ECB loosening is not enough

The European Central Bank's negative interest rates and quantitative easing measures cannot by themselves address the pervasive risk aversion holding back the eurozone economy. Eurozone policymakers must, therefore, find the political will to design a comprehensive package of financial and fiscal measures aimed at injecting new energy into the European project.

LONDON – If indications of disappointing economic growth in the eurozone are confirmed, the European Central Bank will loosen monetary policy further in September. Last week, outgoing ECB President Mario Draghi signaled a further likely cut in the ECB's rate on commercial banks' overnight deposits with the central bank, which is already -0.4%. In addition, the ECB is discussing a new program of asset purchases.

Economic stimulus is clearly needed. Annual inflation is well below the ECB's target of "close to, but below 2%," and financial markets expect it to remain so for years. What's more, the eurozone has grown more slowly than the US economy since the 2008 global financial crisis. Growth has flagged since peaking in the third quarter of 2017, and slowed

again in the second quarter of this year.

It is also clear that national governments in the eurozone are reluctant to provide a coordinated fiscal stimulus, despite the urgings of the ECB and many economists. Willingly or not, the ECB remains the only game in town.

The question is whether monetary policy alone can help to improve real growth and the inflation outlook in the eurozone. Monetary policy can be a powerful tool. The key to President Franklin D. Roosevelt's successful effort to revive the US economy in the 1930s was not deficit spending, but rather the large monetary stimulus resulting from America leaving the gold standard before continental European countries did. Today, the ECB needs to engineer something similar with different tools.

In principle, taking the ECB deposit rate further into negative territory should remove the restriction on future expected short-term interest rates turning negative, and therefore flatten the forward yield curve. A rate cut should also put downward pressure on the euro's exchange rate, potentially making eurozone exporters more competitive.

But such a move would be controversial, in particular because it would dent the profitability of banks that cannot pass on negative ECB deposit rates to their customers. Such policies have heterogeneous effects across banks, and mitigating action, although feasible, requires complex engineering.

According to an analysis by the ECB's staff, "strong" eurozone banks are able to pass on negative rates to their corporate clients; "weak" banks cannot.

The ECB is therefore considering ways to mitigate this – in particular by granting very favorable conditions on the special loans that it will offer under the TLTRO III program, which are likely to be taken by the "weak" banks. In addition, a tiering system is being considered in which reserves below a

certain threshold would not be subject to negative rates. But this is likely to benefit the strongest banks of stronger core eurozone countries such as Germany, France, and the Netherlands, which together hold about one-third of total deposits at the ECB.

Beyond these technical considerations, policymakers must grapple with two root causes of excess demand for central-bank reserves among strong eurozone banks. One is very high demand for safe assets in general – and banks in core eurozone countries have little incentive to hold their own governments' debt when the interest rate is below the ECB deposit rate. Another cause is the segmentation of the eurozone's interbank market, which, if the ECB implemented tiering, would prevent strong banks from benefiting from arbitrage opportunities by lending to weak banks at a rate above -0.4%. Both causes are the result of the eurozone's dysfunctional banking system, in which demand for safe assets involves both a "home bias" and a strong demand for core countries' sovereign debt.

In these circumstances, the ECB will not find it easy to implement a policy that would remove the constraint of the zero lower bound on interest rates, while ensuring that the policy's distributional effects on banks and EU member states are neutral. Doing so will involve many instruments and complex design, far from the simple one-tool-for-one-target framework that was best practice before the financial crisis.

Moreover, negative rates become less effective over time and, if protracted, may have undesirable effects – for example, by inducing savers to de-risk, thereby potentially generating asset-price bubbles and increasing financial disintermediation. The positive stimulus from the depreciation of the euro's exchange rate could offset these effects, but only if other central banks – and in particular the US Federal Reserve – do not ease at the same time. And on July 31, the Fed announced a widely expected quarter-percentage-point cut in its benchmark interest rate, while further future cuts

cannot be excluded.

