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LEGALLY GREEN

Climate change and the ECB mandate

In this paper

The ECB needs to act on climate change to fulfill its primary and supporting objectives, as well as to minimize risk on its balance sheet.

The market neutrality principle might need to be reformed, while the central bank independence is reinforced, not threatened, by the ECB's climate action.

Climate data and metrics are still incomplete and will remain so for the foreseeable future. However, enough is available for the ECB to act on now and thus fulfill its mandate.

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July 2021

**POLICY
PAPER**

Colofon

Utrecht, July 2021.

The Sustainable Finance Lab (SFL) is an academic think tank whose members are mostly professors from different universities in the Netherlands. The aim of the SFL is a stable and robust financial sector that contributes to an economy that serves humanity without depleting its environment. To this end the SFL develops ideas and provides a platform to discuss them, thus bridging science and practice.

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The authors would like to thank Kern Alexander, Nik de Boer, Seraina Grünewald, Jens van 't Klooster, David Ramos Muñoz, René Smits, Jamie Sawyer, Marijn van der Sluis, Agnieszka Smoleńska, and the participants of the Sustainable Finance Series of the European Banking Institute for their comments to an earlier version. All errors are our own.

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Policy Paper

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SUMMARY

Through its unconventional monetary policies the ECB is having an unprecedented influence on the economy. This comes at the time that politicians are showing an increased determination to limit climate change.

This paper provides an overview of the legal arguments for taking climate change into account in the monetary policy of the ECB. We conclude that taking climate change into account is not just an option but rather an obligation. Looking at the EU treaty and other regulations we see the following legal basis for this:

1. **Price stability** A stable climate might be a precondition for price stability in the medium to long term, as the worst effects of climate change may be incompatible with price stability. To this end the ECB needs to extend its current time horizon as the Treaty does not limit its obligation to safeguard price stability to a particular (limited) time horizon.
2. **Supporting other objectives** The EU Treaty also specifies the obligation to support the general economic policies in the Union. In this respect limiting climate change is unique due to the large macroeconomic effects it will have, the international agreements that have set clear goals for the coming decades as well as the broad and deep political backing for this within the Union.
3. **Minimizing risk in its operations** The ECB is obliged to carefully manage risk in its operations, with both climate transition and physical risk now widely recognized as posing material risk. The ECB can act as a 'universal owner', accepting that through its large and diversified portfolio it cannot escape being exposed to climate risk. An argument that is especially relevant to the majority of the ECB's holdings in sovereign bonds.

However, currently through its monetary operations the ECB is actually lowering the cost of capital for relatively carbon intensive companies, thus actively steering against the stated policies of the democratically elected governments.

This is something that can be remedied through a modest ‘tilting’ approach, thus neutralizing the carbon impact of the ECB’s monetary policy. However, more effort on the part of ECB may be needed to effectively help governments achieve their climate goals, by reducing the financing costs of more Paris-aligned corporations.

The ECB seems to accept that they need to take climate change into account in its monetary policies. However, at the same time it signals that it will study and discuss the ‘how’ for quite some time before real action is taken. Time that may not be there if climate change is to be limited given the closing window of opportunity to do so.

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It is also questionable whether there really is a need to wait as the data are available to conclude that currently collateral and asset purchase are more carbon intensive than the economy as a whole, and not aligned with the objectives set by the Union in order to comply with the Paris Climate Agreement. Governments, companies and financial institutions are already acting on the basis of the available data. The latter pressured to do so by the supervisory arm of the ECB.

Not reducing its current and future carbon footprint may make the ECB vulnerable if it is challenged at the European Court of Justice. The ECB may therefore not only be able to be ‘legally green’. It also risks being considered ‘illegally brown’.

INTRODUCTION

Climate change will shape the economy in the coming decades. That leaves us with two options. Either the economy will be fundamentally transformed to limit carbon emissions and thus effectively halt global warming, or the world will fail to reach the goals of the Paris Climate Accord and will experience a surge in disruptive floods, heatwaves and wildfires, at much higher economic costs.

Recognizing that “climate change affects all aspects of monetary policy” (Lagarde, 2020b) ECB President Christine Lagarde wants the ECB “to explore every avenue available in order to combat climate change” (Khalaf & Arnold, 2020). However, doubts have been raised as to the legality of such a course (Gros, 2020; Weidmann, 2019).

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This paper provides an overview of the different legal arguments for and against taking climate change into account in the monetary policy of the ECB, weighs and discusses these arguments, and concludes what specific course with regard to climate change on the part of the ECB therefore may be warranted. This discussion requires insights from different disciplines. The starting point of our analysis is the legislative framework underpinning the ECB’s mandate. We add to this insights from macro and monetary economics, the macroeconomic modelling of the effects of climate change, and of the sustainable finance practices of institutional investors.

In the first section we discuss the relationship between climate change and the primary objective of the ECB: to maintain price stability. Section 2 discusses the ECB’s role in supporting “the general economic policies in the Union” and other Treaty provisions with a view of supporting other objectives, and more specifically, climate change.

Section 3 discusses what we call the ‘risk perspective’: how both transition and physical climate risks impact the ECB portfolio. Section 4 discusses the arguments against implementing a monetary policy that takes climate change into account: the principles of market neutrality and central bank independence. Section 5 concludes and discusses questions for further research.

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1. THE PRIMARY OBJECTIVE OF PRICE STABILITY

The impact of climate change on prices

Article 127 of the Treaty on the Functioning of European Union clearly states that the ECB's primary objective is to maintain price stability. There is a growing recognition that both climate change and measures to counter this have an effect on price inflation.

Climate change can impact prices in two different ways. In the more benign scenario of an energy transition, shifts in the energy mix and, hence, relative prices could destabilize inflation expectations. For instance, a sustained rise in the relative price of carbon could impact wage negotiations, leading to a wage-price spiral. Furthermore, high carbon prices could push energy prices upward (Batten et al., 2016; Cœuré, 2018; McKibbin et al., 2017; NGFS, 2020).

In a scenario where climate change is not contained extreme weather events, such as hurricanes, droughts, floods, heat waves, will severely disrupt the global economy. These, and the social effects they have, can have long-lasting effects on aggregate supply and demand, and thereby on inflation (Cœuré, 2018; Krogstrup & Oman, 2019; Lagarde, 2020b; McKibbin et al., 2017; Schnabel, 2020b). The physical damage of climate change can set off a negative supply shock, e.g. rising food prices after harvests that have been damaged by extreme weather. Moreover, heat stress can negatively impact the labor supply (Lagarde, 2021). Increases in both the impact and the frequency of such shocks may force monetary authorities to raise interest rates to dampen inflation, thereby further hurting the economy (Cœuré, 2018; McKibbin et al., 2017). On the other hand, climate-related supply shocks may become adverse demand shocks. Rising sea levels, for example, could lead to abrupt re-pricing of real estate in exposed regions, causing large negative wealth effects that, if uninsured, may weigh on demand and prices and have a deflationary effect (Cœuré, 2018).

Until now, these effects have mostly been seen as one-offs, with monetary policy-makers expecting inflation levels to return to their pre-shock levels without any monetary policy intervention. The main action taken so far as a result of the supposed relationship between prices and climate risks is an investment in the analytical capacities on the part of central banks to understand these interactions.¹

So, until now price stability has not been seen as a reason for the ECB to proactively help mitigate climate change. This course of (in)action may change when either:

1. the time horizon of monetary policy is extended to periods where climate change will impact the economy more severely, or
2. when the impact of climate change on economy and society over the relevant period is big enough to materially destabilize prices.

Price stability, now and forever

Firstly, with regard to the time horizon it is important to note that currently the time horizon of the ECB for setting monetary policy is 2-3 years. This follows from the ECB Governing Council's own interpretation of price stability as "below, but close to, 2 percent within a medium term time horizon" (European Central Bank, 2003). However, what 'medium term' means is left intentionally undefined, as to give the ECB more flexibility to act (De Haan et al., 2016; Hartmann & Smets, 2018), while usually understood to mean 'between 18 months and three years' (Claeys et al., 2018). Whereas climate change is already having a visible impact, which is expected to only further grow in the coming 2-3 years, clearly its full impact will materialize in decades rather than years (van 't Klooster & van Tilburg, 2020). This might leave the ECB unable to fully account for the economic effects of climate change and reflect them in their monetary policy setting.

