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The "five Ds" of structurally higher inflation

Demographics, decarbonization, deglobalization, debt, digitalization

Executive Summary

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Over the last decades, and especially since the global financial crisis (GFC), structural factors have caused a secular decline of inflation. Globalization, digitalization and aging populations in advanced economies have been strong disinflationary forces.

The negative supply-side shocks from the recent crises have reversed this trend – inflation has surged on the back of containment measures (constraining supply chains) or sanctions on energy imports from Russia (raising gas and oil prices). While creating more resilient supply chains and onshoring could slow the pace of globalization (and thus reboot inflation due to tighter labor markets), higher energy prices represent a new structural factor, which is likely to persist even if the war in Ukraine comes to an end.

We see five structural factors – the five Ds – that will determine the course of inflation over the longer term: decarbonization, demographics, digitalization, deglobalization and debt. The net effect of the factors will be inflationary, with significant variation across countries. The supply of labor is declining, which increases the wage pressure (demographics). Costs are rising directly (decarbonization or rising carbon prices) or indirectly (deglobalization). The pricing power of companies is increasing (digitalization). And rising debt levels could generate inflation bias, which could in turn threaten central-bank independence if debt-sustainability concerns encroach on setting a monetary stance aimed at keeping prices at the inflation target.

However, the inflation impact of these factors can change and is significantly influenced by economic development and policy choices affecting the supply side. The decline in the labor force, for example, can be mitigated by countermeasures to increase activity rates (e.g. more older workers and more women in full-time employment). The inflation impact of de-globalization – or more precisely, decoupling from China – depends heavily on the geopolitical circumstances.

Also the demand side cannot be ignored. Decarbonization is one case in point. The higher the carbon price, the faster energy systems transition away from fossil fuels – and the lower the inflation impact of energy consumption. The same applies to demographics: older people generally consume less and differently, which may have a disinflationary effect due to higher savings (especially if social security systems provide less financial protection at old age). Finally, investments in innovation and automation (e.g. AI) could carry higher productivity gains, which dampen inflation.

Therefore, the actual or adjusted inflation impact might be considerably different from the initial impulse. Over the long term, we see the highest inflation pressure coming from demographics, deglobalization and debt as these trends are the hardest to mitigate – and might even deteriorate further. Overall, the five Ds might significantly lift annual inflation (by up to 1pp).

The structural drivers of inflation - the five Ds

Drivers	Positive inflation impact (unadjusted)		Potential mitigating actions		Potential change		Effective inflation impact
	strength*	why?	feasibility**	how?	likelihood**	what?	
Demographics	high	declining workforce and wage pressure	medium	increasing activity rates, re-/up-skilling, automatization	low	inefficient labor market policies, insufficient labor reallocation	**high**
Decarbonization	medium	rising fossil fuel prices	high	accelerating green transition (public investment, R&D)	medium	incomplete green transition due to energy security concerns	**low**
Deglobalization	medium	increasing input costs and less contestable product/labor markets	low	reviving multi-lateralism	high	increasing fragmentaton and de-coupling of large emerging market countries	**medium**
Debt	medium	higher leverage creates inflation bias	medium	debt consolidation	medium	undermining central banks' independence	**medium**
Digitalization	low	pricing of data and price discrimination	medium	effective regulation of the digital economy	medium	persistent digital / tech monopolies, fragmented regulation	**low**

* high: over 0.5pp p.a., medium: 0.2pp p.a., low: below 0.2pp p.a.
** high: over 75%, medium: 50% to 75%, low: below 50%

Source: Allianz Research.
Note: 1/ "high"= ≥0.5pp per year, "medium"= 0.5-0.2pp per year, "low"= ≤0.2pp per year; 2/ "high"= ≥75%, "medium"= 50-75%, "low"= ≤50%.

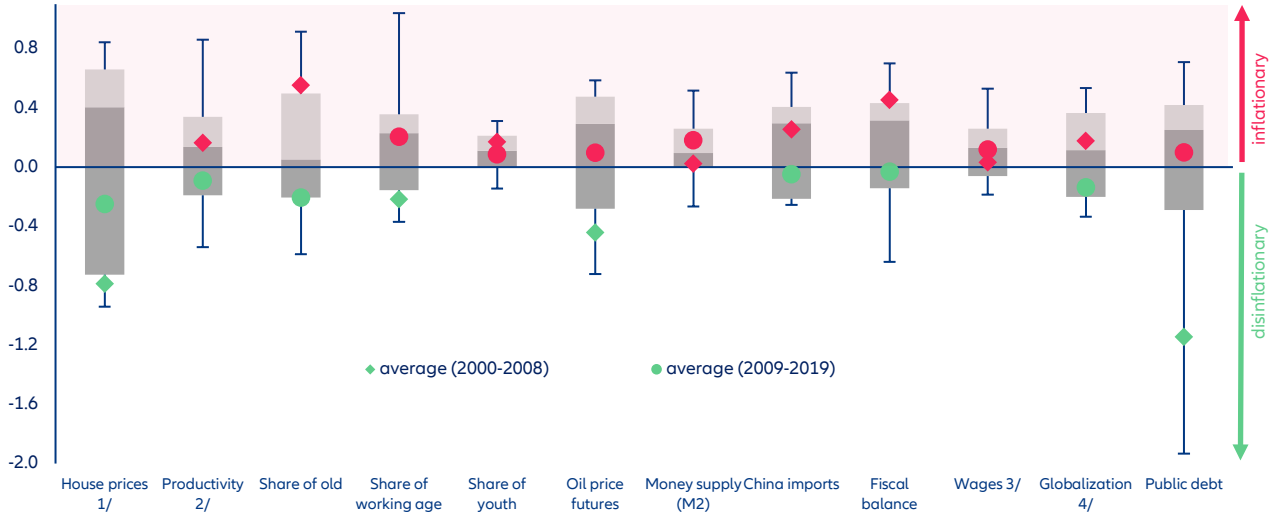
Photo by Jack Prichett on Unsplash

The end of the divine coincidence: from disinflation to rampant inflation

Inflation is driven by both cyclical and structural factors. The inflation rate comprises a broad-based basked of consumption goods and services. Commodity and food prices tend to be more volatile inflation components and, thus, influence inflation temporarily. Most central banks aim at a low and stable rate of inflation over the medium term (usually 2%), which equates to setting an inflation target as a price stability objective. They look through short-term changes of inflation that deviate from the inflation target (such as cost-push shocks due to commodity prices, FX rate, capacity constraints) and rely more on the measures of underlying inflation to determine their monetary stance (in particular core inflation, which strips out energy and food prices). However, inflation dynamics are also influenced by gradual changes in structural factors, which influence the demand and supply for goods and services. For instance, these changes could stem from both domestic (e.g. ageing populations and their rising propensity to save) and external factors (e.g. increasing trade and labor market integration through globalization). Given their gradual but persistent nature, structural changes have a lasting impact on inflation components, and, thus, could materially alter inflation dynamics over a longer time horizon.

Over the last decades, and especially since the global financial crisis (GFC), structural factors have caused a secular decline of inflation rates. Our analysis of the changes in inflation for OECD member countries since the 2000s shows that globalization has significantly contributed to an increasing convergence of inflation rates and declining volatility. In particular, the recursive estimates in Figure 1 show a high statistical and economic significance of labor productivity, a shrinking workforce and globalization as disinflationary forces, which have gained more importance over time.

Figure 1: Structural drivers of global inflation (OECD countries): Bayesian coefficients of explanatory variables (2000-2019)[1]



Sources: Bloomberg LP, Haver, IFS, IMF World Economic Outlook, IMF-Real Estate Index, Refinitiv Datastream, United Nations, Jobst (2016), Allianz Research.
Note: 1/ real house price index; 2/ output per hour; 3/ nominal hourly wages; 4/ openness=world imports/world GDP. Global inflation is measured as the principal component of de-trended inflation rates of all OECD countries. The estimation was completed using Bayesian model averaging (BMA) to solve a canonical regression problem with 26 explanatory variables (Fernandez and others, 2001). The presented results show the most relevant variables (i.e., ranked by their posterior inclusion probability (PIP), which at least once included in the 50 best models containing the most efficient predictors of the observed value (i.e., global inflation) over a rolling estimation window of five years (starting in 2000 Q1) with quarterly updating. The estimates are generated using a random prior and 5,000 iterations of 1,000 draws via a Markov Chain Monte Carlo simulation. Boxplots include the average for two distinct time periods (diamond (2000-2008) and dot (2009-2019)), as well as the 25th and 75th percentiles (grey box, with the change of shade indicating the median), and the 90th and 10th percentiles (whiskers) over the entire sample period.

The disinflationary impact of structural factors coincided with a change in central bank mandates. During the high-inflation period between the early 1970s and until the mid-1980s, inflation rates in most advanced economies exceeded 10% (except for Germany and Switzerland). It was only in the late 1980s, when several central banks shifted towards inflation targeting and thus a more aggressive monetary policy stance, that inflation was reduced and stabilized at lower levels, with reduced dispersion across countries.

