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Christian Pfister and Natacha Valla*

Financial Stability Is Easier to Green Than Monetary Policy

In the face of mounting evidence of global warming, which is an irreversible process, central banks, as other policymakers, have to play their part. They need to consider climate risks not only in their internal management, but also when they devise their strategies, conduct their policies and implement their decisions. This article examines the possible impacts of climate risks on the two main variables of interest for monetary policy, economic growth and inflationary pressures. On that basis, it infers the potential consequences for the objective of monetary policy, its conduct and its implementation.

What can central banks do to help fight climate change? Like any other body, they can first improve their own functioning and incorporate climate change risk considerations in the drawing and the implementation of their projects. Central banks may also consider climate change risks when making decisions about their own funds investment policy (Cœuré, 2018). Above all, they can examine the extent to which they can incorporate these risks when pursuing their two main missions: defining, conducting and implementing monetary policy, and preserving financial stability. The case for doing so appears easier in the latter.

A likely limited impact on monetary policy in the short to medium term

This article first examines the possible impacts of climate risks on the two main variables of interest for monetary policy, economic growth and inflationary pressures. On that basis, the potential consequences for the objective of

monetary policy, its conduct and its implementation are inferred.

The focus of this article is on the case of the most developed economies. For the sake of simplicity, we distinguish between two extreme scenarios. In Scenario 1, or the “cooperative scenario”, governments act jointly, rapidly and forcefully against climate risks and accordingly raise carbon taxation. We assume that this allows avoiding “tipping points”, i.e. situations where climate change is likely to have irreversible effects with the breach of biophysical thresholds. In Scenario 2, or the “free-riding scenario”, governments try to free-ride on the efforts made by their international partners, procrastinate and do not act in a significant manner. Table 1 summarises the results, focusing on the signs of expected changes rather than their intensity, which is more uncertain. We distinguish between consequences in the medium term, which is the relevant time horizon for monetary policy, and consequences in the longer term, in which all components of monetary policy, including strategy, can be adapted. We also distinguish between the expected effects on both levels and volatility of the variables of interest.

The possible impacts with regard to economic growth, in the long term, are clearly negative on the level and positive on volatility in Scenario 2, as climate risks materialise and intensify.¹ The policies implemented in Scenario 1 help to avoid this impact. This is not necessarily the case in the medium term if the government does not use the proceeds

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¹ In the opposite direction, in some developed economies, such as the Nordic countries or Canada, global warming could lead to an increase of productivity in agriculture. There could also be migration flows to these and other developed economies that would support growth in these economies.

Table 1
Possible impacts of climate risks

Variables of interest		Time horizon	Scenario 1 (cooperative)	Scenario 2 (free-riding)
Economic growth	Level	Medium term	- or =	-* or =
		Long term	=	-
	Volatility	Medium term	= or +	= or +*
		Long term	=	+
Inflationary pressures	Level	Medium term	+	= or +*
		Long term	+	+
	Volatility	Medium term	= or +	= or +*
		Long term	=	+

Note: * refers to the possibilities of “tipping points” in developed economies.

Source: Authors’ elaboration.

of the carbon tax efficiently or if growth becomes more volatile in emerging economies, a risk that is present in both scenarios, since these economies are likely to be affected by climate change earlier than developed ones.

With regard to inflationary pressures, the standard inverse relationship in the medium term between the levels of growth and inflation in the case of supply shocks, such as those resulting from climate change and policy responses to address them, would prevail. In Scenario 1, the increase in energy prices induced by carbon taxation also fuels inflationary pressures. In the long term, the lower global supply and higher growth volatility imply increased and more volatile inflationary pressures in Scenario 2. Conversely, in the long term, the increase in the relative prices of energy becomes embedded in expectations in Scenario 1, helping to stabilise inflationary pressures.

Underlying and overall inflation

Would targeting price stability become significantly more difficult because of climate change and the policies implemented to address the risks in Scenario 1? Should central banks target a “green” inflation rate, excluding items directly causing climate risks rather than overall inflation, as suggested by Rey (2020) to avoid that they try to offset the increase of energy prices by putting pressure on other prices, thereby conducting too restrictive a monetary policy? The answers to these questions should consider the following factors.