However, the EU Treaty does not limit the time horizon for the ECB's objective to preserve price stability to just 2-3 years. Whereas this shorter time horizon may have previously been suitable for its conduct of monetary policy, given the traditional factors affecting prices and the working of its instruments, climate change would force the ECB to look ahead much further if it is to understand the full threat it poses to price stability, as well as to decide what instruments to use to counter this threat. For instance, if it were to decide that climate change is a big enough threat to price stability in the long term, the ECB may deploy its monetary powers to help mitigate this threat. It could even accept higher inflation in the short and medium term if that would help prevent a much worse price instability in the long term.

1. See the work of NGFS, for an example.

Central banks may also be singularly suited to tackling this issue. As their mandates are designed to deal with the time-inconsistency issues, they might be better placed to keeping climate change in their crosshairs in the longer term than governments. Central banks may also be more able to organize the global coordination that is needed for this (Dikau & Volz, 2020; van Tilburg & Simić, 2021). The Network for Greening the Financial System (NGFS), with its 90 members and 14 observers in the field of central banking and financial supervision, is the primary actor in this area. Moreover, a curious historical fact is that central bank cooperation, through the BIS, predates the global cooperation of governments in the shape of the UN. This heritage gives them the experience and the leverage to jointly support their governments and act on climate change in a manner appropriate to their mandates.

Is the impact of climate change on prices big enough to warrant a proactive approach?

Studies of the economic impact of climate change show that this impact will be substantial. Most economic models predict an average loss of global GDP of between 15-45 percent of a climate change of 3-4°C (current pathway) at the end of this century (Burke et al., 2015; Hof et al., 2014; Howard & Sterner, 2017).

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These are staggering numbers in their own right. However, the impact of this economic damage, and specifically on price stability, may be underestimated, as such models generally do not take 'socially contingent' impacts, such as migration and conflict into account (Stern, 2007).

Like the physical consequences of climate change, the impact on the economy is not geographically uniform. The countries in the Global South will be more affected than in the North. Burke et al. (2015) estimate that by 2100 GDP per capita in South Asia, Southeast Asia and Sub-Saharan Africa will be 80 percent lower should global warming hit 3.7 degrees Celsius compared to a scenario without climate change. Even in this generation, by the middle of the century, the economic costs can run into the tens of percentage points in these regions.

Projected impact of climate change on GDP of selected world regions

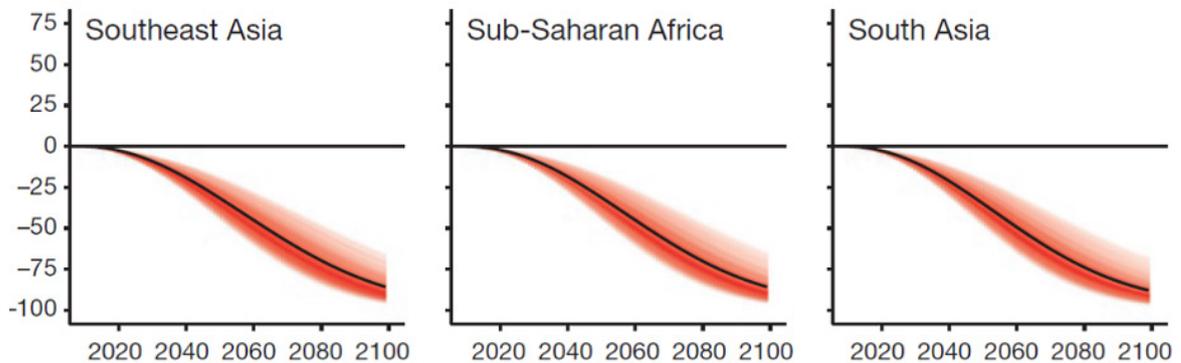


Figure 1. Source: Burke et al. (2015)

This may lead to nations or citizens turning on each other. For this reason the US Department of Defense has called climate change a “threat multiplier” as it exacerbates existing tensions within and between nations (Department of Defense, 2014). This is a mechanism we may have seen recently in Syria as witnessed by the discussion on the relationship between climate change, the hot and dry summers in Syria, and the war that has erupted there (Karak, 2019).

Thus, climate change may give rise to a much more disruptive environment than the current economic models currently predict. These new and unforeseen circumstances might in many aspects resemble the historical episodes where very high or even hyperinflation occurred (Hanke & Krus, 2012; van Tilburg & Simić, 2021).

For instance, the World Wars that ravaged the European continent, and with its large swathes of capital stock, led to some countries experiencing bouts of hyperinflation (Schacht, 1967; Siklos, 1991). Moreover, many formerly communist countries in the Eastern Bloc, most notably ex-USSR and ex-Yugoslavian countries, suffered hyperinflation as a result of breakups in foreign trade, impossibility of tax collection, high foreign debt, and the resulting reliance on excessive money creation (He, 2017).

Conversely, and importantly, many large peace-time (re-)construction projects – partly financed through central bank involvement – resulted in very little inflation. These episodes may entail two lessons for central banks. The first is that targeted investments into productive capacity do not necessarily lead to high inflation periods (Ryan-Collins, 2015; Ryan-Collins & van Lerven, 2018; van ’t Klooster & van Tilburg, 2020; van Tilburg & Simić, 2020). An example of this is the Bank of Canada, which was specifically established in order to alleviate the effects of the Great Depression through self-financed, targeted investments (Ryan-Collins, 2015).

The second lesson is that macroeconomic shocks can be sudden, large, unpredictable and incompatible with price stability, rendering central bankers incapable of achieving their primary objective. This could induce the ECB to take on a precautionary and proactive role and mitigate the worst effects of climate change before they manifest themselves (Chenet et al., 2019). This course of action is also enshrined in the Article 191(2) of TFEU, stating that: “It [EU policy on the environment] shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay”.

Thus a proactive approach to help governments limit climate change may be defended on the basis that it is needed to avert a larger fundamental threat to price stability. As Klaas Knot, president of the Dutch Central Bank and as such member of the ECB Governing Council recently stated: “periods of severe economic instability caused by climate change, can carry serious risks to financial and price stability. For that reason, in the medium to long term, a stable climate can be seen as an important precondition for central banks to be able to deliver on their mandate” (Sustainable Finance Lab, 2021).

That the ECB has much room to choose its instruments, as long as they contribute in a proportional way to achieving its objective, was recently confirmed by the EU Court of Justice according to Frank Elderson, Executive Board Member of the ECB: “During the sovereign debt crisis and the pandemic, the ECB has taken resolute action and developed new policy tools to preserve the singleness and effectiveness of monetary policy. The Court of Justice of the European Union has confirmed that *catering for the preconditions required for the pursuit of our primary objective falls within our mandate to maintain price stability* [emphasis added]” (Elderson, 2021).

In a recent ECB-hosted podcast he reiterated that: “We have a primary objective, and the primary objective is price stability. [T]he European Court of Justice has said that it also means that within our mandate fall the *preconditions* for getting there. So it’s a little broader than just price stability. We can also focus on *helping to create the preconditions* that we need to get to price stability [emphasis added]” (The ECB podcast, 2021).²

2. From timestamp [15:41] onwards.

This means that there may be a tradeoff to be made between allowing higher inflation in the short run in order to prevent larger future price instability. Hence, according to that logic, the ECB could play a more active role mitigating climate change, even if this would lead to some above target inflation in the short run. This change in policy would demand the reinterpretation of the ECB's policy horizon towards a more longer-term outlook. It would also demand a very clear communication strategy and firm commitment on the part of the ECB, in order to credibly explain why it is temporarily deviating from its policy target and when it can be expected to return to lower inflation targeting.

This change in inflation targeting regime might not be as radical as it seems. First off, the Federal Reserve has already adopted a version of this policy, allowing for inflation overshoots in the future as a way of correcting underachieving in the previous periods (Martínez-García et al., 2021). Moreover, some ECB officials have gone on the record to support this policy and its potential introduction in the Eurozone (Arnold, 2021a, 2021b). Lastly, as already mentioned, the ECB has it well within its mandate to interpret its own targets and monetary policy operations.

A shift towards the new inflation targeting regime would not require a Treaty or Statue change. The only leap necessary would thus not be legal, but conceptual. It would involve the ECB acknowledging the negative inflationary effects of climate change in the *future*, but venturing to act upon them *now*.