The recipe for the monetary policy stance became increasingly enshrined in reaching the "divine coincidence" of keeping inflation stable while creating financing conditions that would keep economic activity at (or close to) potential output. Rather, disinflation (and possibly deflation) became a real challenge for central banks as countries seemed to slip into a "liquidity gap": Despite increasingly loose monetary policy and declining interest rates (which even dropped into negative territory in Europe and Japan), structural factors kept demand subdued. The surge of money supply caused asset prices to rise sharply but failed to raise consumer prices (which are commonly used to measure inflation)

One pandemic and one war later, inflation dynamics have completely changed. Both crises were negative supply-side shocks, which raised the cost of living and production — whether through containment measures

[1]Jobst, Andreas, 2016, "What Is the Impact of Negative Rates on Europe's Financial System? How Do We Get Back to Normal?," European Capital Markets Institute, Annual Conference, November 9 (Brussels: National Bank of Belgium).

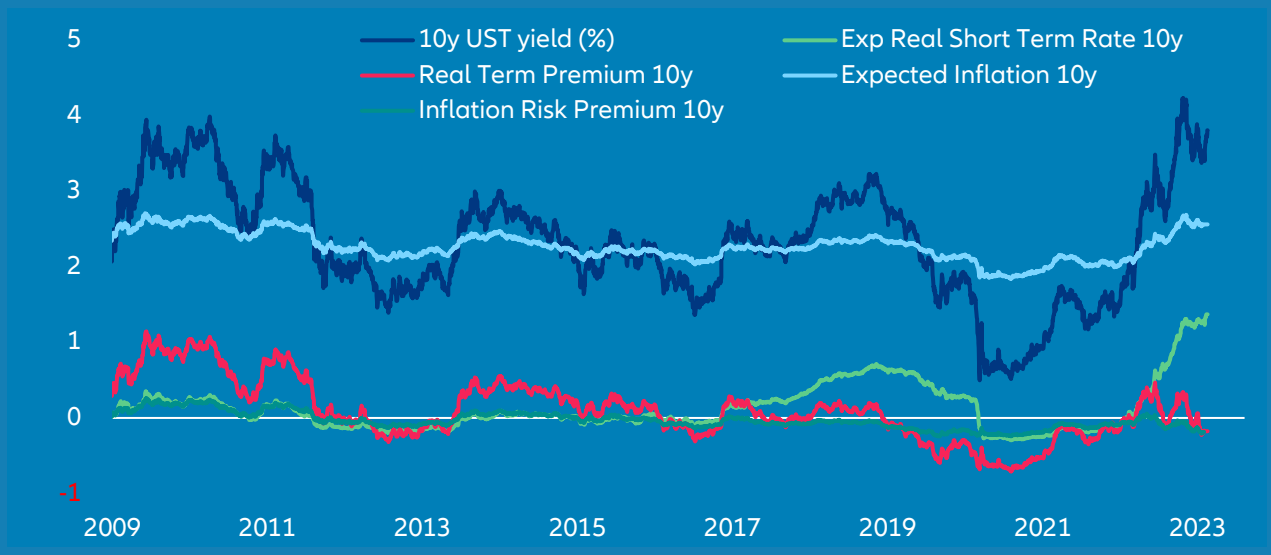
(constraining supply chains) or sanctions on energy imports from Russia (raising gas and oil prices). Higher demand played a smaller role, and it was expansionary fiscal policy, rather than expansionary monetary policy, that poured money directly into citizens' wallets, generating excess savings and raising asset prices even more (providing further fuel to an already frothy housing market).

However, even if supply-side pressures ease significantly, both crises could have more permanent negative effects on potential output and perpetuate inflationary pressures. The war in Ukraine is not only a turning point in politics, but also in economic development. Relations in the world economy are set to change fundamentally. Trade links, energy supplies, international value chains and technological dependencies will all be put to the test. We see five structural factors – the five Ds – that will determine the course of inflation over the longer term: decarbonization, demographics, digitalization, deglobalization and debt.

Box 1: Markets adjusting to higher inflation

Capital markets have been rattled by the unexpected surge in inflation. Investors are highly sensitive to inflation, which directly and/or indirectly influences the pricing of most asset classes, especially government bonds. Decomposing the drivers of the 10-year US Treasury yield suggests that rising inflation uncertainty has affected both the short and long end of the sovereign yield curve through higher expected real short-term rates (as central banks raise rates to combat inflation) but also (temporarily) higher long-term nominal yields as expected inflation increased (Figure 2).

Figure 2: US TIPS and inflation risk premium

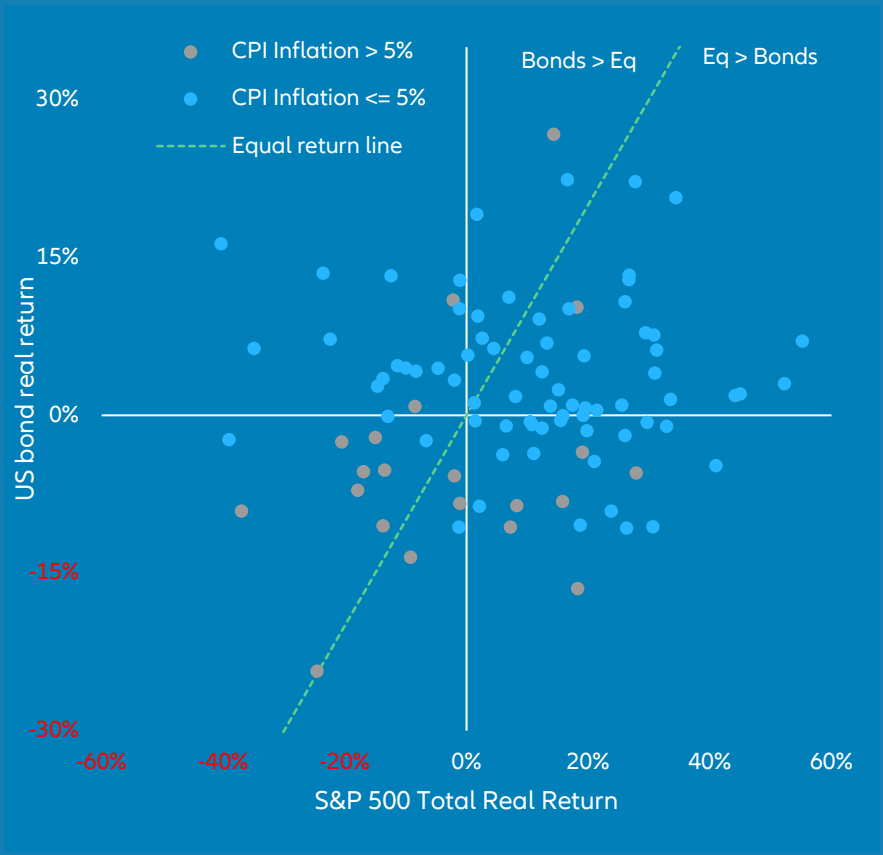


Sources: US Federal Reserve, Refinitiv, Allianz Research. Note: Decomposition based on D'Amico and others (2019).

The corporate side of capital markets is also sensitive to changes in inflation dynamics. However, it is worth mentioning that corporates can accommodate inflationary environments as they can adjust prices, revenues streams and business structures. Nonetheless, their resilience to tends to be effective only when inflation is "moderate" (within a corridor of around 0% to 4% annual inflation rates). Above or below the corridor, demand erosion far outpaces corporates' balance-sheet resilience, leading to a sharp repricing of corporate risk. However, and as in the case of sovereign bonds, abrupt changes in inflation and the subsequent effect on monetary policy also have an impact on corporate valuations.

High inflation periods tend to generate lower diversification benefits. So what can we draw from history and the current environment? First, most years with negative returns in both government bonds and equities have corresponded to years of high (above target) inflation. Second, even though bonds typically yield negative real returns in high inflation years, they are not necessarily lower than those for equities. Periods of high inflation and positive real growth favor equities, while periods of high inflation accompanied by economic depression would make bonds (relatively) outperform (Figure 3).

Figure 3: Compared returns of US government bonds and equities (1928-2022)



Sources: NY University, Allianz Research
Note: Each dot represents the yearly returns for a calendar year. 10Y maturities used for US Treasury bonds. 5% is an arbitrary threshold; it has been used instead of the common 2%-inflation target of central banks because ideally the chart should use inflation surprise rather than inflation, and we consider an inflation reading above 5% more consistent (although imperfect) with a surprise than e.g. 3%.

Photo by Jack Prichett on Unsplash

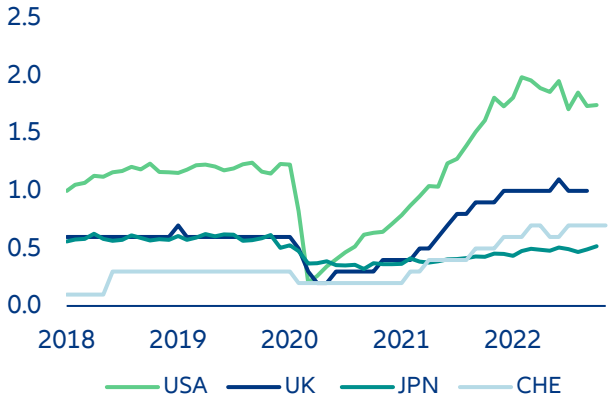
Structural drivers of inflation in the future: the five Ds

The following section examines the five structural factors of inflation in detail. Overall we find that the combined impact of the 5Ds on future inflation dynamics is significantly positive; however, mitigating actions can be quite effective, especially policies aimed at reducing the transition risk from higher energy prices, and to a less extent, counteracting the adverse effects of tighter labor markets, higher debt levels, and digitalization (see table in executive summary).

