution until the beginning of the Common Era, populations grew moderately, expanding from about 5 to 300 million.[2] Global economic growth also remained at low levels. It did not increase until the end of the medieval period with the expansion of universities in Western Europe in the 14th and 15th century as well as a series of technological inventions such as letterpress book printing and nautical navigation.

With the dawn of the industrial revolution and the machine age at the beginning of the 18th century, growth reached new dimensions: The steam engine made it possible to use fossil energy stored in the ground for transportation and later to transform that energy via generators into electricity. This triggered a historic growth spurt leading to further ground-breaking innovations. With the proliferation of banknotes made of paper, which only required partial coverage by gold, it became possible to increase the money supply and easier to realise big investments.[3] The industrial revolution, like the Neolithic revolution before it, led to an expansion of the world population – but this time on a much bigger scale. Once again, technical innovations, and the increased added value that they brought, were the initial drivers of growth. World population climbed to one

billion between the beginning of the Common Era and the industrial revolution. By the time the automobile was invented by the German engineer Carl Benz in 1886, the number of people living on the planet had already increased to 1.5 billion. In 1930, two billion people lived on Earth, in 1960 three billion, in 1999 six billion, and today the number is 7.5 billion.[4, 5]

So growth as we know it has only been around for a few centuries. More people meant more economic output – and the effect yielded overproportional gains. While global average per capita GDP (calculated based on the International Dollar GK$[6] 1990) was around 467 Dollars at the beginning of the Common Era, it probably reached 566 Dollars during the renaissance, then 1,261[7] Dollars by 1900, 6,038[8] Dollars by the year 2000, and in 2005 it was 14,725 Dollars.[9, 10] Total worldwide economic output increased by a factor of 19 between 1900 and 2000.[11] Since then it has nearly doubled, reaching 74.5 trillion Dollars today.[12]

Population growth was once the basis for economic growth

This parallel development suggests that economic and population growth were closely linked, at least during the initial phase of economic and industrial development. More people meant more consumers, more producers and more innovators. There being more people of working age and more people of an age to have children required investment, both in employment and in housing. Rising demand was a crucial driver for the economy. In addition, higher population density made production cheaper. Mass production in assembly lines and the possibility of economies of scale substantially improved each worker's productivity.

However, population growth is coming to a halt in an increasing number of countries. Demographic change and aging populations, offers one plausible explanation for secular stagnation. Others are diminishing productivity gains or increasing income inequality in many states.[14]

Explosive Mix

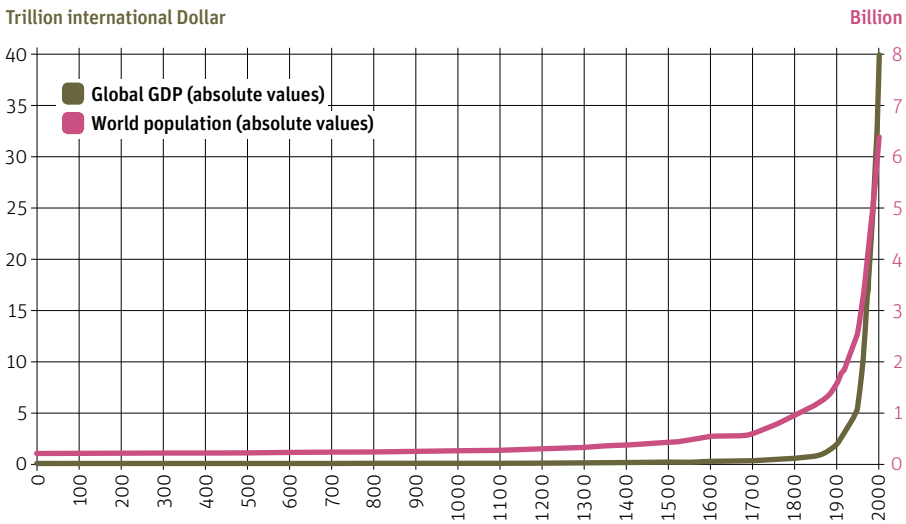
What seems to be self-evident from today's vantage point is a rather new phenomenon: Both economy and population have exhibited an explosive growth since the 19th century. The fact that both have a natural limit is obvious for physical reasons. Nevertheless, it creates considerable problems that economic growth has begun to dwindle.

Obstacles to growth: No. 1

Demographic change

In the past, innovations and increasing production levels made it possible for a growing number of people to be fed and provided with necessary goods and services. This explains past population growth – and population growth in turn facilitated economic activity and innovations.[15]

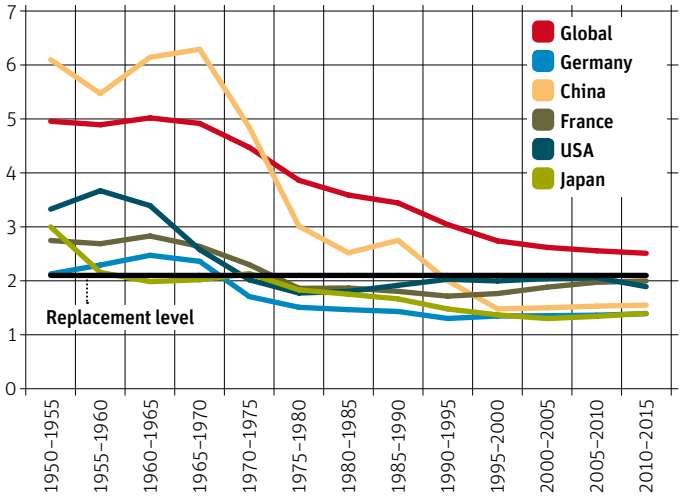
However, while in the 1960s the world's population was growing at a rate of 2.1 per cent per year – at a time when fear of a "population explosion"[16] was widespread – that same figure has fallen to 1.2 per cent at present.[17] Beginning with the industrial nations, and later followed by the emerging countries, welfare, innovation and education brought about improved living conditions in many ways, leading to an ever higher life expectancy, shrinking fertility rates and smaller families: no industrial country (with the exception of Israel) has a fertility rate of more than 2.1 children per woman, the so-called replacement level.[18, 19] Without



Global GDP in trillion international Dollar (absolute values, purchasing power of 1990) and world population (in billion), year zero to 2008
(Data source: Angus Maddison[13])

Wealth and education lead to a reduction in the number of children

Because people are better off in most countries and are benefiting from more education, the number of children per woman has declined significantly. With the exception of Israel, no industrialized country exhibits fertility rates above 2.1 children per woman, the replacement level. As a consequence, an essential driver for economic growth, a growing work force, falls away.



Children per woman (total fertility rate) in different countries and worldwide, 1950 to 2015 (Data source: UN World Population Prospects[20])

immigration, these countries cannot keep their population figures stable in the mid term. They have lost a crucial driver of economic growth.

Globally, the average number of children per woman has halved to 2.5 since the late 1960s – that is, over a period of merely 50 years. Today, the global fertility rate is closer than ever to the replacement level of 2.1, and UN projections predict a substantial slow down in population growth in the second half of the 21st century.[21] Other scenarios even suggest that humankind will cease to grow during the present century and will start to shrink.[22] More than half of all world citizens are already living in one of the more than 80 countries in which the fertility rate has fallen below 2.1, including China, Brazil, Iran and all European states with the sole exception of Kosovo.[23]

Demography changes economic opportunities

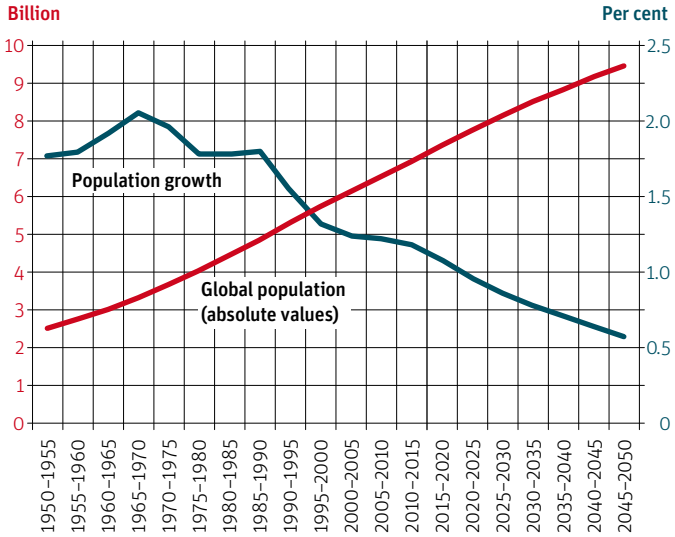
The gradual end of population growth represents only one demographic factor slowing economic growth. It is not only the size of societies that changes, but also their composition. Fewer children and an increasing life expectancy cause populations to age, a phenomenon known as demographic transition. To date, the theory of demographic transition is the only generalisable explanation for the development trajectory of nations.[25]

In all countries, the transition begins during the pre-industrial phase, during which people have a lot of children. At the same time, because of their limited means, many people die, especially the younger ones. As a consequence, population grows only slightly or not at all. Once living conditions improve – with better nutrition and hygiene – the mortality rate declines. Because people continue to have a large number of children for some time following these improvements, the population grows suddenly and substantially. It is only after a certain delay, with spreading prosperity and education – especially for women – that the fertility rate decreases and population growth comes to a halt or even becomes negative.

It is vital that the demographic transition opens up new economic opportunities: once the number of children falls and the cohorts of the baby boomers reach working age, society has at its disposal a disproportionately high number of productive workers. This working population – the age group that typically makes the highest contributions to the economy – can come to constitute up to 70 per cent of the population. This beneficial situation is described as a demographic bonus. Because during this time there are fewer children that require care and not yet too many dependent elderly people, the working population – if it is sufficiently qualified and there are enough jobs – can bring about an economic boom: the demographic bonus becomes a demographic dividend.[26]

Population growth is slowing down considerably

In the early 1970s, the fear of a „population explosion" was rampant. At that time, women worldwide had on average 5 children. Today, the figure is 2.5. The reason that population growth has nonetheless continued by 80 to 90 million people every year over the past few decades is because the number of women at childbearing age has approximately doubled over the last 40 years. Twice as many potential mothers with the number of children per mother having halved means the same absolute growth as in the 1970s. The overall population growth rate has fallen from over two to just over one per cent. Different projections consistently predict a sharp decline in population growth.



World population (in billion) and population growth (in per cent), 1950 to 2050 (values for 2015 and onwards are estimates) (Data source: UN World Population Prospects[24])

All industrial and emerging countries have experienced the process in this order and direction, although with differing results. The most successful nations were those in which the share of individuals with a secondary or tertiary education – the human capital of a society – notably increased during the demographic transition. As a result, their economies were able to obtain higher added values. Economic success was in these cases usually accompanied by increasing life expectancy and further drops in the fertility rate.[27]

From demographic to economic transition

The time window during which a nation can reap a demographic dividend is about 40 years. However, this is naturally only a one-time opportunity. If a country succeeds in generating high prosperity during this time, it is comparatively well prepared for its aging population. But if the economy does not do so well during this phase, the nation is in danger of becoming old without having become rich. After 40 years or so the last baby boomer cohorts will reach retirement age. The number of young people entering the working population will be comparatively small while the proportion of non-productive yet economically dependent people increases. The demographic transition is accompanied by an economic transition.

While the demographic transition brings population growth to a halt, the economic transition means that previously high economic growth rates decrease. Germany, which is benefitting from the demographic bonus stemming from the last years of its baby boomer generation, was able to create a record number of jobs and earn high tax revenues. But Germany could very well be moving towards the end of this phase, as the babyboomers will soon reach retirement age.

Japan, the country with the strongest demographic aging trend worldwide, has been experiencing how this process feels for the last two decades. Its demographic dividend began waning in around 1995, when the number of people of education and working age, between 15 and 64 years, reached its historical maximum at 87.3 million, while there were only 18.3 million people over 64 years old.[28] Today, the number of 15 to 64 year olds is 76.2 million, while those over 64 years old number 34.6 million.[29] According to Japan's bureau of statistics, the ratio of working age to retirement age people will further decline over the next few decades.[30]

Globally, the growth of the working population has slowed down. While the number of 15 to 65 year olds increased by an average of 1.8 per cent per year between 1960 and 2005, it is currently increasing by no more than 1.1 per cent per year. This

figure is likely to decline further in the future. In all developed societies and in most of the emerging countries the proportion of people of working age is no longer growing, or only through immigration.[31] Where economic development is lagging behind and the number of children is very high – such as in many African countries, Western Asia or in the Middle East – the demographic transition is faltering. Populations in these countries continue to grow substantially, without generating a demographic bonus or a demographic dividend.

Against this background, it is important to consider the United States. Over the last few decades, the USA has achieved higher economic growth rates than other early developed industrial nations. Among the key drivers of this success, beside its dynamic research landscape and active entrepreneurial community, is its ever growing working population: Over 30 years, the working population in the USA has grown twice as fast as in the UK, five times faster than in Germany, and ten times faster than in Japan.[32]

Since different countries' demographic transitions take place at different times, their economic transitions are also not simultaneous. Demographic transition began in the early developed industrial states and has now reached contemporary emerging countries. The latter are in the middle or at an advanced stage of demographic transition, which is why some of them are experiencing economic growth rates as high as those that once used to be the norm in the industrial nations. Southern and Western Asia as well as Africa have only recently begun the demographic transition. Accordingly, they can still hope for a high-growth period and could in theory become a new pillar of the world economy.

The remaining candidates for high economic growth

Emerging and developing countries in particular are dependent on growth. They need it to break out of poverty, to finance education and health services and to provide employment for the huge number of young people as a way of mitigating the negative side-effects of unsustainable and dangerously high population growth.

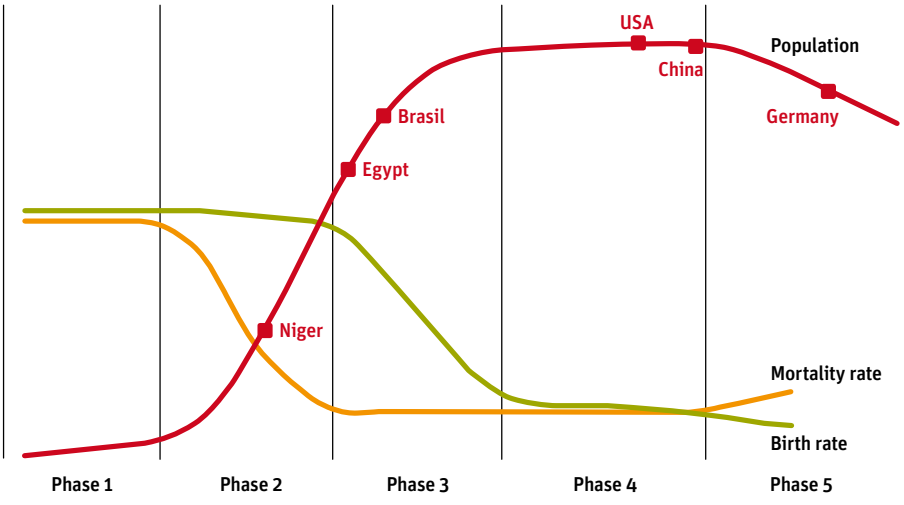
Industrialised and export-driven countries have profited from the rise of the emerging countries in the context of globalisation. This has helped developed states to partly compensate for the economic consequences of their demographic development. Nonetheless, they have not returned to their old rates of economic growth.

Whether contemporary developing countries in Africa and Western Asia can bring a new momentum to global economic growth just as the emerging countries did, remains an open question. In view of existing political and social issues and increasingly frequent crises this looks rather unlikely.

Since the rich countries have already made use of their one-time demographic dividend and the emerging countries are moving closer to this condition, the poor countries remain the last hope for economic growth, one that could spill over into the industrial nations.[33] After this effect occurs, should it materialise at all, there is no reason to expect another demographically-caused impulse to economic growth from anywhere in the world.

Demographic transition

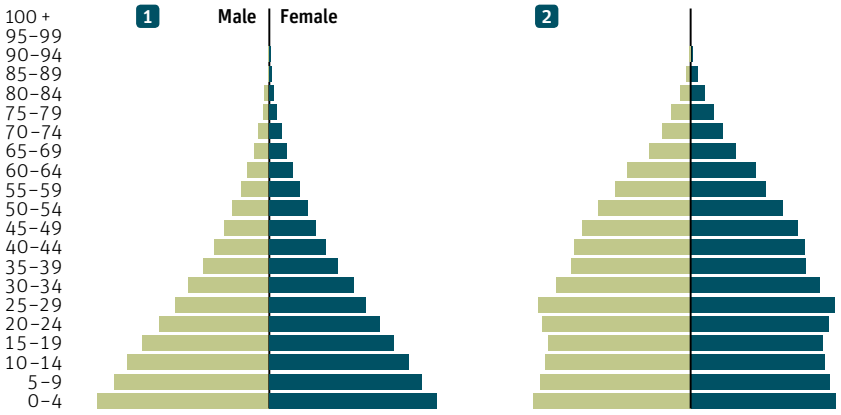
All countries undergo a demographic transition over the course of their socio-economic development. Improvements in living conditions lead to an increase in the mortality rate and, with a time delay, a decrease in the fertility rate. In this intermediate phase, the population grows strongly. Toward the end of the demographic transition, population growth stagnates or begins to shrink as long as there is no immigration.



Schematic diagram depicting the development phases of birth and mortality rates as well as the overall population

From transition to dividend

All countries go through a demographic transition in the course of their development. The point of departure is the pre-industrial phase, characterized by high rates of mortality and birth. The process begins with (1) a transitional phase in which life conditions are improved, child mortality declines, education spreads and people have fewer and fewer offspring. (2) If subsequently the remaining baby boomer generations enter the labour market (3) and find employment, strong economic growth follows and the number of children continues decreasing. At this point, the country benefits from the so called demographic dividend. As soon as the baby boomer generation reaches retirement age, economic growth necessarily fades (4).



Development of the age structure of a population over the course of the demographic transition

Countermeasures with limited success

The consequences of demographic change have been known to most of the affected governments for some time. Most of them are aware of the levers they have to move in order to mitigate economic repercussions – at least in theory. Some of the countries whose populations are shrinking in the mid term are trying to make up for the decline by way of immigration. Others make efforts to improve the qualifications of the workforce by investing in research and development as a means to boost the economy. Other states try to bring more women and immigrants into the labour market or increase the retirement age, in order to prolong working life. However, all of these countermeasures are naturally limited in their impact.

For example, the female employment rate cannot be indefinitely increased. Over the past decades, more and more women have found their way into the labour market inter alia thanks to better access to education. As a result, female workers have caught up with men in terms of professional qualifications, or have even overtaken them. Higher female employment rates have increased productivity per capita and for societies as a whole. However, the impact of this measure is fading, as the industrial nations already have between 35 per cent (Turkey) and 86 per cent (Iceland) of all women of working age employed (OECD average: 63 per cent). The fact that the average employment rate for men in the OECD is 80 per cent suggests that there is not much more room for improvement.[34] The impetus to economic growth that women once provided cannot be repeated a second time.

More education can hardly boost economic growth

That education is a prerequisite for economic success should hardly come as a surprise to anyone. However, the correlation between education and economic growth is non-linear. When a previously illiterate population begins learning to read, write and calculate, human capital increases sharply in the initial phase. In almost all countries, extending basic education to broader sections of society was the basis for overcoming poverty and laid the foundations for a later economic upswing.[35]

The effect of education flattens out once a large number of people has acquired a secondary education. In Germany, the proportion of people of school-leaving age who complete the university preparatory qualification (Abitur) has increased from around 10 per cent (West Germany)[36] in 1970 to roughly 50 per cent (Germany as a whole) today.[37] The proportion graduating with a university degree has increased similarly rapidly, and is now 32 per cent.[38] While this figure can certainly be improved, it remains a matter of dispute whether amassing university graduates is in itself a worthwhile objective.[39] What is certain, however, is that an expansion of education of this magnitude cannot be repeated again.

Generally speaking, investment in education pays off whenever life expectancy rises and society and economy can benefit longer from individuals' qualifications. Here too, though, diminishing marginal utility is at work: investing in education in highly developed societies becomes incrementally less beneficial because, relative to the number of years spent in education and training, people spend "too long" in retirement, a period during which they can no longer capitalize on their education (at least, this is the case

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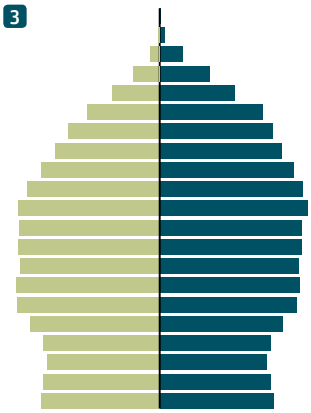

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where retirement begins early, as is typical in most industrial nations). This effect is measurable: on average, societies reap the greatest benefits from improvements in education when average life expectancy is between 60 and 75 years. After this point, the effect fades due to declining profitability.[40] In the European Union, the US and on average in the OECD, people are already living well beyond 75 years.[41]

Are we nearing saturation point?

As the population ages, consumer spending may also decline, yet another factor reducing economic growth. In Germany, average income is highest during the main working phase between 24 and 54 years. By the age of 64 it begins to fall, and continues to do so thereafter.[42] Because of this, average household consumer spending drops when the main income earner passes the age of 55.[43] The need for more durable consumer goods is particularly low among elderly people – either because they already own these products or because older people are less inclined to constantly buy new products. However, on average, pensioner households have considerable assets at their disposal, and they have so far tended to pass these assets on to the next generation. As the population ages, it is likely that the healthcare costs for this section of society will increase. On the one hand, this will tend to reduce pensioners' assets, but on the other hand it may stimulate economic growth through the healthcare sector.

Declining consumption in highly developed societies that have reached a certain living standard may be exacerbated by so-called saturation effects. National economies typically exhibit the strongest growth rates at the beginning of their development. They start from a low level, either because they had no opportunity to grow before or because they had to begin anew after war and destruction, as Germany did after World War II. German companies had to build their production from scratch, and people bought houses and consumer goods ranging from a refrigerator to their first car. However, at a certain point saturation sets in and the demand for goods fades, because the basic needs of individuals are more than satisfied when virtually all households own a stove or a TV. In cities with good public transport options private automobiles are becoming increasingly superfluous. Some people, particularly in the wealthy industrial nations, refrain from ever-greater consumption for environmental or sustainability reasons. This "new frugality", though it is not yet widespread, could further curb the demand for consumer goods in the future.

Obstacles to growth: No. 2

Diminishing productivity gains

A slower growing population, or one which has ceased to grow and has begun to shrink and age, need not be an economic problem, as long as the working population becomes ever more productive. In theory, this helps to absorb losses that occur due to demographic change. Some renowned economists have even come to the (disputed[44]) conclusion that the aging of society leads to more economic growth.[45]

Productivity is the second most important factor for economic growth. By 'productivity', economists mean the relation between what is produced and the resources used during the production process. Briefly put: yield per effort or output per input. In the long run, a company can only be successful if it is at least as productive as its competitors; that is to say, if the yield per work force employed is equal to or greater than that of other companies. Only then will the sum of the production costs – in terms of materials and components, employees' wages, interest on invested capital, expenses for research and development and so on – be lower than the price for which the company can sell its goods on the market.

Productivity gains – more goods produced with the same input or less – are a natural objective of companies. Without more efficient processes, firms make losses at some point, go bankrupt and exit the market. Without productivity gains it is not possible to increase per capita income, obtain more leisure time and achieve growth in material prosperity. If productivity doubles, people will be twice as well off, all else being equal.