But the main problem is that neither negative rates nor quantitative easing can by themselves address the pervasive risk aversion holding back the eurozone economy. The ECB is trying to discourage demand for safe assets by making them more expensive to hold, but it cannot address the causes of the increase in such demand. This is a global trend driven by several factors, including demographic changes, widespread uncertainty linked to technological transformation, and political risks such as trade wars and nationalism. But in the eurozone they are exacerbated by the lack of reform of the single currency.

More than ten years after the financial crisis, the eurozone's financial markets are still fragmented, and the supply of safe assets is limited by the conservative fiscal policy of northern European countries, particularly Germany. Eurozone policymakers must, therefore, find the political will to design a comprehensive package of financial *and* fiscal measures aimed at injecting new energy into the European project. Such a combined approach is essential to address the deep-rooted risk aversion sapping growth across the eurozone.

In the 1930s, America's key stimulus was monetary rather than fiscal, but a vital ingredient of success was a comprehensive set of reforms coupled with a strong message capable of unifying the country. Today, Europe needs a twenty-first-century version of that policy.

LUCREZIA REICHLIN

Writing for PS since **2014**
16 Commentaries

Hedge funds raise their bets on falling US crude prices

NEW YORK (Reuters) – Hedge funds and money managers raised bullish wagers on U.S. crude oil in the latest week, data showed on Friday, as prices rose with the risk of global supply disruptions remaining high.

The speculator group raise its combined futures and options position in New York and London by 31,273 contracts to 472,907 in the week to April 17, the U.S. Commodity Futures Trading Commission (CFTC) said.

During the period, oil prices rose about 1.5 percent.

Oil markets have been supported by the sentiment that there are high risks of supply disruptions, including

However, Brent crude speculators cut net long positions by 12,572 contracts to 619,882 in week to April 17. Last week, the group hiked bullish bets to the highest on record.

Oil markets were tense about the possibility of Western military action in Syria heading into the weekend but prices

weakened amid a lack of escalation following intervention by the United States, France and the UK.

Oil prices had risen nearly 10 percent in the run-up to the strikes, as investors bulked up on assets such as gold or U.S. Treasuries, which can shield against geopolitical risks.

In the United States, inventories have fallen as fuel demand has firmed and imports dropped. Crude stockpiles fell 1.1 million barrels in the week to April 13, the Energy Information Administration said on Wednesday, compared with analysts' expectations for a decrease of 1.4 million barrels.

Among refined products, bullish bets on U.S. gasoline climbed to the highest in more than two months. Net long positions rose by 9,269 lots to 97,978 lots.

Gasoline demand has jumped to levels seen during peak driving season in the summer, data showed.

In distillates, bullish bets on ultra low sulfur diesel also rose to a more than two-month high. Distillate stockpiles decreased 3.1 million barrels, versus expectations for a 268,000-barrel draw, the EIA data showed this week, putting overall inventories of these products, which include diesel, heating oil and jet fuel, at levels not seen seasonally since 2014.

ing conflicts in the Middle East, renewed U.S. sanctions against Iran and falling output as a result of political and economic crisis in Venezuela.

Gazprom eyes Eurobond issue in July

Gazprom PJSC is considering testing the mar- ket's appetite for its debt this year by issuing Eurobonds through a Russian or UK unit said a person familiar with the company's plans. The Russian gas producer is working to set up a UK unit because a legal spat with JSC Naf- togaz Ukrainy makes it difficult to use its existing Luxembourg- based financial arms, the person said, asking not to be named because the plans aren't public. Earlier this month, a court in Luxembourg confirmed the Ukrainian company's right to demand a freeze of Gazprom's local assets and debt. The energy giant may use the British unit by the end of the year for a small Eurobond issue, the person said. Since Decem- ber 2018, securities legislation also allows Russian corporate issuers to make direct placements of Eurobonds compliant with foreign regulations, without needing to use a special purpose vehicle, or SPV, based overseas. Gazprom does not need external financing, so any bond issue would be mainly aimed at gauging investors' enthusiasm for the assets, the person said.

