BANK POLICY INSTITUTE

Climate Risk and Bank Capital Requirements

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Several central banks and supervisors in Europe have started to assess the effect of climate-related risks on the banking sector. The ACPR and Banque de France just published the results of their first assessment of financial risk stemming from climate change; the European Central Bank is conducting a macro climate stress test and will be undertaking a micro-prudential climate stress test in 2022; and the Bank of England Climate Biennial Exploratory Scenario (CBES) is currently underway.

The main goals of those exercises are to raise awareness about climate risks, to strengthen bank risk-management processes, and to make data needed to measure climate-related risks more readily available. However, some have argued that regulators should go further than just raising awareness or assessing climate-related risks, and instead should use bank capital requirements to make the financial system more resilient to those risks. Under such plan, bank exposures associated with activities with a larger carbon footprint should have higher risk-weights. The increase in risk-based requirements would supposedly bolster the capacity of banks to withstand future losses while helping support the United States on a path toward decarbonization.

Requiring banks to hold more capital when lending to carbon-intensive firms misuses the risk-based capital regulatory framework, ignores the challenges in estimating climate-related financial risks, or overlooks that those risks tend to be relatively small compared with other sources of risk over similar time horizons. Increasing risk weights of exposures with a higher carbon footprint would also simply cause lending to migrate to shadow banks. This would reduce the supply of credit for firms wanting to invest in less carbon-intensive infrastructure and technologies and hinder the Federal Reserve's ability to monitor those risks when assessing financial stability.

Rationale for Capital Regulation. The role of capital requirements is to ensure the safety and soundness of banks by preventing them from taking on too much risk and leverage, thereby avoiding bank failures that amplify the economic cost of financial crisis. Although higher capital reduces the probability of bank failure, it also increases the cost of lending. This is because equity capital is more expensive than bank deposits. Therefore, an increase in capital requirements raises the cost of financial intermediation by banks and reduces lending and economic growth. As a result, when banking regulators set the optimal level of capital requirements, they did a trade-off between the benefits of having a more stable banking sector versus the costs brought on by the reduction in lending.

Two key elements of capital requirements are important to note. First, risk-based capital requirements are calculated as a percentage of risk-weighted assets. The latter is computed by assigning risk-weights to each bank exposure. The risk-weights are risk sensitive, so exposures with a higher probability of default carry a higher risk-weight relative to financial assets with a lower risk, such as securities guaranteed by government agencies or the U.S. government. Second, capital requirements are defined with a specific time horizon in mind. The ongoing capital requirements agreed on in Basel generally assume a horizon of about one year, while the U.S. supervisory stress tests assess the capital adequacy of large banks using a horizon of nine quarters. The European and U.K. stress tests assess the capital adequacy of banks over a three-year and five-year horizon, respectively. If regulators were to adjust risk-weights to consider the impact of climate change—as they do for credit risk, operational risk,

and market risk—they would have to consider the particular asset's risk and the horizon over which that risk would materialize.

It is also worth noting that capital regulations were significantly overhauled after the 2007–2009 global financial crisis. Specifically, the Basel III accord strengthened the quality and level of regulatory capital for all banks and imposed new capital buffers on top of regulatory minimum capital requirements. In addition, the largest banks were assigned a capital surcharge intended to account for their systemic risk. On top of the increased stringency of the ongoing capital requirements, large banks are subject to annual or biannual stress tests. In the U.S., the stress test results consistently show that banks are extremely well capitalized and can withstand a severe recession while continuing to offer credit to their customers. In other words, if climate-related losses were material in the planning horizon of the stress tests, they would certainly be reflected in banks' peak losses in those tests.

Challenges in Climate Stress Testing. As discussed in a prior note, the measurement of risks associated with climate change poses significant challenges. These involve several major departures from the assumptions used to arrive at the risk-weights in the Basel capital framework. The note discussed several "known unknowns" that make the results of climate stress tests difficult to translate to bank capital requirements. And even if some regulators may want to adjust these requirements, scaling the risks to the time horizon typically used to set capital requirements would most likely result in negligible adjustments to risk-weights of loans to firms in carbon-intensive sectors.

1. **Complexity and opacity of climate models**. The lack of data creates important challenges when modeling the interactions between and among climate, the macroeconomy and the financial sector. Modeling those interactions is necessary in the design of scenarios suitable for analyzing the risks associated with climate change. Due to the lack of reliable data, climate scientists must rely on huge, complicated and opaque models to quantify the economic and social impacts of climate change. In addition, there is considerable uncertainty about some of the key relationships assumed in those models. Two frequently cited examples include the relationship between CO_2 emissions and temperature changes (i.e., "climate sensitivity") and the impact of climate change on economic growth (i.e., specified by "damage functions" included in climate models).