2. CLIMATE AS AN OBJECTIVE SUPPORTED BY THE ECB

Supporting the general policies in the Union

Article 127 of the TFEU, which pertains to the objectives of the ECB, not only sets as its primary objective to maintain price stability, but also: “Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union³ with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union.” Article 3 explicitly refers to, among others, a “high level of protection and improvement of the quality of the environment”.⁴

These objectives are also commonly known as ‘secondary’, implying a hierarchy of goals that the ECB needs to observe. However, this view is somewhat inaccurate. Firstly, the term ‘secondary’ does not figure anywhere in the Article 127. On the other hand, ‘supporting’ and ‘contributing’ are explicitly used, so the usage of ‘supporting/contributory objectives’ might be preferable. Moreover, the hierarchy model of objectives is also overplayed. It would be incorrect to say that supportive objectives are to be ignored as long as the primary one (price stability) is achieved.

3. This obligation is reiterated in the Article 282 of the TFEU.

4. Article 3 TFEU: “The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a *high level of protection and improvement of the quality of the environment*. It shall promote scientific and technological advance. It shall combat social exclusion and discrimination, and shall promote social justice and protection, equality between women and men, solidarity between generations and protection of the rights of the child. It shall promote economic, social and territorial cohesion, and solidarity among Member States. It shall respect its rich cultural and linguistic diversity, and shall ensure that Europe’s cultural heritage is safeguarded and enhanced [emphasis added]”.

The converse is more accurate, and enshrined in the mandate: supportive objectives are always to be taken into account, but only as long as they don't negatively impact price stability. This is confirmed by Isabel Schnabel, who stated that the way the ECB would observe its supporting environmental objective is by, given two competing policies, and assuming both have an equivalent impact on price stability, the policy with a smaller environmental impact would be selected (The ECB podcast, 2021).

Secondly, referring to these objectives as secondary has sometimes implies their optionality or passivity of action. With regards to climate, it is often stated that the ECB does not have a mandate to act until the governments act first (Gros, 2020; Weidmann, 2019). This interpretation does also not seem to be borne out in the mandate. One reason is that nowhere in the Article 127 does it state that government actions preclude the ECB's own conduct. Moreover, as will be discussed later, EU has shown initiative on the climate front, and the role of the ECB is to support these initiatives. Furthermore, it is publicly recognized by the ECB officials that observing the secondary mandate is not optional, but obligatory. For instance, the ECB Executive Board Member Frank Elderson stressed that observing the secondary objective on the part of the ECB is "a duty, not an option" (Elderson, 2021). This fact is also recently reinforced in a speech by his colleague Isabel Schnabel (Schnabel, 2021).

Other relevant legal provisions

There are also other Articles in the Treaty that are not part of the secondary mandate but do have a bearing on how the ECB sets its monetary policy.

For instance, Article 11 enshrines environmental protection in all EU policies: "Environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development".

This principle is considered 'cross-sectional', in that it encompasses all regulation in the EU. As such, it presents a requirement on the part of policymakers to take the quality of the environment into account when formulating EU-level policy (Solana, 2019). Furthermore, Article 11 has traditionally had support by the CJEU in the matter such as agricultural and transport policy. It is thus hard to see why monetary policy would lack such support (Solana, 2019).

This fact is also recognized by ECB Executive board member Frank Elderson: “the Treaties explicitly state that environmental protection requirements must be integrated into the definition and implementation of all EU policies and activities, which include actions taken by the ECB. More generally, the Treaties require consistency between EU policies” (Elderson, 2021). In this quote he also implicitly refers to the Article 7 that states that “The Union shall ensure consistency between its policies and activities, taking all of its objectives into account and in accordance with the principle of conferral of powers”.

It should be noted that Articles 7 and 11 are not in the ECB mandate *strictu sensu*, but are pertinent to the conduct of monetary policy. In the text of the recent ClientEarth lawsuit, this is taken to mean that “these obligations are not expressed to be ‘without prejudice’ to achieving the primary objective of maintaining price stability” (Berthier, 2021). However, these Articles are also more general to the mandate of the ECB, whereas the Article 127 is more specific to it. More specific provisions usually take precedence over the more general ones. Roda Verheyen, in her recent legal opinion commissioned by Greenpeace stated: “Article 11 does not specify a doctrine on the weighting of values; rather, it wants to oblige the institutions to include certain issues in their considerations given the open horizon of objectives [...] [t]he consequence of the obligation of inclusion is that the interests of environmental protection would have to be included in considerations within the framework of practical concordance with conflicting interests” (Verheyen, 2021).

The ClientEarth lawsuit similarly stressed that the ECB has not conducted its due diligence and included environmental considerations when designing its Corporate Sector Purchasing Programme, appealing to the aforementioned articles. Moreover, this same lawsuit went further and cited the ECB’s alleged breach of the EU Charter of Fundamental Rights (CFR) (Berthier, 2021). Roda Verheyen in her legal opinion appealed to the Article 37 of CFR, stating that a “high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development” (Verheyen, 2021). According to Article 6(1) of TEU, CFR has the same rank as the Treaties. Furthermore, according to article of the Article 51 of CFR, it binds all institutions, bodies, and agencies of the Union – thus including the ECB (Verheyen, 2021).

Christine Lagarde, the President of the ECB, has reiterated that the ECB is an addressee of this Charter (Lagarde, 2020a). Moreover, the ECB is bound to observe human rights pursuant to the Article 2 of TEU that states that “[t]he Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and *respect for human rights*, including the rights of persons belonging to minorities [emphasis ours]”.

The human rights framework was appealed to in recent EU judgements. For instance, the German Constitutional Court ruled that Germany needs to set itself higher emission reduction targets as otherwise the burden on future generations would threaten their “fundamental rights to a human future” (Federal Constitutional Court, 2021). More recently, a Dutch court ordered the private company Royal Dutch Shell to decrease the emissions of its operation by 45% before 2030 based on article 2 and 8 of the European Convention of Human Rights.⁵ Therefore, there is recent precedent in the legal cases in Europe that could be relevant to the ECB’s own legal challenges and its monetary policy setting.

Can it be done without prejudice to price stability?

From this legal reading it seems clear that the EU Treaty mandates the ECB to take climate into account as long as this can be done without jeopardizing price stability (according to Article 127). It is, however, this clause on endangering price stability that in recent decades has prevented the discussion on the so called ‘secondary objectives’ of the ECB, and most other central banks in developed countries, from hardly ever being on the table.

Historically the content of the secondary objective has referred to economic growth or employment. After the economic stagnation and inflation of the ‘70s and ‘80s, a consensus emerged that whereas it is possible to stimulate the economy in the short run through monetary policy, raising inflation above the target level, but only at a very high cost to the real economy of bringing the inflation back down again. Thus, it was concluded, long-term employment/growth is best served with a sole focus on price stability (Barro & Gordon, 1983; Kydland & Prescott, 1977; Woodford, 2003). Therefore, the secondary objectives were put to the side and in practice there was not much difference between the policies of central banks with dual mandate (such as the Fed and central banks of Australia and New Zealand) and those with its sole primary objective of price stability (like the ECB, Bank of England, Swiss National Bank).

However, unlike with growth or employment there is no inherent tradeoff between pursuing price stability and addressing climate change. Preliminary economic modelling work finds that “The actual mandate of price stability does not interfere with a potential objective of limiting the GHG emissions in the euro area. Symmetrically, the pursuit of this secondary objective would not interfere with the actual mandate.” (Blot et al., 2020, p. 114).

5. <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:RBDHA:2021:5339>

Why climate?

It is also argued that if it is possible for the ECB to contribute to mitigating climate change, without prejudice to the objective of price stability, then it should also act so as to promote all other items enumerated in its secondary mandate (Gros, 2020). Why, then, should the ECB start with climate change? As then-ECB Executive Board Member Benoît Cœuré (2018) stated “one could equally ask, for example, why the ECB should not promote industries that promise the strongest employment growth”. Indeed, the issues of financial stability and income and wealth inequality has been raised in relation to the ECB’s monetary policy (Bernanke, 2015; Hansen et al., 2020; Lenza & Slacalek, 2018; Mumtaz & Theophilopoulou, 2017; Samarina & Nguyen, 2019).

There is little guidance on this in the EU Treaty and other legal texts. For that reason, as we will discuss below, there may be reasons for politicians to give more guidance to the ECB on its secondary objectives. This is in addition to what the European Parliament already noted in its 2020 Resolution: “that, as an EU institution, the ECB is bound by the Paris Agreement on climate change and that this should be reflected in its policies, while fully respecting its mandate and its independence [c]alls on the ECB to implement the environmental, social and governance principles (ESG principles) into its policies, while fully respecting its mandate and its independence” (European Parliament, 2020).