Gazprom’s spokesman Sergei Kupriyanov declined to comment. Gazprom issued $1.25bn of Eurobonds in February, in what became the biggest single-tranche dollar transaction for the company since 2009. Investors initially bid more than $5.5bn amid positive sentiment for emerging- market bonds. Investors will have an appetite for Gazprom’s new debt as long as the issuer is located in a safe jurisdiction, Lutz Roeh- Meyer, chief investment officer at Berlin-based Capitulum Asset Management GmbH, said by e-mail. “Which SPV is doing it, is unimportant,” he said, adding that he views both the UK and Luxembourg as safe. Gazprom has said it has enough liquidity as it aims to complete three major gas pipeline projects this year — Nord Stream 2 to Europe, TurkStream to Turkey and Power of Siberia to China. Last week, it raised a further $2.2bn when its subsidiaries sold quasi-treasury shares equivalent to 2.9% of the company to an unidentified buyer. Gazprom’s legal battle with Ukraine is over multibillion-dollar gas transit debt payments. The Russian company has been trying to fence off Naftogaz’s attempts to arrest its assets across Europe with mixed success.

BP can’t sell tainted oil as market struggles to deal with crude

Bloomberg/London

Russia’s contaminated oil crisis isn’t over yet — at least not for the traders trying to find a home for the cargoes they unwittingly bought.

BP Plc, the London-based oil giant, failed to find a purchaser for more than 700,000 barrels of Urals crude that got loaded onto a tanker almost three months ago at a port in the Baltic Sea, people with knowledge of a sales tender said, asking not to be identified because the matter is private. The cargo has excessive levels of organic chlorides that could damage a refinery if not removed.

In late April, it emerged that Russia was inadvertently sending millions of barrels laced with the contaminant through its Druzhba pipeline system to refineries across Europe, a situation that eventually caused flows to be halted. Some barrels also got sent to the port of Ust-Luga in the Baltic, where BP and other companies loaded them onto tankers.

Russia’s pipeline operator Transneft said last month that it would pay $15 a barrel in compensation to Belarus for supplies sent by pipeline. Its eastern neighbour said recompense should not be dictated.

It’s unclear what traders have been told about compensation.

There was insufficient interest in the cargo for BP to be able to sell it, the people said. The shipment has an organic chloride content of about 29 parts per million. It needs to be less than 10. A spokesman for BP declined to comment.
There are still about 5mn barrels of the tainted oil on tankers in northwest Europe, Singapore and other locations, according to traders and tanker tracking data compiled by Bloomberg. That represents about 40% of the roughly 12mn barrels that were on ships at one stage during the height of the contamination crisis.

Turkish Airlines Shows Interest in HNA's Virgin Australia

Turkish Airlines is interested in HNA Group Co.’s minority stake in Virgin Australia Holdings Ltd. as it seeks growth in the Asia-Pacific region, according to people familiar with the matter.

Turkey’s national flag-carrier is among companies looking at HNA’s 20% stake in the Australian airline, said the people, asking not to be named because the discussions are private. Deliberations are preliminary and may not result in a deal, the people said.

Reports that it will acquire HNA’s 20% stake in Virgin Australia “do not reflect the truth,” Turkish Airlines said in a statement Thursday. “We share our objectives of developing our business partnerships in the Asia-Pacific region with our stakeholders.” A representative for HNA Group declined to comment.

The troubled Chinese conglomerate was open to offers for its stake in Virgin Australia as part of efforts to cut debt, Bloomberg reported in August last year. Singapore Airlines Ltd. and Nanshan Capital, which each control about a fifth of Virgin’s shares, were among the companies weighing a bid, people familiar with the matter said at the time.

Shares Decline

Virgin Australia closed 3% lower at 16 Australian cents in Sydney, valuing the airline at A$1.35 billion ($925 million). Turkish Airlines fell as much as 2% and traded 0.9% lower at 12.35 liras as of 11:58 a.m. in Istanbul.