Demographics

Covid-19 left a legacy of stalled migration and sparked the early retirement of baby boomers in advanced economies, which made labor markets even tighter. In the US alone, at its worst, the ratio of vacancies per unemployed persons was up to 2.0 (Figure 4). Labor market tightness brings bargaining power, which is traditionally associated with an upward pressure on wages, mostly benefitting lower-wage earners, but adding to inflation risks

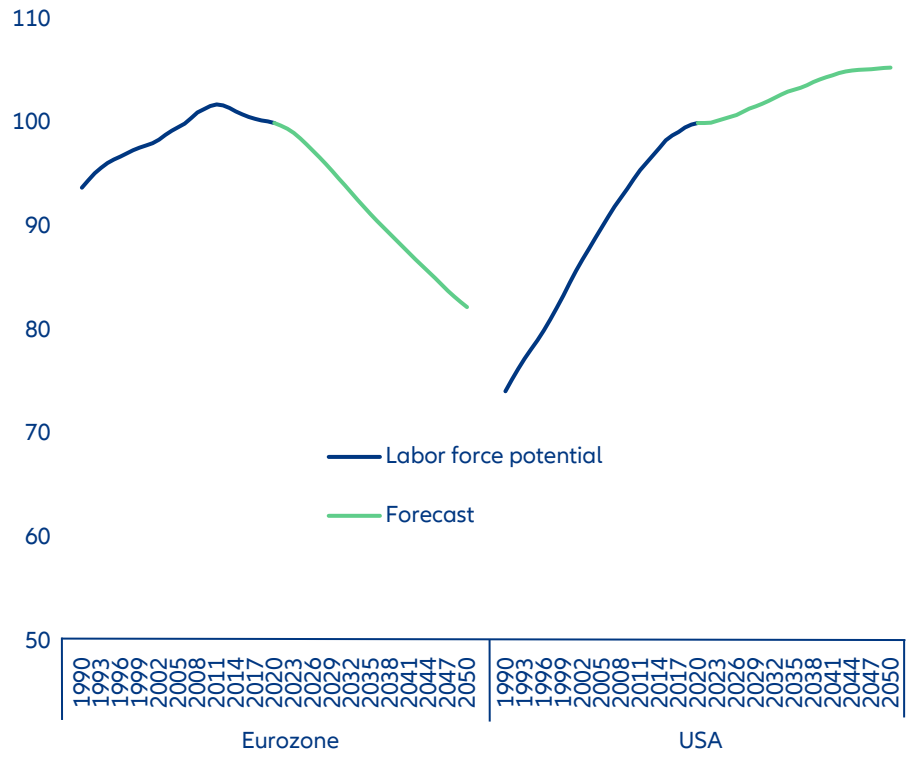
Figure 4: Labor market vacancies per unemployed persons



Sources: Refinitiv, Allianz Research

With the baby boomers leaving the labor market and being replaced by smaller age cohorts, the growth dynamics of the labor supply are going to change markedly. Between 1990 and 2022, the workforce population aged between 20 and 64 increased by +6% in the 20 countries of today's Eurozone, and by +35 % in the US. In the next 30 years, the UN expects an increase of only +5% for the US, from 197.4mn today to 207.8mn in 2050, and a decline by -17% for the Eurozone, i.e. from 201.1mn to 166.3mn (Figure 5).

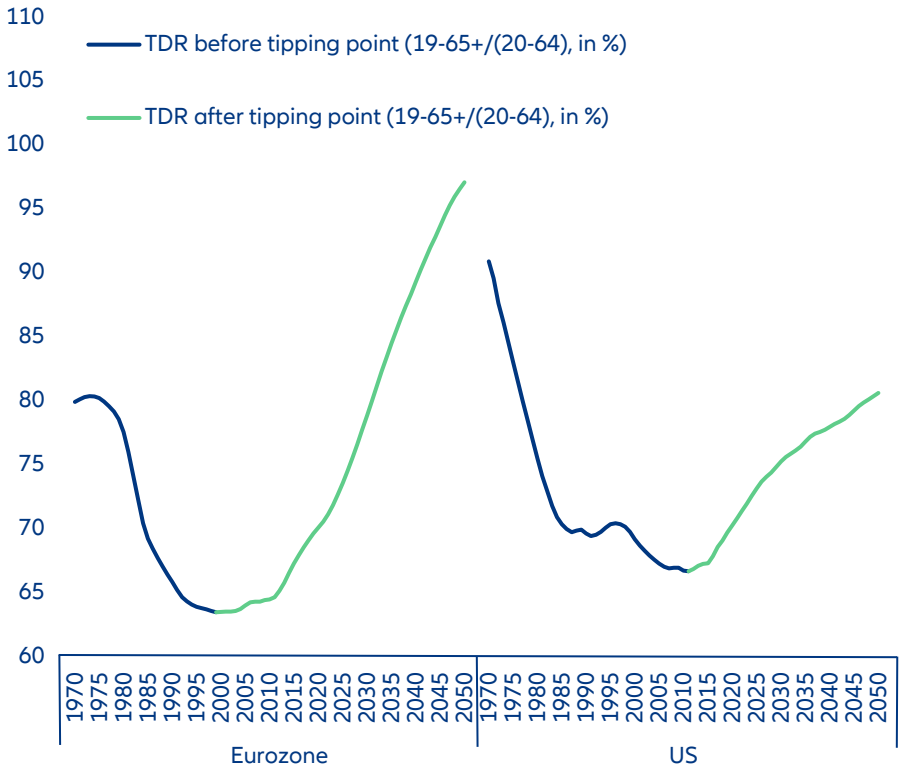
Figure 5: Working-age population set to shrink in Eurozone and to hardly grow in the US (2020 = 100)



Sources: UN Population Division (2022) and Allianz Research

While the strength of inflationary pressure that stems from the labor markets might differ markedly due to the underlying demographic dynamics, both the US and Eurozone face an increase of their total dependency ratios, though to varying degrees. To the extent that the number of people not yet (aged 0 to 19) or no longer active on the labor market (older than 65), i.e. mere consumers, per 100 persons of working age increases, the inflationary pressure increases, too.[2] In the Eurozone, the turning point in the development of the TDR was already in 1999, when it was merely 63.5%. Since then, it has increased to 71.1% and is set to reach 97.1 % in 2050. In the US, the turning point was in 2007; since then, the TDR has increased from 66.9% to 71.4% in 2022 and is expected to increase to 80.3% in 2050 (Figure 6).

Figure 6: Total dependency ratios set to increase markedly; the population dividend has vanished



Sources: UN Population Division (2022), Allianz Research

Changing migration trends driven by equally significant demographic shifts in the most important origin countries might worsen the situation. The workforces in the three most important sender countries for the Eurozone – Bulgaria, Poland and Romania – are likely to shrink by -33%, -24% and -21%, respectively. The US will likely feel the demographic shifts in two of its most important sender countries: Mexico and China. In Mexico, workforce growth is set to slow down considerably, while in China the workforce population is likely to shrink by a fifth. Therefore, future migration flows are already expected to be much lower than in the past. The UN expects net migration into the Eurozone to drop from an average of 0.8mn per year to only 0.4mn over the next three decades. And for the US, it assumes a decline from an average of 1.3mn to 1.0mn.

Shifts in the age structure of the workforce population might also add inflationary pressures on wages. With the size of young age cohorts shrinking, labor market entrants could gain more bargaining power with respect to entry-level wages. While this might narrow the seniority gap in wages, it could lead to a permanent upward pressure on the increasing wage level.

[2] Mikael, Juselius and Előd Takáts, 2018, "The Enduring Link between Demography and Inflation," BIS Working Paper No 722 (Basel: Bank for International Settlements).