However, besides this, there are also reasons why one could argue that climate change is an exceptional case that warrants to be prioritized above other potential secondary objectives. The first one being the scientific evidence of the impact that climate change may have on the economy. Thus the sheer potentially devastating effects of climate change might be a sufficient cause of action. Furthermore, without a stable climate many of the other general economic policies in the Union as specified by Article 3, and even the more fundamental democratic principles of Article 2, may come under severe pressure. Limiting climate change can therefore be seen as a precondition for achieving any of the other general economic goals.

Secondly, limiting climate change is enshrined in international Treaties, as evidenced by the global Paris Agreement, which establishes GHG reduction goals up to the year 2050. The Agreement itself is found to be legally binding and has garnered a wide global support (Bodansky, 2016). This has recently been tested in the 'Urgenda' case, where the Dutch Supreme Court recognized the immediacy of the climate threat and urged the Dutch Government to further increase its climate goals (Spier, 2020).⁶ Furthermore, according to the Article 216 of the TFEU, all international treaties signed by the EU bind all of its institutions, including the ECB. Thus the ECB should be seen as also being bound by the Paris Agreement targets.

Thirdly, climate is a clear political priority. The EU has recently adopted higher targets now aiming for reducing the emissions by 55% until 2030, translating this into policies like the Green Deal and the Next generation EU Fund (European Commission, 2020c). The EU Climate Law will reinforce these targets by enshrining them in law. On this matter the European Parliament and the European Commission have reached a provisional agreement, and the law is currently being prepared for formal adoption (European Commission, 2020b). In this way climate does stand out among the many other objectives of governments, having the full support by the European Parliament and the European Council, and could therefore be considered as pushing climate action on top of its political agenda. This fact might indicate to the ECB the relative importance of climate action compared to other items in the secondary mandate.

Lastly, climate considerations may be easier to operationalize and include in the monetary policy framework than other secondary objectives. As noted already, many proposals were put forward that offer (often slight) adjustments to the ECB's monetary policy that would reflect the environmental considerations (Dafermos et al., 2020, 2021; Oustry et al., 2020; Schoenmaker, 2021; van 't Klooster & van Tilburg, 2020).

6. <https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:HR:2019:2007>

3. THE RISK PERSPECTIVE

Protecting the ECB balance sheet from climate risks...

Climate change introduces two kind of risks: physical (i.e. material destruction of assets) and transition (i.e. financial value lost through the transition taking place) (Carney, 2015; TCFD, 2017). As a supervisor the ECB emphasizes the importance of taking the effects of climate change into account, obliging its supervised institutions to “understand the impact of climate-related and environmental risks on the business environment in which they operate in the short, medium and long term, in order to be able to make informed strategic and business decisions” (European Central Bank, 2020, p. 4). However, these obligations extend to the ECB protecting its own balance sheet as well.

The ECB balance sheet has expanded significantly over the last decade through its asset purchase programmes and accepting of collateral, also related to its refinancing operations,. These developments urge the ECB to look at the risks, including climate risks, of its portfolio. This follows from the obligation to carefully manage risk in their operations, as enshrined in Title VI of the General Documentation Guideline (*Guideline (EU) 2015/510*, 2014). This risk-minimization obligation was further reinforced by the European Court of Justice judgement on Outright Monetary Transactions⁷, mandating the ECB to reduce the risk of losses to which it is exposed (Mersch, 2017).

7. <https://curia.europa.eu/juris/document/document.jsf?text=&docid=165057&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=8631853>, para. 123-126.

... to which it is now exposed disproportionately

An indicator of transition risk is the carbon intensity of a portfolio. Here the ECB clearly seems to be overexposed. Recent research has shown that whereas carbon intensive companies account for 29.1% of the Euro Area's Gross Value Added (GVA) they are 62.7% of the ECB bonds purchased by CSPP/PEPP (Dafermos et al., 2020), confirming earlier findings by Matikainen et al. (2017). Furthermore, it was shown that if transition risks were taken into account, five percent of the corporate bonds purchased by the ECB could face a credit rating downgrade to the extent that they would no longer be eligible for purchase (Monnin, 2018). Thus, one way for the ECB to reduce its exposure to transition risk may be to reduce the ratio of climate-intensive corporate bonds in its portfolio.

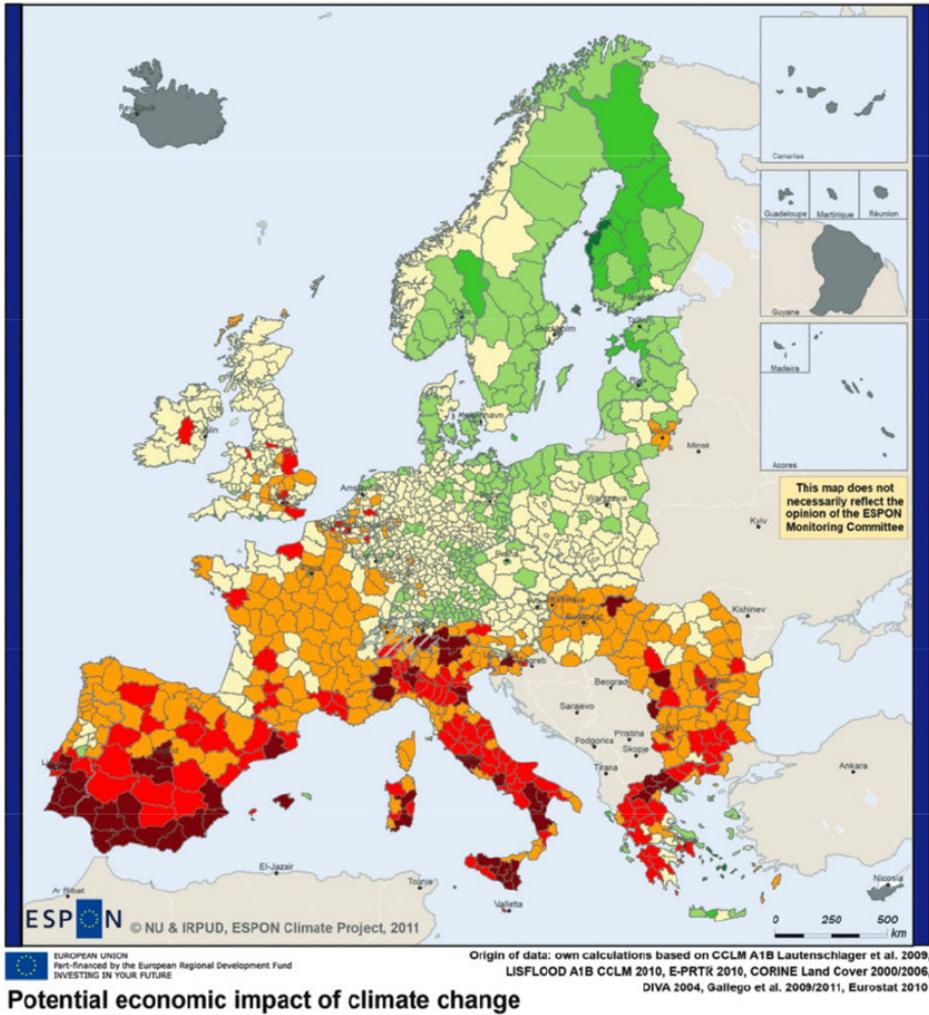
The ECB is also exposed to physical climate risks. Both from corporate asset purchases (companies with operations in regions that will be impacted by climate change) as well as sovereigns (where the South of Europe will be impacted much more severely by climate change) (Ciscar et al., 2018).

Reducing monetary operations specifically in the South will clearly endanger the effectiveness of the ECB's monetary policy. The recent Pandemic Emergency Purchase Programme (PEPP) for this reason explicitly allowed for deviations from the capital key thought to be in favor of the Southern Eurozone members. These deviations are explicitly permitted in times of crises by the ECJ in the *Gauweiler*⁸ case in order to maintain the transmission mechanism and the singleness of monetary policy. By analogy, it would be reasonable to expect they would be put in place, and found legally unobjectionable, in case of the large scale climate change effects.

An alternative route to reduce physical risks may be to act as a 'universal owner'. Universal owners are considered to be large institutional investors whose highly-diversified, globally-spread portfolios are representative of global capital markets, holding effectively a slice of the overall market. They can thus not divest from specific climate risks and have to accept that when climate risks materialize this will impact their portfolio negatively (Kelly et al., 2015). This makes their investment returns dependent on the continuing good health of that economy. Universal owners can therefore improve their long-term financial performance by encouraging companies to contribute to the sustainability transitions.