First, based on the indications provided by the International Monetary Fund (2019), we estimate that the direct impact on overall inflation in the euro area of a tax rate of \$75 per

tonne of CO₂ in 2030,² in line with the objective of keeping global warming to two degrees Celsius, would be below 1.5% over ten years. Even if one allows a doubling of the overall impact, in order to consider propagation effects, this would imply a contribution of less than 0.3% to the average year-on-year overall inflation rate over that period.

Second, in the medium term, the underlying and overall inflation coincide. After a supply shock, overall inflation converges towards underlying inflation if monetary policy is credible (the increase in energy prices, for instance, is then no more than a relative price shock). Conversely, underlying inflation converges towards overall inflation if inflation expectations are not well anchored. If anything, the low levels of inflation experienced in developed economies since 2008, as well as those embedded in market or professional forecasters’ expectations, tend to show that inflation expectations are anchored at low levels in these countries. In the case that a significant carbon tax is implemented, overall inflation would converge towards underlying inflation, keeping both of them low in the medium term.

Third, the positive impact of carbon taxes on energy prices could be partly neutralised in the medium term by a positive supply shock if the proceeds of carbon taxes are used to lower other, more distortionary, taxes.

At this stage, there do not appear to be reasons to change the formulation or the level of the inflation target in order to accommodate policies addressing climate change risks. In that regard, it is worth noting that in Sweden, the country where the carbon tax was the highest in the world in 2020, the central bank did not change its inflation target. However, central banks in most developed economies could give more prominence to underlying inflation measures in their assessment of inflationary pressures and their communication, in both Scenario 1 and 2, insofar as these measures would be less volatile than the one of overall inflation.

Demand and supply shocks

Concerning the conduct of monetary policy, a textbook issue in monetary economics is how to respond to demand and supply shocks. Demand shocks do not pose a specific problem since they move inflation and growth in the same direction. This is not the case for supply shocks,

² We use France, Germany and Italy as a proxy for the euro area, and the impact of a \$75/tonne carbon tax provided in Table 1.3 of *Fiscal Monitor: How to Mitigate Climate Change* (International Monetary Fund, 2019, 9) on coal, natural gas, electricity and gasoline prices, as well as the weight of energy in the euro area overall Harmonised Index of Consumer Prices (10%). The report supposes that this policy applies globally, in combination with investment policies aimed at promoting energy saving and climate-friendly technologies.

such as those created by the materialisation of climate change risks or the implementation of policies to address these risks. The standard prescription is that monetary policy should not react to price increases driven by supply shocks unless second round effects (e.g. the incorporation of higher inflation expectations in wage negotiations) risk materialising. Such episodes could become more frequent in the future, particularly in Scenario 2.

Conversely, monetary policy should do its best to stabilise the economy in the face of supply shocks, provided this does not cause a “de-anchoring” of inflation expectations. In that regard, one concern is that the combination of a lower and more volatile rate of growth (see Table 1) could reduce the “policy space” to stabilise output in most developed economies (Network for Greening the Financial System, 2020). However, this would just make a problem already affecting the conduct of monetary policy (i.e. the fall in the natural rate of interest) more acute (Pfister and Valla, 2018; Pfister and Sahuc, 2020). The only durable remedy to such a problem is the implementation of supply-side policies that support the rate of growth in the longer run, hence raising the natural rate of interest. Regarding climate change policies, this means that they should be implemented as early as possible (Scenario 1), as any delay weighs on longer-term economic growth.

The impact of climate change on asset valuations and the effect on the balance sheets of banks could also affect the transmission channels of monetary policy. This would call for a strengthening of the analytical toolkit (macroeconomic models and forecasting tools) that central banks have at their disposal in order to take climate risks into account (Villeroy de Galhau, 2019). However, acting more forcefully to avoid possibly deflationary scenarios could be particularly problematic in a situation where “policy space” would be slimmer.

Monetary policy implementation

The central bank might consider introducing some discrimination in its collateral and asset purchase policies in order to limit climate change risks (Schnabel, 2020; Weidman, 2020). This could be achieved through various channels, for instance by excluding some bonds or issuers and/or favouring some others or by differentiating haircuts,³ penalising “brown” assets and favouring “green” ones. However, without prejudging the decision the European Central Bank (ECB) will take when it finalises the review of its monetary policy, expected by the end of 2021, the room for manoeuvre

in implementing such measures might be limited both from a technical point of view and as a matter of principle.