2. **Long planning horizon.** Climate change is a long-term problem, because it takes a long time for the effects of policies or climate-related risks to materialize. As a result, climate stress testing requires the measurement of outcomes over an extended time horizon—30 to 50 years. The unusually long horizon creates even more uncertainty in estimating the size of climate-related financial risks. Moreover, climate stress tests make several simplifying assumptions, such as banks taking no actions to reduce exposures to climate risks over the exercise's horizon. The flat-balance-sheet assumption naturally overstates climate-related financial risks, since bank loans typically have short tenors (averaging around 3 years) and banks dynamically manage their portfolios to adjust to evolving risk factors.

3. **Lack of data on bank counterparties**. As described in more detail in this post, the exposure-level models that map the climate risk scenarios to expected credit losses require large amounts of information about future counterparty behavior over a long time horizon. For example, the Bank of England's CBES is directing banks to do a detailed analysis of at least their top 100 non-financial corporate counterparties based on exposures. As a result, banks must engage directly with their counterparties to collect these data in a standardized way. In addition, the data collection includes an estimate by those counterparties about their forward-looking behavior across a range of scenarios.

4. **Modeling of second-round effects.** Modeling the dynamic behavior of banks over a prolonged horizon is daunting. Central banks have not yet been able to model second-round effects in macroeconomic stress tests, where banks and supervisors have much more data, more experience in scenario design and proven models with demonstrated reliability under stress conditions. Yet in the context of climate stress tests, it is important to evaluate the second-round effects given the very long horizon. These challenges, while not insurmountable, will take time to address in an empirical, data-driven manner. The current limitations would certainly call into question the validity of tying any outputs of climate stress tests to the risk-based capital framework.

Recently, the ACPR and the Banque de France released the results of their pilot climate exercise. Before the release of the results, the Banque de France described the methodology used in their pilot exercise in several working papers. These options are being considered as viable alternatives for banks to conduct their own climate analyses. One important takeaway from the results of the pilot analysis is that the increase in credit risk is small, even under the most adverse scenario considered (disorderly transition). For instance, the analysis reports a maximum increase of 42 percent in the annualized ratio of provisions to exposures under the disorderly transition scenario. To help put these results into perspective, in the June 2020 CCAR, the ratio of provisions to loans rose 360 percent on an annualized basis, which is nearly 10 times higher.[1]

Putting aside concerns about scenario design, the long horizon, and the lack of data, **climate-related risks have a negligible effect on the probability of bank failure over the standard horizon used in capital analysis**. Note that the Banque de France avoided overstating climate-related losses by using a dynamic-balance-sheet assumption. This is more reasonable than assuming banks continue to lend to the same set of firms over the entire horizon used in climate stress tests.

Unintended consequences of trying to implement climate policy through banks. A large body of academic research shows that increases in capital requirements lead to a reduction in lending. So, if regulators increase the risk weights of exposures to more climate-sensitive sectors, we would expect the supply of credit to those sectors to be significantly curtailed. As noted by Anderson (2021), it is widely recognized that to finance the transition to a low-carbon economy, all elements of public and private financing will be necessary to meet $3 trillion to $5 trillion in financing need every year over the next several decades. If financing through banks is significantly reduced because of unsubstantiated higher capital charges, the transition financing gap will only grow.

A more useful exercise in helping to guide capital allocation decisions by banks would be to develop consistent taxonomies for transition-related financing and robust portfolio-alignment tools that accurately track the evolution of industries and the economy to lower-carbon business models. For these tools to be effective and to mitigate the migration of lending from the regulated to the shadow-banking sector, they should also be required of all financial intermediaries and not just publicly traded banks.

FINAL THOUGHTS

In summary, banks and their supervisors have a long journey ahead as they learn how to develop the required tools to assess the effect of climate-related risks before deciding on how those results relate to quantified measures of risk. At best, these exercises are useful as a risk management tool and help bank management deal with the strategic risks faced by their financial institutions. Those analyses also help policymakers to further understand possible long-term shifts in economic activity across the various climate scenarios. So far, results suggest that the impact of climate-related risk on bank failure is negligible.

[1] The annualized ratio of loan loss provisions to loans was 68 bps in 4Q19 across the 33 firms subject to the stress tests. In the DFAST 2020 stress tests, the aggregate ratio of provisions to loans was 311 basis points on an annualized basis.

There are other policies that could be effective at guiding the U.S. towards a path to decarbonization. If that is the goal, a more appropriate strategy would be to invest in the development of low-cost clean technologies such as those from solar and wind generation and to subsidize the production of electric vehicles instead of altering the risk weights used by regulators to set banks' risk-based requirements.

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