More and more machines – but productivity growth is slowing down

Machines in particular have increased productivity in the past: A combine harvester performs thousands of times the work a farmer used to do with a flail and scythe. A digger replaces hundreds of construction workers with pickaxes and shovels. Nowadays, computers or robots are capable of handling routine work faster and cheaper than humans could. Without these technological aids, the economic growth seen in the past would not have been possible. And because technological innovation cycles have considerably accelerated over the last decades and centuries, because more and more researchers are working in universities and labs on ever more diverse knowledge areas, one would assume that productivity should increase faster as well. Interestingly, this is not the case.[46]

Productivity gains in mature economies are slowing down, despite numerous inventions, breath-taking improvements in computer performance and the rapid spread of robots in the recent past. For example in Germany, while productivity per working hour has increased about four per cent each year since the 1970s, around the turn of the millennium the figure was already down to two per cent. Today, the rate is less than one per cent.[47] Electrical and mechanical engineering, which represent two particularly important branches for Germany, have essentially made no further productivity gains since 2011, as a study by the consulting company IW Consult indicates.[48] The authors of the study deem this development to be "extremely alarming", yet fail to provide an explanation in view of the manifold technological advancements of recent years. Productivity gains are declining not only in Germany but in all industrial nations. In the US, growth in productivity over the period from 1995 to 2004 was 2.8 per cent, but this figure more than halved, to 1.3 per cent, in the period 2005 to 2015.[49]

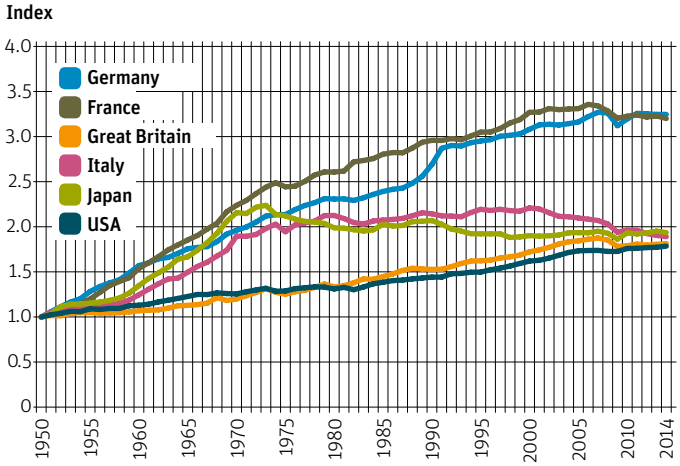
According to the US American economist Robert J. Gordon from Northwestern University Illinois, the decline in productivity gains can be explained by the fact that the most important inventions of our era already made their impact a long time ago. Contemporary innovations may be great in number but have been, at least until now, rather modest in their effect. In a historical review, Gordon defines three industrial revolutions: the first lasted from 1750 to 1830 and was initiated by the invention of the steam engine, with which it became possible to power looms and locomotives. The second took place from 1870 to 1940 and was characterised by the invention of electricity and the combustion engine. Candles and oil lamps were replaced by light bulbs, horse carts were replaced by automobiles and electrically driven trains. During this phase, according to the author, economic development improved people's lives in a way that is no longer achievable today.[51] Gordon finally argues that the third industrial revolution, beginning in the 1960s with the spread of the computer, came to an end with the combination of the PC with communication technologies and the subsequent triumph of the internet.[52]

All three waves of innovation were accompanied by high economic growth in the industrial nations. However, this happened with a slight delay, as it took time for new inventions to become affordable through mass production and thus penetrate the entire economy: only 150 years after the invention of the steam engine did the economic boom that it initiated reach its peak. It took around 100 years until the combustion engine reached its maximum uptake, and 40 years for computers. Overall, Gordon regards the time period between 1870 and 1970 as a unique epoch of progress, which, beside the technologies just mentioned, brought people the toilet flush, vaccines and antibiotics, central heating and air conditioning, and thereby brought about remarkable improvements in living conditions.

Since the dawn of the computer era human creativity has brought new ideas and products to the market and will certainly continue to do so. Nevertheless, productivity gains have considerably declined. Already in 1987, the US American winner of the Nobel Prize in economics Robert Solow noted that the computer age is visible everywhere, just not in the statistics. This "productivity paradox", sometimes termed in his honour the "Solow computer paradox", consists in the apparent contradiction between the increasing rate at which new technologies are being produced and the slowing growth of productivity.[53]

Fewer groundbreaking inventions

Increasing productivity, understood as the ability to produce goods and services with less effort, is an important driver for economic growth. Groundbreaking inventions such as the internal combustion engine or electricity drove the expansion of productivity. However, more recently productivity gains have remained rather limited – despite robots and digitalisation.



Development of total factor productivity (TFP) keeping price levels constant (1950=1), 1950 to 2014 (Data source: Penn World Table[50])

3D printers, Facebook and autonomous driving are rather small leaps in the history of technological evolution and provide only limited potential for productivity gains when compared to Johannes Gutenberg's invention of the printing press or the automobile.[54] To be sure, this should not be seen as the end of innovation. As long as human beings are around, innovation is likely to persist. Nevertheless, innovations no longer seem to be great drivers of growth. For that reason, Robert Gordon concludes that the growth and productivity patterns of the past were historically unique occurrences, although it is difficult to assess whether the future will bring new ground-breaking inventions.[55, 56]

Diminishing growth could thus be explained by a decline on the supply side; that is, due to companies no longer launching products that consumers are eager to buy. This idea is diametrically opposed to Lawrence Summers' theory of secular stagnation, as he locates the causes of anaemic growth on the demand side. Summers believes that national economies worldwide put too much emphasis on austerity instead of investment, due to their fear of increasing public debt, something that they have been wary of since the financial crisis of 2007/08. Investment in state infrastructures, education and research can provide new impetuses to growth, even if the debt burden rises as a result.[57] Regardless of the differences in their explanatory models, both economists are convinced that industrial nations are headed towards a long, if not very long, period of economic weakness.

Yet another explanation for the inertia of productivity is related to the transition from an industrial to a service-oriented society. While robots can carry out a vast share of tasks during industrial production processes, this is seldom the case with service providers. Here, the human being lies at the center. This includes researchers, judges and lawyers or branches such as catering, the tourism and medical sectors and nursing care, to name but a few examples. Although in these areas, too, productivity may increase as a result of digitalisation,[60] the likely extent of these gains is disputed. The higher productivity gains in industry compared to the service sector are especially clear when one considers differences in the price of industrial products compared to services. For example, purchasing a new vacuum cleaner or mobile phone is, or appears to be, cheaper than repairing broken devices.

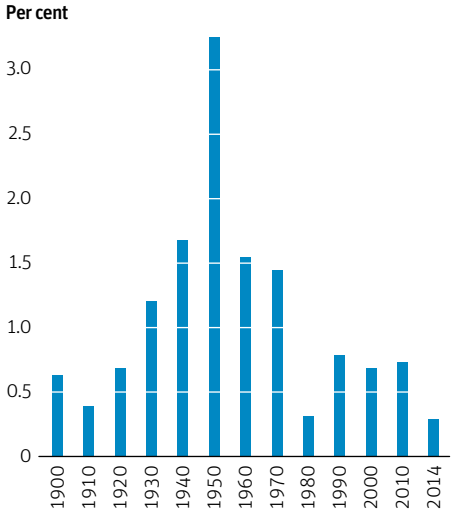
There is one demographic factor in particular which could lead to further reductions in productivity: the retirement of the baby boomer cohorts has the unintended consequence that countries with a good employment situation, such as Germany, will suffer increasingly from labour shortages. In response, private companies tend to "hoard" employees even at times of lower demand, at the risk of underemployment, because they fear not finding suitable personnel when new orders come in. In better times, when firms are receiving many orders, they recruit people with lower qualifications and unemployed individuals from the so called "hidden reserve" who would otherwise have few opportunities on the labour market.

Doing so may bring about lower unemployment rates but will also unavoidably reduce productivity, argues Christoph Schmidt, professor of economics at the University of Bochum and chairman of the German council of economic experts.[61] The same effect might occur if one increases the retirement age in order to get older people into work, or if labour shortages are tackled by recruiting immigrants with lower qualifications.

If a surge in the employment rate follows from the hiring of people with low qualifications at low wages, the overall economic output of a nation increases as a result – because more people are involved in the process – but not so the productivity of the companies affected. This circumstance can weaken companies' competitiveness

Were the enormous productivity gains of the past a one-time effect?

The 1950s were the golden age of productivity gains – and not only in the US. At that time, mass production on assembly lines took hold in industry. The effects of the computer and the internet in the 1990s were comparatively small. The impact of what is now referred to as industry 4.0 is yet to be seen.



Increase in total factor productivity in the USA (in per cent), 1900 to 2014
(Data sources: Gordon[58], Penn World Table[59])

compared to others from abroad that may produce cheaper due to lower labour costs. Under these conditions, too, economic growth would slow down.

And yet it remains worthwhile for national economies to strive for full employment regardless of whether this comes at the cost of employing a less productive work force. Even if less skilled workers' salaries are financed through subsidies, this method gets people to work and is still better than making them dependent on social security benefits.

Will the fourth industrial revolution provide the great growth impetus?

It is difficult to predict developments regarding productivity gains in the future. Experts from the German Fraunhofer Institute for Industrial Engineering expect, as do many other scientists, that the digitalisation-driven "industry 4.0" process will bring about a fourth industrial revolution. In this scenario, machines, robots and artificial intelligence will gradually take on tasks in production and innovation and thereby accelerate another efficiency revolution in the economy.[62] Biotechnology and new materials from nanotechnology are projected to provide additional productivity gains.

Other experts, including US-American Economist Lawrence Summers or Robert J. Gordon from Northwestern University, take a more sceptical view and do not believe that considerable productivity gains will result from digitalisation. In fact, Gordon even warns of "techno-optimists" who primarily focus on technological improvements instead of dealing with structurally-caused "headwinds" hampering economic growth, such as demographic change.[63]

The rise of information and communication technology has in fact been going on for quite some time now, but without promoting economic growth. In Germany, for instance, digitalisation rates for private companies show a considerable increase over the past years. The monitoring report Wirtschaft DIGITAL 2016 (digital economy 2016) issued by the German Federal Ministry for Economic Affairs states that 27 per cent of production-oriented industry is already "highly digitalised".[64]

IT-optimists such as Andrew McAfee and Erik Brynjolfsson from the Massachusetts Institute of Technology argue that it takes a while for a new technology to assert itself, which is why productivity gains and sharp rises in growth rates might still lie ahead.[65] However, by the same token, present digitalisation may also show its negative effects later, and lead to the loss of millions of jobs, cause social unrest, reduce consumption and thereby worsen future growth prospects. The outlook is gloomy, especially if the more difficult jobs become obsolete as well as a consequence of computers and robots taking over, as these are precisely those jobs that are carried out by highly-skilled and well-paid employees. Wage and salary-earners may thus face a similar fate to that of horses in agriculture, wrote the Russian-American economist and Nobel prize winner Wassily Leontief back in 1983: draught animals were pushed out by tractors and automobiles, and were left with no alternative tasks to take on in other productive areas. Human beings who lose their jobs to machines and robots may find themselves equally unable to find other employment, argues Leontief, even if they are retrained for other occupations.[66]

Results presented by the German Institute for Employment Research indicate that, in 2013, 15 per cent of the working population in Germany had a very high potential for substitutability; that is to say, 70 per cent of their daily tasks were deemed replaceable by computers. Estimates for the US even suggest a substitutability potential as high as 50 per cent for the entire working population over the course of the next 10 to 20 years.[67]

The question is whether such a development, in which losses in jobs are accompanied by gains in productivity, will negatively impact overall economic development, since machines and robots, unlike working human beings, do not spend money, hardly consume

anything, and do not pay taxes, at least as long as they are not subject to a machine tax, as recently suggested by Microsoft founder Bill Gates.[68] While productivity gains generally imply a profit, in this case this profit generally accrues to the firms and not to the multitude of workers. Every job that disappears in this manner implies a loss in purchasing power, insofar as the individuals who are laid off cannot be put into work elsewhere. When companies cannot sell their products, this reduces their profits and the state's tax revenues and, on top of all, adds to the nation's social security expenses due to rising unemployment. The state then needs to take on additional debt to finance social support instead of making investments in growth-stimulating areas such as education and research.

However, digitalisation may create more jobs for highly-skilled people than it takes away for the less skilled, since computers and robots must be developed, built, programmed and distributed by specialists. After all, job gains driven by new technologies have always turned out to be greater than the job losses incurred through rationalisation, as occurred in the cases of weavers, agricultural workers, coachmen or meter readers in the past. For instance, the PC industry ruined typewriter manufacturers and left thousands of people unemployed, but in return this newly-created industry has made up for these losses by providing considerably more job opportunities. This applies to innovations across the board: worldwide, the number of working people has increased over the centuries – despite all sorts of inventions and efficient machines.

Free internet-based services and applications, ranging from Wikipedia and Google to Facebook or WhatsApp, simplify the lives of their users (and take away plenty of time that could be spent more productively), but have little impact on a country's GDP, at least none that is measurable. Large parts of information technology are not "priced" and therefore do not contribute to a country's GDP. Using a search engine or a smartphone's map feature, tweeting or looking up information on Wikipedia certainly save time and money and can probably help do certain tasks in more efficient ways. But we usually use these services free of charge. And where no monetary transaction is involved there is nothing to earn, neither for private entities nor the state. This is a rather undesirable situation because the state, in view of declining growth and demographic aging, is in need of additional income to finance social security payments.

Even if productivity increases because of information and communication technology (ICT) and it becomes possible to get things done faster, this potential benefit is difficult to measure and is not reflected in the GDP statistics. Some experts therefore believe that productivity gains through ICT are in fact occurring but are just not measurable. In this view, lack of economic growth can be attributed to some sort of measurement error. This, however, raises the question of where this impact is if it is not detectable in other statistics.[69]

Only a small set of ICT services are reflected indirectly in GDP, in the form of tablet and smartphone purchases; broadband cable installations and phone bills;[70] via product purchases, whose sale is boosted by ubiquitous advertisement of internet services and social media; or through user data, which companies gather and sell. This is how IT giants such as Google or Facebook make high profits but at the same time fail to lift economic growth rates to former levels. In addition, they require less personnel for running their business and, compared to industrial firms, they make little investment in machines and intermediary products. It is for this reason in particular that such corporations have huge financial reserves at their disposal, allowing them to continually purchase start ups, who themselves have usually made even less investment in tangible assets. Such companies are anything but capital-intensive and contribute little to economic growth.

Obstacles to growth: No. 3

Increasing social inequality

It is rather difficult for policy to influence processes such as demographic change, aging populations, long term population decline and diminishing productivity. Policy makers can hardly alter the course of these developments. Rather, they have to learn to deal with them. However, there are further reasons for the decline in economic growth, reasons that are more readily influenced by political means.

In many countries worldwide, prosperity and wealth are becoming more and more unevenly distributed. Those who profit from growth, if there is any, are disproportionately from higher income groups while low-income households are left behind, according to the OECD. This weakens national growth and impedes low earners from profitably investing their human capital.[71]

Generally speaking, income inequality affects purchasing power, the demand for goods and services, and therefore economic performance more generally. This effect will become "significant", the OECD suggests, if more and more citizens lack the money

to buy the products offered by private companies.[72] In addition, the poor can invest less in the education of their children. The rich, by contrast, do not know how to spend their money and thus save it instead. Too many savings, in turn, suppress interest rates and lead to the flooding of the market with money. These developments are considered to be crucial evidence of secular stagnation as well as a sign of waning investment, which reduces economic growth even further.

What is more, affluent people tend to find partners who are also wealthy, with the result that wealth remains concentrated within certain social groups. These individuals are able to make greater investments in the education of their offspring than are poorer people. As a result, the gap between poor and rich widens – as can be observed in the US.[73]

According to the global wealth report 2016 published by Switzerland's Crédit Suisse, worldwide financial assets have been growing slowly, in 2016 merely 1.4 per cent in total, compared to figures well over 10 per cent on average between 2001 and 2005. Despite this, inequality of wealth is becoming ever greater, measured in terms of the share of the richest 10 per cent compared to the remaining adult world population. While the poorer half together owns less than one per cent, the wealthiest 10 per cent own more than 89 per cent of global wealth.[74]

The income gap is widening in many countries: in the 1970s in the US, for example, income gradually shifted from the middle class to the top earners. In 15 out of 50 states, the richest one per cent claimed almost all of the increase in total income between 2009 and 2013, that is, since the financial crisis which has otherwise crippled the entire economy. The remaining 99 per cent of the population, by contrast, either went away empty handed or even had to suffer losses. Considering the entire US, the wealthiest one per cent of the population took 85 per cent of the increase in total income. Increasing inequality is mostly driven by rising wages and capital earnings. In particular those who already possess a certain level of capital endowment benefit the most from capital earnings.[75]

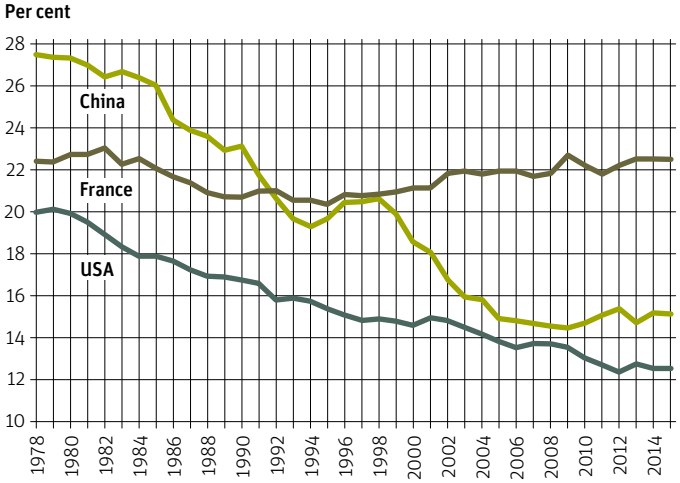
According to surveys, social divisions between rich and poor and the creation of a knowledge and capital elite is one of US citizens' foremost worries. Leading economists such as Paul Krugman, Joseph Stiglitz or Branko Milanovic, among them two Nobel prize winners, go as far as to argue that increasing inequality threatens democracy.[76]

In global comparison, growth in inequality is particularly pronounced in countries that are only just at the beginning of their economic development, such as China, which is still a communist state. In China, while ever more people from the middle class are indeed benefiting from economic development, wealth is increasingly concentrating in the hands of a few.[77]

Whether inequality in Germany has increased in the past few years remains a subject of dispute: in 2014 in one of its studies the OECD concluded that it has increased.[78] The Munich-based ifo Institute by contrast argues that inequality of income decreased between 2004 and 2013. Inequality measured in terms of net income, which includes both work and alternative income sources, has essentially remained unchanged.[79] The German Ministry of Labour reports, too, that incomes in Germany remained mostly stable between 2005 and 2011 and that inequality in wealth between 2002 and 2012 even slightly decreased.[80]

Divided societies

It is widely known that the income gap in the US is growing ever wider. In emerging countries such as China, this development is progressing even faster. Although incomes have increased across social strata since China's economic liberalisation, the rich still benefit most from the overall profits. In France, by contrast, the income gap has remained rather stable over the past decades.



Pre-tax national income per adult in the bottom 50 % income group as a share of total pre-tax income in the USA, China and France, 1978 to 2015 (Data source: National Bureau of Economic Research[81])

Obstacles to growth: No. 4

Ecological damage as a brake on growth

Finally, there is another factor that can negatively affect economic growth: ecological damage, caused by consumption and the emissions of a world population numbering 7.5 billion, can considerably impact living and working conditions regionally and globally. Environmental problems such as air pollution or the contamination of drinking water are damaging for people's health as well as for their productivity. Climate change may swamp densely populated coastal regions destroying production facilities, farming land and investments. Droughts, floods caused by heavy rains and storms threaten agriculture in many parts of the world.[82]

Precisely how big these future damages will be is difficult to quantify and is therefore a subject of dispute. The "Stern Report" offers a rough overview on the matter – a 650-page long document penned in 2006 by Nicholas Stern, former chief economist of the World Bank, and commissioned by the British government. It calculates the long-term costs of unchecked climate change at about five per cent of global GDP.[83] This would be a significant loss, and would by itself cause economic growth to fall below zero.

While a great many environmental problems in industrial nations have been solved thanks to better environmental laws, others have merely been outsourced to poorer countries. Particularly dangerous and dirty industries have migrated to these countries, such as the leather and textile industry, agriculture and fisheries as well as raw material extraction. This is one reason why emerging and developing countries will face a more substantial environmentally-driven drop in growth rates compared to the industrial nations.[84]

Weak economic growth has become part of our reality

To sum up, the most relevant factors providing impetuses to economic growth in the past have run out of steam. Incomes in the industrial nations are no longer increasing as much as they used to, partly also due to diminishing growth, and tax burdens are mounting. Private household consumption in Germany has in recent years, that is since 2000, not even grown half as fast as it did from 1970 to 2000, adjusted for prices.[85]

Factors responsible for the decline of growth occur in concert and are mutually reinforcing: demographic change is the result of wealth, better education and health. However, these transformations also mean that the fertility rate falls below the replacement level and life expectancy rises. As long as governments do not increase the retirement age to compensate for these developments, a nation's overall economic potential will decline. Populations are aging, some have already begun shrinking, consumption is decreasing, and the potential for innovation is diminishing, which in turn negatively affects productivity. Put briefly: economic growth is slowing down because people are better off.

In this view, diminishing economic growth is part of a structural transformation within industrial societies. This trend may perhaps be reverted by the impetus provided by an as yet unknown innovation, putting the economy and society back onto a growth track. Or the trend could be halted if societies destroy their wealth altogether and have to rebuild everything anew. This proposition may sound absurd, but it is no secret that societies have experienced their highest growth whenever they have had to start from scratch and rebuild their economies in the wake of wars or other catastrophes.

Because the first scenario is uncertain and the second undesirable, it is recommendable to devise a "plan B" for the not so distant eventuality of a secular stagnation. This would mean accepting the unavoidable shrinking trend and devising life models conducive to the well-being of society with less or even in the absence of growth. In reality, however, the state and business react rather differently to diminishing growth. This is the topic of the following chapter.

3 HOW POLITICS AND BUSINESS HAVE REACTED SO FAR

There are many possible explanations for low economic growth rates: failed policies, unrest and international conflicts, oil crises, burst financial bubbles and many more. In theory, all these issues can be tackled. Whatever the specific reason for a particularly weak economic cycle, the policy makers in charge have again and again been able to devise new means to boost the economy.

In doing so they have typically resorted to classic instruments for promoting growth and have somehow always succeeded in overcoming crises. Governments have taken loans and increased public expenditure. Central banks have decreased interest rates in order to facilitate investments by the state as well as by private actors. Policy makers have invented subsidies or reduced taxes as a means to boost consumption. To facilitate innovations, they have used long term growth instruments, lifted trade barriers and promoted research. In the worst cases, those in power have provoked conflicts and taken on massive debts in order to profit from the war economy.

With these methods, governments were usually able to achieve the desired effects. New jobs were created and consumer spending increased again. Companies invested in machines and new production plants, turning a recession into renewed economic growth. These processes stimulated demand for new loans and brought interest rates back up. If everything went well state income rose, enabling governments to pay back their loans.

This approach more or less reflects the main premises of classic anti-cyclical Keynesian economic policy: during recessions the state intervenes, but once the economy is back on a growth track governments move to reconsolidate the public budget. In practice, however, this approach faces a considerable challenge: states seldom take debt repayment seriously. The track record shows that almost no state has ever managed to "grow out" of its debt. Countries with higher levels of public debt generally struggle when it comes to promoting new, sustainable growth.[1]

During a structurally-caused weak economic growth phase such as secular stagnation, the situation is complicated: simple interventions are ineffective in overcoming stagnation and may even impede the repayment of public debt. Secular stagnation is the result of long-term changes that are difficult to influence, not least because they are not related to cyclical economic dynamics. This not only complicates problem solving but also poses the more fundamental question of how to come to terms with secular stagnation as a new phenomenon. Neither the economy nor politics have hitherto seriously dealt with this question, as the winner of the Nobel prize in economics Paul Krugman writes: "the real possibility that we've entered an era of secular stagnation requires a major rethinking of macroeconomic policy."[2]

Perhaps the most counter-intuitive aspect of growth fatigue is the fact that it is based on socio-economic developments that are actually quite positive and desirable: improvements in the quality of life. Because the growth of the past has enabled a higher-quality diet, modern medical care and improved working conditions, we are much

better off and our life expectancy has risen. Thanks to functioning social security systems it has become possible to lead a socially and economically secure life in older age without having to raise children. As people have come to benefit from more education, personal liberties and growing prosperity, the number of children has declined. This socio-economic development, along with the demographic change that is a result of it, ultimately causes economic growth to decline. Demographic change and diminishing growth thus appear to be logical consequences of our species' success.

And the conditions underlying these developments are unlikely to change in the foreseeable future: demographers have concluded that the decline in birth rates in developed countries is irreversible. They are certainly not expecting the number of children per woman to return to 2.1 or higher, which would lead to new natural population growth.[3] In the absence of immigration, populations in developed countries, and soon in many emerging countries too, will shrink in the medium term. In some societies, this process has already begun.