From a technical point of view, the distinction between carbon-intensive and low-carbon financing is not straightforward, especially when the metrics are lagging. In the process of drawing such a distinction, upstream and downstream carbon emissions should also be considered, as well as the presence or not of energy substitutes and, most importantly, changes (as proposed by Villeroy de Galhau, 2021) vs levels of emissions. There could also be legal issues. Indeed, Article 18.1 of Statutes of the ECB and European System of Central Banks (ESCB⁴) foresees that, when conducting their credit operations, the ECB and national central banks shall base their lending on “adequate collateral”. This phrase is usually understood as aiming to protect the lenders to the full extent possible, thus a priori reducing the possibility of a differentiation. Furthermore, Mäkinen et al. (2020) show that, on average, there is no impact of corporate bond eligibility for central bank purchases on yield spreads.

This casts doubt on the possible impact of a differentiated access to central bank refinancing, although one cannot preclude that the “shaming” impact of a “black-listing” could be powerful. In fact, the risk of runs on “brown” assets that would be excluded from investors’ portfolios may on the contrary justify creating a liquidity backstop in their favour (Jondeau et al., 2021). Nevertheless, since the beginning of 2021, in order to limit its exposure to risk, the Riksbank has been purchasing only securities issued by firms that it assesses as complying with international standards and norms of sustainability (Andersson and Stenström, 2021). As this decision, however, applies in a country (Sweden) that is exemplary in its fight against climate change (see above), it should affect very few firms. In addition, although the ECB does not accept as collateral or purchase bonds the coupon of which is uncertain because of a “step-up” clause, it has made an exception from September 2020 in favour of “sustainability bonds”. However, this decision, too, should probably apply in very few cases.

As a matter of principle, one may wonder whether it is legitimate for a central bank to try to influence factor allocation and thus risk creating market distortions (Cœuré, 2018; Villeroy de Galhau, 2019; Weidman, 2020).⁵ In that

3 A haircut is a reduction applied to the market value of an asset in the framework of a collateralised credit operation in order to protect the lender against an unforeseen change in the value of the collateral.

4 The ESCB is made of the ECB and the national central banks of the EU, including those of countries not participating in the euro area.

5 During the press conference following the December 2020 Federal Open Market Committee meeting, Chair Powell, when asked about the decision of the Fed to join the Network of Central Banks and Supervisors for Greening the Financial System, also declared, “We’ve historically shied away strongly from taking a role in credit allocation. I would be very reluctant to see us moving in that direction, picking one area as creditworthy and the others not.”

regard, Article 2 of the Statutes of the ECB and the ESCB states: “The ESCB shall act in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources”. More broadly, the point has been made that the counterpart to the independence that central banks enjoy is a narrow mandate (Landier and Thesmar, 2020).

Finally, the question arises about who is to blame for neglecting climate change risks. If it is governments because they do not enact adequate legislation or do not implement it properly, should, for example, the share of Bunds in the Eurosystem asset purchases be reduced because the share of coal and lignite in the production of electricity in Germany still stood at 28% in 2019? Conversely, should Bunds be favoured because the share of renewable energies in the production of electricity was 40% in the same year? Both policy options would obviously be excessive, since they would likely have wide repercussions on financial markets and the economy that could in turn disrupt the monetary policy transmission mechanism.

A more significant impact on financial stability

As explained by de Bandt et al. (2021, 348-352), the slowdown in economic growth has an indirect impact on the financial system, and hence financial stability, as it implies lower demand for financial services. However, climate change also has a direct impact on financial stability, creating new risks for financial institutions and markets.