HNA has about dozen airlines in its portfolio including Hainan Airlines Holding Co. Ltd., Hong Kong Airlines Ltd., Lucky Air Co. Ltd. and Tianjin Airlines.

The Chinese firm is selling assets after racking up one of the nation’s biggest corporate debt loads in a global acquisition spree. It also considered selling its majority stake in oil-

storage and logistics business HG Storage International Ltd. as well as container-leasing unit Seaco, tech-outsourcing arm Pactera Technology International Ltd. and aircraft-maintenance firm SR Technics, Bloomberg News has reported.

Turkish Airlines has been evaluating investments in other carriers in a departure from concentrating on growth at its huge Istanbul hub as it looks to safeguard expansion as Mideast and European economies falter and a rise in protectionism weighs on global cargo flows. The company has a longstanding holiday venture, SunExpress, with Deutsche Lufthansa AG, and set up a joint venture in Albania last year.

The airline plans to boost its fleet to 474 planes by 2023 including 25 Boeing 787-9s, according to its website. It took delivery of the first Dreamliner in June as part of a deal for 40 of the jets.

In another development, Turkish Air on Thursday announced a so-called code-share partnership with Bangkok Airways PCL. The deal will allow Turkish to sell tickets on Bangkok Air flights as if they were its own, opening up more destinations in Thailand and other parts of Southeast Asia.

EU failing to find consensus on IMF chief to succeed Lagarde

Paris: EU members have so far been unable to reach a consensus on a candidate to succeed Christine Lagarde as head of the International Monetary Fund and may yet need a vote to break the deadlock, officials said Thursday.

EU states had given themselves a deadline of the end of July to find a candidate to head the Washington-based global lender, which by tradition – but not rule – is led by a European.

But reflecting tensions all too familiar in Brussels, the process to replace Lagarde, who is to become head of the European Central Bank, has been mired in disputes between northern and southern EU member states.

“At this stage, although some candidates´ names gather more support than others, there is not yet a full consensus around one name,” said an official from France´s finance ministry, asking not to be identified by name.

French Finance Minister Bruno Le Maire, who is leading the

talks on finding a European candidate, has spoken to “all his colleagues” over the last few days and in particular his German counterpart Olaf Scholz.

Sources say that five candidates are currently in contention – from southern Europe Spain´s Finance Minister Nadia Calvino and her Portuguese counterpart Mario Centeno, and from northern Europe, former Dutch finance minister Jeroen Dijsselbloem and Bank of Finland chief Olli Rehn.

The fifth candidate – from central Europe and a possible compromise figure – is Kristalina Georgieva, the current number two at the World Bank.

Southern EU states fear that Rehn and Dijsselbloem, who enjoys German backing, excessively favour economic austerity which risks harming growth.

Southern countries have particularly long memories of Dijsselbloem because of his tough stance against southern nations like Greece when he headed the group of EU finance ministers.

“I can´t spend all my money on drinks and women and then ask for help,” he said in one particularly notorious comment in 2017. But northern countries are also underwhelmed with the southern European candidates, with Calvino in particular seen as having insufficient experience.

“This situation shows the splits between the north and the south and the difficulties for the Europeans in agreeing on a solid candidate,” a source close to the talks told AFP.

The ECB´s outgoing chief Mario Draghi said last week that he was “not available” for the position. At 71, he is too old to hold the post, according to IMF rules, which state that the managing director must be under 65 when appointed.

This leaves Georgieva – but the snag is that she will soon be

66, above the age limit of 65. “The other members of the fund will need to make an exception for her, and that it is not a given,” one source said.

Adding to the uncertainty, Le Maire has allowed Britain, after its government shake-up last month, one more day to present a candidate, source said. This could allow a candidacy by Canadian-born Bank of England governor Mark Carney, who holds Canadian, British and Irish nationality.