Box 2: Aging and inflation - the Japanese experience

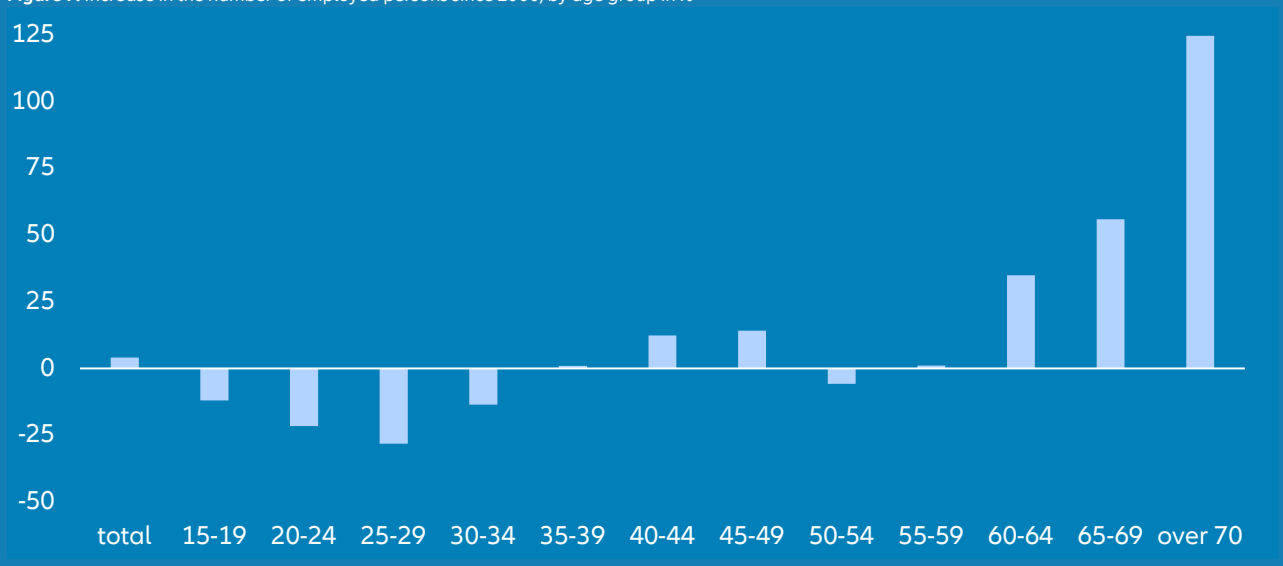
Japan is the prime example of an aging and shrinking society. Its working-age population has been declining since 2001, by 11.5mn or -13.4%.[3] At the same time, the total dependency ratio (TDR) rose sharply by around 20pps to 67%.[4] Both of these trends were expected to have an inflationary effect. However, instead Japan was struggling with stubborn deflation. Why? Two developments stand out: employment and foreign investment. First, although the labor force shrank sharply, employment increased over the same period (+4.1%), albeit not uniformly. While the number of younger employees fell, that of older ones increased: in the 65 to 69 age group, this increase amounted to 56%, and for the 70+ age group even to 125%. (Figure 7) This increase was mainly due to the employment rate, which in the 65 to 69 age group alone shot up from 36% to 50% in the last ten years; even in the 70+ age group it is now 17%.

The development of Japan's foreign direct investment (FDI) is similarly spectacular. Since the turn of the millennium – after an interim high during the bubble economy – it has risen sharply again (Figure 8).

[3]Related to the age group 20 to 69. With a different definition (15 to 64), the decline already started in 1995 and amounted to a loss of 14.7mn (-16.8%).

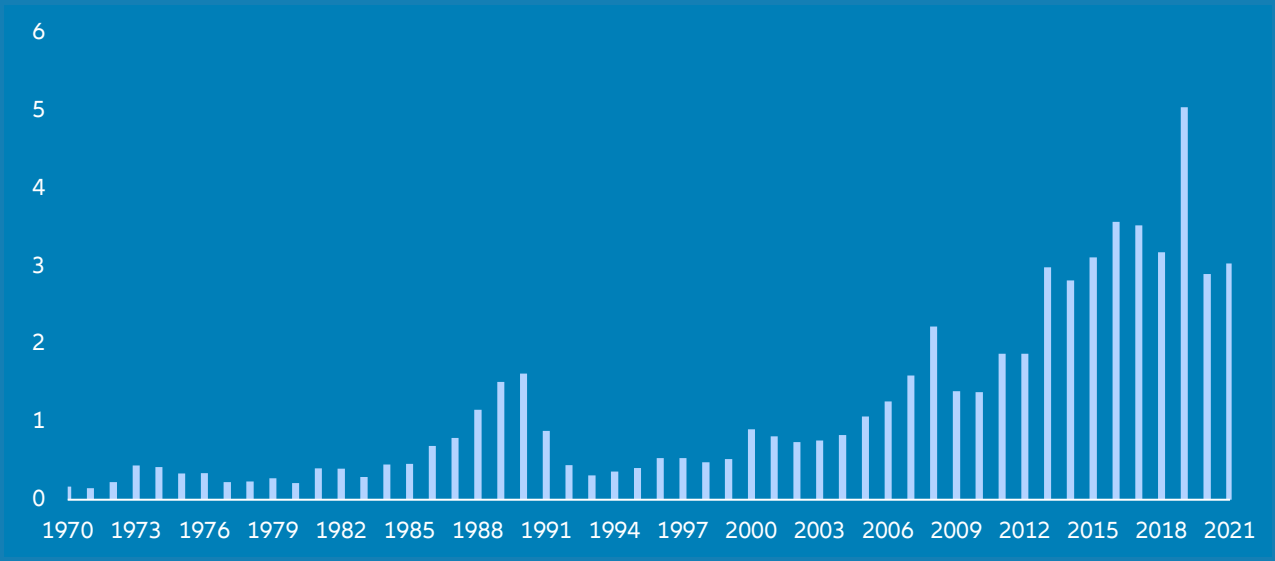
[4] Working-age population: 20 to 69. If the working-age is defined as 15 to 64, TDR stands already at 71%.

Figure 7: Increase in the number of employed persons since 2000, by age group in %



Sources: Statistics Bureau of Japan, Allianz Research

Figure 8: Japan's FDI, net outflows in % of GDP



Sources: The World Bank, Allianz Research

In recent years, Japan has thus succeeded in reversing the potentially inflationary demographic trend by systematically exploiting its labor potential and joining the Asian production networks. Of course, the strategy is finite. Not all older people can or want to work, and its Asian neighbors – above all China – are coming under increasing demographic pressure themselves. This way out will be increasingly difficult for Japanese companies. But Japan still has two aces up its sleeve: migration and automation. The former, however, is even more controversial politically and socially in Japan than elsewhere. As a result, the first steps in this direction have been correspondingly timid. Automation, on the other hand, seems less problematic – and is being pushed accordingly: With a robot density of 399 per 10,000 employees, Japan is already one of the most automated countries in the world. However, a look at the leaders South Korea (robot density: 1000) and Singapore (670) shows that there is still considerable room for improvement.[5]

The bottom line: Japan is an instructive example of the fact that no hasty conclusions should be drawn from so-called mega-trends. This also applies to aging and inflation. One does not necessarily imply the other.

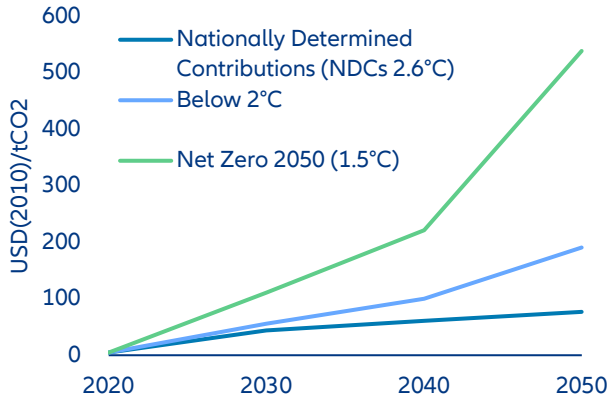
[5]International Federation of Robotics, 2022. *World Robotics 2022 Report.* October (Frankfurt am Main: VDMA Robotics + Automation).

While aging impacts labor supply negatively, the impact on demand is less clear. True, consumption increases with age and continues to increase beyond the retirement age. But this is mainly driven by increases in healthcare spending, which has to be financed by taxes, cuts to government spending in other areas or public debt. This might mitigate the impact on aggregate demand in the medium term. Furthermore, population aging appears to weaken the dynamism of the economy, reducing the pace of investment. Aggregate demand falls because the elderly spend less on goods, while firms – expecting weaker demand due to slowing population and productivity growth – become more hesitant to invest.

Decarbonization[6]

Carbon-pricing policies that aim to increase fossil energy prices to drive down demand and promote the use of climate-neutral alternatives could be another driver of inflation. Carbon prices are increasing production costs, which are ultimately passed through into final demand and thus increase the price of consumption and investments for households, companies and the government. Figure 9 shows the average development of carbon prices affecting household consumption in three different climate scenarios proposed by the Network for Greening the Financial System (NGFS)[7]. Average carbon prices on consumption start at around USD5 in 2020 and by 2050 reach USD77 in the Nationally Determined Contributions scenario or USD540 in the Net Zero scenario.

