

Reflections

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Climate change on central banks' and forecasters' radar

The effects of global warming and the transition to a sustainable level of fossil fuel emissions pose new challenges and opportunities for companies and investors. Meanwhile economic policy makers and forecasters are under growing pressure to pay attention to these issues. The main responsibility rests with governments and fiscal policy makers, but climate change-related challenges have also turned up on the agendas of central banks. Various consequences to financial stability are clear, but the impact of climate change on macro forecasts is highly uncertain and often double-edged, so any direct impact on monetary policy is unlikely.

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Complex risks over long periods of time

Assessing the economic consequences of climate change is very complex. One reason is that carbon dioxide emissions are long-lasting, with consequences far beyond the normal decision-making horizon. Although there is strong scientific consensus on the fundamental connections between greenhouse gas emissions and rising temperatures, the probability of different outcomes is highly uncertain. Moreover, there are risks of ripple effects on ecosystems and rapid, irreversible climate change – due to such threshold events as the melting of polar ice, changes in ocean circulation or methane gas emissions from the Arctic tundra. So-called fat tails in probability distribution imply that there is an appreciable likelihood of more extreme outcomes, with dramatic consequences.

further complication: today no one needs to take responsibility for consequences beyond their traditional decision-making horizon.

Global solutions are needed. Because emissions are not geographically containable, international agreements are necessary to achieve effective results. One dilemma may be that advanced economies – which have the greatest potential to initiate and implement effective measures – are likely to be less directly affected by climate change than poor countries. They may instead see indirect effects connected to political instability and migration flows. How we evaluate hard-to-quantify damage, with a horizon of a century or more, also depends on how the well-being of future generations is weighed against that of today's generations. This is expressed in the sensitive issue of choosing discount rates in socio-economic calculations.

Some impact on economic forecasts

There are a number of channels through which climate change may affect economic forecasts and thereby also economic policies. This is true of direct physical risks and damage as well as costs of transitioning to a fossil fuel-free society, plus indirect financial risks that primarily affect deliberations related to financial stability (see below). This past year the most newsworthy forecasting questions have involved the short-term impact of extreme weather events, such as the consequences of storms, floods, fires or crop failures. Last year's Swedish drought, for example, led to somewhat lower production and higher prices for agricultural products. In addition, the economy may be affected by political adjustments to climate change and ultimately by how popular opinion reacts to them. Last year's German economic slowdown was partly due to lower auto production, as a consequence of new emissions tests in response to "dieselgate". The "yellow vest" protests in France were triggered by petrol tax increases and contributed to reduced activity in the service sector in the fourth quarter. Higher taxation of fossil energy sources may lead to both changes in relative prices and to generally higher inflation, depending on the extent to which increased energy costs are passed on to prices of other goods and services, as well as wages.

Tricky but limited consequences for monetary policy. Climate events often take the form of supply side-related shocks that tend to marginally boost inflation while hampering growth. This combination causes central banks to face more difficult trade-offs than demand side shocks that push down both inflation and growth. There may

There is little doubt that taxation and fiscal policies command the most direct means of reducing carbon dioxide emissions

Fiscal policy makers bear the main responsibility. There is little doubt that via their taxation and fiscal policies, governments command the most direct means of reducing carbon dioxide emissions. The fundamental problem is the externality or market failure that occurs when the societal costs of climate-changing emissions do not need to be taken into account. This market failure must be managed via taxes ("Pigou tax") or politically mandated quantitative limits. The "tragedy of the commons" was early 19th century British economist William Forster Lloyd's classic name for the dilemma that no market player needs to take responsibility for shared negative consequences. Bank of England Governor Mark Carney has perceptively described "the tragedy of the horizon" as a

thus be reason to extend the analysis to cover dispersal mechanisms etc. But fundamentally, natural disasters, commodity price fluctuations and changes in taxation are not new issues for central banks. As long as the effects of these shocks are viewed as transitory, and do not affect the long-term trend, monetary policymakers can normally see past them. Most central banks, including Sweden's Riksbank, have also toned down the importance of climate change in their actual policy decisions, but repeated climate-related supply side shocks can perhaps no longer be viewed as temporary, but rather as permanent, as the Reserve Bank of Australia and others have pointed out.

GDP growth since 1980 has essentially been zero, if we take into account the environmental impact in the broad sense

Lower inflation and growth trends? Further ahead, other types of effects are conceivable. For example Yves Mersch of the European Central Bank has focused on the possibility that successful transition to renewable energy may lead to a lengthy period of general downward pressure on energy prices. If this coincides with a new productivity surge due to a Fourth Industrial Revolution, we could face a new period of strong disinflation on a par with the most intensive phase of the globalisation process. A lower GDP growth trend is another conceivable consequence. The San Francisco Federal Reserve, for example, highlights studies (such as Ric Colacito et al, *"Temperatures and Growth"*, 2018) suggesting that the large-scale need for "defensive" investments such as air conditioning, protective walls or reinforcement of railways and other infrastructure will squeeze out more productivity-raising investments. The study estimates that this may lower trend GDP by 0.5 points within a few decades.