Sources said a vote by ministers is a possible way to break the impasse, adding that Le Maire has raised this as an option. But this would also have the disadvantage of exposing to the world the inability of Europeans to unite around a single top-level candidate, the sources said.

The IMF says any of the fund´s 189 members can nominate a candidate between July 29 and September 6, after which the board will announce its shortlist of up to three names. But with the US and Europe having the biggest voting blocs in the IMF, it would be difficult for an outside candidate to upset the tradition whereby they divvy up the IMF and World Bank jobs between them.

The convention has nonetheless come under strain in recent years, with developing economies demanding a greater say at the Washington-based institutions. US Treasury Secretary Steven Mnuchin emphasised at a meeting of G7 ministers last month that naming a European to head the IMF was a convention, “not an official policy”.

Possible non-European candidates could include the general manager of the Bank of International Settlements and former Bank of Mexico governor Agustin Carstens, and Lesetja Kganyago, the governor of the central bank of South Africa. The IMF plans to select its new leader by October 4.

France’s EDF fined nearly 2 mn euros for not paying bills on time

Forgot to pay your bills? Don’t worry. So did your electricity provider.

France’s state state energy giant EDF has been fined 1.8 million euros ($2 million) for not paying its bills on time, a record amount that aims to dissuade big businesses from starving small suppliers by putting off payment for as long as possible.

Junior economy minister Agnes Pannier-Runacher said Thursday the government wanted to “hit companies in the wallet” to force a change in their thinking on paying bills, currently treated by many as “a minor administrative issue”.

France, like many European countries, has been getting tougher

on late payers, blamed for sometimes bankrupting small companies by failing to settle their bills on time.

In 2016, the socialist government of then president Francois Hollande increased the maximum fine for late payments from 375,000 euros to 2 million euros.

President Emmanuel Macron has continued on the same track, pushing through a UK-inspired law that allows the government to publicly name and shame offenders for the first time.

Several big companies have been outed as late payers in recent months, including US online retail giant Amazon, China's Huawei and France's own cosmetics chain Sephora as well as the national postal service.

But the fine imposed on EDF dwarfs all previous sanctions, with the stiffest to date – 670,000 euros – going to a subsidiary of German industrial giant HeidelbergCement in May.

As further punishment for EDF, in which the state has a 83.7-percent stake, the company will also be stripped of a label it earned in 2015 for its "balanced relations" with suppliers.

The government audited over 130,000 bills received by the company between March and August 2017.

It found that 3,452 suppliers who sent bills totalling 38.4 million euros had not been paid on time.

EDF said Thursday that it had "taken note" of the fine and vowed to "continue reinforcing internal procedures…so that procedures allowing bills to be paid on time are understood and followed" by staff.

In France, companies have 30 days to pay their bills unless otherwise stated in the contract, which can give creditors up to 60 days to pay up.

But big groups regularly disregard the deadlines, with fewer

than one in two settling their bills within 60 days, according to a 2018 report from the Banque de France’s monitoring centre.

The centres blamed late payers for robbing small companies of 19 billion euros in cashflow.

The coming clash between climate and trade

By Jean Pisani-Ferry /Paris

The incoming president of the European Commission, Ursula von der Leyen, has laid out a highly ambitious climate agenda. In her first 100 days in office, she intends to propose a European Green Deal, as well as legislation that would commit the European Union to becoming carbon neutral by 2050. Her immediate priority will be to step up efforts to reduce the EU’s greenhouse-gas emissions, with the aggressive new goal of

halving them (relative to 1990 levels) by 2030. The issue now is how to make this huge transition politically and economically sustainable.

Von der Leyen's programme reflects growing concern over climate change among European citizens. Even before the continent's recent heat wave, protests by high-school students and the surge in support for Green parties in the European Parliament election had been a wake-up call for politicians. Many now regard climate action not only as a responsibility to future generations, but also as a duty to today's youth. And political parties fear that dithering could lose them support among huge numbers of voters under 40.