Figure 9: Average carbon prize by different climate scenarios

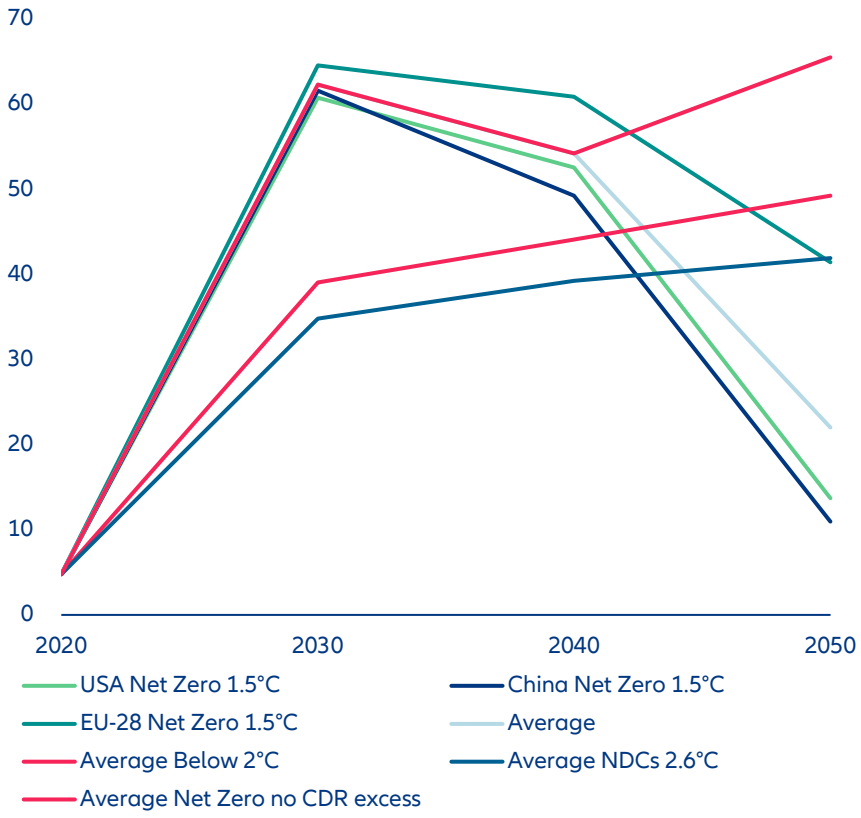


Sources: NGFS, Allianz Research

The effective carbon burden depends not only on the carbon price, but also on the development of the carbon footprint of the consumption good. We approximate the carbon footprint by the development of the sectoral carbon emissions in the respective NGFS scenarios[8] . Figure 10 (following page) shows how the effective carbon burden – the product of carbon price and footprint – evolves over time in the different scenarios, as well as the differences in the observed regions for the Net Zero scenario. It is striking that for the Net Zero scenario, the effective carbon burden peaks at around USD60 in 2030 but is declining thereafter. This is due to the fact that carbon emissions in this period decline faster than carbon prices increase.

[6]The methodology of this chapter is explained in the appendix.
[7]Carbon prices in NGFS show some sectoral variation. Each sector in each region of the OECD household consumption of final goods was matched with the most representative NGFS sector available (NGFS is much less granular than OECD) and weighted by the share of total emissions embodied in the final goods of the respective sector. The shown average is then the arithmetic mean over the three observed regions US, China and EU-28. EU-28 household consumption and emissions are aggregate over countries before applying the sectoral carbon prices.
[8]Again, each sector in each region of the OECD household consumption of final goods was matched with the most representative NGFS sector available (NGFS is much less granular than OECD) and weighted by the share of final consumption of households from the respective sector.

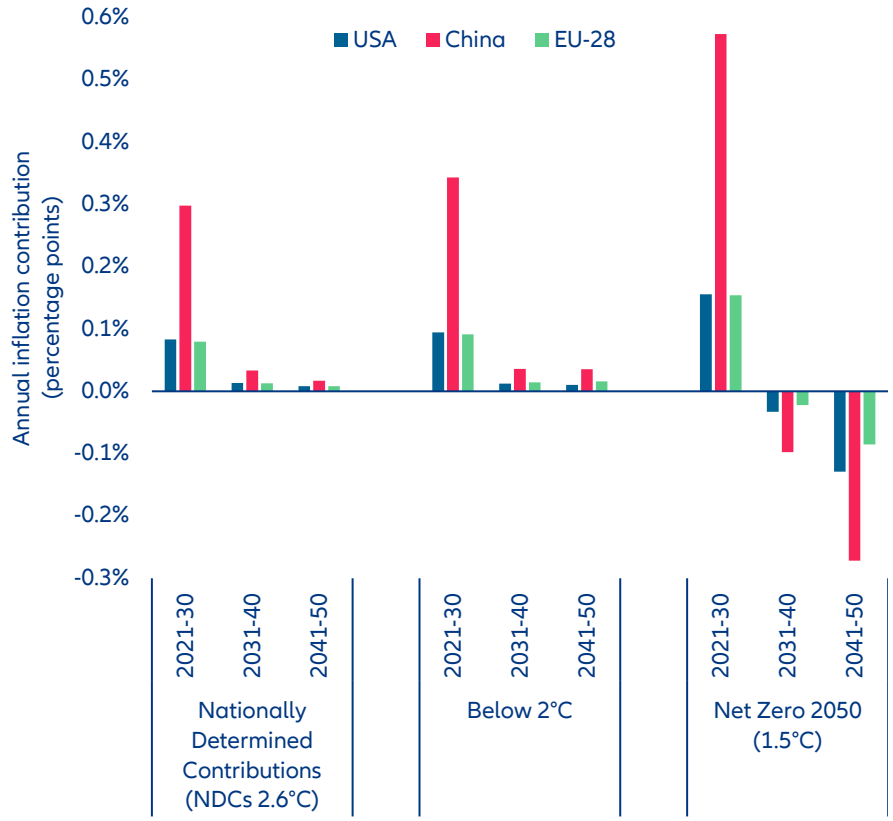
Figure 10: Average carbon prize by different climate scenarios



Sources: NGFS, Allianz Research

Translating these carbon burdens into inflation impacts, based on household consumption expenditures, leads to annual contributions between 0.08pp and 0.16pp in the US and Europe, and between 0.3pp and 0.57pp in China. Figure 11 shows the inflation impact by scenarios, regions and decades until 2050. All three regions experience the highest impact in the current decade under the Net Zero scenario, with carbon-pricing contributions to annual inflation of about 0.16pp in the US and EU-28, and 0.57pp in China (given that China enforces the full global carbon price on the complete carbon footprint). The Chinese burden in this analysis is higher as the same carbon prices as in the EU or the US are met by lower consumer goods prices and higher carbon footprints in the Chinese consumer goods basket. In the subsequent periods in the Net Zero scenario, carbon pricing becomes deflationary as the induced emission-reduction through fuel substitution and technology adaptation overcompensates for the carbon-price increase. For the other two scenarios, the impacts are lower but will stay inflationary throughout the entire period.

Figure 11: Global carbon price contribution to inflation in selected regions

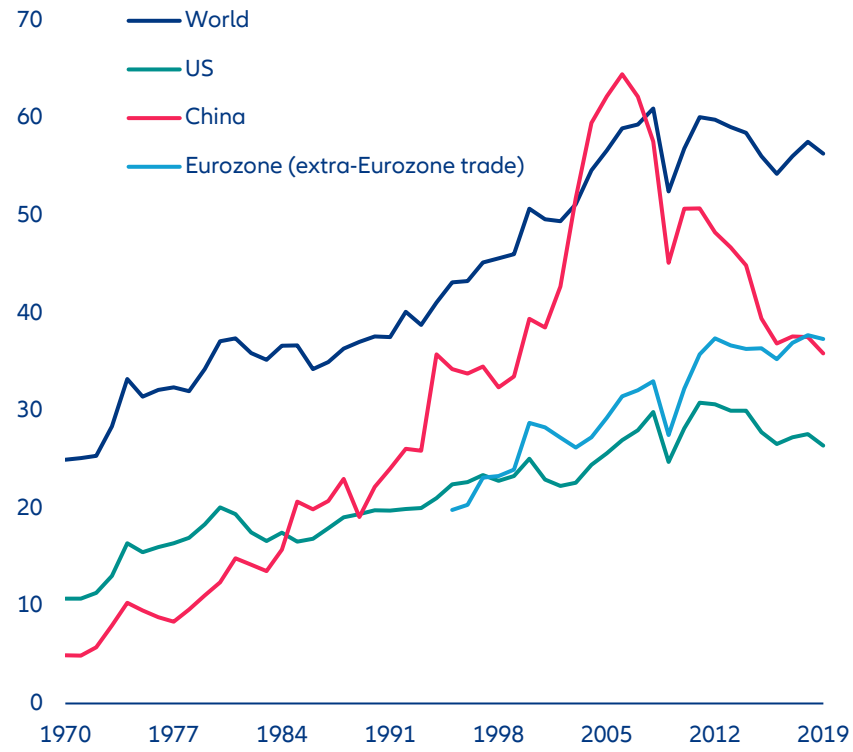


Sources: NGFS, Allianz Research

Deglobalization

The global division of labor is no longer governed by the imperative of efficiency, but by that of resilience and security. This trend is often summarized under the header of "deglobalization". Strictly speaking, however, a reversal of globalization is not on the cards. But there will be shifts in the degree of connections. In the past, trade in goods used to grow much faster than economic activity, resulting in an era of hyper-globalization (from the 1980s to the late 2000s) when emerging economies across Asia, Latin America and Central and Eastern Europe contributed to a complexification and diversification of supply chains. But in recent years, the flows in goods (but not those in services and data, for instance) have levelled off (Figure 12). Even if this stalling turns into an outright decline, it would not entail a radical rupture of trade relations but rather their reconfiguration: Future growth would create fewer new global connections. Compared to the halcyon years of free-wheeling global markets, it certainly would feel like the opposite; hence, the ubiquitous talk of "deglobalization".