Virtuous circles are also possible. Assuming long-term downward pressure on both inflation and trend GDP, estimates of the neutral interest rate may also need to be re-assessed. But as with other long-term changes such as demographic trends, such re-assessments are uncertain. It is thus hard to draw clear conclusions for monetary policy. The effects also need not be lopsidedly negative. Increased investments in climate-friendly infrastructure may have positive growth effects, while innovations in climate-friendly technology may spread through the economy, for example in the form of more efficient energy use. The need for climate adaptations may also increase public acceptance of a generally active fiscal policy in many countries, strengthening arguments for looser fiscal policy advanced by economists such as Olivier Blanchard and Larry Summers in an environment of weakened monetary policy effectiveness and less risk of crowding out by other private investments.

Greater consequences for financial stability

As for the financial stability policy area, it is easier to see clearer consequences of climate change. This may explain why central banks whose remit includes main responsibility for these areas, such as the Bank of England, have had a higher profile on climate-related issues than such peers as the ECB and the Riksbank. The various kinds of risks are also more concrete when it comes to financial stability.

- Physical risks, for example a higher frequency of extreme weather events that create major damage.

- Risks from the adjustment to a more climate-friendly society.

Generally speaking, technological and policy changes pose greater transitional risks while "business as usual" involves greater physical risks.

Higher insurance costs. Climate change has already begun to have a clear impact on insurance-related costs. For example, a 20 cm rise in sea level around Lower Manhattan since the 1950s is believed to have increased insured losses by 30 per cent during Superstorm Sandy in 2012. Major climate events may cause bankruptcies among insurance companies or force them to divest financial assets on a large scale, leading to downward price pressure. It may also become harder to insure certain assets at all, resulting in other risks to financial stability when uninsured households and businesses are hit by the consequences of natural disasters. Another concern is that climate events or environmentally related damage may threaten the value of collateral for borrowing and cause credit losses, especially in geographically or sectorally concentrated loan portfolios.

The transition process may create stranded assets. Major changes in the pricing of various assets may also pose risks to financial stability. Price declines for fossil commodities or shares in companies with business models that are dependent on fossil energy sources, may be extensive in the future. Examples of such stranded assets are coal reserves that, due to changed regulations, would no longer be worth extracting. A "carbon budget" – stating how much carbon dioxide emissions are compatible with limiting the global temperature increase to 2 degrees Celsius – would, for example, require that 2/3 of currently known fossil fuel reserves stay in the ground. Most of this consists of coal. Worries about correlated credit losses and falling asset prices – and in the worst case, crises throughout the financial system – have resulted in global initiatives to increase transparency about the exposure of individual companies to climate-related risks.

Greener markets: Opportunities and risks

Aside from direct effects on forecasting and economic policy, discussions are now under way on other institutional changes. One area concerns the introduction of macroeconomic metric and targets that take into account environmental changes such as climate change or degradation of natural resources. According to various studies (such as *"Mismeasuring Our Lives: Why GDP Doesn't Add Up"* by Joseph Stiglitz et al, 2010), one can argue that GDP growth since 1980 has essentially been zero, if we take into account the environmental impact in the broad sense. Overall metrics such as "green GDP" have the potential to provide better guidance for decision makers to operate in a more complex world.

Type of risk		Examples of risks to the economy	Examples of risks to financial stability
Physical risks	Extreme weather events	Unexpected supply (and demand) side shocks	Costs of damage (insured & uninsured), damage claims, credit losses
	Global warming	Lower productivity & trend growth	
Adjustment risks Technology & policy changes		Effect of supply (and demand) side shocks on inflation & (trend)growth	"Stranded assets", impact on business models, "green bubbles"
"Business as usual" => greater physical risks Changes in policy & technology => greater adjustment risks			

But new metrics are also associated with risks. For example, it may be hard to design metrics without making genuinely difficult trade-offs that sow divisions in the research world or deal with political conflict zones where there are no easy answers. We should also bear in mind that the existing GDP metrics are not primarily intended as goals in themselves. Although per capita GDP is sometimes used as an indicator of well-being or even “happiness”, GDP is primarily designed to serve as a stabilisation policy tool to enable fiscal and monetary policy makers to orient themselves in matters of a more cyclical nature. Green elements would make these metrics harder to interpret in that function. It is thus more a question of finding complements to traditional metrics, not replacing them.

Initiatives for a greener financial market. Central banks and other regulators can play a key role in developing a financial infrastructure in which green bonds are used to finance climate-related investments. Their purpose is not only to encourage the private sector to provide resources for climate transition, but perhaps above all to stimulate climate innovations. But there is a risk that the burgeoning interest in “green investments” will lead to price bubbles. The ECB’s Yves Mersch has gone so far as to label this phenomenon a systemic financial risk of its own. This worry, in turn, underscores the need to create transparent and uniform rules about what may be labelled “green”. One example is the European Union’s “green taxonomy”.

Central banks have generally distanced themselves from “green” monetary policy concepts, however. One example is proposals that central banks should prioritise green bonds as part of their quantitative easing. At the ECB, for example, bonds in carbon dioxide-intensive companies accounted for nearly half of the total universe when the central bank launched its corporate bond-buying programme. Such a policy change, central banks maintain, might conflict with the overall goal of price stability as well as requirements that such policies must be neutral from a competitive standpoint. In addition, the supply of available bonds for the private market would be limited, further accentuating the above-cited bubble risks. But the fundamental reason behind central bank reluctance is concern that increased elements of political deliberation may threaten central bank independence.

To summarise, climate change does not yet seem likely to have a noticeable impact on monetary policy. Yet the risk of more frequent and extreme weather events and disruptions to the financial system from both climate events and adjustment process create a greater need for an understanding of climate change and its economic consequences.