8. <https://curia.europa.eu/juris/document/document.jsf?text=&docid=165057&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=8631853>, para. 50, 77

Economic impact of climate change on various regions in the EU.
Darker red areas indicate higher negative impact.
Darker green areas indicate higher positive impact



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Figure 2. Source: ESPON (2011)

Like these large institutional investors, the ECB also has a broad diversified portfolio and thus is inevitably exposed to the physical risks of climate change. Especially the physical risk of sovereign bonds cannot be avoided. This necessitates the universal portfolio owners to look for ways to reduce this risk from materializing (PRI, 2011).

They can achieve this not only through avoiding certain assets for their physical climate risk, but rather by avoiding the worst scenarios from materializing. Here a clear synergy exists with strategies to reduce transition risks, such as the tilting approach discussed below. However, more proactive approaches directed at influencing the allocation of capital may be needed on top of these efforts.

4. THE OBJECTIONS OF MARKET NEUTRALITY AND CENTRAL BANK INDEPENDENCE

Market neutrality

One argument against a rebalancing of the ECB portfolio towards less carbon intensive assets is that this would clash with the principle of market neutrality in executing monetary policy. This principle is often considered to be supported by the Advocate General Wathelet's opinion of 4 October 2018 on the Weiss case, where he claims that: "to exclude the purchase of bonds with a negative yield from the PSPP would be contrary to the principle of market neutrality, which forms part of the principle of an open market economy with free competition, a condition of the ESCB's activity pursuant to Article 127(1) TFEU."⁹

While often invoked, there are several issues with this argument. First, the term 'market neutrality' is not enshrined in the EU Treaty or anywhere in the relevant legal documentation of the ECB. Article 127 TFEU states that the ECB shall act "in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources"¹⁰, but that is a vague basis for the policy of market neutrality as the ECB operationalizes it. Moreover, the ECB has considerable leeway in interpreting its own mandate, and it is not clear that the current one is the only conceivable, or the most desirable one.

9. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:62017CC0493&from=GA>, para. 74

10. The ending of the clause is "... and in compliance with the principles set out in Article 119". The Article 119 states that "the activities of the Member States and the Union shall include [t]he adoption of an economic policy which is [c]onducted in accordance with the *principle of an open market economy with free competition.*" [emphasis ours].

Secondly, the principle of market neutrality has only gained importance in recent years. Before that, the ECB itself declared that pursuing market neutrality was hampered by capital market fragmentation and the lack of a banking union in the Eurozone (Cheun et al., 2009).

Thirdly, the CJEU rulings on *Gauweiler*¹¹ and *Weiss*¹² cases give the ECB broad autonomy over its interpretation of what is adequate collateral, provided that the ECB performs the necessity and suitability tests and act proportionally with the necessary aims (Boer & van 't Klooster, 2020). To that effect, the ECB has a large autonomy over its conduct of monetary policy, as guaranteed by the Treaties, with the ECJ having the prerogative of reviewing only the manifest errors of judgement, as ascertained by the *Weiss*¹³ ruling (Boer & van 't Klooster, 2020).

A fundamental criticism of the concept of market neutrality is that central banks through their monetary policy by definition shape markets in various ways: be it through setting interest rates (thus shaping the repo markets) (van 't Klooster & van Tilburg, 2020); through asset purchasing programs (thus favoring large, capital intensive companies over SMEs) (Dafermos et al., 2020); or through sovereign bond markets (by allocating different shares for different countries) (Colesanti Senni & Monnin, 2020). This fact makes it difficult to conceive how true market neutrality is even attainable.

There are also two climate change-specific problem with the concept of market neutrality. The first is that following this principle in its corporate bond buying programme, the ECB is picking out the most capital intensive and polluting companies, thus having a disproportionately large environmental impact (Dafermos et al., 2020; Matikainen et al., 2017). Market neutrality thus may lead to outcomes that are far from neutral with regard to climate change. As we discussed, the obligation to support the general economic policies in the Union including environmental ones, makes 'carbon neutrality' of the ECB also an important principle. Actually, more may be asked from the ECB when possible without prejudice to price stability. Not to be neutral in the sense of being as carbon intensive as the current economy, but rather to be 'Paris-aligned' in a forward looking sense. Thus reducing the carbon intensity of its portfolio in line with what is needed to limit climate change.

11. <https://curia.europa.eu/juris/document/document.jsf?text=&docid=165057&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=8631853>, para. 67
12. <https://curia.europa.eu/juris/document/document.jsf?text=&docid=208741&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=8629044>, para. 72
13. <https://curia.europa.eu/juris/document/document.jsf?text=&docid=208741&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=8629044>, para. 24

The second issue is that in this particular case markets are often perceived as not properly accounting for all externalities, thus making the market inefficient. As the ESRB concluded: “There is also broad agreement that climate risks continue to be mispriced in financial markets” (European Systemic Risk Board, 2020). ECB Executive Board Member Isabel Schnabel has noted: “In the presence of market failures, market neutrality may not be the appropriate benchmark for a central bank when the market by itself is not achieving efficient outcomes” (Schnabel, 2020b). The market failure mentioned pertains to the climate risk not being properly priced in by the private sector (Lagarde, 2021).

Along those lines, Isabel Schnabel has recently proposed a shift from market *neutrality* to market *efficiency*. This move would, according to her, not only price-in all the (climate-related) externalities, and thus improve the price discovery and efficiency in the market, but also be more faithful to the Article 127 that explicitly calls for the EU to maintain an efficient allocation of resources (The ECB podcast, 2021).

A more practical reason why market neutrality has been invoked is the simplicity and the ease of operation of large scale purchasing programs (Honohan, 2020). It is argued that the deviation from this principle could render the monetary policy less effective and weaken the transmission mechanism, as buying assets of only a small number of firms would weaken the impact on EU wide inflation (Schoenmaker, 2021).

However, this need not be the case. With regard to limiting transition risk, one such policy relies on ‘tilting’ away from the highest polluters in the CSPP and towards lower carbon intensive companies. That way the ECB maintains effectiveness of its monetary policy, as no sectors are divested from, while still reducing the total carbon emissions of its monetary policy portfolio (Schoenmaker, 2021). A variant of the ‘tilting’ proposal has also been defended by Isabel Schnabel as a way of moving towards the aforementioned market efficiency policy (The ECB podcast, 2021).

Central bank independence

Next to the discussion on the legality of whether climate change should be taken into account in setting and designing monetary policy, there is also a discussion on its wider implications for the independence of central banks. Some central bankers fear that making choices with regard to such real life political issues threatens their independence (Tucker, 2018).

Others authors, however, point to the fact that historically central banks have also always helped to finance challenges to society, ranging from wars to pandemics, natural disasters and financial crises (van Tilburg & Simić, 2021). Failing to do so now may actually erode the political support for central bank independence (Honohan, 2020). Similarly, it has been claimed that central bank independence is not a goal of its own, but is bestowed so as to improve the stability and sustainability of the economy. While previously referring to stable inflation, in the current circumstances this rather refers to the effects of climate change (Verheyen, 2021). This point has been reinforced by Isabel Schnabel, who stated that “independence *requires* a central bank to respond to the concerns of the public and to carefully evaluate whether and how it may be able, within its mandate, to respond to these concerns [emphasis added]” (Schnabel, 2021).

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Here it is also important to make a distinction between not going against stated government policies on the one hand, and actively contributing to these on the other. As we discussed, currently the ECB’s Asset Purchasing Programme is lowering the cost of capital of the more carbon intensive companies relatively more than that of the rest of the economy, which is contrary to the EU’s political priorities.

In 2012 in the *Gauweiler* case, the German Federal Constitutional Court’s (FCC) relied on a distinction between the economic policy (executed on a Member State level) and monetary policy (executed on the EU level), claiming that the ECB was mandated to execute the latter, but not by affecting the former disproportionately. Furthermore, that monetary and economic policies are inextricably intertwined has also been recognized by the ECJ in its *Weiss* ruling (Boer & van ’t Klooster, 2020; Whelan, 2020). In that sense, the ECB needs to be conscious of the economic effects of its monetary policies and recognize if they can contribute, or at least be neutral, with regard to the ‘general economic policies in the Union’. In these actions it needs to conduct its policy in a proportional manner, as well as explain its actions.

More explicit democratic legitimacy can be obtained with regards to the items in the secondary mandate. The first steps have already been made in that direction, when the EC-commissioned Green Taxonomy was published, giving clear guidelines to the markets, and by extension the ECB, to assist the transition in line with environmental objectives and policies of the Union (European Commission, 2020a).