Climate change risks to financial stability

Since Carney (2015), it is common to distinguish between physical and transition risk. Physical risks, on the one hand, are the economic costs and financial losses due to the increasing frequency and severity of climate-related weather events (e.g. storms, floods or heat waves) and the effects of long-term changes in climate patterns (e.g. ocean acidification, rising sea levels or changes in precipitation; Bolton et al., 2020). While insurance providers traditionally offer catastrophe or weather-related insurance and banks factor some physical risk in loan contracts, the nature and the dimension of climate change, as well as further unexpected climate change related shocks, imply a dramatic change in the way financial institutions conduct their business, with short- and medium-run adverse consequences on financial institutions' profitability. This includes, as discussed in Bolton et al. (2020):

- the losses incurred by firms across different financial portfolios (e.g. loans, equities, bonds) following climate change related events, which can make them more fragile
- the impact on real estate exposures, in particular for long-term mortgage loans in coastal areas following rising sea levels or in more regularly flooded areas along rivers.

As natural catastrophes become more frequent, worldwide, non-insured losses can threaten the solvency of households, businesses and governments, and therefore financial institutions.

Transition risks, on the other hand, are the policy-induced risks that are associated with the impact that could result from a rapid low-carbon transition, but they include also reputational impacts, technological breakthroughs or limitations, and shifts in market preference.⁶ In particular, a rapid and ambitious transition to lower emissions means that a large fraction of proven reserves of fossil fuels would not be extracted, becoming “stranded assets” (de Bandt et al., 2021). As these assets appear in the portfolio of banks, insurers or asset managers, these institutions would face asset depreciation and possibly losses, eventually transmitted to their customers and shareholders. As Carney (2016, 1) puts it: “too rapid a movement towards a low-carbon economy could [...] spark a pro-cyclical crystallisation of losses and lead to a persistent tightening of financial conditions: a climate Minsky moment”.

De Bandt et al. (2021) note that physical and transition risks are actually interrelated: a swift policy action to mitigate climate change, embedded in Scenario 1, would increase transition risks and limit physical risks, but they would remain existent. In contrast, delayed and weak action to mitigate climate change, as in Scenario 2, would lead to more severe physical risks.

The current situation in the euro area

According to a joint report by the ECB and the European Systemic Risk Board (2020), based on available disclosures, euro area banks' exposures to high-emitting firms, hence part of transition risks, appear limited on average. Furthermore, the CO₂ intensity of exposures appear to have declined by 20% in the three years preceding the publication of the report. However, exposures are concentrated in a few large exposures for some banks. The report also provides the results of two forward-looking scenarios.

First, sharp policy tightening of climate change policies would imply costs that would be manageable and temporary for banks and insurers, as the negative impact on

⁶ Liability risk is often considered a third additional risk. It can also be seen as part of transition risks.

GDP would be limited. Bank capital losses would amount to 0.8 percentage points following the shock, and this effect would gradually fade, halving at a five-year horizon.

Second, technology-related shock, in which the share of renewable energy would increase across sectors, would be approximately GDP neutral. Bank capital losses would be temporary and limited (less than 0.2 percentage points in the first two years) and banks' solvency ratios would even be 0.2 points higher than in the baseline at a five-year horizon.

The report concludes that these transitory losses are paltry compared with the potential economic losses associated with the manifestation of potentially broad physical risk over the medium term, suggesting that early action to tackle climate risks should have net benefits.

On a less positive note, the ECB (2020a) has assessed the comprehensiveness of climate-related and environmental risk disclosures of 107 significant institutions (those it supervises directly) and 18 less significant institutions in the reference year 2019. It finds that virtually none of the institutions assessed would meet a minimum level of disclosures set out in the *Guide on climate-related and environmental risks* (ECB, 2020b). In particular, only 8% of the institutions assessed and that consider the climate change risks immaterial provide substantiation. Furthermore, statements by banks are too rarely supported by quantitative information, with only 37% of the assessed institutions disclosing at least one metric and one target. Finally, less than one in three of the institutions assessed disclose the potential impact of transition risk on their business model in the short and long term and this proportion is even less than one in four for physical risk.

Policy responses

We distinguish between the actions undertaken, those contemplated in the near future, and further actions. So far, the work undertaken is mainly of a fact-finding and methodological nature. However, the top French banks and insurers were already running the first pilot exercise on stress tests of exposures to climate change risks in autumn 2020 (Villeroy de Galhau, 2020). In the euro area, the ECB (2020b) has published its guide on climate-related and environmental risks in November 2020. The guide explains how the ECB expects banks to prudently manage and transparently disclose such risks under current prudential rules. Inter alia, for the purposes of internal reporting, institutions are expected to report aggregated risk data that reflect their exposures to those risks, in order to enable the management body and relevant sub-committees to make informed decisions.