Figure 12: Trade in goods and services, as % of GDP

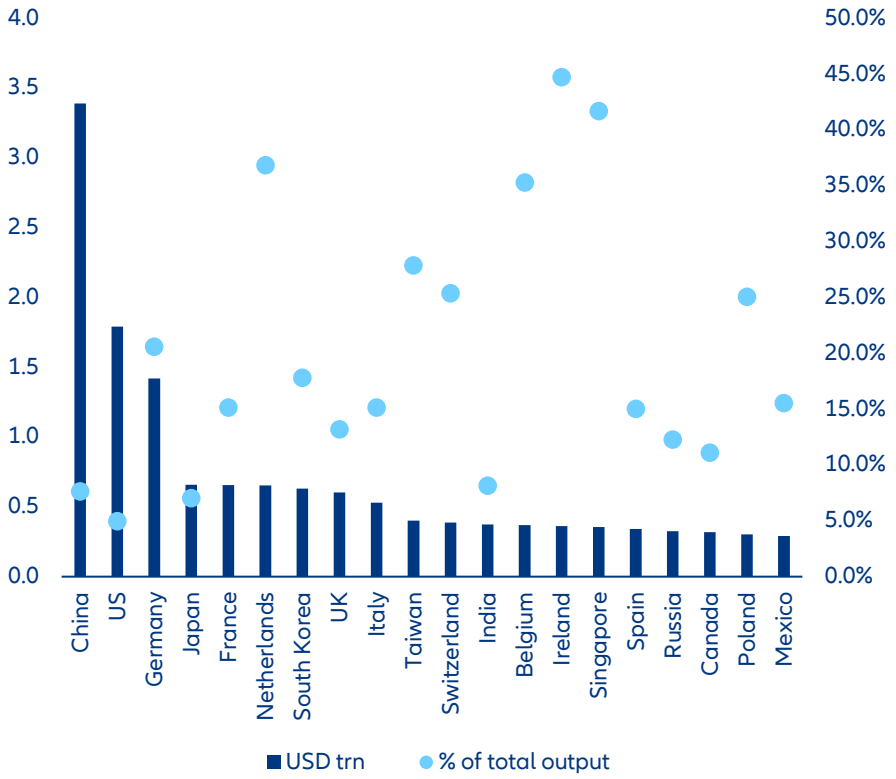


Sources: World Bank, National Sources, Allianz Research

At the epicenter of "deglobalization" is China as the country is by far the most important provider of production inputs (Figure 13). While (European) dependence on Russia rested primarily on its role as a supplier of (cheap) energy, the case of China is different: its influence is based primarily on its huge market. China's strength is not oil and gas, but millions of wealthy consumers as well as its position as a critical provider for a large number of products[9] . Against the background of the changes in China itself (e.g. rising labor costs), the increasingly interventionist behavior of the government and deteriorating geopolitical relations (particularly with the US), many companies in the West will start to rethink their China strategy in the coming years. The continued rivalry between China and the US will do its part to drive de-coupling, not least with regard to advanced technologies: a (further) splintering of technology standards and rules seems likely. However, a truly bipolar world, in which companies and countries are required to choose sides, is less likely. Decoupling with China is expected to remain limited as mutual business interests remain huge; most countries will try to safeguard their economic relations with both China and the US. Diversification strategies, such as China Plus One, seem to be increasingly considered by companies.

[9]For more details, see: Can the US and EU really "friendshore" away from China?

Figure 13: Output destined for global value chains, by country

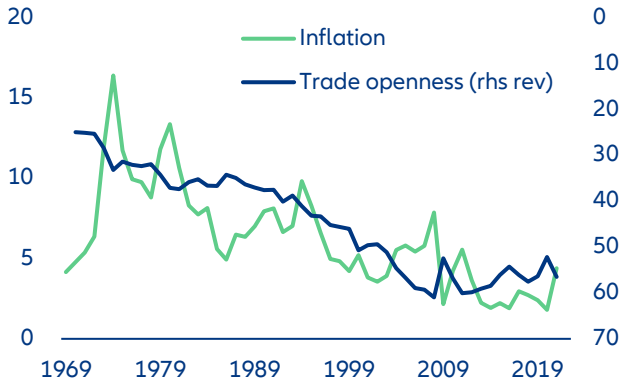


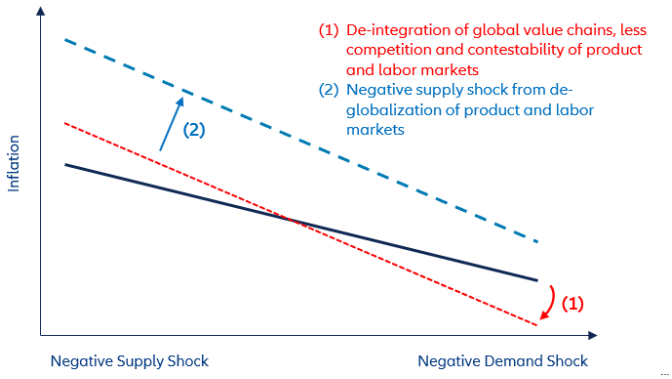
Sources: World Bank, Allianz Research

However, the slowing of globalization could be inflationary. Decades of hyper-globalization coincided with a period of declining inflation, particularly in advanced economies, where less expensive imports replaced more costly domestic products. The global division of labor, the use of global supply chains to optimize production costs, the reduction in workers' bargaining power locally and lower trade barriers (the global weighted mean applied tariff rate declined from a peak of 8.6% in 1994 to a trough of 2.6% in 2017) all contributed negatively to inflation. Research finds[10] that the rise in global value chain participation through 1996-2014 on average contributed to a -0.25pp decline in producer price inflation in 2014, with the effect more than double that amount in some OECD countries (e.g. -0.6pp in Germany). As globalization stalls, the negative supply shock from a reconfiguration of global value chains could decrease competition and increase the pricing power of domestic players, which is likely to slow (or potentially reverse) the decline of inflation in many advanced economies (Figure 14, following page).

[10]Andrews, Dan, Peter Gal and William Witheridge, 2018, "A Genie in a Bottle? Globalization, Competition and Inflation," Economics Department Working Paper No. 1462, March (Paris: Organization for Economic Co-operation and Development).

Figure 14: Impact of globalization on inflation (trade openness and re-steepening of the Phillips curve)





Sources: Bank of England, Refinitiv Datastream, Allianz Research

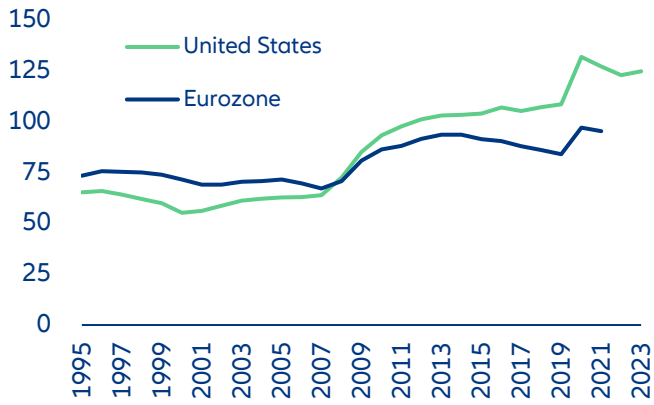
Debt

Rising system-wide leverage in most economies could lead to structurally higher inflation. Over the last decades, government and private sector debt have steadily increased. In 2020, global debt rose to USD226trn (or more than 350% of GDP), according to the IMF's Global Debt Database[11], due to an unprecedented scale of fiscal measures to stem the economic impact of the Covid-19 pandemic (Figure 15). While government debt accounts for about half of the increase of global debt, private debt from non-financial corporations and households also reached new highs. Indeed, when individuals, businesses and governments are heavily indebted, they may be more willing to tolerate higher inflation as it reduces the real value of their debt. But this can encourage people and organizations to take on additional debt, which can further fuel inflation.

In particular, higher government borrowing could create a negative feedback loop with inflation. When a government borrows money by issuing bonds, it can increase money supply, which can lead to higher inflation if the demand for goods and services remains constant. Additionally, when the government increases its borrowing, it can lead to higher interest rates, which can further fuel inflation by making borrowing more expensive by crowding out borrowing from households and businesses. If government revenues do not keep pace with the rising costs of goods and services (especially if unemployment increases), governments may have to issue more debt to finance their spending. This can lead to a vicious cycle where high inflation leads to higher debt, which then leads to higher inflation and so on.

[11]Mbaye, Samba, Marialuz Moreno Badia, and Kyungla Chae, 2018, "Global Debt Database: Methodology and Sources," IMF Working Paper No. 18/111 (Washington, DC: International Monetary Fund).