Using the Taxonomy should decrease any discretionary roles that the ECB would have needed to assume. Aside from the Taxonomy Regulation, the Taxonomy Legislation also includes the Sustainable Finance Disclosure Regulation (sustainability-related disclosures for the financial sector); Non-Financial Reporting Directive (analogous to the former, but covering the non-financial companies); as well as the Benchmark Regulation (regarding EU Climate Transition benchmarks and EU Paris-aligned benchmarks) (Smits, 2021).

But more can be done by the relevant EU institutions. According to Article 130 of the EU treaty the ECB is not allowed to ask for or receive instructions from the other EU-institutions. However, this does not exclude less formal and legally non-binding guidance from certain politicians towards the ECB. This is in line with the Article 284 of the TFEU that states that: “The President of the Council and a Member of the Commission may participate, without having the right to vote, in meetings of the Governing Council of the European Central Bank. The President of the Council may submit a motion for deliberation to the Governing Council of the European Central Bank”.

However, some argue that the European Parliament and Council could provide more guidance to the ECB with regard to prioritizing the secondary objectives (Boer & van 't Klooster, 2020; Jourdan & Beckmann, 2020). While not legally binding, it could further reinforce the political commitment of the European politicians towards climate action and give an even stronger signal to the ECB on the sustainable direction of EU policy.

There are several forms that this could take. Firstly “the Council can set out broad economic policy guidelines in accordance with the procedure of Article 121 (2) TFEU and articulate how it sees the role of the ECB in realizing its secondary mandate” (Boer & van 't Klooster, 2020).¹⁴ The Council would then need to notify the Parliament doing this. However, as the EP has already shown its commitment to the climate change mitigation, it could be expected to support the Council's guidelines thus increasing their legitimacy.

14. Article 121 (2) TFEU: The Council shall, on a recommendation from the Commission, formulate a draft for the broad guidelines of the economic policies of the Member States and of the Union, and shall report its findings to the European Council. The European Council shall, acting on the basis of the report from the Council, discuss a conclusion on the broad guidelines of the economic policies of the Member States and of the Union. On the basis of this conclusion, the Council shall adopt a recommendation setting out these broad guidelines. The Council shall inform the European Parliament of its recommendation.

Another proposal is for the European Parliament to “use its annual resolutions on the ECB to vote a ranking of three top secondary objectives” and to “refocus the quarterly ‘monetary dialogues’ hearings with the ECB President to carry out regular checks on the delivery of the thus-interpreted mandate” (Claeys et al., 2021).

Lastly, innovative forms of monetary-fiscal interaction might give more political guidance to the ECB’s monetary policy. A proposal to that effect was recently put forward by BlackRock. The proposal entails the fiscal authorities to draw up a list of shovel-ready projects, pre-defined by the politicians and based on the public investment needs. On the monetary side, funding would be allocated by the central bank up to the amount assessed to be necessary to return to the desired inflation target. This would ensure the wide democratic guidance of the necessary stimulus, as well as maintain central bank independence, as the proposal requires the monetary powers to decide only on the size of the stimulus, but not its direction as well (Bartsch et al., 2019).

5. CONCLUSION AND FURTHER RESEARCH QUESTIONS

An obligation, not an option. But is it also a possibility?

Monetary policies always have economic effects. In that sense they are never 'neutral' from an economic or market perspective. This is even more the case for the unconventional policies that central banks, including the ECB, have conducted in recent years. They moved from using solely interest rates to manage inflation, to the buying of bonds of specific countries and companies, and inducing lending of specific banks. These are all instruments that more directly impact the real economy. With its Gauweiler and Weiss rulings, the ECJ has shown that this is not necessarily a problem. The ECB, however, does need to take this economic impact into account, show the proportionality of its monetary actions in that respect, and communicate and explain its actions clearly.

In recent years the impact of monetary policy on climate change has increasingly surfaced as one of the economic issues that the ECB needs to take into account in setting, designing and implementing its monetary policies. There are several reasons for this:

1. A stable climate might be a precondition for price stability in the medium to long term, as the worst effects of climate change may be incompatible with price stability;
2. The EU Treaty also specifies the obligation to support the general economic policies in the Union. In this respect limiting climate change has emerged as a clear political priority;
3. The ECB is obliged to carefully manage risk in its operations, with both climate transition and physical risk now widely recognized as posing material risk.

The discussion presented here suggests that monetary policy makers should take climate change into account in both setting and executing their monetary policies. Climate change therefore is not something that ECB *can* do, it is something it *needs to do*.

However, currently through its collateral framework and asset purchase programmes, the ECB is actually lowering the cost of capital for relatively carbon intensive companies, thus actively steering *against* the stated policies of the democratically elected governments. This is something that can be remedied through a modest ‘tilting’ approach, discussed in this paper, that is compatible with price stability. This could steer towards neutralizing the carbon impact of the ECB’s monetary policy. However, more effort on the part of the ECB may be needed to actually help governments achieve their climate goals, by reducing the financing costs of more Paris-aligned corporations.

The ECB board seems to be convinced of the need to take climate change into account, as evidenced by public statements by a majority of its executive board members and of several presidents of national central banks (Lagarde, 2021; Schnabel, 2020a, 2020b). However, whether a move towards a more sustainable monetary policy will actually happen still remains a question. It has been signaled that the operationalization may be prohibitively problematic.¹⁵ The question whether this is a legitimate argument is outside of the scope of this paper, as that would require a more extensive analysis of the availability of data and methodologies to assess the viability of a more ‘green’ monetary policy. However, we do note that the data are available to judge that the current collateral and asset purchase are more carbon intensive than the economy as a whole, and surely not aligned with the objectives set by the Union in order to comply with the Paris Agreement (Dafermos et al., 2020; Matikainen et al., 2017). We therefore conclude that it is dubious whether Ms. Schnabel’s reluctance will be defensible if a legal case is started against the ECB and claimed that it is doing not enough on the climate front. The ECB may not only be able to be legally green, but it also risks being considered ‘illegally brown’.

15. As mentioned by Isabel Schnabel: “The question of course is what does that mean in practice. It seems to suggest that we should ‘tilt’ our asset purchases in the direction of less emission intensive firms, but this of course has to be operationalized, and this is tricky, and we are discussing this a lot how this could be done in a proper way. My prediction is that we will discuss this for quite some time because it is really complicated” (The ECB podcast, 2021)

Discussion

Through its discussion of the relevant legal articles in their economic and monetary context this paper has brought some arguments to the table that have not been brought into the discussion before. These may provide new avenues for taking climate change into account in monetary policy.

On the 'why' of it we discussed:

- The need to extend the time horizon of the ECB for the long term threat to price stability. Whereas the effects of climate change are uncertain, unpredictable, and possibly far off into the future, that does not relieve the ECB of the obligation to act as the Treaty does not limit its obligation to safeguard price stability to a particular (limited) time horizon.
- Why climate could be prioritized. With respect to the supportive objectives we discussed why climate could be prioritized between the different other 'general economic policies': that climate change is unique due to the large macroeconomic effects it will have; the international agreements that have set clear goals for the coming decades; as well as the broad and deep political backing for this within the Union.
- The ECB as a universal owner. With regard to the risk perspective we added the perspective of the ECB, and more widely central banks, as 'universal owners' of large and diversified portfolios of financial securities widely exposed to climate risk. An argument that is especially relevant to the majority of the ECB's holdings in sovereign bonds, specifically of those euro member states that are exposed to the physical risks of climate change.

On the 'how' of taking climate change into account in its monetary policies we raised the following issues:

- What can the ECB do to help mitigate climate change without limiting the scope of the instrument too much and thus jeopardize its effectiveness. In the current situation: to explore stronger tilting of corporate bonds purchases and higher haircuts than justified from a strict climate (transition) risk perspective.
- What can and should the ECB do in a situation where there is no longer need for unconventional monetary policy? What is the effect of interest rate setting on climate change? Is there a case for differentiated interest rates (credit guidance) favoring companies that are 'Paris-aligned' and 'Taxonomy-aligned'?

- What can and should the ECB do in a situation where the inflation risk is towards the upside and hence no monetary stimulus is needed? Can a policy of credit guidance with differentiated low interest rates still be feasible? For instance because by accepting (slightly) higher inflation now as a consequence of this a larger danger to price stability in the medium to long term is averted?
- What is the greater threat for the central banks' monetary independence: becoming involved in the political cause to limit climate change? Or public opposition to an institute that does nothing to help, despite its powerful and unique instrument that historically has been used by its predecessors to tackle specific challenges of society.