At the global level, the Task Force on Climate-related Financial Risks (TFCR) established in February 2020 by the Basel Committee on Bank Supervision has conducted a survey among its members, the results of which were published in April 2020 (Stiroh, 2020a). Respondents identified a number of operational challenges in developing a robust framework to assess climate-related financial risks, including data gaps, methodological challenges and difficulties in mapping the transmission to the banking system. Two-fifths of members had issued, or were in the process of issuing, more principle-based guidance regarding these risks. Finally, the majority of members had not factored, or had not yet considered factoring, the mitigation of such risks into the prudential capital framework. From autumn 2020 on, the TFCR has focused on understanding the transmission channels of climate risks as well as devising methodologies for measuring and assessing these risks (Stiroh, 2020b). It has received help from the Network for Greening the Financial System, which has proposed to the community of central banks and supervisors a common framework, published in June 2020, to devise stress test scenarios and evaluate climate-related financial risks (Després and Allen, 2020). This should ensure some consistency and comparability of the results. It should also avoid financial institutions that have a large international presence being submitted to unnecessarily different approaches.

Following up on the publication of its guide on climate-related and environmental risks, the ECB asked banks in early 2021 to conduct a self-assessment in light of the supervisory expectations outlined in the guide and to draw up action plans on that basis. The ECB will then benchmark the banks' self-assessments and plans, and challenge them in the supervisory dialogue. In 2022, it will conduct a full supervisory review of banks' practices and take follow-up measures where needed. As far as it is concerned, building on the analytical work it has undertaken and that it plans to complete by mid-2021, the TFCR intends to consider the extent to which climate-related financial risks are incorporated in the existing Basel framework and to identify effective supervisory practices to mitigate such risks (Stiroh, 2020b).

Further, supervisors intend to conduct full stress tests of exposures to climate change risks. In that regard, bank supervisors have repeatedly indicated that they do not intend so far to use the results of climate stress tests to size institutions' capital buffers (Bailey, 2020; Stiroh, 2020a, 2020b). However, there could be a "double dividend" in doing so, as addressing the possible impact of climate change on financial stability should contribute to improving the efficacy of monetary policy, in particular by securing the transmission mechanism, on top of strength-

ening the financial intermediaries' balance sheets. Conversely, just as central banks might consider introducing some discrimination in their collateral and asset purchase policies in order to limit climate change risks when implementing monetary policy, supervisors might bias Pillar 1 of the Basel requirements. This would mean penalising high CO₂ emission assets, and/or softening solvency requirements for exposures to low CO₂ emission assets (a "green supporting factor"). In that regard, one could draw a parallel with the "supporting factor" introduced in 2014 with the implementation of a Capital Requirement Directive that granted banks a 25% reduction in their own fund requirements against their loans to small and medium-sized enterprises (SMEs). However, lower capital requirements on loans to SMEs may appear more justified from a risk-based perspective, inter alia because these loans allow a better risk diversification than loans to large firms (Dietsch et al., 2020). In the case of "green loans", it would need to be demonstrated that they are effectively "green" (which raises the issue of appropriate measurement tools) and that they are associated with lower risk-taking, for instance because they would reduce liability risks. Conversely, a "brown penalising factor" could be set, just as central banks could apply higher haircuts to "brown" assets in monetary policy operations due to the liability risk they might create, if this was the case and market prices did not incorporate this risk.

Conclusion

In the face of mounting evidence of global warming, which is an irreversible process, setting a social price of carbon at the global level (Nordhaus, 2019) and devising appropriate metrics to assess climate risks at the micro-economic level are currently priorities. Central banks, as other policymakers, have to play their part and thus consider climate risks, not just in their internal management, but also when they devise their strategies, conduct their policies and implement their decisions. At this stage, this seems to require some limited adaptations of their monetary policy frameworks rather than profound changes. Climate change risks, however, are bound to play an increasingly important role in the conduct of financial stability policies in the coming years.

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