In truth, however, the EU (including the United Kingdom) is a minor contributor to climate change these days. Member states' combined share of global CO2 emissions has declined from 99% two centuries ago to less than 10% today (in annual, not cumulative terms). And this figure could fall to 5% by 2030 if the EU meets von der Leyen's emissions target by that date.

While the EU will undertake the painful task of cutting its annual emissions by 1.5bn tonnes, in 2030 the rest of the world will likely have increased them by 8.5bn tonnes. Average global temperatures will therefore continue to rise, possibly by 3C or more by 2100. Whatever Europe does will not save the planet.

How Europe deals with this frontrunner's curse will be critical. The von der Leyen plan will inevitably cost jobs, curtail wealth, reduce incomes, and restrict economic opportunities, at least initially. Without an EU strategy for turning the moral imperative of climate action into a trump card, it won't be tenable. A backlash will come, with ugly political consequences.

So what strategy might Europe adopt? One option is to bet on leading by example. By building an environmentally friendly development model, Europe and other climate pioneers would establish a path for others to take. And non-binding international agreements such as the 2015 Paris climate agreement would help to monitor progress, thereby pushing

laggard governments to act.

But because climate preservation is a classic public good, climate coalitions are inherently unstable – and larger ones create even more incentive for members to defect and free-ride on others' efforts. Leadership by example is thus unlikely to suffice.

Alternatively, Europe could build on its first-mover advantage to develop a competitive edge in new green technologies, products, and services. As Philippe Aghion and colleagues have argued, innovation can help tap the potential of such technologies and start changing the direction of economic development.

There are encouraging signs: the cost of solar panels has fallen faster than anticipated, and renewables are now more competitive than had been expected even ten years ago. Unfortunately, however, Europe has failed to convert climate action into industrial leadership. Most solar panels and electric batteries are produced in China, and the United States is its only serious competitor.

Europe's remaining card is the size of its market, which still accounts for some 25% of world consumption. Because no global firm can afford to ignore it, the EU is a major regulatory power in areas such as consumer safety and privacy. Moreover, European standards often gain wider currency, because manufacturers and service providers that have adapted to demanding EU requirements tend to adhere to them in other markets, too.

The EU's bet is that the combination of its own strong commitment to decarbonisation and the much softer, but global, Paris climate agreement will lead firms to redirect research and investment toward green technologies. Even if other countries do not set ambitious targets, the argument goes, enough investment may be redirected to make green development more affordable for all countries.

Yet current progress in this regard is clearly insufficient to curb global emissions and keep the global increase in temperature this century well below 2C above pre-industrial

levels, as the Paris agreement stipulates. For example, global coal-powered capacity is still growing, because China and India are building plants faster than the US and Europe are dismantling them.

Europe is therefore short of tools that could make its transition to carbon neutrality economically and politically sustainable. In her address to the European Parliament, von der Leyen dropped a bomb: she promised to introduce a border tax aimed at preventing “carbon leakage,” or the relocation of carbon-intensive production to countries outside the EU.

Such a tax will win applause from environmentalists, who (often wrongly) believe that trade is bad for the world’s climate. More important, the measure would both correct competitive distortions and deter those tempted to abstain from taking part in the global climate coalition. As long as there is no binding climate agreement, a carbon border tax makes economic sense.

Yet such a tax won’t fly easily. Committed free traders (or what remains of them) will cry foul. Importers will protest. Developing countries and the US (unless it changes course) will portray the measure as protectionist aggression. And an already crumbling global trade system will suffer a new shock.

It is ironic that the new leaders of the EU, which has relentlessly championed open markets, will likely trigger a conflict between climate preservation and free trade. But this clash is unavoidable. How it is managed will determine both the fate of globalisation and that of the climate. — Project Syndicate

*Jean Pisani-Ferry, a professor at the Hertie School of Governance (Berlin) and Sciences Po (Paris), holds the Tommaso Padoa-Schioppa chair at the European University Institute and is a senior fellow at Bruegel, a Brussels-based think tank.