Japan as a pioneer of demographic change …

Because demographic change is an important cause of a decline in economic growth, let us first look at the example of Japan, which the Financial Times calls a world champion in secular stagnation.[4] Nowhere in the world is the composition of the population changing as radically: Since 1974, the birth rate has stayed consistently below the replacement level of 2.1 children per woman. The 1990s brought yet another drop, down to 1.5. Since then, every generation of children has replaced its parents' generation by only two thirds.[5] In 2014, Japan recorded fewer than half as many newborns as 40 years earlier.[6]

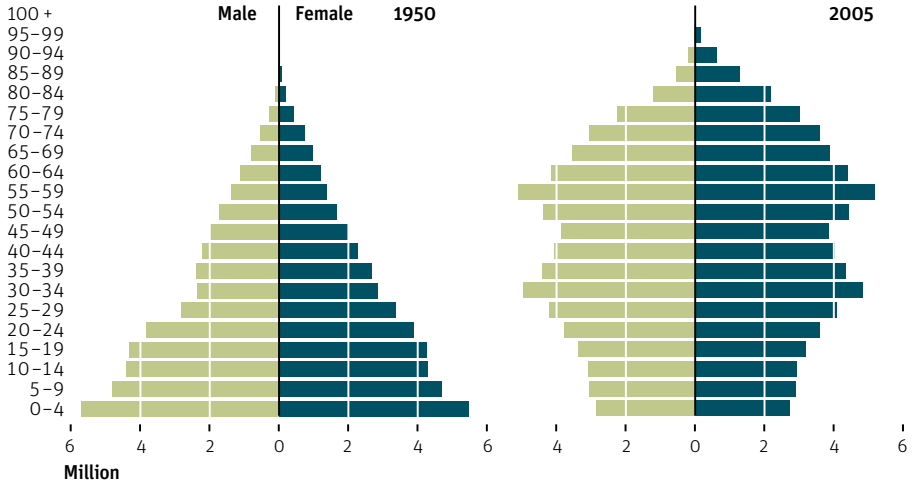
Unlike the US or many European countries, Japan largely rejects immigration, which means that falling birth rates translate into a population decline, albeit with a time lag. Since 2006, more people die every year than are born. Japan's population, having reached a peak of 128 million in 2008[7], has started declining already, numbering only 126 million in 2016[8] – so far a manageable change. However, Japan's population decline will accelerate sharply in time. The National Institute for Population and Social Security's average projection expects that Japan will have a population of 87 million in 2060. In the projected scenario up to the year 2100, which should however be viewed with caution due to the long time frame, Japan's population is estimated to decrease to 50 million, a historically unique drop.[9]

From an economic standpoint, more problematic than the mere population decline in Japan is the related phenomenon of an aging population. It is the result not only of a lack of children and immigration, but also of one of the world's highest life expectancies, around 81 years for men and 87 years for women. Until 2030, these figures are likely to increase further, probably up to 83 and 88 years respectively.[10] In 2017, the proportion of people over 64 had already reached 28 per cent in Japan (in Germany, the figure was 21 per cent in 2015[11]). In 2060, this proportion may rise to 40 per cent. The proportion of people either in training or of working age, between the ages of 15 and 64, would then be only about half of Japan's total population. A small proportion, roughly 9 per cent, would be children and teenagers below the age of 15 – Japan's "future", so to speak.[12]

In 1963, the number of hundred-year-olds in Japan was 153. Today there are over 60,000,[13] and their number is expected to reach 400,000 in 2050. The societal costs of aging could crush the country.[14, 15] This already manifests itself in a tiny facet of Japanese social policy. On the "day of respect for senior citizens", the Prime Minister traditionally presents people who have reached the age of 100 with a ceremonial silver cup, the Sakazuki. There are only a few countries where the elderly enjoy more respect than in Japan. However, the Ministry of Health, Labour and Social Affairs, which is responsible for awarding the cups, had to cut down on the cost of the gift. Since 2016, the cups are no longer made of sterling silver but of a cheaper alloy.[16]

Turbo aging

In Japan, few children are born, immigration is widely unpopular and life expectancy is one of the highest in the world. Taken together, these factors mean that the population is aging rapidly. Japan is therefore a pioneer of demographic change. This situation is likely to substantially impact economic possibilities.



Age structure of the Japanese population, in 1950, 2005, 2035 and 2060 (Data sources: Statistics Japan[17], UN[18])

… and economic stagnation

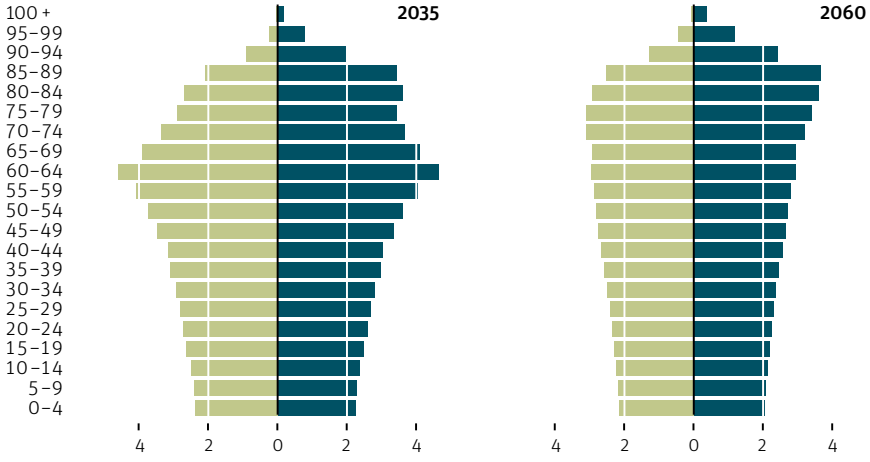
Countries such as Italy, Germany, Bulgaria or Finland, whose populations are aging to a similar extent if not quite as fast, should study this development carefully. Japan, which is still the world's third-largest economy, is experiencing a dramatic economic transition parallel to demographic change: the country is in an economic crisis that has lasted for over a quarter of a century, since the late 1980s. Except for a few short-lived fluctuations, Japan's GDP, measured in US Dollars and adjusted to today's prices, hardly changed at all between the early 1990s and 2015.[19]

At the end of the 1980s, the Japanese central bank cut interest rates and flooded the country with cheap money in order to devalue the yen, facilitate exports and promote investment. However, neither private citizens nor companies invested in growth-enhancing technologies. Instead, they chose to invest in bonds or real estate. The prices of the latter tripled within a decade and the owners became ever richer, at least on paper. At the end of 1989, the speculative bubble burst, countless companies went bankrupt and the banks were soon sitting on a pile of bad loans. At the beginning of the 1990s, economic growth, which had averaged over 4% over the previous 20 years, collapsed. Within two years the Japanese stock index lost half its value.[20]

Banks nevertheless continued to give loans to indebted companies, a policy that eventually got them into trouble themselves. The government pumped trillions of yen into bank rescue operations, called bailouts, often claiming the banks were too big to fail. A "zombie economy" emerged, keeping afloat companies and banks that had already become "dead corpses". Their artificially prolonged presence on the market hindered the founding of new innovative companies. The displacement of traditional structures to make room for new ones, a process that the Austrian economist Joseph Schumpeter termed "creative destruction", was prevented.[21] This was an expensive business for the Japanese state. In order to finance the rescue, it issued more and more new bonds, and from 1993 onwards drove the national budget, which for many years had experienced surpluses, into deficit.[22]

Japan's governments, which are changing frequently as a result of the long-term crisis, have since tried to stimulate growth with more and different economic stimulus programs. But the interventions – so-called deficit spending – have remained ineffective, as they cannot tackle structural problems: neither has investment by companies risen – among other things because such investments are of little value in an aging society – nor has there been any significant increase in household income or consumption.[23, 24]

Instead, deflation took hold. It can arise when the economy produces more goods and services than people require. Demand, in turn, may drop because people expect a deterioration in the economic situation and/or because an aged society needs fewer goods. This may lead to a persistent decrease in prices. With deflation people need only wait a few years before purchasing a car or television and prices will have become cheaper. Consumption goes down even further, making deflation perpetual.



Deflation is very unpleasant for economic and financial policy makers. While a central bank can strangle emerging inflation – by gradually raising interest rates thus making loans more expensive and slowing the flow of money into the market – its hands are tied with deflation. The central bank cannot lower interest rates as it pleases. Once interest rates reach, or fall below, zero, conventional monetary policy is more or less ineffective. In this case, it is no longer worthwhile for creditors to lend money. Because they do not want to take any unnecessary risk, creditors prefer to hoard cash, hoping that interest rates will rise again later – they are in a "liquidity trap".[25]

In order to escape the liquidity trap, many states place their bets on an expansive fiscal policy. The Bank of Japan is a prime example: as a means of tackling anaemic growth and turning the deflation into a slight inflation of around 2 per cent – which is considered a desirable objective in many industrial countries – the government has steadily expanded debt-financed stimulus packages.[26]

The objective of an inflationary monetary policy is to bring about a gradual and continual decline in the value of money, so people prefer to buy something today that may be more expensive tomorrow. As a result – according to the reasoning of the bank of Japan – consumption will increase, companies will make more money and wages will rise, thereby setting into motion an economic upturn. However, so far, all attempts at fuelling inflation in Japan have largely failed.[27] Since the beginning of the 1990s, Japan's inflation rate has remained at zero per cent on average.[28]

Abenomics going round in circles

With the economic policy that bears his name, current Prime Minister Shinzo Abe has taken his predecessors' growth strategy to new lengths, guided by the motto: there is no such thing as the wrong tool, only tools that are too small. Abe has substantially expanded attempts at economic reanimation, with the declared objective of lifting economic growth rates and stabilising them at two per cent.[29] Here, too, the results are rather sobering: since the beginning of his term of office (i.e. between 2013 and 2016), the Japanese economy has grown on average by a mere 0.9 per cent per year.[30]

Abe has pulled out all the stops to stimulate the economy. In 2013, the Japanese central bank, which is less independent than its European or American counterparts and is expected to cooperate closely with the government[31], began a large purchase of government bonds and securities. This measure was expanded in 2014. Bonds enable a state to borrow money on the financial markets to compensate for deficits in the budget or in order to make investments. It is common practice for the state to pay the money back after an agreed time period and to service the interest on the loans at regular intervals. If a state becomes overly indebted and its credit ranking drops, its risk of defaulting increases. This poses a threat to investors seeking to get their money back. Financiers typically stay well clear of such risky bonds unless the state grants considerably higher interest rates, the so called risk premium. In other words, the state incurs ever-mounting costs trying to get its hands on urgently needed money, while at the same time it is drawn further into the debt spiral – a vicious circle.

In order to prevent the debt spiral, the Japanese central bank is putting more and more money into circulation with a trick that is difficult for a layperson to understand: it provides the commercial banks with favorable loans, these banks use that money to buy government bonds and in the end the central bank moves to repurchase those bonds. As a result, the state obtains cheap money without an oversupply of bonds on the market, which could potentially erode bond prices.

The Japanese central bank's money press is vital in this process, because it requires "freshly printed money" to buy state bonds. The "printing" should not be understood in the literal sense though, because, strictly speaking, the central bank merely transfers credit to the commercial bank's accounts, who can then lend the money on the market. By doing so, the money is put into circulation (see box on page 46). In late 2016, the central bank owned 41 per cent of all Japanese bonds and had increased its balance sheet total to over 4 trillion US Dollars, or 90 per cent of Japanese GDP.[32, 33, 34]

What is more, as a means to support the markets, the central bank is purchasing shares in real estate funds and Japanese stocks via index funds that are traded on the stock market. Stable or high stock prices suggest healthy corporations, which provide banks with the needed security when issuing loans. A related objective with these measures is to facilitate investments. By the end of July 2016, the central bank decided to increase its purchase of stocks to 60 billion Euros per year, making it the largest shareholder in many Japanese companies, a situation that resembles a creeping nationalisation.[35]

Prime Minister Abe has also issued an instruction to prefer governmental infrastructure programs, in order to stimulate the economy. The Summer Olympics in Japan in 2020, with related projects such as the construction of the necessary stadiums, high-speed trains and a newly developed high-tech video system for monitoring the sports facilities, are designed to put the economy back on track.[36]

Abolish cash?

Ideally, savings are deposited in a bank, where they find their way to borrowers and flow into investments. If savings are not turned into investments, the result is a savings glut, an excess of money that can no longer fulfil its original purpose on the capital market. As a result, an economy can slip into a phase of weak growth that cannot be reversed by low interest rates.

Current theories suggest only a few rather unconventional solutions for reviving an economy where people save too much. The first idea is not really new and involves continuing the current policy of some central banks: permanent negative interest rates, making the ownership of money so unattractive that people prefer to spend it. Lawrence Summers, the modern advocate of the theory of secular stagnation, thinks that an interest rate of at least minus three per cent would be needed to balance the economy. However, he does not believe that this is possible without "radical measures."[39]

Such asset-melting negative interest rates cannot work as long as there is cash. If in doubt, hoarding cash money in the safe would be smarter than carrying it to the bank just to watch it melt away. Negative interest rates can only fulfill their purpose if cash money is abolished, as noted by the American Harvard economist Kenneth Rogoff or Andrew Haldane, chief economist of the Bank of England.[40, 41] Only in the absence of cash does the state have the ability to take control, reduce interest rates and penalize the possession of money. By doing so, the interest rate is turned into a kind of tax.

But this policy, too, has its side effects. People do not simply save money because they have some to spare but also because they need to store up reserves for a potentially long life span. This applies to industrialised countries in particular, where the proportion of retirees compared to working people will rise sharply with the retirement of the baby boomers, and where pay-as-you-go financed social security systems will have less money to pay out to retirees in the future. This applies even more so to emerging economies, where aging will begin a few decades later but where social security systems will most likely not be able to offer sufficient payments.[42] Global demographic change means that people must save money. Any policy that hinders them from saving money would have catastrophic consequences for the future social security.

In 2016, Japan gave the economic screw yet another turn: the central bank decreased interest rates to below zero, with the intention of rendering it yet more attractive to take out a loan. Negative interest rates mean that investors can borrow money and pay back less later on, and are designed to make the possession of money so unattractive that it flows either into consumption or into investments. Japan was able to stimulate the construction sector temporarily, but damaged the business model of banks that rely on making money with loans.[37]

The side effect of negative interest rates: to prevent their assets from melting off, the Japanese have begun hoarding money in cash. After the introduction of the negative interest rate, the sale of fireproof steel vaults skyrocketed. By mid 2016, assets worth 360 billion US Dollars had been stashed away at home, according to estimates.[38]

Japan's expansive fiscal policy has led to a gradual increase in public debt; since 1990, the size of the debt has gone from 66 to almost 240 per cent of annual economic output.[43] This, too, is a world record, and an expensive one: Even if the state is currently able to lend money at extremely low interest rates, about a quarter of the budget alone is spent on debt service.[44] In order to get rid of the debt, the Japanese would theoretically have to waive their income for two and a half years and deliver it completely to the state. Because of its horrendous debt, but also because social spending related to the care of the aging population are increasing intensely, international rating agencies have denied Japan the top credit ratings achieved by countries such as Switzerland, Germany and Norway since 2007.[45]

But what does the Japanese central bank do with all the shares, real estate and state securities it purchases? Only in the unlikely ideal case of a long-lasting economic rejuvenation is it conceivable that investors could be found who would buy back the shares and real estate from the central bank. The central bank for its part does not necessarily have to sell off the state bonds but it will probably get the money back when it is due. So far, however, it has in such cases opted for buying new bonds immediately.

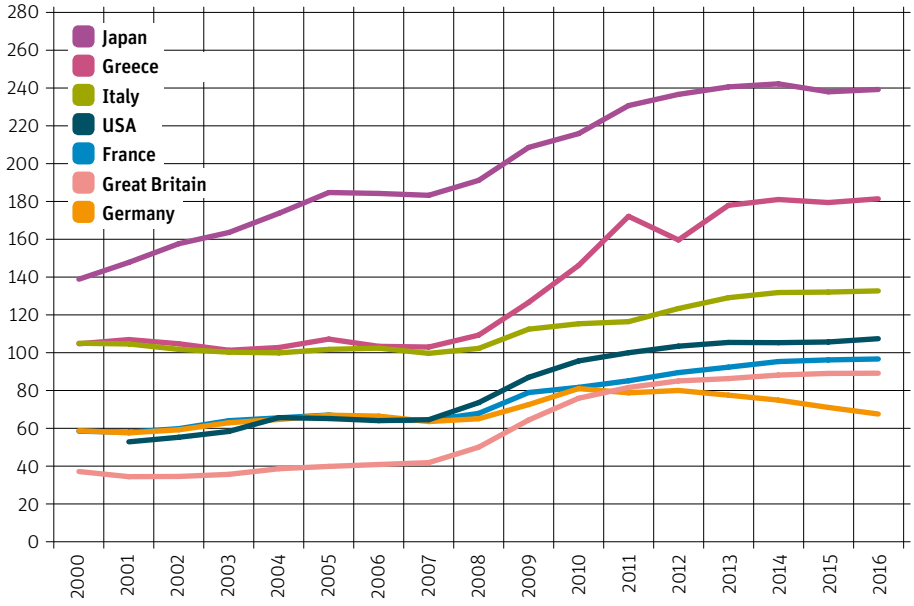
On the other hand, if the central bank were ever able to reduce its balance sheet, the inflationary amount of money in circulation would decline and initiate a gradual return to normality. This path, too, brings certain problems: if the money flow is reduced, interest rates will rise, and all previous buyers of low-yield bonds will write losses, as their value is lower than the higher-yielding new bonds. This may threaten the existence of insurance companies or pension funds.

As a result, professional investors such as the US fund manager and billionaire Bill Gross believe that Japan is in an unsolvable predicament and will never find a way out of its debt trap: "At some point Japan will basically buy up all its debt and the central

States living on tick

States have typically taken on debt at times of economic crisis as a means to stimulate the economy with investment programs. Once the economy recovered, the debt would be repaid. However, since the financial crisis, debt obligations in many countries have risen much faster than economic output. This trend has been evident in Japan for more than two decades.

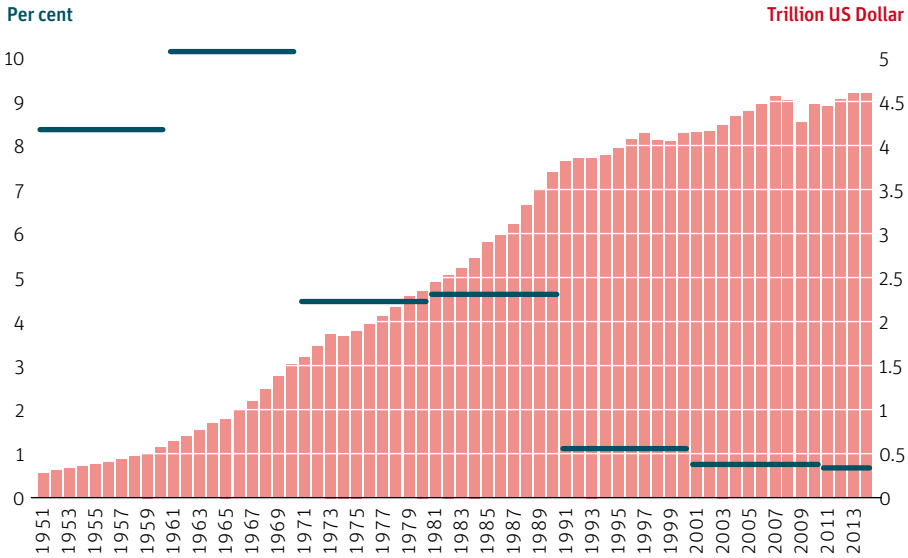
Per cent



Government debt-to-GDP-ratio for different countries, since 2000 (Data source: IMF[49])

The engine of growth is flagging

After the Second World War, Japan took time to recover economically. In the 1960s, the country experienced its maximum growth, which has steadily declined ever since.



Annual GDP values (in trillion US Dollar, price level constant) and ten-year average GDP growth rates (in per cent) for Japan, 1951 to 2014
(Data source: Penn World Table[50], own calculations)

bank will forgive the Treasury".[46] This would be nothing less than radical debt relief, because debts can be transferred to other creditors but not vanish. In the end, someone will always have to foot the bill for bad loans, by default usually citizens. It is also possible to use a "hidden debt cut" with which the central bank extends the maturity end of government bonds, if necessary into eternity, so that the debts need never be repaid.

In the demographic-economic trap

Japan is stuck in a stagnation which can accurately be termed a secular stagnation. There is no end to the malaise in sight, especially as the aging population compounds the difficulty of the problem: because demand is going down, the domestic market for consumer goods has been stagnating for some time, or even decreasing.[52] Implementing reforms is becoming more and more difficult because Japanese retirees vote for secure pensions rather than for investments that promote growth for the future, such as family support, education or research.[53] Six prime ministers within the seven years preceding the Abe government mostly failed because they dared to announce reforms. Abe has learned from this and is delaying the necessary steps again and again. He has repeatedly promised reforms such as deregulation, more gender equality and a better family policy to bring more women into the job market. But Abe has failed to deliver on these pledges. It appears as if Japan is stuck in a demographic-economic trap, rendering reforms impossible.

Due to the strong trend towards an older population, the electorate is centered around higher age groups. Those who are today over 65 were alive when Japan celebrated its greatest economic success, and therefore have a hard time accepting a decline.[54] Meanwhile, demographic problems are intensifying and are likely to reach their most substantial impact around the year 2040. By that time, Japan's baby boomers will have become so old that experts speak of societal hyperaging.[55]

This process could ruin public budgets. While in the 1990s social spending accounted for less than 20 per cent of the national budget, currently it is already over 33 per cent, and without controversial reductions it will continue to rise at a similar pace.[56] If Japanese pensions, which are already low in comparison to the rest of the OECD, were subject to further reductions, the elderly would have no other choice than to work beyond retirement age or cut down substantially on expenses. This is something that they are already used to. According to an OECD pension systems report from 2015, the retirement age among Japanese men was already as high as 69.3 years, 4.7 years higher than the OECD average. Female workers in Japan retire on average at 67.6 years, which means they work 4.5 years longer than the average female worker in the OECD states. In contrast, the poverty rate among pensioners is 19 per cent, seven points above the OECD average.[57]

Population aging also seems to paralyze Japanese companies, previously power houses of innovation. They are suffering not only from weak domestic demand and the rising cost of social services but also from a lack of young innovative minds with new ideas to provide impulses to growth and to develop the high-tech products for which Japan was once famous. Many innovative goods and services such as the iPhone, Facebook, Airbnb or the services of Alphabet are now being developed elsewhere. Erstwhile world market leaders such as Sony, Toshiba, Panasonic or Sharp are either regularly declaring losses or have already been sold.[58]

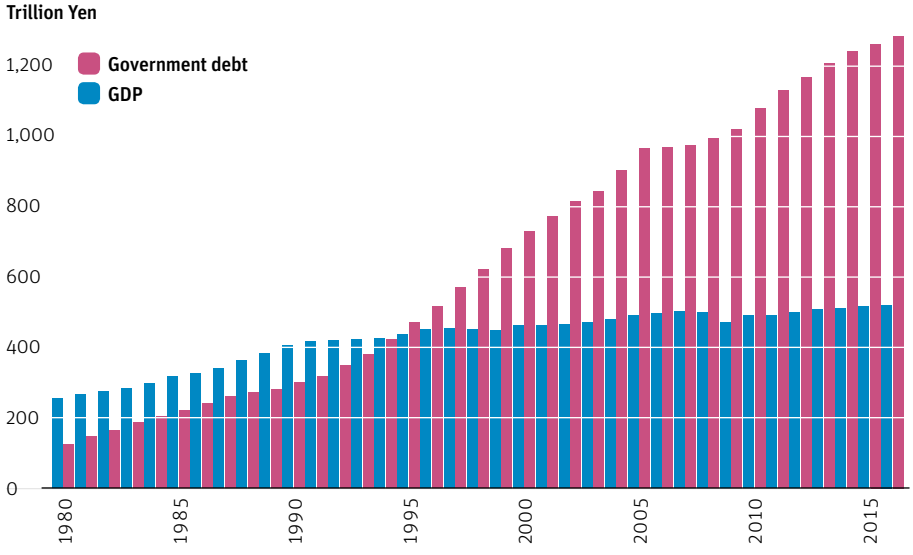
Immigration as a means of reviving the labour market still remains a taboo topic in Japan, a country which is extremely sceptical of foreigners. All important parties as well as the trade unions reject immigration. "Robots, not foreigners" has long been the motto of immigration policy. This applies not only to the manufacturing industry but also to the care sector, where the country has the greatest need for labour. Indeed, the fact that Japan is a leader in the automation of labour processes is in large part due to its rejection of immigration.[59]

A section of Japanese youth, otherwise the country's great hope for the future, has begun to give up, as the phenomenon of hikikomori shows. The term describes young people who completely retreat from public life, isolate themselves at home, aborting their training or quitting their work. A lost generation whose number is officially estimated at 700,000.[60]

So far Japan has not been able to find any answers to its structurally-induced economic weakness. This is hardly surprising, because the instruments of cyclical economic policy that the country has habitually resorted to cannot successfully influence long-term developments such as demographic change or declining productivity gains. Fundamental reforms have failed to materialise, as have attempts to prepare society for, and help individuals adapt to, a new reality and a changing economic framework. In this experience, however, Japan is not alone.

Japan in the debt trap

Fading economic growth and rising public debt levels are leading into a trap. A government in this situation is required to come up with ever more money to service the debt while running out of money for sorely needed growth-inducing investments. A rapidly aging population, as experienced by Japan, does not make the issue any easier, because it increases public expenditures at a time when income levels are stagnating or even declining.



Comparison of Japan's government debt and GDP (in trillion Yen), since 1980 (Data source: IMF[51])

Europe on its way to Japanisation?