Further research

From this the following questions for further research emerge:

- What are the expected effects of climate change on the economy, the wider society and thereby on inflation dynamics? Both within Europe (differences between North and South, but also countries/regions at risk of flooding) and in the rest of the world, in particular on the borders of the Union like Africa and the Middle East.
- How can fiscal and monetary institutions cooperate more effectively? Is a Treaty change necessary for that? Will it infringe on central bank independence? What would the role of central banks be in this new model?
- How can central banks globally cooperate more effectively to safeguard price stability as universal owners (risk perspective)?
- Which tools can central banks use in order to make their (unconventional) monetary policy instruments more sustainable? Are there any other monetary policy instruments that would be more suitable to this purpose?
- How could/should the ECB act to address other items in its secondary mandate aside from environmental considerations? If so, what would be the instruments and the trade-offs?
- Could or should the ECB move away from its inflation targeting framework to some other variable targeting? Would this promote sustainability in the Eurozone?
- Is the shift from market neutrality to market efficiency a sufficient one? Could or should the ECB go further than that towards a more explicit credit guidance role in order to promote the transition?

REFERENCES

Arnold, M. (2021a, March 16). *Philip Lane: 'We have a unique initiative in Europe now—It is really quite something.'* Financial Times. www.ft.com/content/2aa6750d-48b7-441e-9e84-7cb6467c5366

Arnold, M. (2021b, May 9). *Rehn calls for change to ECB's inflation target in line with Fed approach.* Financial Times. www.ft.com/content/05a12645-ceb2-4cd5-938e-974b778e16e0

Barro, R. J., & Gordon, D. B. (1983). Rules, Discretion and Reputation in a Model of Monetary Policy. *Journal of Monetary Economics*, 12(1), 101–121. [https://doi.org/10.1016/0304-3932\(83\)90051-X](https://doi.org/10.1016/0304-3932(83)90051-X)

Bartsch, E., Boivin, J., Fischer, S., & Hildebrand, P. (2019). *Dealing with the Next Downturn: From Unconventional Monetary Policy to Unprecedented Policy Coordination* (No. BIIM0819E-939246-1/16; Macro and Market Perspectives, p. 16). BlackRock Investment Institute. www.blackrock.com/us/individual/literature/whitepaper/bii-macro-perspectives-august-2019.pdf

Batten, S., Sowerbutts, R., & Tanaka, M. (2016). *Let's Talk About the Weather: The Impact of Climate Change on Central Banks* (Staff Working Paper No. 603; p. 38). Bank of England. www.ssrn.com/abstract=2783753

Bernanke, B. S. (2015, June 1). Monetary policy and inequality. *Brookings*. www.brookings.edu/blog/ben-bernanke/2015/06/01/monetary-policy-and-inequality/

Berthier, A. (2021, April 12). *Letter from ClientEarth to Christine Lagarde.* www.clientearth.org/media/jtxnhiba/2021-04-12-letter-from-clientearth-to-christine-lagarde.pdf

Blot, C., Creel, J., Faure, E., & Hubert, P. (2020). Setting New Priorities for the ECB's Mandate. In *The ECB's mandate: Perspectives on general economic policies: Compilation of papers*. https://op.europa.eu/publication/manifestation_identifier/PUB_QA0120313ENN

Bodansky, D. (2016). The Legal Character of the Paris Agreement. *Review of European, Comparative & International Environmental Law*, 25(2), 142–150. <https://doi.org/10.1111/reel.12154>

Boer, N. de, & van 't Klooster, J. (2020). The ECB, the courts and the issue of democratic legitimacy after Weiss. *Common Market Law Review*, 57(6). <https://kluwerlawonline-com.proxy.library.uu.nl/journalarticle/Common+Market+Law+Review/57.6/COLA2020765>

Burke, M., Hsiang, S. M., & Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature*, 527(7577), 235–239. <https://doi.org/10.1038/nature15725>

Carney, M. (2015, September 29). *Breaking the Tragedy of the Horizon – climate change and financial stability* [Speech]. Lloyd's of London, London. www.bankofengland.co.uk/-/media/boe/files/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability.pdf?la=en&hash=7C67E785651862457D99511147C7424FF5EA0C1A

Chenet, H., Ryan-Collins, Josh, & van Lerven, F. (2019). Climate-Related Financial Policy in a World of Radical Uncertainty: Towards a Precautionary Approach. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3520224>

Cheun, S., von Köppen-Mertes, I., & Weller, B. (2009). *The collateral frameworks of the Eurosystem, the Federal Reserve System and the Bank of England and the financial market turmoil* (No. 107; Occasional Paper Series, p. 49). European Central Bank. www.ecb.europa.eu/pub/pdf/scpops/ecbocp107.pdf

Ciscar, J. C., Feyen, L., Ibarreta, D., & Soria, A. (2018). *Climate impacts in Europe: Final report of the JRC PESETA III project*. [JRS Science for Policy Report]. European Commission. <https://data.europa.eu/doi/10.2760/93257>

Claeys, G., Boer, N. de, Demetriades, P., Diessner, S., Jourdan, S., van 't Klooster, J., & Schmid, V. (2021, April 22). The ECB needs political guidance on secondary objectives. *Www.Euractiv.Com*. www.euractiv.com/section/economic-governance/opinion/the-ecb-needs-political-guidance-on-secondary-objectives/

Claeys, G., Demertzis, M., & Mazza, J. (2018). *A monetary policy framework for the European Central Bank to deal with uncertainty* (Policy Contribution No. 21; p. 19). Bruegel. www.bruegel.org/wp-content/uploads/2018/11/pc-21final2.pdf

Cœuré, B. (2018, November 8). *Monetary policy and climate change* [Speech]. Scaling up Green Finance: The Role of Central Banks, Berlin. www.ecb.europa.eu/press/key/date/2018/html/ecb.sp181108.en.html

Colesanti Senni, C., & Monnin, P. (2020, October 16). Central Bank Market Neutrality is a Myth. *Central Bank Market Neutrality Is a Myth*. www.cepweb.org/central-bank-market-neutrality-is-a-myth/

Dafermos, Y., Gabor, D., Nikolaidi, M., Pawloff, A., & van Lerven, F. (2020). *Decarbonising Is Easy: Beyond Market Neutrality in the ECB's Corporate QE* (p. 25). New Economics Foundation. <https://neweconomics.org/uploads/files/Decarbonising-is-easy.pdf>

Dafermos, Y., Gabor, D., Nikolaidi, M., Pawloff, A., & van Lerven, F. (2021). *Greening the Eurosystem Collateral Framework: How to Decarbonise the ECB's Monetary Policy* (p. 46). New Economics Foundation. <https://neweconomics.org/uploads/files/Collateral-Framework.pdf>

De Haan, J., Hoeberichts, M., Maas, R., & Teppa, F. (2016). *Inflation in the euro area and why it matters* (Occasional Studies No. 14–3). De Nederlandsche Bank. www.dnb.nl/media/ziwmfvg4/201609_nr_3_-2016-_inflation_in_the_euro_area_and_why_it_matters.pdf

Department of Defense. (2014). *Quadrennial defense review*. https://archive.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf

Dikau, S., & Volz, U. (2020). *Central Bank Mandates, Sustainability Objectives and the Promotion of Green Finance* (Working Paper No. 232; p. 36). SOAS Department of Economics. <https://eprints.soas.ac.uk/32598/1/file145514.pdf>

Guideline (EU) 2015/510, (December 19, 2014). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014O0060&rid=6>

Elderson, F. (2021, February 13). *Greening monetary policy*. www.ecb.europa.eu/press/blog/date/2021/html/ecb.blog210213~7e26af8606.en.html

ESPON. (2011).