Figure 15: Government debt (% of GDP)



Sources: Refinitiv, Allianz Research

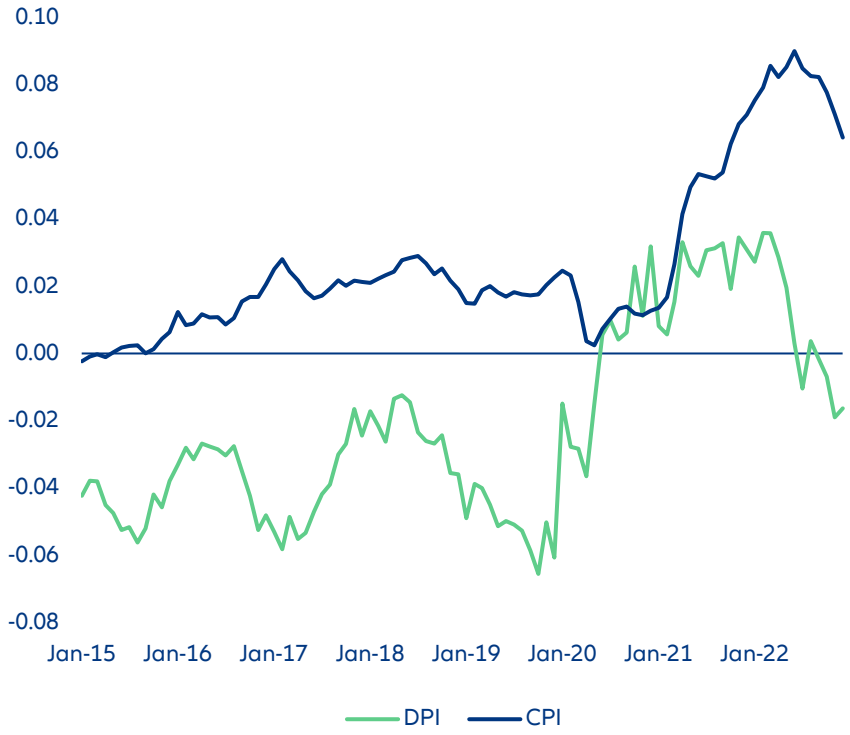
Digitalization

Before the recent crises, digitalization had often been cited as one of the reasons for the secular decline of inflation in advanced economies. First, it impacted directly the declining prices of ICT-related goods and services. Second, it also changed the market structure in many sectors and increased competition. Lastly, thanks to cost-efficient technologies, it increased firms' productivity[12]. Although the digital economy was creating "superstar" firms with quasi-monopolies, regulators did not break them up, arguing that barriers to entry are low in the digital economy and that digital giants were not taking advantage of their position to raise prices.

[12]Charbonneau, Karyne B., Alexa Evans, Subrata Sarker, and Lena Suchanek, 2017, "Digitalization and Inflation: A Review of Literature," Staff Analytical Note 2017-20 (Ottawa: Bank of Canada).

However, digital firms may not defy gravity and classical economic theory forever. Looking at US price data, we find that during the period when they benefited from increased sales (i.e. during and right after the pandemic in 2020) – e-commerce retailers increased prices faster than average retailers (Figure 16, following page). This is particularly striking given that CPI also includes online prices despite measurement issues and challenges.

Figure 16: Consumer Price Index versus Digital Price Index in the US

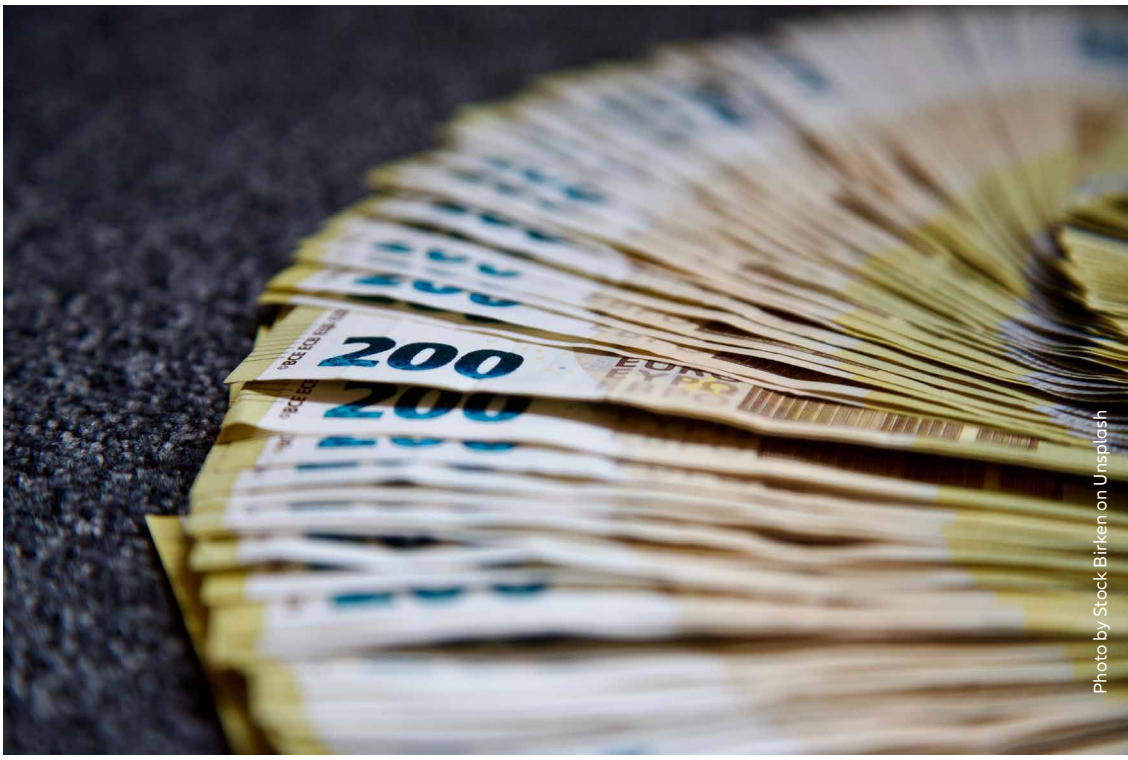


Sources: Refinitiv, Adobe, Allianz Research

As digital business models shift focus from growth to profitability, high market concentration and a better price-segmentation of customers might increase prices. One striking example of the strategy shift to profitability is Uber. According to YipitData, Uber ride fares in the US jumped by +83% from Q3 2019 to Q3 2022, which represents a +17.5% increase in annualized terms. Unsurprisingly, despite some decrease in usage, the company managed spectacular revenue growth (e.g. +72% y/y in Q3 2022). Uber, which has a 71% market share, represents the perfect example of a firm in a dominant position that can increase prices without suffering (much). Many other markets are in a similar configuration and exhibit the same seeds for inflation.

Inflationary risk could stem from the rise of data. As large digital players are harvesting and leveraging huge amounts of data on consumers, they could implement very effective price-discrimination strategies, and even individual pricing for each consumer. So far, we have no evidence of such practices but in theory they could be implemented. Most regulators do not have the human or technical capacity to monitor these practices. Moreover, it remains a question whether governments would sanction corporates that provide digital services and infrastructure for healthcare and banking systems, as well as other critical sectors such as defense.

Photo by Stock Birken on Unsplash



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Policy and business implications: containing inflation pressure

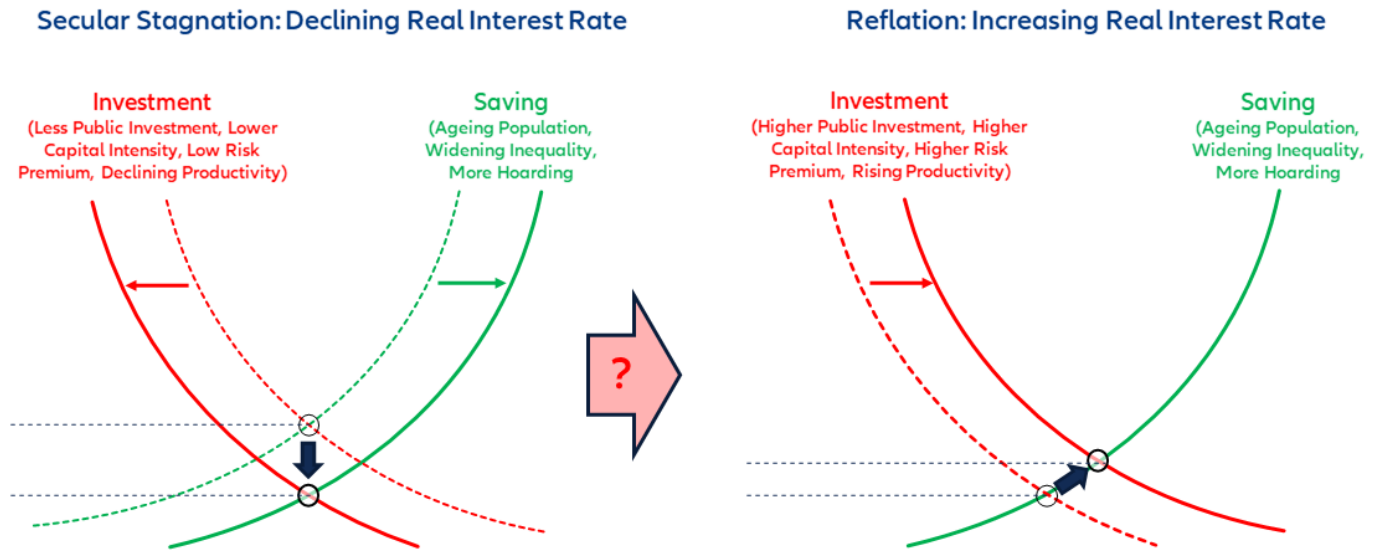
Monetary and fiscal policies

Central banks will be better prepared to handle structurally higher inflation if demand-side factors help raise the natural rate of interest (Figure 17). As much as the great moderation of loose monetary policy failed to stem the structural decline of inflation due to a rising imbalance between savings and investment, the recent negative supply side shocks (and the collapse of the "divine coincidence") have made it equally difficult to rein in inflation. In the current situation, a higher neutral rate (e.g. by raising productivity) would allow more effective inflation fighting by central banks, which could raise policy rates higher (than before) without running the risk of tightening financing conditions enough to spark a recession. Raising the inflation target might also be an option to adjust central banks' mandate to the new reality of structurally higher inflation. So if structural factors require a higher inflation rate to reach potential output, the price-stability objective would need to adjust; otherwise, the result would be a persistently (too) restrictive monetary stance and sub-optimal growth. However, raising the inflation target could have considerable distributional consequences, especially for vulnerable parts of society.