We have dwelled on the Japanese example and discussed it in such detail because it best demonstrates the difficulties of dealing with the *New Normal*. At the most general level, these experiences also apply to Europe and the majority of highly developed industrial countries, because in these states political desire and economic reality are also widely divergent. In 2000, in the Lisbon strategy, the EU set itself the goal of boosting growth rates up to three per cent per year by 2010 to ensure high employment rates and make the EU the "most competitive and dynamic knowledge-based economy in the world"[61]. In reality, the average growth rate between 2000 and 2010 amounted to 1.4 per cent per year[62] (1.1 per cent within the eurozone) and between 2011 and 2016 to 1.1 per cent (0.9 per cent within the eurozone).[63]

Even if Europe's growth rates and its demographic situation are better than Japan's, in particular because of immigration, the parallels are obvious. Not only are the reasons for the structural weakness of the economy similar, but also the attempts to deal with it: the eurozone also pursues a low interest rate policy, in which the European Central Bank (ECB) buys massive state securities. In many places commercial banks are no longer sure whether their loans are of any worth Observers are therefore already speaking of a "Japanisation of the eurozone".[64]

Interest rates down - growth up: a thing of the past

In order to facilitate investments and prevent deflation, the ECB decreased its key interest rate from four to zero per cent after the financial crisis of 2007/08, and since 2014 even below zero.[65] Commercial banks have been able to obtain money from the ECB for zero per cent interest since March 2016. However, if they cannot pass the money on to customers via loans and have to deposit it with the ECB instead, the banks must pay a penalty interest of 0.4 per cent.[66] The first banks have therefore begun to loan their money at zero per cent. Doing so may encourage consumers to buy a car or electronic goods, but carries the danger of tempting them into careless consumption. Once interest rates begin rising again, this becomes a trap.[67]

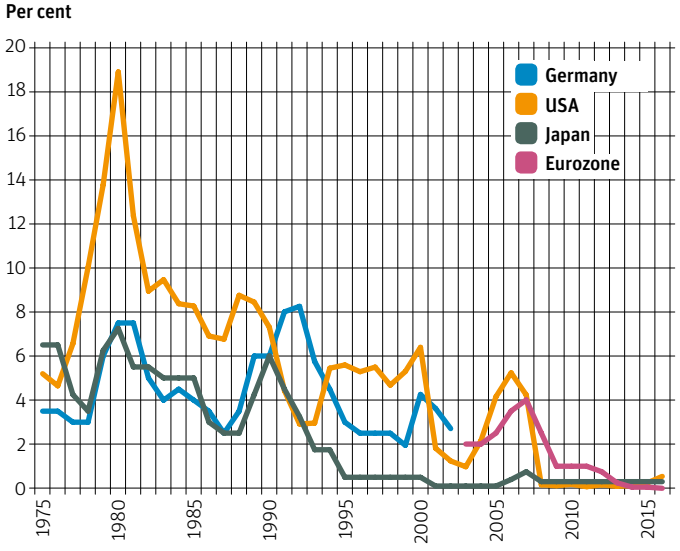
Central banks typically reduce the interest rate during economically weak phases, hoping that investments and growth will follow. Interest rates usually pick up again as soon as the economy is recovering and begins to run the danger of "overheating". However, in the recent past, phases of weak growth, even recessions, have become more frequent. Inflation in most industrialised countries is low and interest rates remain at record low levels.

In the eurozone, low or negative interest rates have not yet given the economy a sustainable boost. However, depending on the point of view, they have a number of positive or negative side effects:

- They result in a weak external valuation of the euro and thus create favorable export opportunities, which is particularly beneficial to an export-oriented country such as Germany.
- They are good for those euro countries that want to take on debts, or for those who are already heavily indebted and want to refinance cheaply. Low or negative interest rates decrease the willingness to reduce debt.
- They facilitate long-term public investment in infrastructures such as bridges, roads or a fast internet, an investment that can pay off for future generations.

Interest rates are falling everywhere

Officially, the goal of many central banks such as the ECB is to ensure price stability. However, since growth rates have declined in industrial nations, central banks have also been trying to reduce the key interest rate for commercial banks so that the latter can lend money to companies who then use it for investments. Because this is standard textbook monetary policy, despite the fact that it rarely works in the real world, key interest rates in Japan and the eurozone have already come close to zero. In the US, by contrast, where the economy has somewhat recovered since the financial crisis, the Federal Reserve is now back to increasing interest rates step by step.



Development of key interest rates (in per cent) in Japan, USA, Germany and the European Monetary Union (as of 2003), since 1975 (Data source: German Federal Bank[68], European Central Bank[69], Federal Reserve Bank[70])

- Conversely, low or negative interest rates inhibit necessary structural reforms of labour markets, social and tax systems, and education and immigration policies, which could in theory help accelerate growth again.[71] The indebted eurozone countries have so far been able to fill the gaps in their budgets with cheap money without engaging in unpopular reforms. They are grateful that the ECB in effect finances parts of their budget.

- They are bad for private savers and institutional investors such as life insurers, pension funds and trusts, who need to invest capital defensively. These individuals and organisations are subject to a hitherto unheard-of transformation from creditors to borrowers, which in effect means that they are gradually expropriated by a combination of bank fees and zero or negative interest rates.

- They burden companies that have entered into pension commitments through occupational pension schemes. These companies can no longer generate the originally projected interest on capital reserves.

Zombies and Bubbles

When money is cheap, private individuals run the risk of taking on debt irresponsibly, shareholders take greater risks to obtain a worthwhile return on their investment, and banks borrow money for low-profit or high-risk projects. The latter keeps companies afloat that are no longer competitive and hinder the innovation process, as happened with the zombie economy in Japan in the 1990s.

Cheap money was also the trigger for the American real estate bubble, in which hundreds of thousands were tempted into purchasing a house that they could in no way afford. When the bubble burst, banks fell like dominoes, causing the bankruptcy of Lehman Brothers and the global financial crisis in 2007/08, which drove entire economies to the brink.[72] The housing crises in Spain and Ireland in 2008 can also in large part be attributed to cheap loans, which were difficult to repay after the economic collapse and caused massive losses to the banks. In the wake of the crisis, the rescue programs for German banks alone cost the taxpayer an estimated 30 to 50 billion Euros.[73] The banking sector was not genuinely saved, however, as the ongoing crises of many banks in Italy and elsewhere indicate. In 2016, institutions such as the well-established Italian bank Monte dei Paschi di Siena resorted once again to billions in support from the Italian banking aid fund due to bad loans.[74]

These problems are not directly caused by secular stagnation but they are the consequences of an inappropriate response to a structural weakness in growth. If central banks respond to a crisis that was brought about by low interest rates by further reducing interest rates, they risk causing the next bubble, leading to a permanent crisis. In fact, when the New Economy bubble burst in 2000, the big world economies barely had time to recover sustainably before the next bubble set in.

When financial bubbles burst, low interest rates cause the opposite of what they are designed to achieve. Instead of growth, they lead to an economic collapse and, in the worst case, to immense losses: the International Monetary Fund (IMF) estimates the loss due to the financial crisis of 2007/08 at around 12 trillion (i.e. 12,000 billion) US Dollars.[75] Back then, this translated into 1.800 US Dollars per world citizen.[76]

Money flooding

A second similarity between the ECB and the Japanese central bank lies in their attempts to revive the sluggish consumption of goods and services through government spending and a loose monetary policy. ECB President Mario Draghi announced in June 2012 that he would do "whatever it takes to preserve the euro".[77] With this policy, Draghi aimed to drive off the speculators who were betting on the bankruptcy of the crisis states in the eurozone and sending interest rates on their government bonds to extreme levels. Draghi acted like a poker player going "all in" and thereby forced other players to check by putting in at least as much. Because no speculator was able to match the ECB's stakes, Draghi succeeded, at least temporarily: interest rates in the crisis countries fell immediately after his announcement. State bankruptcies were averted. With his signal to do everything at his disposal to save indebted countries and thereby the euro, Draghi was able to calm the markets.

The long-term effect of this policy is still unknown, because, among other reasons, it is yet to be concluded. The ECB continues to buy state bonds, and to a lesser extent corporate stocks, from its member states via national and commercial banks – totaling 60 to 80 billion Euros each month. As in Japan, the aim of this "quantitative easing" program is to keep interest rates on the bond market low and to provide banks with additional money for new loans.[78]

By March 2018, the total volume of ECB purchases is likely to total about two trillion Euros. Because the purchases are linked to the size of the respective eurozone country, German government bonds account for the largest share, at about a quarter of the total. The ECB is therefore likely to hold German government bonds worth 525 billion Euros. With this money the German federal budget could be financed for 1.75 years.[79]

Officially, the end of ECB interventions would be reached by mid-2018, as the central bank is not permitted to acquire more than 33 per cent of the bonds of any of the member states.[83] But what happens if the purchases end but the ECB has still not achieved its objectives? Or worse, if Europe is affected by a new debt crisis in the meantime? What happens if one of the euro countries goes bankrupt despite the interventions, takes debt relief or exits the eurozone?

Financial analysts rule out that the ECB would ever admit its rescue policy to have failed.[84] Such an admission would be the largest imaginable disaster for a central bank and would ultimately erode financial markets' confidence in the euro. Although scenarios for such a collapse are surely stored away somewhere in the drawers of the ECB and national banks, they will never find their way to the public.

It is therefore conceivable that the 33 per cent limit on the ECB's bond purchasing will be discarded. The Japanisation of the eurozone would then continue. When push comes to shove, the ECB could also buy stocks, real estate and other assets, just like the Japanese central bank. All these measures focus on the hope of increasing inflation in the eurozone up to the target value of two per cent in the long term, allowing member states to move on to a sustainable growth track as quickly as possible and to adequately reduce their debt levels. This is a best case scenario.

Money from the helicopter?

If despite all efforts money is still not flowing into investments and consumption but rather into speculative activities such as real estate or stock markets, there remains one rather unconventional and radical proposal for stimulating growth: helicopter money. The underlying idea is that money can best boost growth if it goes directly to the people, who can then spend it immediately. In order to achieve this goal it would be best, figuratively speaking, to throw money to the people out of a helicopter. This could be done through temporary grants to households or a regular payment that guarantees a permanent basic income for all residents of a country. Such an income would be especially useful for the less affluent, who are most likely to use it for consumption. The result would be an economic upswing as if by magic.

Some politicians, such as Jeremy Corbyn –head of the British Labour Party – or Lord Adair Turner – former chairman of the British financial services authority – consider helicopter money a great idea for freeing countries from the economic crisis. Jeremy Corbyn considers helicopter money to be a form of quantitative easing for ordinary people. Even the President of the ECB, Mario Draghi, is not fundamentally opposed to the proposal.[80]

The concept of helicopter money goes back to US-American economist Milton Friedman, who had expressed the idea as part of a thought experiment in 1969. He considered it a last resort option that central banks could call upon for fuelling consumption and growth if everything else proved ineffective.[81] This idea was hardly new. Economists before him had also considered what to do in case the economy did not respond as policy makers wanted. For instance, John Maynard Keynes once suggested burying money in abandoned mines. Unemployed people could dig it up and reintroduce it into the economic cycle. In economic terms, this would be like the discovery of a new gold mine.[82]

In the worst case, the ECB's efforts may turn out to be of no avail: the financial markets will lose patience, particularly with euro countries that despite the loosest monetary policy fail to grow and instead sink ever deeper into debt. International speculators would return to betting against the euro. The risk premiums on Italian or French bonds would rise, making it impossible for these countries to take on or pay back debt. As a result, risk premiums would continue to increase, rendering state bankruptcy inevitable. Solid euro members would refuse further aid to crisis countries, effectively making the latter exit the eurozone. Their citizens would storm the banks to grab the last euro. Afterwards these countries would have to start from scratch with a national currency. Under these conditions, nationalist parties are likely to gain support and it would be very unlikely that insolvent countries could pay back any worthwhile portion of their debt. The eurozone would become a liability alliance.

Unintended side effects

It is obvious that the ECB wants to avoid such a scenario at any cost. But like Japan's central bank, it has created a deeply-entrenched dependency which makes it all the more difficult to end long-established loose monetary policy. Because the worst-case scenario absolutely must be avoided, the money tap must remain open, even at the expense of mounting debt. The risks and side-effects are deliberately ignored. Indeed, rising debt levels are difficult to reconcile with declining growth rates, since with declining growth debt can never be repaid.

The euro states are therefore moving further and further away from the provisions of the Maastricht treaty, agreed in 1992, which permit debt of up to 60 per cent of GDP. Presumably the authors of the treaty stipulated this criterion for a good reason.[85] 13 of the 19 euro countries are currently violating this provision, without fear of sanctions.[86, 87] Consequently, eurozone debt is now much higher than when the ECB began its interventions. The eurozone countries need massive growth to meet the Maastricht criteria, because saving alone will not suffice to service their debts. But sufficient growth is nowhere in sight. The ECB is also caught in the trap.

A partial explanation for this state of affairs lies in the fact that the ECB, too, trusted for a long time in growth as a natural law. It massively overestimated the economic potential of the euro area after the financial crisis of 2007/08 and built its expectations and policies on these false estimates. A Deutsche Bank research paper argues that since 2012 the ECB has manoeuvred the eurozone into a situation in which it is caught between permanently low growth, high unemployment, a lack of reform and higher risks for the core countries' balance sheets. In other words, the ECB has in fact further cemented the stagnation that it aimed to avert.

The Japanese central bank and the ECB may have succeeded in soothing and stabilising the financial markets. However, neither the policy of low interest rates and quantitative easing nor short-term government stimulus packages solve the fundamental problems of structural growth anaemia in Japan or the eurozone, let alone enable a sustained economic recovery.[88] Because economic weakness is caused by demographic change, declining productivity gains and growing social inequality, monetary policy can have no impact on these developments. At the very best, monetary policy may temporarily alleviate the consequences of stagnation, but cannot tackle its causes.

What the consequences of stagnation are and how they affect life in developed countries is described in the next chapter.

4 THE CONSEQUENCES OF DECLINING GROWTH

Even if most people prefer growth to its opposite, the question is whether a gradual end to growth in early developed industrial nations would be such a bad thing. Wouldn't everything essentially remain the same, since there would be neither more nor less of anything?

If this were the case, people could continue to enjoy a standard of living that the majority of the world's population can only dream of. For environmentalists it would offer the hope of an end to the ongoing plunder of resources and a chance to minimise the damage to climate and biodiversity. In general, then, a good thing.

However, the consequences of stagnation are manifold and impact virtually all aspects of life. In this chapter we intend to demonstrate what fading growth may imply for state, business and society. So far there has been a strong dependency on growth in all of these areas. Social security systems and state finances necessitate ever-increasing revenues from taxes and other sources.

Companies invest in new technologies and production sites, expecting their sales figures to continue to grow. Social cohesion rests on the hope that people will be better off in each new generation. Without the prospect of economic growth, these expectations may not be met.

Implications for the state

Germany is currently doing well in comparison with other industrialised countries that are experiencing declining growth rates. Unemployment figures and the development of state revenues give little grounds for concern. The situation in those European countries that have been severely affected by the finance and debt crises is different. In Greece, one in four people are unemployed, and in Spain almost one in five. At the same time, the economic performance of these countries has still not returned to pre-crisis levels. In 2016, Greece's economic output was just three quarters of what the country generated back in 2007. In 2016, GDPs in Croatia, Latvia, Cyprus, Portugal, Finland, Estonia, Italy and Spain also remained below pre-crisis levels.[1]

A weak economy takes its toll on public budgets. Debt burdens have risen dramatically within a very short time. Spain's mountain of debt has nearly tripled since 2007 and currently amounts to 100 per cent of its annual GDP. The increase in Greece's public debt ratio seems moderate in comparison, though beginning from a higher starting point: from about 100 per cent of annual economic output in 2007 to 179 per cent in 2016. These developments are not confined to southern Europe either. While in 2007 just 9 out of 28 EU member states had debt levels higher than 60 per cent of their annual economic output – and were thereby failing to meet one of the Maastricht criteria adopted in 1992 – the situation changed substantially thereafter. In 2016, this figure increased to 16 countries, now including the United Kingdom, Austria and Germany.[2]

No relief in sight

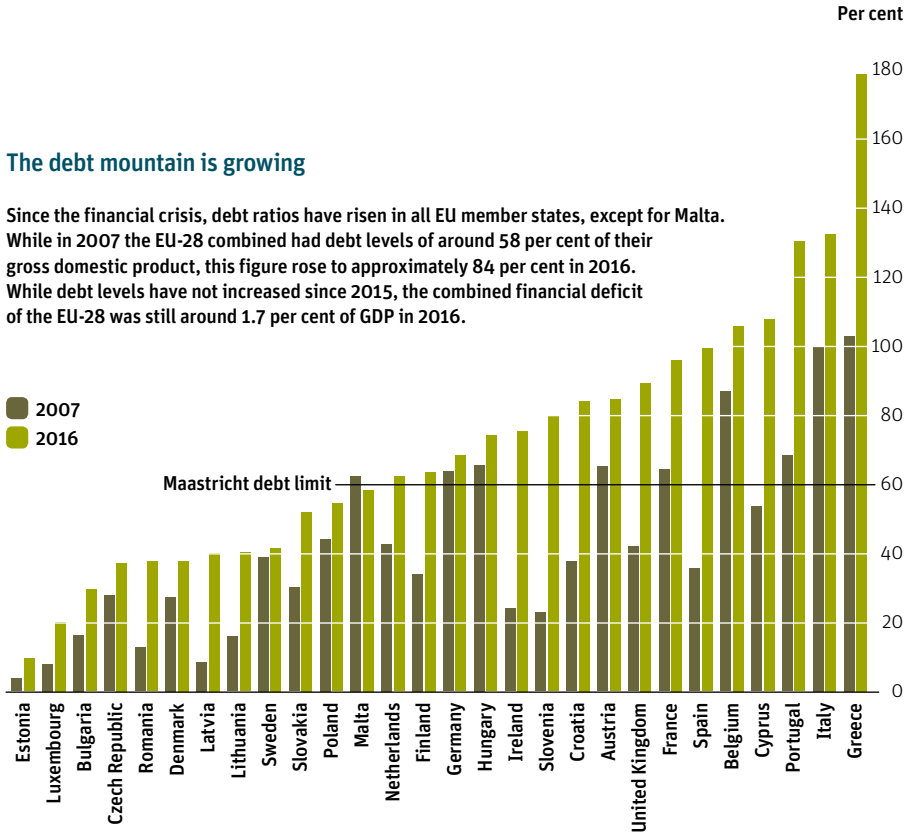
Europe's weak economic performance over the last ten years illustrates well the repercussions of fading growth. It also indicates a pattern that seems to have emerged over the past few decades: a weak economy causes public debt to rise significantly. Ideally, during periods of economic recovery these debts should at least partly be repaid. But what if the expected growth fails to materialise? We have already seen just how difficult it can be to service debt when this occurs: the low growth rates of recent years, coupled with low inflation, have made it difficult for countries to reduce their public debt ratio.[4]

It is also unlikely that the situation in many European countries will improve in the long term. Current debt and additional expenditures due to an aging population, such as health care or state pension costs, add to the pile of liabilities.[5] Experts speak of a so-called sustainability gap if there exists a difference between expected revenues and future expenditures.[6]

Estimates show that there is a sustainability gap in almost all European countries. Budgets are in need of consolidation. In order to keep debt levels constant and to meet the growing costs of demographic change in the long term, the majority of states have to find ways to increase revenues relative to expenditures. The extent of the gap varies across countries. Budget deficits are, for example, particularly pronounced in Slovenia, Malta and Luxembourg, whereas the situation is comparatively good in Croatia and Cyprus. In order to cover their expenditure, most EU countries would have to improve their budgetary balance by around two per cent of their annual economic output.[7] Even if growth revived, it would be difficult to cope with the accumulated debt burden of the past while also generating additional income for an aging population. If growth is negative or near zero, this will most probably be impossible.

The debt mountain is growing

Since the financial crisis, debt ratios have risen in all EU member states, except for Malta. While in 2007 the EU-28 combined had debt levels of around 58 per cent of their gross domestic product, this figure rose to approximately 84 per cent in 2016. While debt levels have not increased since 2015, the combined financial deficit of the EU-28 was still around 1.7 per cent of GDP in 2016.



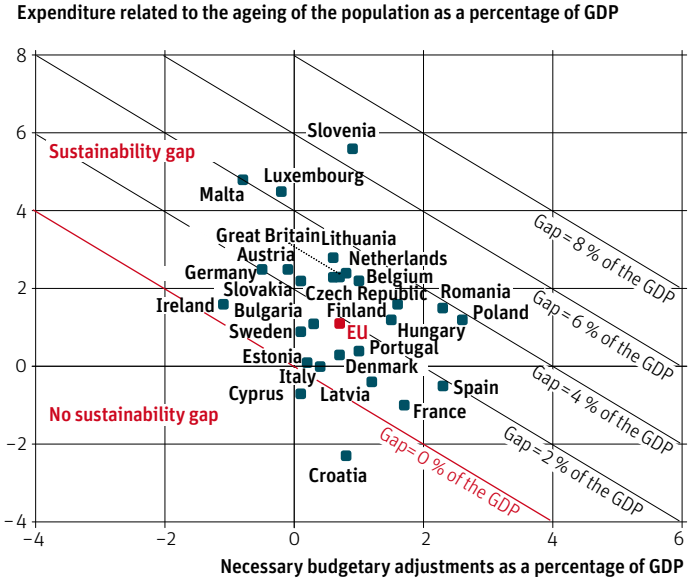
Government debt in the EU-28 as a percentage share of annual economic output, 2007 and 2016 (Data source: Eurostat[3])

Germany: Current situation good, prospects poor

Germany's current budgetary situation could hardly be better. In 2016, the federal, state, and municipal authorities and social insurance institutions earned almost 24 billion Euros more than they spent. In absolute terms this is the biggest yearly surplus that the state has achieved since reunification.[9] However, the long term prospects for social security systems are not so bright. With various reforms, such as introducing a sustainability factor into the pension system or raising the retirement age to 67, policy makers have tried to make pension, health care and long-term systems future proof.

Aging is tearing additional holes in public budgets

The future revenue of a state must cover not only the usual expenditure on social security, infrastructure and security, it must also be sufficient to prevent debt from rising further and to finance the costs of an aging population. Where future costs exceed expected revenues, there is a sustainability gap. With the exception of Cyprus and Croatia, for all countries a permanent budgetary adjustment is required. These are particularly pronounced in Slovenia. This small country in the eastern Alps would have to permanently improve its budget balance by more than six per cent of its annual GDP in order to achieve a balanced budget. The situation in Germany is considerably better, a country which would need to improve its budget balance by two per cent of its GDP.



Sustainability gap of different EU countries based on budgetary adjustments necessary to maintain current government debt levels (measured in terms of annual GDP) and expenditures related to the ageing of the population (as a percentage of GDP) (Data source: European Commission[8])

Pay-as-you-go social systems work well as long as the relationship between net contributors and beneficiaries is fairly balanced. In the coming decades, however, the number of those who receive benefits from pension, health and long-term care insurance will increase as the baby boomer generation retires. At the same time, the number of people of working age, who are essentially responsible for generating prosperity, will reduce. This will create difficulties for social systems.

But just how high are the additional costs of maintaining social security systems? An estimate commissioned by the German Federal Ministry of Finance provides an approximation of possible developments over the next decades, assuming that current policy does not change. It takes into account public expenditure related to aging, health and long-term care, unemployment insurance, education and family support up to 2060. Costs in these areas are closely related to demographic change and amount to approximately 60 per cent of the government's entire budget. The estimate also incorporates expected gender and age-specific labour force participation, the development of the unemployment rate, and the overall economic trajectory.[10]

If economic output – and related income from taxes and other sources – increases at the same rate as expenses do, the additional costs can be met. However, this is an ideal situation that is unlikely to materialise. As things stand, the share of GDP that will have to be spent to cover demography-related public expenditure will increase. Currently, this figure amounts to roughly 26 per cent. Even under highly favourable conditions, the ratio of demography-related expenses to GDP is likely to rise to over 29 per cent by 2060. Further increases are probable if, for instance, employment, immigration or fertility rates turn out lower than anticipated. In the worst case, the expenditure ratio could reach 33 per cent by 2060. This is mainly due to mounting costs in pension systems, long-term and health care.[11]

Offsetting the financial burden in the health care and long-term care systems is more difficult than in the pension scheme. Expenses are driven not only by the aging population but also by technological progress. Innovative and expensive treatments are entering the market at a rapid pace and replacing cheaper conventional ones. Unlike the car, computer or mobile phone industry, where older and lower-priced models continue to be attractive for consumers, in the health care sector people always desire the best available products and treatment methods. This drives costs upwards. For example, new medication entering the market enjoys monopoly status for a time, enabling companies to set initial prices high.[12] Unless people accept a reduction in the quality of health care or health care becomes cheaper for other reasons – for

example if people become risk averse or less likely to become ill and dependent on medical care – then financing the health system is only possible if the economy grows. The greater the economic output, the smaller the financial burden for future generations.