The Dangerous Delusion of Optimal Global Warming

Aug 1, 2019 ADAIR TURNER

The Nobel laureate economist William Nordhaus believes that global warming should be limited to 3.5°C, which is much higher than the 2°C targeted by the Paris climate agreement. But Nordhaus's approach represents a misguided application of sophisticated modeling to decision-making under extreme uncertainty.

LONDON – The United Kingdom is now legally committed to reduce net greenhouse-gas emissions to zero by 2050. Opponents in Parliament argued for more cost-benefit analysis before making such a commitment; and Nobel laureate economist William Nordhaus argues that such analysis shows a much slower optimal pace of reduction.

The 2015 Paris climate agreement seeks to limit global warming to "well below 2°C" above preindustrial levels, while the Intergovernmental Panel on Climate Change recommended in 2018 that the increase be capped at 1.5°C. By contrast, Nordhaus's model suggests limiting warming to 3.5°C by 2100. If that were

the objective, net zero emissions would be acceptable far later than 2050.

But Nordhaus's approach represents a misguided application of sophisticated modeling to decision-making under extreme uncertainty. All models depend on input assumptions, and Nordhaus's conclusions rely crucially on assumptions about the additional harm of accepting 3.5°C rather than 2°C of global warming.

For some types of climate impact, quantitative estimates can be attempted. As the Earth warms, crop yields will increase in some colder parts of the world and decrease in hotter regions. Any estimate of the net economic impact is subject to wide margins of error, and it would be absurd to imagine that benefits in one region will be transferred to others that have been harmed, but at least modeling can help us to think through the possible scale of these effects.

But it is impossible to model many of the most important risks. Global warming will produce major changes in hydrological cycles, with both more extreme rainfall and longer more severe droughts. This will have severe adverse effects on agriculture and livelihoods in specific locations, but climate models cannot tell us in advance precisely where regional effects will be most severe. Adverse initial effects in turn could produce self-reinforcing political instability and large-scale attempted migration.

To pretend that we can model these first- and second-round effects with any precision is a delusion. Nor can empirical evidence from human history provide any useful guidance for how to cope with a world that warmed to Nordhaus's supposedly optimal level. After all, 3.5°C warming above preindustrial levels would take us to global temperatures not seen for over two million years, long before modern human beings had evolved.

Modeled estimates of adverse impacts are also incapable of capturing the risk that global warming could be self-reinforcing, creating a nontrivial risk of catastrophic threats to human life on Earth. Recent Arctic temperature trends confirm climate model predictions that warming will be greatest at high latitudes. If this produces large-scale melting of the permafrost, huge amounts of trapped methane gas will be released, causing climate change to accelerate. The higher the temperature attained, the greater the probability of rapid and uncontrollable further warming. Models always struggle to capture such strongly endogenous and non-linear effects, but Nordhaus's 3.5°C point of optimality could be a hugely unstable equilibrium.

Before the 2008 financial crisis many economists, including some Nobel laureates, believed that sophisticated "value at risk" (VaR) models had made the global financial system safer. Then-US Federal Reserve Chair Alan Greenspan was among them. In 2005, he reassuringly observed that the "application of more sophisticated approaches to measuring and managing risk" was one of the "key factors underpinning the greater resilience of our largest financial institutions."

But those models provided no warning at all of impending disaster. On the contrary, they deluded bank managers, central bankers, and regulators into the dangerous belief that risks could be precisely foreseen, measured, and managed. VaR models could not capture the danger of catastrophic collapse resulting from endogenous self-reinforcing feedback loops within a complex and potentially fragile system. The same is true of supposedly sophisticated models purporting to discern the optimal level of global warming.

The economic costs of achieving carbon neutrality by mid-century are also uncertain. But we can estimate their maximum order of magnitude with far greater confidence than is possible when assessing the costs of adverse effects of climate change.