Fiscal policy would need to become not only more targeted and redistributive but also more growth-enhancing. Big fiscal leaps are behind us as the room for maneuver is much more constrained amid rising interest rates and debt burdens. At the moment, available fiscal support will reduce the impact of higher energy prices on real disposable incomes but can also slow down the reduction in inflation overall. In order

to address structurally higher inflation, vulnerable households and firms in particular might require more support to limit the fallout from higher energy and input prices. Reducing the tax burden and removing tariffs might be effective options, but they do cater to the significant distributional implications of higher inflation. For instance, in the case of higher energy prices (also due to higher carbon taxes), targeted programs to ensure a "just transition" could help mitigate the inflation impact.

Figure 17: Determinants of the natural interest rate



Sources: Refinitiv, Allianz Research

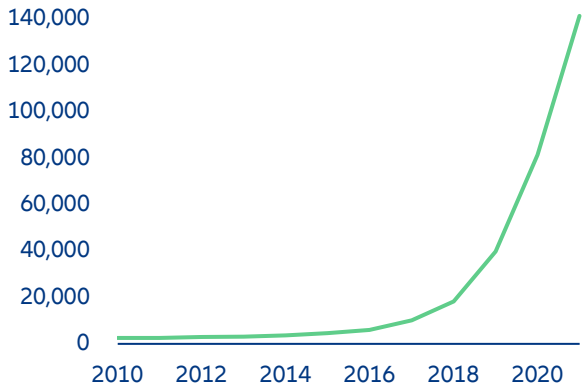
Structural policy

Structural policy targets the supply side impacting inflation. Policymakers can try to directly expand the supply of labor and capital; they can also influence the framework conditions in such a way that the available resources are used more efficiently (i.e. higher productivity). Both can have a dampening effect on inflation. The most important instruments are tax policy (for both labor and capital), investment promotion (capital) and migration policy (labor). However, other measures can also have a positive impact on the supply of labor and capital, such as raising the retirement age as part of a pension reform (more older workers), expanding childcare to improve the reconciliation of work and family life (more female workers) or measures to improve regulation and cut red tape (more and faster investment projects). Of course, these measures can also work in the opposite direction; this is most obvious in migration policy, where in recent years there has been more of a global trend toward isolation and less immigration. But excessive investment promotion can also have a rather inflationary effect under certain circumstances, if funds are wasted in the preservation (or creation) of inefficient production structures.

Policies can significantly influence activity ratios as part of raising labor supply. In the Eurozone, 147mn or 80% of the 183mn persons in working age between 20 and 64 were active on the labor market in 2021. In the US, the corresponding figures were 77% or 136mn of the 175mn in this age group. However, generosity of the pension systems and early retirement rules as well as the acceptance of older workers in labor markets explain significant differences between the Eurozone and the US. In the Eurozone, activity ratios in the age group 25 to 54 ranged from 77% in Italy to 92% in Slovenia; in the US, it stood at 82%. In the age group 60 to 64 the span was even wider, with activity ratios ranging from 23% in Luxembourg to 68% in Estonia; in the US, the corresponding figure was 57%. If we assume that activity ratios would converge to the maximum in each country and age group, the total activity ratio would climb to 88%, increasing the workforce by 12mn and 20mn persons by 2050 in the Eurozone and the US, respectively.

Competition policy is the top priority for reversing the secular deteriorating of productivity over the last decades. The aim is to prevent market-dominating positions of individual companies – with the corresponding pricing power. The fact that this is anything but trivial in digital markets is demonstrated not least by the EU's years of wrangling with major tech corporations. It remains to be seen whether the new „Digital Markets Act" will give competition regulators a sharper sword than in the past. In the international context, strengthening competition takes place within the framework of trade policy. In the past, nothing has probably kept inflation in check as much as the opening of markets. Here, too, however, a trend in the opposite direction has become apparent in recent years: Under the guise of national sovereignty, protectionism is making an astonishing comeback. In view of the new geopolitical situation, a rapid return to the concept of open markets – a global level playing field – is hardly to be expected. In the coming years, the main task will be to prevent the worst excesses of protectionism. In addition to these direct policies, there is also a wide range of structural policy measures that can indirectly improve resource allocation, from housing policy to expenditures for education and R&D.

Figure 18: Patent filings for AI technologies



Source: OWID

The latter might become increasingly important because when labor-supply growth slows, firms start to substitute capital for labor. This has already happened in manufacturing sectors. Acemoglu and Restrepo (2022)[13] argue that the demographic changes are associated with greater adoption of robots and other automation technologies, such as AI. According to Acemoglu and Restrepo, adding one additional robot per 1,000 workers reduced the national employment-to-population ratio by about 0.2%, with some areas of the US affected far more than others. If this leads to a rebound in productivity growth, declining workforces must not automatically fuel inflation. AI, in particular, could become a game-changer.

[13]Acemoglu, Daron and Pascual Restrepo, 2022, "Demographics and Inflation," *The Review of Economic Studies*, Vol. 89, No. 1, pp. 1-44.

Impact on insurance

Inflation does not pose many problems for insurers per se. Property insurers can easily absorb higher prices – provided the increase is steady and remains moderate within an expected range – by raising their premiums. For a life insurer, inflation is largely irrelevant, since benefits are generally fixed in nominal terms. (Here it is mainly so-called second-round effects that have a negative impact, for example, the decline in real incomes, which reduces demand for savings products). What is problematic, however, is an unexpected and sharp rise in prices – exactly the situation in 2022, when surging energy price-induced inflation many by surprise. In such a situation, claims payments rise much more sharply than calculated, the combined ratio can quickly climb above 100 and painful additional reserving becomes necessary. If the sudden price increase is also accompanied by an equally sharp rise in interest rates, the asset side of the balance sheet also comes under pressure: many assets decrease significantly in value (Figure 19).

Figure 19: Stylized balance sheet impact (P&C insurer)

Sources: Allianz Research

But even in such a situation, insurers have some levers at their disposal to mitigate the impact. In addition to the aforementioned pricing, these include product design and mix, possible indexation of premiums and covers, asset allocation and the use of reinsurance solutions. So the biggest challenge for insurance companies is not inflation itself, but its impact on the economy and markets: Slowing growth, declining real incomes and investment cutbacks are weighing on new business; price corrections and market turbulence are making investment more difficult.

APPENDIX

Methodology to calculate the inflation impact of carbon prices
To evaluate the impact of the carbon price on the price of consumption goods, several simplifying assumptions are made:

- The carbon-pricing policy is fully effective, meaning it prices the full carbon footprint of the consumption good with the full carbon price that is applied to the sector in which the good is produced[14]. This leads to an upwards bias in the inflation-contribution estimate.

- The consumption basket stays fixed for the whole analysis, ruling out substantial reactions by consumers and thus also leading to an upwards bias in the inflation-contribution estimate.

- Mitigation is reached through a mix of investments in green production infrastructure (increasing CAPEX) and the use of sustainable energy sources instead of fossil fuels (increasing OPEX). The OPEX effect of the effective energy-mix price is to be seen as separate from the carbon-pricing policy and is not included in the inflation-contribution estimate in this section. Depending on the sector, the OPEX in the Net Zero scenario can be higher or lower than in the respective period in the NDCs scenario.

- As indicated, carbon prices will trigger mitigation investments. At the margin, the mitigation-investment costs will be equal to the Net Present Value of avoided carbon-price payments. Typically, these investments are highly subsidized, leading to little effective exposure of consumption-good prices through this channel. Investment expenditures are neglected here, leading to a downward bias in the inflation contribution estimate[2].

[14]The carbon footprint is approximated with the OECD data on carbon embodied in trade, thus allocating all upstream emissions in the production chain to final demand. All carbon emissions, and thus the carbon-price burden, are therefore allocated to the components of final demand, including consumption and investment demand by households, companies and the government.
[15]In mathematical terms, if the necessary mitigation-investment costs are equal to the NPV of avoided carbon price payments, then the total mitigation expenditure (investment CAPEX + fuel substitution OPEX) is equal to the integral of the abatement curve that is determined by the emission intensity index on the x-axis and by the carbon price on the y-axis. In 2050, in a calculation for the Net Zero scenario, this burden can reach up to 27% of the carbon price, which is equivalent to USD145.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