Public finances will remain sustainable in the long run if the state increases its income or reduces its expenses permanently. Doing so could yield between 36 and 115 billion Euros in additional income, coming from higher tax revenues and/or savings.[13] It is, however, unlikely that politicians will make such far-reaching cuts. Therefore, those in charge are trying to reduce the sustainability gap by other means. These include facilitating employment-related immigration, promoting female employment, deferring retirement age, and improving the overall qualifications of the population. However, these measures cannot on their own completely close the gap. While policy measures have yielded some progress, in particular with respect to the participation of women and the elderly in the labour force, future potential for improvements appears rather slim.

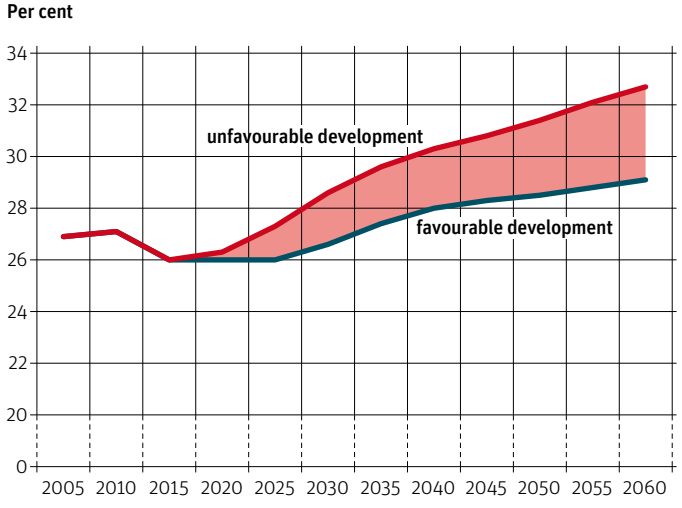
Growth as a problem, growth as a solution

Pension, health and long-term care systems depend on economic growth, provided that contributions and benefits remain overall stable. There is hope that productivity gains and lasting growth will somewhat offset the financial gap widened by demographic change. This is where the real dilemma becomes evident: on the one hand, demographic developments are seen as the major cause of declining economic growth, but on the other hand, economic growth is supposed to alleviate precisely the same problems that demographic change has caused for social security systems.

A glimpse into the past reveals that demographic change not only affects social systems but also the federal budget. In 1995, the pension sector – financed through a pay-as-you-go system – required some additional 17 per cent tax-financed subsidies from the federal budget. By 20 years later the figure had already increased to 31 per cent; in 2015, roughly 84 billion Euros of tax money went into the statutory pension scheme;[15] by 2020, it could be 100 billion.[16] As aging continues, it is likely that the federal budget's contribution to social systems will increase even further. This limits the federal government's freedom of investment. While in 1995 it was able to freely dispose of every second Deutsche Mark to invest in infrastructure development, by 2015, it had only a third at its disposal – and the trend is towards a further decline. This shift in government spending is likely to negatively impact economic growth in the long term.[17]

The costs of aging

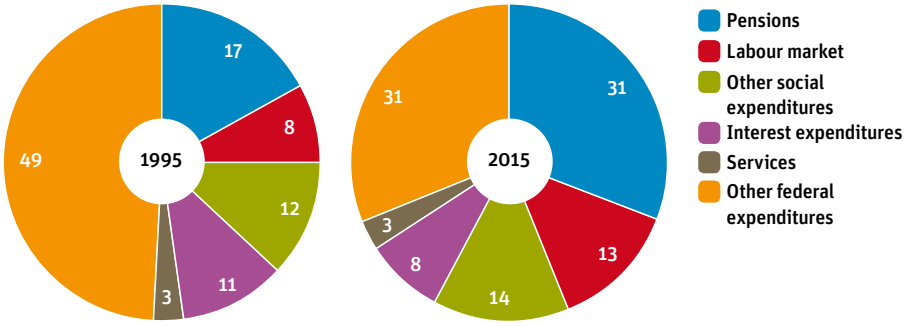
In 2015, the German state spent 26 per cent of its GDP on pension insurance, civil servant pensions, statutory health and long-term care, unemployment insurance, education, child care and family benefits. Both the favourable and the unfavourable projections place likely expenditure by 2060 somewhere between 29 and 33 per cent of annual economic output.



Development of expenditures associated with demographic change in Germany under different assumptions (as a percentage of the GDP) until 2060 (Data source: Federal Ministry of Finance[14])

Money for future investments is becoming scarce

About one third of the federal budget in 2015 was spent on state pensions, despite the fact that these are designed to be financed by contributions from the working population. 20 years ago the figure was only about 17 per cent. The proportion of spending on other social expenditures has increased as well. The federal government is thus gradually losing its room for manoeuver.



Structure of expenditure in the German federal budget (in per cent), 1995 and 2015 (Data source: Federal Ministry of Finance[18])

Where will the state get its money in the future?

What if in the future weak growth periods occur more frequently, with short recoveries in between? Under counter-cyclical economic policies, debt burdens will continue to mount – which is unlikely to have welcome consequences. States need cheap money, which investors only provide as long as they believe in a country's solvency.

And financiers lose trust if they doubt the ability of future generations to generate the tax income necessary to service debts and interest. The higher a state's debt burden, the greater the risk premiums it must pay to obtain money. The situation becomes critical when the interest rate surpasses the economic growth rate, because in that case debt grows faster than income. The only way out is to raise tax rates and/or cut expenses.[19]

If this policy proves ineffective, the budgetary situation will worsen, ultimately risking national bankruptcy. How dangerous such a development can become is observable in southern European countries, which have come close to financial ruin due to high debt levels, rising government bond yields and anaemic growth.

In overly indebted countries, consolidating public budgets requires forgoing additional debt. This reflects the current strategy of the German government. In 2009, against the backdrop of increasing national debt, the Federalism Commission II made a historic decision by agreeing upon a so-called "debt-brake" (Schuldenbremse). Starting in 2016, the federal government (followed four years later by individual federal states) committed to forgoing further debt in the future.[20] The objective is to reduce the debt-to-GDP ratio for future generations. Debts are assessed against economic output and can only be reduced if the economy continues to grow. By contrast, if economic output declines, debt levels rise, even if no further debt is taken on. In this scenario, it is not possible to "grow out" of debt without economic growth.

It remains uncertain, however, whether the German state, which has otherwise acted as a role model on this issue, will retain the debt brake. Exemption clauses allow the federal and state governments to take on further debt in emergency situations such as when "a cyclical development deviates from the normal situation".[21] If secular stagnation were to be seen as such an emergency, the state would be able to take on new loans in order to return to growth – albeit with little chance of success.

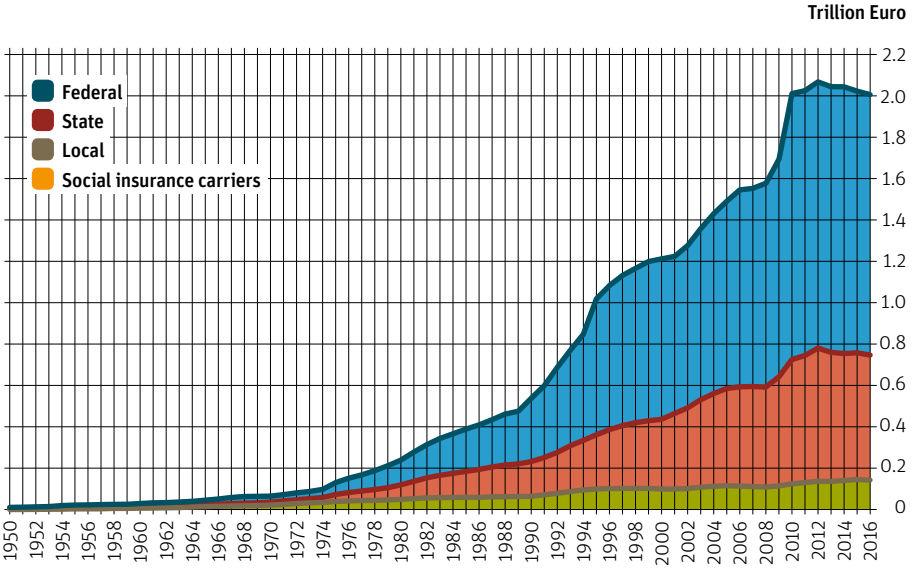
Not being able to obtain new money from the capital market, citizens would have to step in to cover additional expenditures. However, unlike debt, which primarily impacts future generations, tax increases always affect present-day taxpayers, who are also voters. This considerably limits a government's ability to act in this area.

The state in a growth trap

It is widely assumed that growth offers a way out of this unfortunate situation. If growth were high, the state would have more to distribute and could more easily shoulder the burden of aging and demographic change. Growth either enables new debt or increases tax revenues. Without growth, the state would have to raise the tax burden and enact distributive policies. In theory, the state could also drastically cut its expenditure. Doing so, however, would contradict the objective of assuring broad societal participation.

Steep rise, high plateau

In 1950, debts at federal, state and municipality level were lower than 10 billion Euros. This corresponded to 20 per cent of yearly economic output. Until the mid-1970s, debt and gross domestic product were almost in line, so that the debt ratio barely changed. Beginning in the second half of the 1970s, debts grew significantly faster than the economy. In 2010, the debt ratio reached a peak at 80 per cent of GDP.[22]



Total debt on federal, state and local levels as well as debt of the social insurance carriers* (in trillion Euro) in Germany, since 1950 (Data source: Federal Statistical Office[23])

* Debt figures of the social insurance carriers are comparatively low which is why they are not discernible in the figure.

Consequences for the economy

Like the state, modern economies may also be dependent on growth. Swiss economist Hans Christoph Binswanger argues that the economy is driven by a compulsion to grow. His ideas center around the question of how money enters the economic cycle. Nowadays, it is no longer just central banks printing and circulating money. Commercial banks have come to assume this role, by lending money to companies or private individuals. Contrary to popular belief, this money stems not from the bank's savings but is, figuratively speaking, created out of "nothing".

Loans enable companies to buy raw materials and machines and to pay their employees. Companies aim for profits and their expectations are based on the experience that the sum of all revenues needs to exceed costs. However, this works only with a steady increase in money. If the money supply remains constant, companies can at best cover their expenses. Bringing in profits and facilitating growth thus requires banks to continue giving out loans to private companies and thereby bring more money into circulation.[28]

Binswanger's theory suggests that the economy is stuck in a spiral of growth, but one that is no longer spinning. He argues that "today's growth in money and capital must justify yesterday's". Goods that are produced today will enter the market tomorrow, and yield profits only if investments continue in the meantime.

The magic of the monetary system

The foundation of our current monetary system was laid by the gradual spread of paper money in Europe at the end of the 17th century. The new currency did not have to be fully covered by gold and thus had a decisive advantage over the gold and silver coins then in use: the amount of paper money in circulation could be increased indefinitely.[24]

The invention of paper money and the steam engine laid the foundation for economic development in the following centuries. It was in large part due to the new currency that enormous investments in new technology could be made, which enabled the industrial revolution in the 19th century. The ability to create money was an important prerequisite for economic growth.

Today, money creation is predominantly carried out through commercial banks. New money is created by banks, which grant loans to their customers. Entrepreneurs or private individuals thus become indebted to the bank and vice versa. The bank provides a sight deposit to the borrower while committing to pay out the loan in cash if desired. Since bank customers seldom draw their entire balances in banknotes and coins, commercial banks only have to deposit a small portion in deposits or cash with the central bank.[25] At present, the prescribed minimum reserve amounts to just one per cent of the loans given out with the central bank, which only minimally affects their ability to create money.[26] The bank system can thus, at least in theory, continue to create money.

Nevertheless, the banks do not increase the amount of money and credit indefinitely. There are several reasons for this. One of them is that the banks can only grant as many loans as companies demand. Companies usually only do so if they have a worthwhile investment project in mind. But even if there is demand on the part of businesses, this does not automatically mean that the bank also grants them a loan. For the banks, too, will only enter into transactions that are likely to bring them profits as well. For this to be the case, the expected revenues from interest must exceed the risk of default and the costs associated with lending.

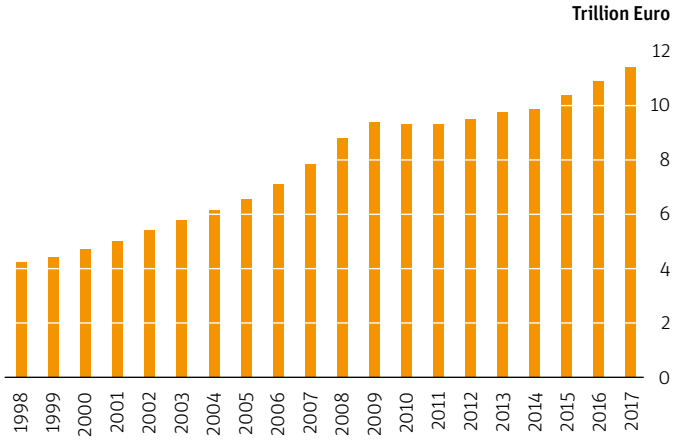
The central bank can also influence the amount of money in circulation. If the central bank increases the key interest rate, for example, commercial banks' costs go up, which are then passed on to borrowers. As a result, the demand for loans decreases, which slows down the overall creation of money.[27]

Investments always precede the sale of newly produced goods. Precisely this sequence is at the center of Binswanger's spiral of growth. For example, higher salaries increase household income, which can be used to acquire the new goods and services that resulted from companies' last round of investment. Only if each cycle increases the amount of money do total revenues exceed previous expenditures and thereby generate profit. Growth requires further growth.

But what happens when the spiral gets stuck and growth comes to a halt? Companies make fewer investments, which leads household incomes to stagnate. Earlier investments are not met by higher demand later on. As a result, profits decline, banks give out fewer loans and investments fail to materialise. More and more companies move into the red and go bankrupt. The forces that previously drove growth are now setting in motion a spiral of contraction.[30]

More and more money on the market

How much money is in circulation? The answer to this question is not easy and depends on how one defines the amount of money. In practice, the M3 figure is commonly used to quantify the money supply, as it covers all kinds of cash money and temporary assets. Since 1998, M3 figures have almost tripled in the eurozone.



Total money supply M3 in the European Monetary Union (in trillion Euro), 1998 to 2016 (data from January each year) (Data source: European Central Bank[29])

Is an equilibrium possible?

Does this mean that the only alternative to growth is contraction – which would mean eventual collapse –, as Binswanger predicts, or is there a viable solution in between? Is it possible to remain in an equilibrium where GDP and the amount of money remain stable? Can a national economy run in a circle instead of a spiral?

Alternative models suggest that a stationary condition is possible, one without monetary growth constraints, where economies remain functional even at constant levels of money supply.[31] Other models project that people would have to rechannel their income directly into consumption and put no money aside, because the result would otherwise be growth pressure all over again. Working people may save their money but only if pensioners spend a corresponding amount out of their own savings. Ideally, net saving and net investment rates should remain balanced at zero over a longer time period.[32] However, a glance at OECD countries shows that this is difficult to achieve in the real world. From 2010 to 2013, Germany achieved a net saving rate between 7 and 10 per cent of GDP.[33] Under these conditions, there remains a dependence on growth and on a steady money supply unless people, in view of diminishing growth, decide to reduce their savings as well.

Companies under growth pressure

Even if the monetary system no longer made growth a requirement, this would not mean that our current way of doing business would be sustainable. The key question is whether companies can survive without growth.

Some economists believe there is only one strategy to survive in capitalism: "grow or go". In this view, companies require growth to hold their ground on the market. They are in constant competition, and cannot lose market share or be defeated in price contests. This is why they invest: to increase productivity. Or they expand production, enter new markets and reduce costs per unit. Corporations often pursue both of these strategies. Expansion and profit maximisation yield revenues, which can in turn be invested in further research and development.[34]

Most executives do not own their firms, and this has crucial implications. Shareholders expect appropriate returns on their investments, such as in the form of an annual dividend. Without payments or growth prospects, investors will sell their shares, the stock price will drop as a result and companies run the risk of being sold or crushed altogether. Those in charge are expected to look for ways to maximise profit. It is therefore rather utopic to expect them to voluntarily do without growth.[35]

These constraints are less applicable to small and medium-sized enterprises run by their owners. Craft enterprises, restaurants or next-door bakeries can survive without increasing sales and profits. A non-representative survey of 700 such companies shows that some operate without growth targets: one third want to keep their company at its current size. One quarter state that growth was not their primary goal while not rejecting it altogether. Just two per cent say they are working towards strong growth. Among those enterprises pursuing little or no growth are primarily small and older

companies, which often operate domestically or on markets lacking substantial growth.[36] They would thus appear to have found a niche with a manageable competition. As such, these examples can hardly serve as a role model for transnational companies, big stock corporations or the many hidden champions in Germany.

No technological innovations without growth

Under weak economic conditions companies' profit prospects are likely to worsen. However, not all companies suffer equally from diminishing growth. Innovative companies will probably remain profitable while an increasing number of unsuccessful companies will be pushed out of the market in a stagnating or shrinking economy. Business start ups are likely to become rare.[37]

In a stagnating economic environment, companies are investing less money in new technologies. Stimuli to modernisation, which could set into motion new economic dynamics, are becoming less frequent. National economies affected by this trend lose competitiveness and corporations consider relocating to places with more favourable conditions. Closing down production sites where no noteworthy prior investments were made does little harm to private companies.[38] However, real damage is inflicted upon those who lose their jobs.

Banks and insurance companies in a tight spot

Low interest rates are considered a global sign of secular stagnation. Not only banks but also private savers suffer from this situation, because they hardly earn anything from their assets. Low interest rates are particularly challenging for German banks, as many focus on the traditional interest rate business – the classic deposit and lending industry.[39] For such banks, decreasing interest rates also reduce projected profits.

A 2015 survey by the Bundesbank of 1,500 smaller and medium-sized German credit institutions – including German credit banks, savings banks and cooperative banks, which form the backbone of the German economy as an important source of financing for SMEs – lends empirical support to this view. Together with the Bundesbank, the surveyed banks developed scenarios for the future, one of which was concerned with low interest rates. The results suggest that the banks' profitability would drop significantly: by 50 per cent by 2019 as compared to 2014.[40] Another study, analysing interest revenues from loans – i.e. the interest rate margin of a bank – comes to similar conclusions. According to the results, at current low interest rates only one in five German banks is likely to achieve a return on equity of around eight per cent by the end of the decade, a level that is internationally expected of banks.[41]

The insurance industry also suffers from low interest rates, particularly in the life insurance and pension sectors. Although the problems are still manageable in the short and medium term, because insurance companies have invested customers' money mostly in older, attractive bonds,[42] this is likely to change if interest rates remain very low in the long run. This conclusion is supported by a study by the International Monetary Fund, which has investigated the consequences of a "Japanisation" of the economy, i.e. permanently low interest rates. Life insurers and suppliers of defined-benefit pension plans, according to the study, will find it increasingly difficult to earn the interest that they have guaranteed on their customers' deposits. Many of them may need additional financial injections in the long term. In the long term, the market for traditional saving products is expected to contract because its products are becoming less attractive both to suppliers and to customers.[43]

Increasing unemployment?

Economic growth generates jobs. This relationship is known as "Okun's Law", named after US-American economist Arthur Melvin Okun, who investigated the correlation between economic growth and unemployment in the US in 1962. Generally speaking, Okun's rule of thumb continues to hold true today. Recent studies have shown, however, that the theorised link differs rather markedly across countries.[44]

Growth must first exceed a certain threshold before employment rates begin to increase. One reason is increasing productivity. The higher the productivity gains, the more products can be produced without hiring new employees. However, technological progress and more efficient production processes have reduced the costs of doing business as

well as the price of goods and services – as a result, demand and consumption rise. While this is unfortunate for environmental and sustainability efforts (see the rebound effect in chapter 5), for the labour market it is a welcome development. The increase in demand leads to an increase in the turnover of companies, which in turn expand production and thereby create new jobs. This is precisely the principle underlying a growing economy.

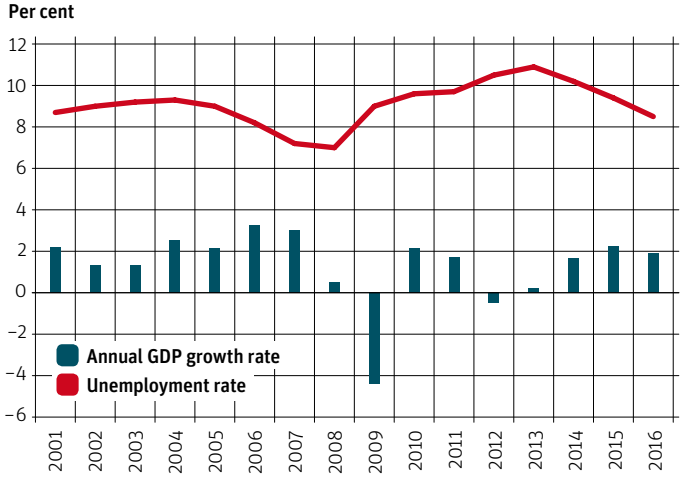
But what if demand ceased to increase in a stagnating economy? Even small productivity gains mean that fewer workers are needed to produce the same quantity of goods. Companies would consequently lay off part of their workforce. Employees with lower qualifications are often the first to lose their jobs.

The longer people are unemployed, the more difficult it is for them to get back into the labour market, because their skills may become obsolete over time.[46] This may apply to younger people, too, if they are unsuccessful in finding a job where they can use their newly acquired knowledge from vocational training or academic studies. With diminishing knowledge, the potential for future growth diminishes too.

To keep the employment rate stable under such conditions, the economy must grow at least as fast as productivity increases. A weak economy means fewer workers are needed. This is where aging societies may be something of an exception regarding their ability to capitalise on demographic change: a shrinking population, or more specifically a shrinking workforce, can better cope with the gradual job cuts that will result from economic stagnation.

Growth is creating jobs

Favorable economic developments between 2000 and 2007 led to a drop in unemployment in the EU-28. The financial crisis, however, brought about a reversal of this trend. Economic output dropped significantly, and a major rise in unemployment followed. It was not before 2014 that a recovery set in and eased the situation on the labour market.



Annual GDP growth and unemployment rates in the EU-28 (in per cent), since 2001 (Data source: Eurostat[45])

Steady state economy

What would life in a steady state economy look like? The notion of a steady state economy was put forward by US American Herman Daly, former chief economist of the World Bank's environment department and a long-time critic of the fixation on GDP-based wealth. Daly regards a steady state economy as the only viable option for sustainable development and the long-term survival of the human race.[47]

However, although Daly's model is based on reasonable economic premises, it largely ignores the everyday pressure emanating from economic, social, demographic and political necessities. He assumes, for instance, a constant population, a stable stock of material goods and a broadly egalitarian society – which does not reflect the current reality in developed nations. Daly also calls for strong institutions to ensure continuity, stability and equality. This, too, is more theory than reality and, as Daly himself concedes, could be a "terrible mistake".[48] For those who regard politics as the art of the possible, says Richard Hartig, political scientist at Texas A&M University, the Daly model is a pure utopia.[49] In fact, Daly fails to show how societies can break out of their growth dependency.

The problem with secular stagnation therefore does not stem from falling GDP growth rates but rather the economy's intrinsic dependency on growth. While there are differing views as to the strength of this dependency, it will probably prove difficult to adapt to a new normality with little or no growth.

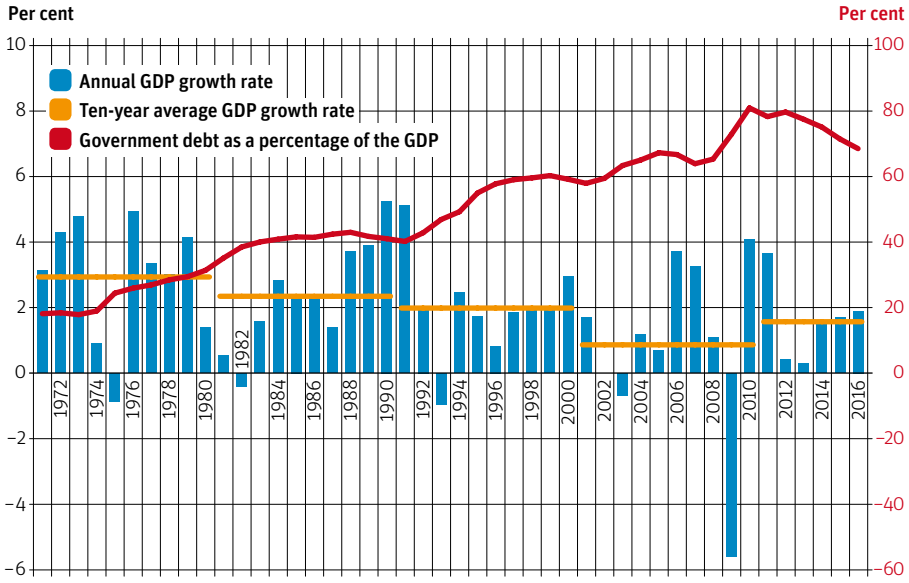
In the absence of growth, contemporary economies run the risk of slipping into a downward spiral which can also lead to high unemployment. In addition, if "newly printed" money keeps flowing into the market, as desired by many central banks, crises can become more frequent. If not used productively, that money will tend to drive real estate and stock prices up and cause new speculative bubbles that in turn threaten to fuel further crises. Should growth anaemia persist in industrialised nations, the ensuing crises will prove difficult to prevent by means of existing monetary policy.