Achieving a zero-carbon economy will require a massive increase in global electricity use, from today's 23,000 TW hours to as much as 90,000 TW hours by mid-century. Delivering this in a zero-carbon fashion will require enormous investments, but as the Energy Transitions Commission has shown, it is technically, physically, and economically feasible. Even if all those 90,000 TW hours were provided from solar resources, the total space requirement would be only 1% of Earth's land surface area. And in real-world competitive energy auctions, solar and wind providers are already committing to deliver electricity at prices close to and sometimes below the cost of fossil fuel generation.

Total cost estimates must also account for the energy storage or backup capacity needed to cover periods when the wind doesn't blow and the sun doesn't shine, and for the complex challenge of decarbonizing heavy industrial sectors, such as steel, cement, and petrochemicals.

Added up across all economic sectors, however, it's clear that the total cost of decarbonizing the global economy cannot possibly exceed 1-2% of world GDP. In fact, the actual costs will almost certainly be far lower, because most such estimates cautiously ignore the possibility of fundamental technological breakthroughs, and maintain conservative estimates of how long and how fast cost reductions in key technologies will occur. In 2010, the International Energy Agency projected a 70% fall in solar photovoltaic equipment costs by 2030. It happened by 2017.

Rather than relying on apparently sophisticated models, climate-change policy must reflect judgment amid uncertainty. Current trends threaten major but inherently unpredictable adverse impacts. Limiting global warming to well below 2°C will cost at most 1-2% of GDP, and those costs will come down if strong commitments to reduce emissions unleash technological progress and learning-curve effects. Given these realities, zero by 2050 is an economically rational target.

Siemens Is Latest Casualty of European Manufacturing Slowdown

German industrial giant Siemens AG became the latest casualty of Europe's economic slowdown, warning a sharp deterioration in some markets hurt quarterly profit and has put financial goals at risk.

The shares dropped as much as 5.9% on Thursday, the most in more than three years, after the region's largest engineering company reported a disappointing set of results, joining ArcelorMittal, Rheinmetall AG and BMW AG in providing evidence of the gathering storm.

The earnings are a sign that a deepening slump in the global car industry and a more general economic malaise are reaching further into corporate Europe. Until now, Siemens was able to rely on its digital industries division supplying factories

with equipment to automate to make up for a protracted slump in the power and gas sector. In the latest quarter, even orders and sales at that unit dropped.

“It is difficult to reconcile owning Siemens for its world-class automation, software franchise when this is driving negative earnings,” Morgan Stanley analyst Ben Uglow wrote in a note.

Downbeat Figures

Manufacturing in the euro area shrank for a sixth month at the start of the third quarter, dragged down by Germany’s worst slump in seven years. The downbeat figures come in the wake of reports showing slower economic growth in France, Spain and the euro area, with Italy stagnating. While part of the weakness is linked to troubles in the automotive industry, a continued downturn could spell more trouble.

Behind the economic statistics, an increasing number of companies like Siemens are also sounding the alarm. The German company is in the midst of an overhaul and is already shedding thousands of jobs. During the latest reporting period, profit declined a worse-than-expected 12% and the company said a target for sales growth will be harder to reach and another for profit margin will be at the lower end of a range.

“The assumptions we made in the first two quarters about the economic and political environment are no longer true,” Siemens Chief Financial Officer Ralf Thomas said, adding that the auto sector won’t improve for at least three quarters. “We’re taking countermeasures to secure our business’s profitability to the greatest extent possible.”

Chief Executive Officer Joe Kaeser has supervised a large-scale breakup of Siemens’s conglomerate structure, starting with a merger of the wind turbine division and a listing of the health-care division. The planned spinoff of the gas and power unit will be completed in 2020. The German executive

also tried and failed to merge the train-making operation with that of rival Alstom SA. The move was partly motivated by the fate of rival conglomerate General Electric Co., which is showing signs of emerging from a troubled period.

Siemens’s new structure has greatly reduced the company’s need for people in central operations, where 2,500 job cuts are planned. In total, the company plans to cut more than 10,000 jobs, although Kaeser has said company also plans to hire about 20,000 in the same time.