Consequences for society

A well devised policy can give wings to economic growth, at least in theory. Ideally, such a policy would include measures for improved education, investments in research and development, a modern infrastructure, efficient transport systems, an unbureaucratic public administration, support for business start ups and the abolishment of subsidies inhibiting innovation.[50] These are all well-known measures that various countries have adopted with varying degrees of success. But even in those developed countries where this has been achieved, the trend towards declining growth continues. Another concern is that growth has mostly brought with it rampant debt, which suggests that economic stimulus packages were debt-financed, at least in part. In the recent past, countermeasures against stagnation have become increasingly frantic, ranging from "growth acceleration laws" to an immense proliferation of debt (see chapter 3). Seldom did these measures bring about the desired growth rates. It seems that our belief in growth has always been stronger than the realistic prospect of achieving it.

Growth is fading, debt is rising

In Germany, economic growth rates and debt levels have been developing in opposite directions since the early 1970s. In particular during economically difficult times, debt levels rose sharply. However, borrowing money seemed for a long time to have ceased to help the state to stimulate the strong growth that is in turn necessary in order to repay debts at a later date. Only in the recent past has this trend reversed, partly due to the ECB's low interest rate policy.



Annual and ten-year average GDP growth rates and government debt as a percentage of the GDP in Germany, since 1971
(Data source: Penn World Table, German Council of Economic Experts, Eurostat[51])

New headwinds

Not all policies can be expected to yield a substantial potential for growth. Above all, policies face new headwinds that inhibit growth rather than boosting it: spreading nationalism and the threat of protectionism have recently been running rampant, partly caused by financial, economic and labour market crises as well as fear of globalisation and structural change. The political agenda is characterised by demands for trade tariffs and barriers to migration.

On this note it is instructive to consider the US, the world's largest economic power, which can influence global growth expectations merely by virtue of its size and importance. Although the US has recovered relatively well from the financial crisis compared to the eurozone, it too has yet to return to pre-crisis growth levels.[52]

The new president of the United States has set a growth target of four per cent.[53] Theoretically, were Donald Trump to achieve this target he could banish the ghost of secular stagnation. His plans to revive old industries such as steel or coal, reduce taxes, and invest heavily in infrastructure and defense could generate a boom and create jobs, but only at the price of new debt. The announced deregulation of the banking system would make it easier for financial institutions to provide loans, even to non-creditworthy customers.[54] While this measure would stimulate consumption, the real estate market and the construction industry, it could also engender the same toxic mix that led to the financial crisis in 2007/08.

The US' newly proclaimed isolationist policies, characterised by withdrawal from international trade agreements, the erection of trade barriers, and exploding military spending, have been criticized from the inside and the outside. They may not only swell public debt but also engender rising prices for American consumers, decrease competition and, as a result, lead to a decline in innovation.[55] Economist Gunther Schnabl, from the University of Leipzig, argues that the US' new policy is likely to further undercut wealth and exacerbate already severe distributional conflicts.[56]

This would mean, the new President's economic policy would have the opposite effect to that intended, namely more problems for American workers and a new headwind for growth. Donald Trump's policy could have far-reaching consequences: the loss of mobility, cultural diversity and open-mindedness. All this could ultimately endanger democracies both in the USA and Europe.

Wealth and democracy – inseparable partners?

Donald Trump's victory, the triumph of the Brexit camp or the rise of right wing populist parties in Europe are often attributed to economic reasons. Crises, structural change and high unemployment rates, so the argument goes, have made people feel insecure and lose hope in the promise that prosperity is obtainable for all. Instead, the disenchanted turn to those politicians who provide them with easy answers and point fingers at alleged culprits. While this may seem like a plausible explanation at a first glance, it is almost certainly incomplete. An important question is how strongly economic growth and democracy depend on one another. Put bluntly: does the decline of growth bring with it the end of democracy?

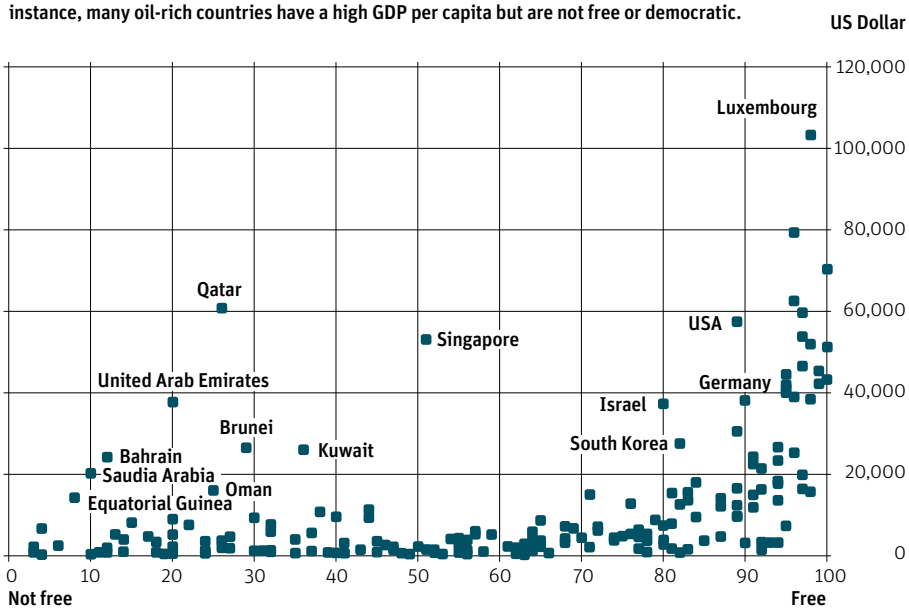
The historical record suggests that prosperity has gone hand in hand with democracy. Almost all rich countries are democracies, while poor states are often authoritarian. But what precisely is the cause and what is the effect here? Does democracy provide particularly suitable conditions for economic recovery or do societies require economic development first before they can develop into democratic polities?[57]

US sociologist Seymour Martin Lipset, who died in 2006, developed a well known theory of the relationship between democracy and wealth. In the late 1950s Lipset concluded that higher income, industrialisation, urbanisation and better education pave the way for the democratisation of a society. He thereby draws upon a basic idea from the Greek philosopher Aristotle, who argued that wealthy societies that are able to eradicate poverty are capable of creating a majority of citizens who participate in political life and stand against irresponsible demagogues.[60]

Following Lipset's theory, a series of studies were published providing empirical support for the causal mechanisms linking economic growth to the emergence of democracies.[61,62] However, more recent work also lends support to a counter argument, stating that democratic structures are a necessary condition for economic growth to gather momentum.[63] The argument is that in a democracy people engage in economic activity because they believe they will be allowed to reap the fruits of their work. This requires guaranteed property rights, the rule of law, planning security and effective anti-corruption measures. Democracies are generally better at providing these than are autocracies. According to this perspective, democracy stimulates the economy and not vice versa.[64]

More freedom, more prosperity

The Freedom in the World Index is a measure of political rights and civil liberties. High values indicate a free society. The freer a society, the higher its per capita income. However, there are also exceptions. For instance, many oil-rich countries have a high GDP per capita but are not free or democratic.



Correlation between the "Freedom in the World 2017" index and per capita economic output in US Dollar, 2016
(Data source: International Monetary Fund[58], Freedom House[59])

A conclusive evaluation of the debate is difficult. There are too many factors playing a role in democratisation. To industrial nations, unlike developing and emerging states, this debate is of little concern, since most of them are democratic and wealthy anyway. The industrial nations are however faced with the question of the survival of their democracy in the face of a decline in growth and wealth that cannot be averted.

In the end, this question will be answered in elections. If voters are convinced that a government did a good job, they will keep it in office. Success is often measured in terms of an increase in real income, a high employment rate and a functioning social security system. If one government fails in the eyes of voters, another one gets to try its luck. So far, so democratic, so good. But what if, as a consequence of growth anaemia, success fails to materialise? Will the ensuing economic crisis lead to political turmoil and eventually to a crisis of democracy as well?

The rise of the populists

Lipset, too, saw in the economic development of a country not only a favorable starting point for the emergence of democracy, but also a guarantee of stability.[65] As long as the majority sees its living standards increase, people tend to stick to the prevailing political system. Most democracies have not yet suffered from stagnation long enough to experience declining incomes and struggling social systems. But without economic growth, more and more sectors of society could experience losses and turn to new political forces that promise a return to the times when economic growth could be taken for granted.

The first signs of this process can already be observed in regions that have already experienced a long period of little to no growth. In Germany, France and the USA, the most affected regions are remote, rural, and partly also industrial areas suffering under structural change. Shrinking populations, the migration of young people, job losses and a dwindling provision of basic services are in many places the hallmarks of demographic and economic decline. Those left behind seem to be strengthened in their belief that they are living in a region that is increasingly decoupled from the rest of the country's

economic development. Whether these people lose faith in democracy remains unclear. Voting behaviour suggests that some of them have lost confidence in established parties, as is the case in Germany, for example. In the most recent state elections in Mecklenburg Western Pomerania or Saxony-Anhalt – states that are particularly affected by demographic and economic change – the new populist right wing party AfD (Alternative für Deutschland) shot from nowhere up to 21 and 24 per cent of the vote, respectively.[66] However, by contrast in Saarland – a state suffering enormously from demographic change – the AfD won relatively few votes.[67]

Without growth, new conflicts are looming

A key advantage of democracies is the empowerment of broader sectors of society to participate in political life and have a share in generated wealth. Democracy depends upon a broad base of support consisting of citizens who believe that democracy will enable them to lead a good life. Economic growth, increasing wealth and educational opportunities created a large middle class in many western countries in the latter part of the past century. This middle class has developed a firm trust in democracy. In addition, thanks to increasing revenues states have set up effective social systems, which protect young and old people from various life risks.

The economic growth of the past was most likely a driving force behind societal participation. However, a recent bestseller by French economist Thomas Piketty, "Capital in the Twenty-First Century", has sparked a global discussion about whether the gap between rich and poor – both in terms of income and assets – in early developed countries is perhaps widening again. Piketty attributes this development partly to shrinking growth rates.[68] He argues that the wealthy few who possess the most capital take a greater share of total income the more growth declines.[69]

Even if many economists disagree with Piketty, it will certainly be difficult to achieve the necessary degree of social balance in a society lacking growth.[70] This applies especially in times of demographic change, where the number of net recipients of income redistribution is inevitably rising. Under these conditions a state cannot hope for yearly gains in revenue that can then be redistributed without controversy. Instead, it would have to resort to taxing existing assets or high incomes. Doing so, however, is politically much more difficult and may engender severe distributional conflicts.

A test for democracies

In summary, all three areas, state, business and society, have strong dependencies on growth. The state in particular may face immense difficulties in the absence of growth. It will have to maintain social security systems for an aging society and yet forgo increases in revenue and refrain from taking on new debt. Business, too, will feel the side effects of shrinking growth. Companies will have to reckon with declining profits, more frequent crises, less investment and slowing technological progress against the backdrop of weak economic growth. The greatest danger would be massive job losses. Mounting unemployment could lead to disenchantment across broad sectors of society. The rise of populist forces and political crises would become more likely and free and open society as we know it would be endangered.

The dilemma is clear: developed countries depend on a rate of growth that is becoming more and more unrealistic to realise. If they nonetheless insist on achieving this level of growth, these nations will have to accept problems elsewhere, such as mounting debt on the capital markets and damage to the environment. States will have to carry out fundamental reforms of their systems and societies, but have so far shown themselves lacking in the necessary courage and imagination.

The question of how state, business and society can free themselves from the shackles of growth cannot be answered conclusively in this study. However, in chapter 6, we will discuss ways of adapting to the decline of growth. First, chapter 5 will address whether shrinking growth may bring with it environmental benefits.

5 CAN THE END OF GROWTH SOLVE GLOBAL ENVIRONMENTAL PROBLEMS?

The fact that economic growth can also bring about problems has been clear since the rise of the environmental movement over 50 years ago. Back then, smoky chimneys polluted the air over industrial areas, waste water disrupted the ecological balance of rivers and lakes, farmland became contaminated with more and more heavy metals, and forests began to die off. Massive protests erupted when, in addition to this creeping damage to the environment, large scale disasters occurred, including the Seveso chemical incident, the Amoco Cadiz and Exxon Valdez oil spills and the nuclear catastrophe at Chernobyl.

A lot has happened since then: at the national level, many countries have passed numerous environmental laws, which have improved regional air and water quality and led to a more careful use of natural resources.

In Germany, SPD candidate Willy Brandt went public with the slogan "the sky over the Ruhr must be clean again" in the run up to the federal parliamentary (Bundestag) elections in 1961 – albeit without success. In the international arena, global agreements such as the Montreal Protocol contributed to the protection of the ozone layer, and the Antarctic Treaty prevented the exploitation of an entire continent.[1]

But after half a century of warnings, research, debate and negotiation, and despite all the efforts of the environmental movement, the overall condition of our planet has significantly worsened. Since the report to the Club of Rome in 1972, which was the first to scientifically question the dogma of growth, carbon dioxide (CO_2) emissions have risen by 150 per cent.[2] Ecosystems that provide us with vital services such as the ability to absorb greenhouse gases, decompose waste material or recycle water, are under severe strain.[3]

A growing world population needs food, which is provided through natural ecosystems. Global economic growth and rising prosperity have placed ever higher demands on food provision, which in turn increases pressure on agricultural ecosystems. Agriculture presently claims over 37 per cent of the global landmass. The intensive use of soils leads to erosion, resulting in an annual loss of 25 to 40 billion tonnes of fertile arable land. This reduces potential yields and the ability of soils to store carbon, water and nutrients.[4]

Expanding agriculture is partly responsible for the global destruction of forests. According to the Food and Agriculture Organization of the United Nations (FAO), people chopped down and burned seven million hectares of wood per year between

2000 and 2010, mainly in biologically diverse tropical forests, of which six million hectares were turned into farming land. Since 2010, global losses and gains in woodlands have been roughly balanced, mainly because new forests are spreading on fallow lands in northern latitudes. However, these attempts at reforestation do not come anywhere near to replacing the biodiversity of lost tropical forests.[5]

Due to human impact, animal and plant species are disappearing about 100 times faster than would be the case under natural conditions. Scientists speak of the "sixth mass extinction", following the five great extinction events in planetary history. Previous extinction events, however, were the result of natural catastrophes, such as the fatal meteorite impact 65 million years ago, causing the climate to cool substantially, ending the age of the dinosaurs and extinguishing around 70 per cent of all existing species.[6]

It is rather difficult to envision how nine to ten billion people are to survive peacefully within a functioning environment in twenty to thirty years if past patterns of economic activity and growth targets are maintained. Conventional wisdom suggests that economic growth cannot be achieved without negative ecological side effects.

Does a shrinking economy bring about greater sustainability?

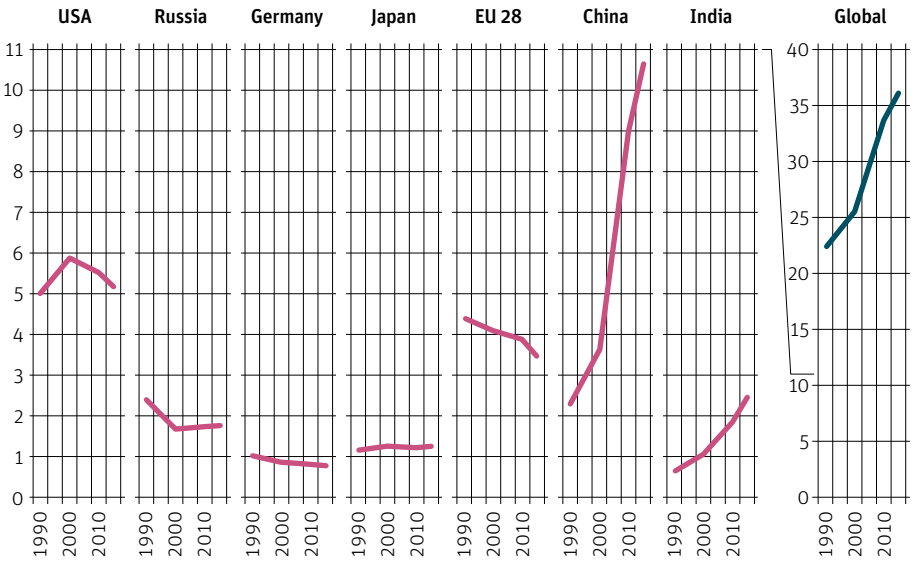
So has the structurally induced decline in population and economic growth come just at the right moment? Wouldn't such a development – although it does not directly come from policy or environmental initiatives such as the Club of Rome or Greenpeace – be the best thing that could happen to our planet?

A key question is whether the equation "more growth = more environmental damage" works in reverse; that is, whether less growth, for example as the result of secular stagnation, will reduce environmental harm as well?

Less growth would certainly be a first step towards sustainability. However, would declining growth in rich countries suffice to overcome far-reaching and global environmental challenges? Or does it instead require a massive economic recession throwing us back a few decades? And would such a recession be manageable or would it have potentially devastating social and political consequences – from the collapse of social systems to an explosion of debt – as described in chapter 4?

Growth is swallowing savings

While in most developed countries CO_2 emissions are slowly declining – despite economic growth – they are continuing to rise in emerging and developing countries. Nevertheless, the United States and the European Union are generating significantly more greenhouse gases per capita than the climate can tolerate. For example, the US was responsible for 15 per cent of global CO_2 emissions in 2015, although it accounts for only 4.4 per cent of the world's population.[11] No country emits more than China, but it is also the most populous state in the world. India is still at the beginning of its economic development and is expected to produce significantly more greenhouse gases in the future. Global emissions, according to estimates, have temporarily reached a plateau – unfortunately a very high one.[12]



CO_2 emissions of selected countries and global CO_2 emissions (in tons), 1990 to 2015 (Data source: Emission Database for Global Athmospheric Research[10])

The pressing burden of environmental problems

In order to understand the extent of global environmental damages resulting from growth and the difficulty of devising solutions to these challenges, the most important problem areas are briefly summarised below.

A core problem for environmental sustainability stems from the ever growing number of people and their growing needs. In sum, ever more people want more and more. Arguably, population growth in highly developed countries has come to a virtual halt. But it was precisely these countries that took the lion's share of natural resources and produced the most emissions in order to fuel their past increase in standard of living. These countries are overpopulated from an environmental point of view; the damage that they cause per capita exceeds what the environment can cope with. In emerging and developing countries the human population meanwhile continues to grow, and a middle class with strong purchasing power is emerging. As a result, energy and raw material consumption is rising substantially, as the examples of China or India show.[7]

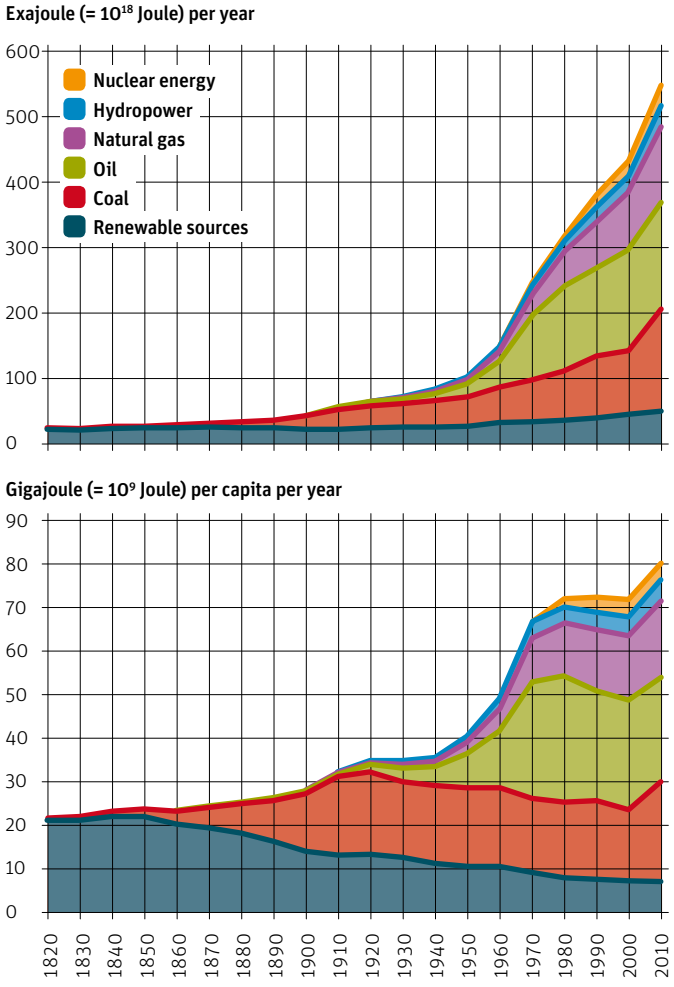
Biologist Paul Ehrlich has formulated the equation "I = PAT" to further our understanding of how populations and businesses affect the environment. The formula stipulates environmental impact (I) to be the product of population (P), affluence (A) and technology (T). It shows that environmental impact increases with the number of people and their income but can be reduced by eco-friendly technologies.[8] Because the effect of population growth and wealth is significantly greater than efficiency gains through technology, damage to the environment is continuing to add up.

This trend is unlikely to change. Although the population growth rate has halved since the 1960s, it is the absolute number of people on the Earth and not the rate of growth that is decisive for the environment, and this number continues to increase by about 80 million per year. While global economic growth has decreased from 4 to 2.5 per cent since the 1970s, this growth today comes on top of an overall economic output that is five times higher than in the 1970s.[9] This implies that a further decrease in economic growth and wealth gains would not have a notable ecological effect – unless new technologies brought about improvements in efficiency so enormous that raw material consumption and harmful emissions radically decrease. This prospect looks so far unlikely.

In fact, raw material consumption has disproportionately increased since 1820 when compared to the growth of the world population from 1 to 7.5 billion. This becomes evident in primary energy consumption, in

Hungry for energy

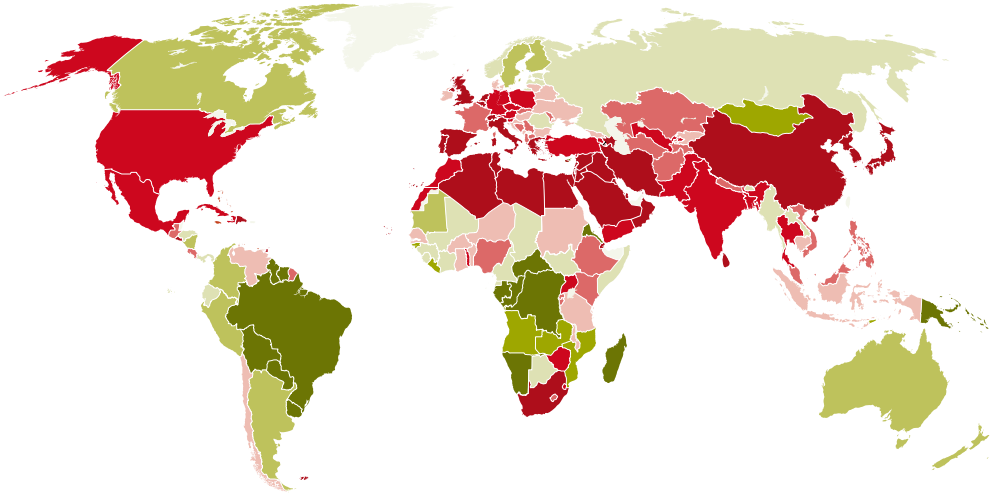
World energy consumption has increased disproportionately to world population, as per capita energy consumption has increased. Although more efficient technologies have slowed this increase, overall consumption continues to rise because humanity is still growing by more than 80 million people per year. As fossil fuels make up 80 per cent of energy production, climate change is accelerating. In order to limit global warming to a maximum of two degrees, global consumption of coal, oil and gas would have to be reduced to zero in the next two to three decades.



World energy consumption in total and per capita, 1820 to 2010 (Data source: Vaclav Smil[14])

Unsustainable

Most countries live way above their ecological means. The "ecological footprint" of a country or region is defined as the excess biologically productive area needed to provide for everything people use and, correspondingly, the extent to which it must "import" certain services because its own biocapacity does not suffice – such as when there is insufficient agricultural land to produce enough food or when more harmful emissions are emitted than can be neutralised within its own territory. On a global scale, countries that stand out as the least sustainable are those that are particularly wealthy (such as the USA and Germany), densely populated (India and China) and have limited biocapacity (oil-rich desert states).



Depiction of countries' ecological footprint as compared to their biocapacity

Ecological footprint exceeds biocapacity	Biocapacaity exceeds ecological footprint
> 150 per cent	0–50 per cent
100–150 per cent	50–100 per cent
50–100 per cent	100–150 per cent
0–50 per cent	> 150 per cent

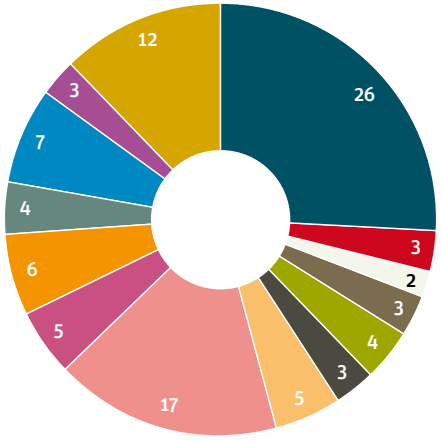
(© 2016 Global Footprint Network. www.footprintnetwork.org.[19])

the form of coal, oil or gas. Over the same time period, primary energy consumption has increased by a factor of 25. That is to say, despite all the technological improvements, per capita energy consumption is four times higher than at the beginning of the industrial revolution. After 1950, during the economic boom, energy consumption sky rocketed, and was only temporarily curtailed by economic recessions such as the oil crises and the financial crisis 2007/08.[13]

To this day, 80 per cent of primary energy production is generated by using coal, oil and gas, which emit carbon dioxide when burned.[15] The economic advancement of industrial nations would not have been possible without these cheap and readily available fossil fuels. CO_2 is the most important anthropogenic, i.e. human-made, greenhouse gas contributing to climate change. In 2015, 36 billion tons of CO_2 were emitted into the atmosphere.[16] Because humanity is discharging more carbon dioxide than the ecosystem can absorb, CO_2 concentration in the atmosphere increased from 0.028 to 0.040 per cent from the beginning of industrialisation up until 2015. In order to avoid an average temperature increase in the lower atmospheric strata of more than of two degrees Celsius, atmospheric CO_2 concentration must not exceed the designated limit of 0.045 per cent.[18]

Cumulative responsibility

Even if emerging economies such as India and China currently exhibit the largest increases in greenhouse gas emissions, CO_2 emissions that have accumulated in the atmosphere stem from the cumulative emissions of the "old" industrialised nations. Through their current wealth and past growth, the industrial countries bear the main responsibility for the human-made greenhouse effect.



Cumulative global CO_2 emissions (by region and as percentage share), 1751 to 2015 (Data source: Carbon Dioxide Information Analysis Center[20], BP[21])

Consequences of climate change

Since the beginning of industrialisation, temperatures in the lower atmosphere have risen globally by about one degree Celsius. 2016 was the warmest year since records began – measured both over land masses and the oceans, in the northern as well as in the southern hemisphere. Nearly all years of the 21st century are among the warmest ever recorded.[29] Currently, temperatures are rising by 0.1 to 0.2 degrees Celsius per decade.[30]

More and more greenhouse gases

Coal, oil and natural gas generate carbon dioxide during combustion. Despite all warnings, from the report to the Club of Rome to a wide range of environmental conventions and agreements, CO_2 emissions have continued to rise. However, for the moment signs suggest that a plateau may be in sight.

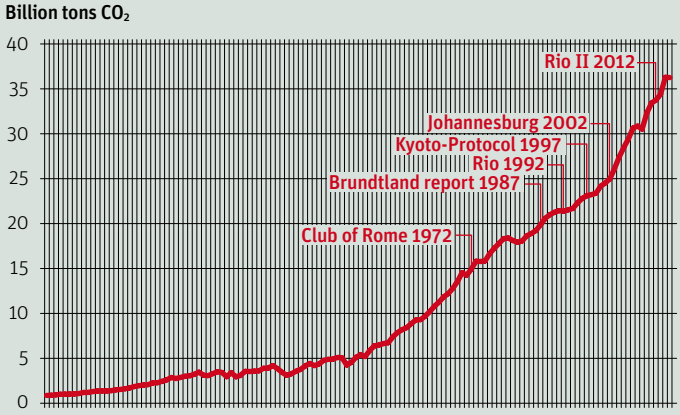
... are warming up the earth ...

As atmospheric physics tells us, Earth's temperature rises as greenhouse gas levels increase. Projections based on past trends suggest emissions will rise by on average well over two degrees Celsius.

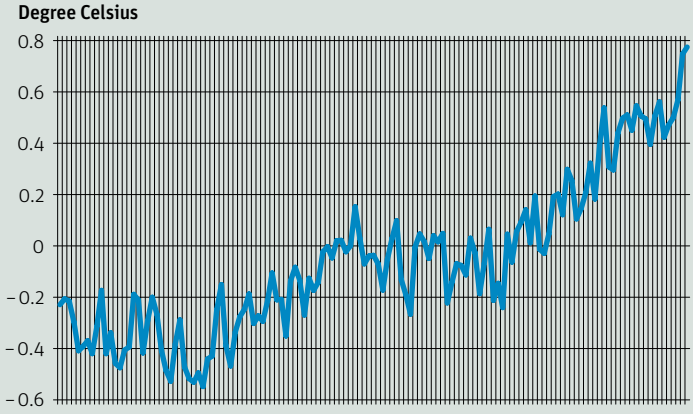
... and leading to a rise in sea levels

Because with higher temperatures continental glaciers begin to melt and oceans expand thermally, global sea levels rise. Without radical climate protection, sea levels will increase by 40 to 70 centimeters over the coming decades and significantly more than one to two meters over the longer term.[28]

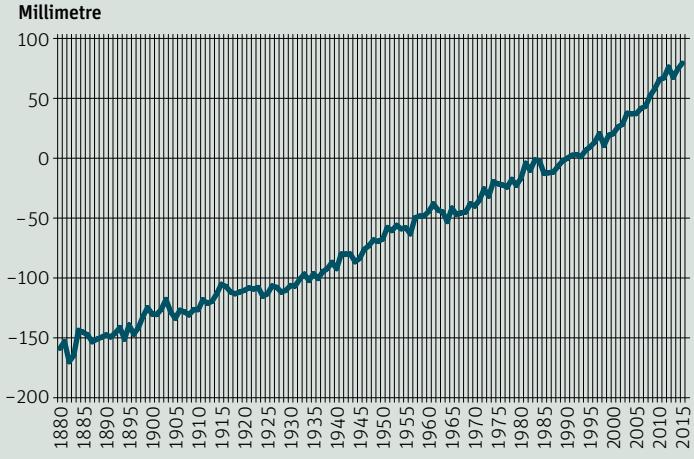
As continental glaciers melt away and the oceans thermally expand due to global warming, sea levels are rising – on average about 20 centimetres since the beginning of the 20th century.[31] By the end of the present century we will likely reach 40 to 70



Global CO_2 emissions (in billion tons) and historical milestones of the environmental movement (Data source: World Resources Institute[22], PBL[23])



Deviation of the global near-earth air temperature in degrees Celsius from the average of the years 1961 to 1990[24] (Data source: Federal Environment Agency[25])



Global average sea level change as compared to the reference value of 1990 (Data sources: Permanent Service for Mean Sea Level (PSMSL)[26], CSIRO Marine and Atmospheric Research[27])

centimetres, without climate protection probably more than one or two metres, argues Stefan Rahmstorf, physicist at the Potsdam Institute for Climate Impact Research. At this point even the strictest climate protection measures would not halt the effects of this warming. Instead, the inertia of the climate system would lead further ice to melt in Antarctica and Greenland.[32]

In 2012, arctic sea ice underwent its lowest expansion since the beginning of satellite-based measurements in 1979. 25 out of 26 glaciers precisely measured by the World Glacier Monitoring Service (WGMS) have continued losing ice. Greenland's ice sheet is likewise dismantling at a record pace. If the sheet melts completely, it will lead to a rise in sea levels of seven meters.[34]

In the meantime, it is not only the upper layers of the ocean that are warming (by an average of one degree Celsius since 1900), but the lower ones as well. One consequence of warmer sea water is the destruction of coral reefs – complex ecosystems that can survive only within a certain temperature range. Higher concentrations of CO_2 in the atmosphere also increase the acidity of the oceans. As more CO_2 dissolves in water it produces more carbonic acid, as in sparkling water. The oceans are currently acidifying faster than they have over the past 65 million years. This transforms living conditions in the oceans and endangers the survival of a number of species. This applies in particular to organisms such as mussels or corals, which under normal circumstances draw CO_2 from the atmosphere and thereby mitigate the greenhouse effect.[35]

Salvation through rationality?

It is to some extent difficult to grasp why global environmental damages add up; because the negative effects of growth are well known, knowledge about the ecological consequences of production and consumption has considerably improved, and there are virtually infinite technological possibilities for making the global economy more sustainable.

As early as 1895, Swedish Nobel prize winner Svante Arrhenius had described and calculated the potential for human-made climate change through greenhouse gases. He concluded that a doubling of CO_2 in the atmosphere would lead to a temperature increase of 4 to 6 degrees Celsius – a result which does not markedly differ from today's sophisticated computer-assisted calculations. It was not before the 1980s, however, that a global warming trend became obvious based on temperature measurements. By 1995, it had became difficult to deny climate change and scientists concluded with 95 per cent confidence that global warming does not have natural causes.[36] A number of reports followed, such as that by the IPCC, and world climate conferences from Berlin (1995) to Marrakesh (2016).

Policy makers have realised the consequences of human-made environmental change: ever since the UN Brundtland report of 1987, sustainability has become a key concept in long-term political planning. At international summits for sustainable development from Rio (1992) to New York (2015), or the Paris world climate conference (2015), thousands of delegates repeatedly pointed out the detrimental impact of human economic activity. The sustainable development goals (SDGs), announced in 2015, are yet another attempt at steering humanity onto a path of sustainability and justice.[37]

Only as recently as 2015, with the Paris climate summit, did 195 participating states manage to agree on measures for limiting the average global temperature increase to a maximum of two degrees Celsius. The reason for the specific choice of two degrees is that going beyond this point would put the world climate system in a critical condition that would have further non-linear and irreversible consequences as well as repercussions that are difficult to foresee.[38] Unfortunately, the agreed voluntary and non-binding objectives will hardly suffice to limit global warming to two degrees, let alone 1.5 degrees, as was the desired goal of the community of states in Paris.[39] In order to achieve even the two-degrees target, humankind would have to reduce emissions from transport, industry and households to zero by 2060. And in the latter half of the 21st century, some of the CO_2 already in the atmosphere would have to be removed somehow. [40]

The two-degrees target will likely be missed because poor countries have to catch up economically. Development is imperative for these countries, not least for providing people with prospects and for managing high population growth, which would otherwise exacerbate a whole array of other problems. The developmental backlog of emerging and developing countries is substantial and likely to consume enormous quantities of raw materials and energy even if state of the art technology is applied. Roads, a (regenerative) energy supply, residential and industrial buildings, hospitals and schools are not constructed out of nowhere. Carrying out such projects requires, among other things, large quantities of material, including cement, whose production is very energy intensive and generates CO_2.

For poor countries, development will have to be achieved, at least in part, by non-eco-friendly means. In order to offset the consequences, industrial nations will have to reduce their emissions much faster and more drastically than envisioned. But this, too, is unlikely. Despite a wide array of political initiatives, there are still no functioning international agreements that can oblige all nations to reduce raw material consumption and emissions, or to preserve soils for agriculture. A reduction in growth would be one way to achieve these goals. But it is unlikely that modern economies will put a brake on growth simply out of conviction. Rather, and as previous chapters pointed out, they are trying to force growth by every means at their disposal. Sustainability targets stand little chance against growth targets.

Salvation through technology?

This is why hope for the Earth's ecological recovery so far mainly rests with the abilities of engineers. They are to develop the technology to achieve what has so far been impossible: more growth with less environmental impact. In fact, economic growth and environmental impact, i.e. raw material consumption and pollutant emissions, have partly decoupled over the past decades. In other words: it is nowadays possible to generate an additional unit of GDP with a lower environmental footprint than in the past. This progress stems from increasingly efficient production systems. Efficiency-orientation is among the basic principles of modern economies, which continually strive to optimise production processes in order to operate more economically and remain competitive.

And yet, decreasing raw material consumption has not materialised on a global scale, let alone achieved something resembling "sustainable growth" which would work without the consumption of natural resources. Growth means more goods and services and therefore an increasing turnover of resources. Hubert Markl, former President of the Max-Planck-Society, once posited sustainable growth to be an oxymoron – a contradiction in terms.[41]

Modern societies find it difficult to decouple growth from natural resource consumption. This is partly due to the so-called rebound effect, also known as Jevons' Paradox. English Economist William Stanley Jevons argued in his book *"The Coal Question"* 150 years ago that a more frugal use of coal would by no means reduce consumption; it would increase it instead.[42] Technological progress may have provided the means to produce iron more efficiently and this was certainly beneficial to producers, but due to increased competition, iron producers had to decrease prices, which in turn stimulated demand. As a result, the number of goods produced from iron, as well as overall consumption, amplified. Productivity gains also helped raise the income of iron workers, who were then able to afford more iron-made goods. This is the paradox, and it is applicable to this day, such as in the case of mobile phones, of which there are currently more in use than there are people on the planet.[43]

Rebound effects are visible in many places; in the second refrigerator, the increase in living space per person, or in energy-saving TVs with ever widening screens. If we still had the same level of efficiency as the first steam engines, their spread and development would have not been possible in the first place. If cars were still being built like the cabs of Carl Benz and Gottlieb Daimler at the end of the 19th century, there wouldn't be a billion vehicles on the streets.[44] The supposedly resource-friendly internet has led to an explosive increase in hardware products, followed by a flood of electronic waste. This waste can only be partially recycled and with great effort. Recycling always requires energy, is incomplete and produces additional waste. It is often toxic, especially when outsourced from industrial to developing countries.[45]

The same but in green

The limits of efficiency gains are also manifest in the so-called green economy, which aims to use "green" technologies to minimise the collateral damage of doing business. It wants to achieve growth by way of renewable energies, intelligent electricity grids, new materials, electro mobility, high-tech organic farming and so on. [46] The green economy basically adopts a classic engineering approach, packaged in green. Parts of the environmental movement adopted this strategy, not least in order to reframe the ecological discourse in ways that avoid pessimism and alarmism. After all, a Green New Deal sounds more promising than austerity and disaster. The demands of the new green movement are quite generic in that they fit into every party program and meet the approval of most companies; they combine growth, technology and environmental protection.

However, there are two problems with the green economy as a universal panacea: first, in order to finance the initial investments necessary for switching to an energy, climate and resource friendly economy, growth is required, which at least in its initial phases is not very green. Second, the underlying principle of growth – more goods, more services – remains, with all the negative side effects that it brings.

The difficulties inherent in such a transformation are evident in the case of Germany's energy transition (Energiewende), which aims to switch from fossil and nuclear resources to renewable energies. At first, such a transition will necessarily require a lot of economic growth, for instance when constructing wind turbines, solar plants, storage capacities and power grids. Their production, in turn, will require substantial raw materials and cause emissions as usual. Once the transition is completed, electricity will flow without the consumption of additional raw materials or emissions – at least as long as the systems do not have to be repaired or replaced.

So far so good: these are the advantages of the new renewable energy system compared to the old, carbon-based industry. Renewable technologies are definitely better than their harmful predecessors. If green growth is to continue, however, the green businesses powered by this green energy will have to continually increase their production and service provision. This involves the consumption of resources, too. And, once out on the market, there need to be people to consume the products, which is not possible without generating waste either. Green growth is still just growth, but with a public relations makeover.

Recycling, another key element of the green economy, can absorb the flow of waste only to a limited extent. Reprocessing works well with classic consumer goods such as glass, batteries, paper, aluminium or iron. Importantly, however, even these products cannot be fully recycled. In addition, the process requires energy and a whole array of machines and recycling plants. Other materials such as plastic or tetra packages can at best be downcycled; that is, reused as inferior raw materials. Further complications stem from the use of modern composite materials, which are not readily decomposable, and the trend towards ever smaller electronic devices. Recovering valuable metals used in mobile phones, for instance, is becoming more expense for this reason.[47] All in all, recycling reduces raw material use – but cannot bring it down to zero, for obvious physical reasons. Under global growth, with the production of goods mounting, recycling is becoming a futile struggle.

World leaders faltering

Achieving climate targets becomes more difficult the more progress a country has already made. Initially, progress is easy. Further developments, however, require considerably greater efforts. Germany, which has long been among the forerunners in climate protection, epitomises the challenges inherent in achieving long-term climate objectives: greenhouse gas emissions have dropped by 28 per cent since the 1990s[48] – against the backdrop of a small growth in population –, but this was largely achieved with one-off initiatives. Antiquated and environmentally harmful industrial plants in East Germany (the former German Democratic Republic) practically disappeared over night. In addition, almost all household waste disposal sites were closed and degassed after reunification, reducing the emission of methane. In terms of reducing greenhouse gases, Germany has already harvested its "low hanging fruit".

Reaching higher hanging fruit, by contrast, is much more complicated: reduction targets become more difficult and costlier to implement the more fundamental the corresponding intervention in industrial production processes and the living habits of people. For instance, the fuel use of automobiles can be readily reduced from twelve to six litres per 100 kilometers. But going from six to zero is much more challenging. Although consumers now buy more efficient cars, there have been no significant reductions in emissions in the transport sector since 1990 because cars have also become bigger and heavier, and people drive and fly more frequently. This is again the rebound effect.

For this and other reasons, Germany has not come any closer to its climate protection objectives since the end of the 2000s. The targets prescribe a reduction in emissions by 40 per cent between 1990 and 2020, and by 80 to 95 per cent by 2050. However, in 2015, Germany was still emitting over 900 million tons of CO_2 equivalents, exceeding the target for 2020 by about 150 million tons. Germany will most likely to fail meet this objective.[49]

The environmental dangers of stagnation

Since sustainable development seems difficult to achieve by political means alone, perhaps secular stagnation may help. After all, serious oil or financial crises have in the past invariably led to less demand and production, declining raw material consumption and fewer emissions. When people feel the need to save, air traffic reduces and consumes less kerosene. When companies shut down because they cannot sell enough products, CO_2 emissions drop, too. Unemployed people use their car less often and reduce their consumption.

But crises such as these decrease energy consumption and CO_2 emissions only temporarily.[50] A recession is normally followed by a return to growth, which makes it difficult to initiate a fundamental shift in the trend. Even when the economy is stagnating or shrinking, sustainable-development is not an automatic result. In Japan, where the economy is mostly stagnating and the population no longer growing, CO_2 emissions have barely reduced since 2000.[51]

On a more positive note: since 2013, global investments in renewable energies have surpassed those in fossil energies. In 2015, more money flowed into renewable energy production than into building new coal, oil or gas plants. CO_2 emissions have only marginally increased since then, but are still too high for climate targets to be reached.[52]

Part of the problem is the market: as demand goes down, raw material prices fall as well. This renders consumption more attractive – and generates a rebound effect, too. In the US, the price for a gallon (3.8 litres) of petrol fell from 4.1 to 1.7 US Dollars between July and December 2008. People took cheap gas as an invitation to drive more. Not long after, consumption and prices went up again, returning to pre-crisis levels by mid 2011. Today, due to the drop in crude oil prices, consumers drive on as little as 2.4 US Dollars per gallon.

And then there is politics, which often responds to a weak economy with cyclical policies that completely neglect environmental impact. What is more, many projects for renewable energy and efficiency were put on ice after the crisis. During an EU meeting in late 2008, for instance, Italy and some eastern European countries announced that this would not be the right moment to pursue previously lauded climate targets.[54]

Make America polluted again

Declining economic growth can even exacerbate environmental damage, particularly if environmental laws are suspended on the grounds that they supposedly inhibit short-term growth, or if antiquated and harmful technologies come back into action for the sake of rejuvenating the economy, as epitomised by the attempt of the newly-elected US administration in 2016 to revive the American coal industry and to create "many millions" of well-paid jobs for Americans.[55] Nobel prize winner Paul Krugman, for instance, considers the job potential of such a strategy slim, but sees in it a viable strategy "to make America polluted again".[56]

Under the impression of an economic crisis, stimulus programs are devised to speed up the turnover of goods during a recession. Or governments pay out subsidies for coal, oil and gas in order to promote growth. According to the IMF, in 2015, globally 5.3 trillion US Dollars flowed into direct and indirect state subsidies (including costs for damages to the environment, health and climate) to artificially hold prices for fossil fuels as low as possible.[57]

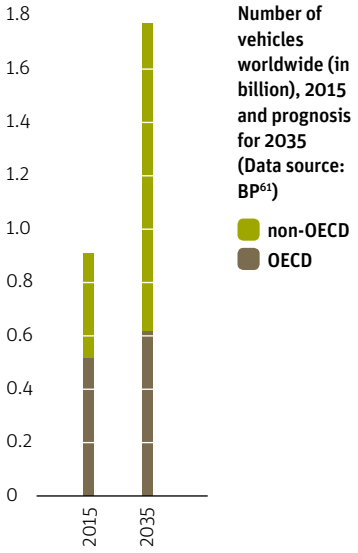
Returning to health through downsizing?

So if neither a structural decline in growth nor a green economy suffice to put the global economy onto a sustainable track, might it instead be appropriate to reduce growth intentionally? This is precisely the idea that critics of growth from the "degrowth" movement have advanced. Their objective is to curb the negative consequences of growth through a sort of new frugality, in order to leave future generations sufficient options and room for manoeuver to determine their own lifestyles. Post-growth advocates fundamentally question the dogma of growth, strive to point out alternatives and are keen on taking on global responsibility.[58]

The post-growth economy is based on the idea of a "sufficiency society". Unlike the so-called "efficiency society", which stresses the development of new technologies to keep the economy running and render consumption more eco-friendly, a sufficiency society aims

Global mobility wave

The growing transport sector is largely responsible for increasing raw material and energy consumption. With the rise of the middle classes in the emerging markets, the global fleet of vehicles is expected to double within 20 years. Even if these were predominantly electric vehicles, the use of energy and resources would still be enormous.



at rolling back consumption and emphasises frugality: buy less, consume less, engage in social projects voluntarily, repair devices and use them longer, forgo travelling by plane, buy local products to decrease transportation distances, turn back globalisation and so on.[59, 60]

Tim Jackson, British Economist and post-growth expert, certainly has a point when he diagnoses as pathological a society in which people spend money they don't have, to buy things they don't need, to impress people they don't like. This critique, originally uttered by Austrian actor Walter Slezak[62], is as old as the philosophies of abstinence and moderation that are practised in many world religions. And yet, reactions to these well-intended appeals are modest at best: people continue to consume relentlessly. This is epitomised in the growing debt of private households from the US to China, the success of e-commerce platforms such as Amazon or Alibaba, the increasing number of cars in circulation and the expanding opportunities for holiday travel. What is more, emerging countries are increasingly copying the industrial nations' patterns of consumption.

Even if the sufficiency life model became a global mass movement – and succeeded in reducing raw material consumption, harmful emissions and environmental problems – there would remain one fundamental dilemma: social systems by design rely on growth. Working, producing and consuming less would remove millions of jobs and cause incomes to dwindle. This would reduce state revenues and cripple public budgets, leaving less money for social programs such as investment in education, care for an aging population, aid for refugees and overseas initiatives to promote sustainable global development. If structural growth anaemia alone already poses such huge adaptation problems, as shown in chapter 4, making a targeted transition to a post-growth society is likely to pose even bigger hurdles.

A functioning post-growth economy that can provide prosperity, ensure social and global balance, and thus open up room for the global South to develop, needs a much broader approach than just restricting consumption.[63] Viable societal and developmental concepts are required; concepts that function on a global scale and reduce the unavoidable costs of growth.

Less but better = ecological dividend

Economist Uwe Sunde, from the Ludwig-Maximilians-University Munich, considers it redundant to enact targeted growth reduction measures in countries that are headed towards secular stagnation anyway. If so, would it perhaps make more sense to look for ways of organising these countries to cope with less growth and to equip them with the tools to do so? Three steps are necessary for this:

Firstly, under these conditions, it is necessary to accept the decline of growth and refrain from taking old, conventional, and ecologically counterproductive measures in responding to anaemic growth.

Secondly, growth would have to focus on those sectors of the economy that verifiably contribute to improving the environment. Even an economy that has ceased to grow tends to benefit from, if not require, innovations and progress in certain sectors. Such an economy would have to pursue the goal of becoming ever more efficient despite the decline or absence of growth.

Thirdly, society should explore niches for business models that are less dependent on growth. As low growth continues and potentially becomes the new normality, such models will become the foundation for human prosperity in the future.

Only if all this succeeds is the consumption of resources likely to drop faster than economic output, in which case secular stagnation may yield a kind of "ecological dividend". In the following chapter, we will discuss novel approaches to restructuring industrial societies in this regard.

6 WHERE DO WE GO FROM HERE?

How should society, politics and business readjust to diminishing growth?

In early developed countries, the end of growth does not inevitably lead to decline. The main challenge will be to maintain their (by global standards) extremely high quality of life and to distribute wealth equally so that societal cohesion is safeguarded.

This raises three questions: First, how to prepare people for a future where the maxim of "ever more" is coming to an end? Second, how to release state, economy and society from their almost compulsive reliance on growth? And third, what would an ecological market economy look like, where sustainability is just as much a priority as maintaining appropriate living conditions and ensuring that future generations retain a sufficient degree of freedom?

Societal debate is paramount. The manifold challenges associated with economic contraction are mostly unknown, but have fundamental economic implications. The relevant debate has not yet been initiated, and is not a very popular topic, because of the negative connotations of declining growth. Politicians will never run a campaign with the slogan: "Dear voters, we need to talk about how to distribute a smaller pie". What is more, a structural decline in growth is an entirely new notion; people have so far little knowledge and experience of it. There are very few tested approaches, for example for maintaining social systems or servicing debt in the absence of growth.

This debate may seem unnecessary at the moment because growth is on an upward trend – globally speaking. Germany, for instance, has achieved record-high tax revenues. However, this is likely to be a temporary peak which will flatten out in the long run as soon as the headwinds described in chapter 2 intensify.

Caution mandates preparing a plan B against the prospect that growth and stagnation harden in the long run. Drawing up such a plan is necessary in order to curb the ecological repercussions of growth and to achieve sustainability in the long term. This should be done while there is still time to debate, explore and adjust concepts to changing conditions. Crucially, some reforms, for example of social systems, require decades to take effect. Since secular stagnation occurs gradually, strategies can be refined along the way if necessary.

Devising a plan B for societal reorientation will require bringing in experts from different sectors of society – business, politics, science, interest groups, non-governmental organisations and trade unions – to develop a model for handling waning growth, which can later be put to practical tests.

Does growth equal accumulation of wealth?

A crucial question is how economic growth benefits people in highly developed countries if it merely serves to repair the damage done by earlier growth. So far GDP has been the main indicator of a society's success. However, proper prosperity is not accurately measured by GDP, let alone wellbeing; GDP simply adds up the total value of goods and services produced by a national economy during a given time period. This measure also counts economic activity in response to events that are not strictly related to prosperity, for example by counting police operations after a terrorist attack or efforts to repair environmental damage. By contrast, informal work and unpaid labour such as family care or voluntary work do not flow into GDP, despite their obvious contribution to social welfare. Many economists agree that GDP is not an ideal indicator of wealth but are also resigned to its use for want of a better alternative.

Whether people feel content depends on many factors that have little to do with GDP. Having a meaningful job and social contacts, or living a healthy life in a democratic and egalitarian society are all conducive to happiness.[1] Happiness, however, is difficult to measure and therefore unsuitable as a macroeconomic indicator.

Affluence is in any case not an appropriate indicator of perceived happiness. At the beginning of the 1970s, US American economist Richard Easterlin analysed survey results and found that people in the US were not becoming happier despite strong growth in material wealth. This effect is known as the Easterlin paradox, which states that money increases wellbeing but after a certain level does not bring about additional happiness. This is why the rich are on average more content than the poor, but do not get happier simply by amassing further riches.[2]

New yardsticks

Societies should therefore use yardsticks other than GDP growth. Precisely which indicators are most appropriate is difficult to determine. They should however be sensitive to vital issues such as sustainability, protection from poverty and unemployment and the right to education. These goals are more important than economic growth. And yet many of them might turn out to be difficult to achieve in the absence of growth. In view of enduring economic weakness it will be necessary to explore alternative ways to meet these needs. Only when people agree on these premises can a new debate emerge; a debate that enables politicians to seriously engage with the topic without fear of being penalised in the next elections.

For people living in highly developed countries, getting used to diminishing growth is likely to be a problem. Another, potentially even bigger, issue concerns how state and business are to adapt to fundamental changes in the macroeconomic context.

1. Accept declining growth

First, it is necessary to come to terms with the structural decline of growth. This likewise involves refraining from taking ineffective and ecologically harmful measures against it. The cases of Japan and the EU show that cheap money and cyclical policy cannot bring back growth by force. These examples also show how additional debt exacerbates existing problems and restricts states' future options. Facing stagnation, states have to refrain from taking on new debt and service existing debt first. In Germany, for instance, the so called debt-brake represents a step in the right direction. However, whether it can also endure more difficult economic times remains to be seen.

Without economic growth, highly developed societies are likely to lose revenues as long as they are reluctant to raise taxes. At the same time, public expenditures will increase due to demographic change. One way to respond is by cutting social spending. But the possibilities for doing so vary across countries. In Greece, for instance, drastic reductions have caused living standards to drop dramatically. In Germany, earlier reforms reducing social spending have left little room for further cuts. In view of increasing old-age poverty, lowering pensions further, to below the allowed level of 43 per cent of the

average income, is unacceptable. Another possibility is to peg the retirement age to increasing life expectancy. Any additional year in life expectancy could be distributed proportionately between working and retirement phases. This would lift the German retirement age up to 69 years by 2060. Doing so promises a double relief, because people would pay into public pension schemes longer and receive benefits later.[3]

Mounting health care expenditure likewise calls for reductions in spending. Here, too, the possibilities vary across states. Japan, for instance, has low health expenditures with very high life expectancy. In the US, it is the other way around, which may be an indication of inefficiency and there being further potential for savings. By contrast, Germany has a highly developed and well accessible health system which incurs fairly average health expenditures.[4] In Germany, too, the retiring baby boomer generation and rising number of elderly people are likely to increase expenditures drastically in the future. One way to reduce costs is to adopt prevention strategies: people who do not smoke, maintain a well-balanced diet and exercise enough are less likely to fall ill with diseases of civilization such as diabetes, obesity, high blood pressure or certain forms of cancer. Policies can promote such a lifestyle. Information campaigns, clear labelling of sugar or fat as well as a comprehensive ban on tobacco advertisements are important steps.[5]

2. Create new sources of revenue

One of the greatest challenges for industrial nations is to provide their citizens an adequate income while remaining able to finance social systems. The tax burden on labour should be limited as much as possible, as it could otherwise intensify declining growth and therefore cost jobs. This is why states affected by declining growth need to find new sources of income.

2.1 Tax robots and machines – or their owners

Since more intelligent machines are being employed, it would be reasonable to levy a tax on them. Currently, taxes mainly burden the labour force and not robots. The latter therefore have a price advantage over humans and will, for that reason alone, take on increasingly more tasks.[6] A robot tax is meanwhile gaining in popularity in the increasing debate about the repercussions of industry 4.0. Microsoft founder Bill Gates, another advocate of the robot tax, envisions using these revenues to train unemployed people for new jobs.[7]

Some economists are rather lukewarm about this idea and argue that the rise of machines and robots has so far benefitted humankind more than harmed it – who would want to replace the harvester with the good old scythe, the automatic road cleaner with the street sweeper? Another argument of the opposing camp is that a robot tax could hinder technological progress, which in turn would reduce productivity gains. Germany and similar countries are most likely to lose out from this, because their competitiveness stems from the employment of new, capital-intensive production processes and not from labour-intensive craftsmanship. Outsourcing may be another consequence, with companies that rely heavily on robots and machines moving to other countries.[8]

A possible solution is to tax the owners of robots instead, for instance by increasing taxes on capital income in the form of dividends or payouts. Doing so would allow the state to cash in on a greater share of profits stemming from automation, use these revenues to offset the increasing divide between capital and labour income and thereby contribute to social equality.[9]

Jobs for a few – unconditional basic income for all?

There is little doubt that machines have in many cases freed people from doing demanding physical work. Swedish health expert Hans Rosling, who died in 2017, even considered the washing machine the most important achievement of the industrial age, because it gave women time for more important things such as education and career.[10] However, what if the oft-invoked scenario materialises in which machines and robots take away people's employment and income?

In the debate on the future of working life, the robot tax and social security for those who lose their jobs are two aspects of a single overall strategy. Some economists argue for a reorganisation of the welfare state to prepare it for a world where many jobs will be replaced by machines. Against this backdrop, Thomas Straubhaar, former director of the Hamburg Institute of International Economics (HWWI), has revived an old concept: the unconditional basic income. The idea is that, instead of conditional social security payments, people receive a monthly income from the state. With this money, they can buy products created by the machines that replaced them. Unlike current social security payments, the basic income would be financed primarily by tax money and not through premiums paid by working people. This would allow the state to draw upon different sources of revenue to finance the basic income – from taxes on wages and capital returns to the business tax and VAT, or a robot tax.[11]

Is it possible to finance such a basic income? If each of the 80 million inhabitants of Germany was to receive a basic income of 1,000 Euros, the state would have to make available a trillion Euros each year. The state could almost entirely finance the basic income by completely cutting existing social expenditure, which amounted to around 900 billion Euros in 2015.[12] But all social services – ranging from pensions, unemployment and housing support, to job placement services and training programs – would cease to exist as a result. Critics object that such a system does not take into account the fact that different people have different needs, as some individuals require more support than others.[13]

In the event that robots take over a great deal of work from humans, the basic income may even widen existing social divisions: a productive group in charge of developing and handling machines; and another group whose services have become obsolete and is therefore compensated with 1,000 Euros a month. Introducing the basic income may also lead people to work significantly less. As a consequence, the employment rate and tax revenues may drop – perhaps more significantly than would be the case as a consequence of automation alone. Not only would this erode prosperity, it would also deprive the basic income of its financial base.[14]

2.2 Tax harmful things, unburden others

In 2016, Germany's tax income amounted to 516 billion Euros (excluding municipal taxes).[15] Revenues from the income tax amounted to 36 per cent of all revenues, making it the second largest contributor to the public budget. In addition, there are social security contributions paid by the employer and employees. Taken together, these expenses not only render the financial burden on labour fairly high but, as a corollary, negatively incentivise companies to cut labour costs. In an economy that is barely growing and creates few jobs, maintaining existing jobs is becoming paramount.

A socio-ecological tax reform, as introduced by Germany in 1999, offers a possible way to reduce labour costs and preserve jobs. The idea was to tax environmentally-harmfull behaviour such as the consumption of fossil fuels and other resources and to reduce labour costs by cutting pension payments. The tax reform prevents additional charges accruing for the average tax payer. Overall, it not only helped reduce energy consumption and CO_2 emissions but also the cost of pension contributions.[16]

Its positive environmental impact did not last for long, however. After a while people had adapted to higher energy prices and consumption rose again. In addition, energy-intensive economic sectors such as the cement industry or agriculture had achieved an exemption from the eco-tax. Policy makers failed to make a case for the eco-tax and to persuade citizens of the link between higher energy prices and the reduction of the financial burden on labour, in part because lobby organisations also managed to portray the measure as a cash grab.[17]

It would nonetheless be a good idea to continue to expand the eco-tax programme. Several EU member states, including Denmark, Slovenia and the Netherlands, report high income from environmental taxes.[18] If the tax is revenue-neutral, budgetary income does not increase overall, but the tax has positive effects on the labour market, generating indirect revenues, for example as a result of lower pension contributions.

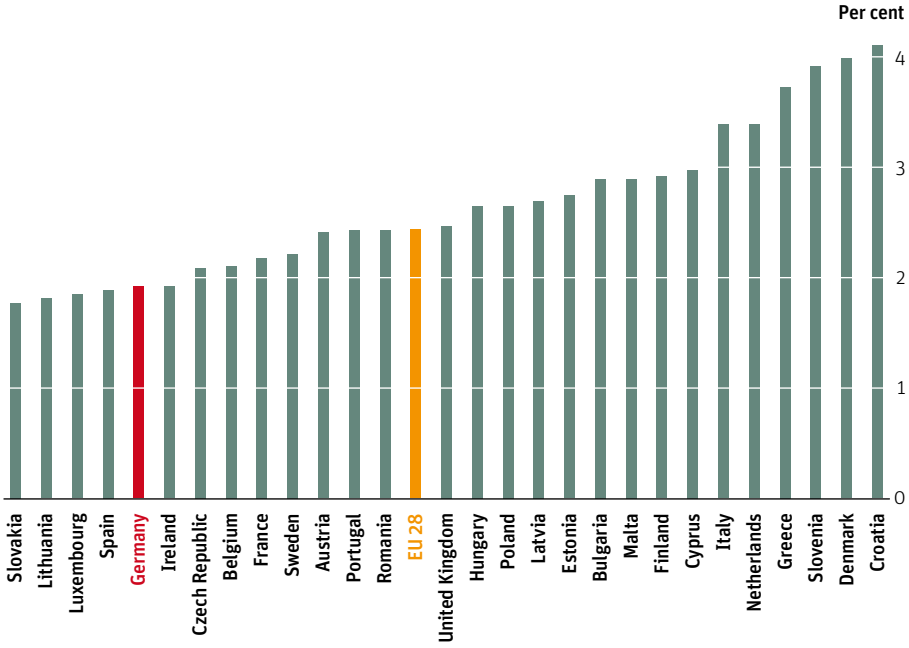
The situation is different in certain emerging countries in the Asia-Pacific region, including India, Indonesia, Thailand and China, who have recently become eco-tax pioneers. These states have understood the environmental repercussions of unbridled growth. A key rationale for developing and emerging countries to raise an eco-tax lies in its capacity to curb environmental harm. Another is to fund public budgets, because income tax revenues in these countries are comparatively low due to a larger proportion of the informal sector.[19]

3. Promote investments in sustainable technologies

Environmental protection and sustainable business are not luxuries to be indulged only in times of economic upswing. In fact, sustainability should be a key priority in any stagnating economy. However, some governments are again and again tempted to resort to old, resource-intensive technologies in order to win back an extra percentage point in growth.

Policies that aim to stimulate innovation and growth should distinguish between eco-friendly measures that increase a society's wealth, and harmful measures that preserve jobs but without consideration for later costs. An eco-social market economy must therefore promote competition among companies so that innovations emerge while at the same time creating clear rules and support networks. Such an economy also needs strong and effective national and international institutions, which adopt emissions standards, set upper limits for CO_2 emissions or introduce targeted bans.

How progress and rules can lead to success is epitomised by the so-called top-runner-principle – a Japanese invention from the 1990s, which has endowed Japan's technology sector with a long-lasting competitive advantage. The top-runner-principle requires comparing the energy efficiency of all devices in a given category (such as refrigerators or vehicles), and then making the most economical device the standard for the entire industry. Devices that exceed this consumption limit cannot be sold after a specific deadline. This rule forces companies to innovate and to consider environmental friendliness. The principle can also be extended to houses, services or industrial processes.[21]



Regulation through taxes

States that tax ecologically harmful production processes or high energy consumption kill several birds with one stone. They promote eco-friendly behaviour while increasing revenues. If the state uses these revenues to reduce pension contributions and thereby relieve labour, the employment rate rises as a result.

Revenues from environmental taxes in EU countries (as a percentage of the GDP), 2015 (Data source: Eurostat[20])

4. Facilitate creative destruction and take advantage of the ecological dividend

It is not possible to halt structural change; at best, injections of money can only delay the inevitable. And yet, politicians again and again use subsidies to keep outdated structures alive. A case in point is Germany's coal industry, which was subsidised with over 300 billion Euros from 1950 to 2008. The subsidy scheme will only end in 2018, when the last mine closes.[22] That money could have been put to better use in the form of structural adjustment programs in the Ruhr region or funding for renewable energy research. These are measures capable of creating high-value jobs, facilitating the energy transition and mitigating the ecological follow-up costs of fossil fuel consumption.

Doing away with unsustainable habits in as part of the process of creative destruction is the first step towards promoting progress and sustainability; harmful technologies need to be replaced by eco-friendly ones without jeopardising jobs. This goes for to the combustion engine just as for the use of coal, oil and gas in the energy industry. Creative destruction can bring about environmentally fair products. Together with structural growth anaemia, this may even engender an ecological dividend: only then would declining growth yield environmental benefits.

Developing countries: Where urgently needed growth must be generated with as little damage as possible

In order to tackle climate change, the most energy-efficient and least polluting technologies would have to be deployed all over the world as quickly as possible – especially in those countries at the early stages of their development. In emerging and developing countries, this requires profitable technologies that promise economic growth. Developing countries should take advantage of advanced states' experiences and not repeat old mistakes, such as resorting to fossil fuels in setting up energy supply systems. Energy is a prerequisite for economic growth and key to the process of catching up with more advanced countries. In addition, massive investments in education and jobs will become necessary to give people perspectives. As a consequence, a new middle class will emerge. These individuals will promote economic growth through rising consumption. But this process will also have negative side effects: raw material consumption will rise and ecological problems intensify. These downsides of development can be minimised but not eliminated.

5. Limit the creation of money

It is difficult to invest money productively in a stagnating economy. Whenever the supply of money increases, the probability of speculative bubbles goes up as well, especially on the real estate and stock markets. Some economists advocate restructuring the money system to give the state more control over the amount of money in circulation. So far commercial banks have been pivotal in creating money; they do so whenever they provide a loan for a client. The ability to create money "out of nowhere" endows commercial banks with a crucial privilege. Critics argue that this facilitates the emergence of bubbles that cause severe economic crises.[23] They demand far-reaching reforms to improve the stability of the economy.[24]

As early as the 1930s, several US economists from the University of Chicago led by Irving Fisher developed a proposal for reform of the money system. The plan: banks must cover 100 per cent of their deposits with central bank money and money creation must become the task of public institutions.[25] A group of IMF economists have developed a model reflecting many of Fisher's ideas. In their view, a reformed monetary system reduces the risk of economic fluctuations through speculative bubbles. It also prevents bank runs during financial crises. The model also projects a decrease in public and private debt levels in the long run.[26] While there is disagreement about these conclusions, for instance from the German Bundesbank,[27] the model – if it holds true in the real world – may help free the economy from its dependence on growth and make it less susceptible to crises.

6. Support the companies that rely the least on growth

In a capitalist system, companies can rarely avoid maximising profits, unless they want to be competed out of business. Organisations that are not stock corporations are often subject to competition too, ranging from public or ecclesiastical organisations to cooperatives or foundations.

Does profit maximisation necessarily mean growth? Big stock corporations are bound by this rule as they need to meet their investors' return expectations. Family-run companies or business partnerships can operate differently. There are examples of enterprises that are able to work just fine at constant levels of sales: a Franconian brewery that sells its beer within a certain radius only; the craftsman and baker with a constant customer base; or a traditional company with high-quality products.[28]

These companies do not inherently rely on growth, but they cannot serve as universal role models. Most of them fill a certain niche and are subject to little competition. A chemical company or car manufacturer has to operate under different conditions, internationally and under constant pressure to grow. It is for these reasons that some post-growth advocates support the idea of funding small and regional enterprises.[29] The much harder task, however, is to curb the growth hunger of stock corporations. Executive managers amenable to progressive ideas should be held to pledge not only to increase returns on investments but also to work to preserve public goods. The state ought to limit the privileges of stock corporations and extend its support for cooperatives and foundations.[30]

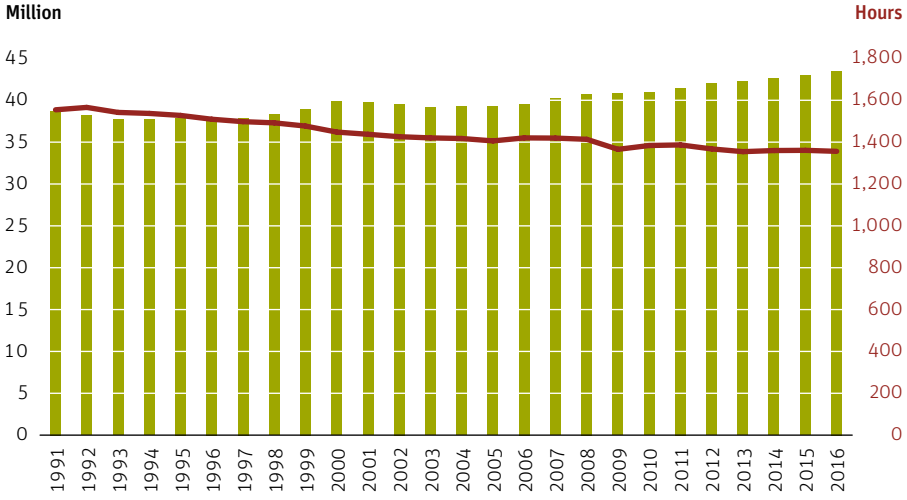
7. Better ways to distribute work

Less growth also means less work. How can the labour market function under these conditions without unemployment rates skyrocketing? A common suggestion is to improve working conditions, by reducing working hours or introducing more flexible job models. Even if the sum total of work load does not increase, these measures would create jobs for a greater number of people.

To take a recent example: in Germany, unemployment rates did not increase dramatically in the wake of the financial crisis of 2009 and the ensuing economic contraction.[31] This so-called German miracle was possible partly because companies were able to go back to short-time work (Kurzarbeit). State subsidies helped German companies to keep their employees on the pay roll. Importantly, however, this is only a temporary measure for responding to a recession.

Less work, more workers

Since German reunification, the number of people employed in the country has risen by almost five million. However, this does not translate into more work. The average number of working hours per person per year has decreased by almost 200. Overall this has led to a slight drop in the total number of working hours, from 60.2 billion in 1991 to 59.4 billion today.



Number of people in employment (in million) and their average working hours (per year) in Germany, since 1991
(Data source: Federal Statistical Office[35])

Cyclical recessions aside, there has also been a general long-term trend towards shorter working hours. Since 1970, the average yearly working hours of OECD wage earners have decreased by 200.[32] And yet, most workers have been able to increase their real incomes. If long term growth anaemia takes hold, the picture is likely to differ; less work will mean lower incomes. This need not be a drawback if people take advantage of its upside: additional leisure time – as John Maynard Keynes predicted for a post-growth society as early as 1930.[33]

People might have more time for themselves, their hobbies and family, neighbourhood services and social engagement. They might suffer less from career pressure and stress. Whatever their loss in material wealth, people may readily compensate for it by doing more things by themselves – helping the children with their homework, painting the apartment or taking care of a relative. The question is whether people are ready and willing to do so. It is possible, but not certain.[34]

8. Prepare for change

There are strong indications that the rapid growth that we experienced in the past, and that created our present wealth, was a temporary phenomenon. If so, societies need to radically rethink old habits. People will continue to demand happiness, welfare and equality, with or without growth. The same applies to creating educational opportunities and job chances, maintaining a sustainable economy, stable democracy and solid public budgets.

Against this backdrop, policy makers can choose between two courses of action: they can either decide to prevent potential harm from happening to their people, or they can do nothing, and hope that the problems will go away by themselves or that people will in the event come up with some idea to help themselves. These two variants correspond to what experts call *change by design* and *change by disaster*, respectively – the former requires forethought in the form of a plan B.

Humankind definitely has more experience with change by disaster. People are generally quite bad at thinking ahead. They have difficulty kicking habits that bring short-term gains but long-term losses; why make any changes if things are going well now? Instead, they tend to wait until after the horse has bolted. For instance, it took forests and lakes to die in Europe and North America before governments enacted air quality laws. And it took several shipping accidents contaminating coastal regions before double-walled oil tanks became the norm.[36] Likewise, financial markets were only made subject to regulation (and then only partially) after the Lehman Brothers collapse triggered a global recession.

Change by disaster means suffering the damage for a certain period of time, during which the living conditions of entire generations can worsen. In the case of climate change, this period may last for a very long time, way beyond the time scales conceivable to human beings.

A secular stagnation, too, can cause disaster, for instance if monetary policy interventions bring about new real estate and stock market bubbles instead of investments stimulating growth; if Euro-countries fail to grow out of their debt traps and become ever more lethargic; if companies and states go bankrupt, unemployment skyrockets and social systems collapse because they are predicated on a growth that is no longer achievable.

This is why change by disaster should be avoided at all costs. Starting from scratch after a bankruptcy or financial crisis would be much more difficult than gradual adaptation. Letting a massive crisis occur in the hope that this will bring a reform with it is a blind flight into chaos. Nobody knows the chain reactions such a crisis is capable of unleashing. In the worst case, people may lose faith not only in the economy but also in the political system. They could turn to populists and autocrats. International conflicts among crisis-ridden countries may ensue. Germany knows this all too well, as it went through a similar experience after the world economic crisis in the 1930s.

Developed countries have an enormous body of knowledge on the relationship between economy and environment. Most importantly, they have functioning institutions and the financial means to conduct research on how to reach a truly sustainable path of development. They are ideally placed to develop a plan B to find ways out of the growth trap.

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+++ diminishing economic growth in industrial nations +++ conventional instruments of economic policy are failing +++ debating secular stag
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