Climate Change and Territorial Effects on Regions and Local Economies (Final Report No. 2013/1/4; Applied Research). ESPON. www.espon.eu/sites/default/files/attachments/Final%20Report%20Main%20Report.pdf

European Central Bank. (2003, May 8). *The ECB's monetary policy strategy*. European Central Bank. www.ecb.europa.eu/press/pr/date/2003/html/pr030508_2.en.html

European Central Bank. (2020). *Guide on climate-related and environmental risks: Supervisory expectations relating to risk management and disclosure* (p. 54). European Central Bank. www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf

European Commission. (2020a). *Taxonomy: Final report of the Technical Expert Group on Sustainable Finance* [Technical Report]. European Commission. https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf

European Commission. (2020b, March 4). *European Climate Law* [Text]. Climate Action - European Commission. https://ec.europa.eu/clima/policies/eu-climate-action/law_en

European Commission. (2020c, September 11). *2030 Climate Target Plan* [Text]. Climate Action - European Commission. https://ec.europa.eu/clima/policies/eu-climate-action/2030_ctp_en

European Parliament. (2020). *European Parliament resolution of 12 February 2020 on the European Central Bank Annual Report for 2018 (2019/2129(INI))* (P9_TA(2020)0034). European Parliament. www.europarl.europa.eu/doceo/document/TA-9-2020-0034_EN.pdf

European Systemic Risk Board. (2020). *Positively green: Measuring climate change risks to financial stability*. https://op.europa.eu/publication/manifestation_identifier/PUB_DT0120342ENN

Federal Constitutional Court. (2021). *Constitutional complaints against the Federal Climate Change Act partially successful*. www.bundesverfassungsgericht.de/SharedDocs/Pressemitteilungen/EN/2021/bvg21-031.html

Gros, D. (2020, December 18). *The Dangerous Allure of Green Central Banking*. Project Syndicate. www.project-syndicate.org/commentary/european-central-bank-should-not-go-green-by-daniel-gros-2020-12

Hanke, S. H., & Krus, N. (2012). *World Hyperinflations*. Cato Institute. www.cato.org/sites/cato.org/files/pubs/pdf/workingpaper-8_1.pdf

Hansen, N.-J. H., Lin, A., & Mano, R. C. (2020). *Should Inequality Factor into Central Banks' Decisions?* (IMF Working Paper WP/20/196). www.imf.org/-/media/Files/Publications/WP/2020/English/wpiea2020196-print-pdf

Hartmann, P., & Smets, F. (2018). *The first twenty years of the European Central Bank: Monetary policy.* (ECB Working Paper No. 2219). European Central Bank. <https://data.europa.eu/doi/10.2866/666520>

He, L. (2017). *Hyperinflation: A World History* (1st ed.). Routledge. <https://doi.org/10.4324/9780203712061>

Hof, A., Boot, P., van Vuuren, D., & van Minnen, J. (2014). *Costs and benefits of climate change adaptation and mitigation:* (Policy Brief No. 1198; p. 34). PBL Netherlands Environmental Assessment Agency. www.pbl.nl/sites/default/files/downloads/PBL_2014_Costs_and_benefits_of_climate_change_adaption_and_mitigation_1198_0.pdf

Honohan, P. (2020). *Should Monetary Policy Take Inequality and Climate Change into Account?* (Discussion Note No. 2020/3). Council on Economic Policies. www.cepweb.org/wp-content/uploads/2020/01/CEP-DN-Should-Monetary-Policy-Take-Inequality-and-Climate-Change-into-Account.pdf

Howard, P. H., & Sterner, T. (2017). Few and Not So Far Between: A Meta-analysis of Climate Damage Estimates. *Environmental and Resource Economics*, 68(1), 197–225. <https://doi.org/10.1007/s10640-017-0166-z>

Jourdan, S., & Beckmann, M. (2020, December 7). Wieso eine grüne Geldpolitik legal und legitim ist. *Makronom*. <https://makronom.de/wieso-eine-gruene-geldpolitik-legal-und-legitim-ist-37773>

Karak, M. (2019, September 12). *Climate Change and Syria's Civil War.* JSTOR Daily. <https://daily.jstor.org/climate-change-and-syrias-civil-war/>

Kelly, S., Zhiyi Yeo, J., Coburn, A., Copic, J., Crawford-Brown, D., Foley, A., Neduv, E., Ralph, D., & Saidi, F. (2015). *Unhedgeable Risk: How Climate Change Sentiment Impacts Investment.* Cambridge Centre for Risk Studies. www.jbs.cam.ac.uk/wp-content/uploads/2020/08/crs-unhedgeable-risk.pdf

Khalaf, R., & Arnold, M. (2020, July 8). *Lagarde puts green policy top of agenda in ECB bond buying.* Financial Times. www.ft.com/content/f776ea60-2b84-4b72-9765-2c084bff6e32

Krogstrup, S., & Oman, Wi. (2019). *Macroeconomic and Financial Policies for Climate Change Mitigation: A Review of the Literature.* INTERNATIONAL MONETARY FUND.

Kydland, F. E., & Prescott, E. C. (1977). Rules Rather than Discretion: The Inconsistency of Optimal Plans. *The Journal of Political Economy*, 85(3), 473–492.

Lagarde, C. (2020a, June 19). Letter from Christine Lagarde to MEP Clare Daly. www.ecb.europa.eu/ecb/access_to_documents/document/correspondence/shared/data/ecb.dr.cor20200619daly.en.pdf?8630685c449cb9bbbda1c1dda7596c9b

Lagarde, C. (2020b, September 30). *The monetary policy strategy review: Some preliminary considerations.* “ECB and Its Watchers XXI” conference, Frankfurt am Main. www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200930~169abb1202.en.html

Lagarde, C. (2021, January 25). *Climate change and central banking.* ILF conference on Green Banking and Green Central Banking, Frankfurt am Main. www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210125~f87e826ca5.en.html

Lenza, M., & Slacalek, J. (2018). *How does monetary policy affect income and wealth inequality?: Evidence from quantitative easing in the euro area.* (No 2190; Working Paper Series). European Central Bank. <https://data.europa.eu/doi/10.2866/414435>

38

Martínez-García, E., Coulter, J., & Grossman, V. (2021, April 6). *Fed’s New Inflation Targeting Policy Seeks to Maintain Well-Anchored Inflation Expectations.* Federal Reserve Bank of Dallas. www.dallasfed.org:443/research/economics/2021/0406

Matikainen, S., Campiglio, E., & Zenghelis, D. (2017). *The climate impact of quantitative easing* (p. 36). Grantham Research Institute on Climate Change and the Environment. www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2017/05/ClimateImpactQuantEasing_Matikainen-et-al-1.pdf

McKibbin, W. J., Morris, A. C., Panton, A. J., & Wilcoxon, P. J. (2017). *Climate Change and Monetary Policy: Dealing with Disruption* (The Climate and Energy Economics Project) [Climate and Energy Economics Discussion Paper]. Brookings. www.ssrn.com/abstract=3084399

Mersch, Y. (2017, September 25). *Risk management in times of non-conventional monetary policy.* Joint Banco de Portugal and European Central Bank Conference on Risk Management for Central Banks, Lisbon. www.ecb.europa.eu/press/key/date/2017/html/ecb.sp170925_1.en.html

Monnin, P. (2018). *Integrating Climate Risks into Credit Risk Assessment – Current Methodologies and the Case of Central Banks Corporate Bond Purchases* (No. 2018/4; Discussion Note). Council on Economic Policies. www.cepweb.org/wp-content/uploads/2019/02/CEP-DN-Integrating-climate-risks-into-credit-risk-analysis.pdf

Mumtaz, H., & Theophilopoulou, A. (2017). The impact of monetary policy on inequality in the UK. An empirical analysis. *European Economic Review*, 98, 410–423. <https://doi.org/10.1016/j.eurocorev.2017.07.008>

NGFS. (2020). *The Macroeconomic and Financial Stability Impacts of Climate Change: Research Priorities* [Technical document]. Network for Greening the Financial System. www.ngfs.net/sites/default/files/medias/documents/ngfs_research_priorities_final.pdf

Oustry, A., Erkan, B., Svartzman, R., & Weber, P.-F. (2020). *Climate-related Risks and Central Banks' Collateral Policy: A Methodological Experiment* (Working Paper No. 790). Banque de France. www.banque-france.fr/sites/default/files/wp790.pdf

PRI. (2011). *Universal Ownership: Why Environmental Externalities Matter to Institutional Investors*. Principles for Responsible Investment. www.ssrn.com/abstract=2222753

Ryan-Collins, J. (2015). *Is Monetary Financing Inflationary? A Case Study of the Canadian Economy, 1935-75* (Working Paper No. 848). Levy Economics Institute. www.levyinstitute.org/pubs/wp_848.pdf

Ryan-Collins, J., & van Lerven, F. (2018). *Bringing the helicopter to ground: A historical review of fiscal- monetary coordination to support economic growth in the 20th century*. Post-Keynesian economics society. <https://neweconomics.org/uploads/files/Bringing-the-helicopter-to-ground.pdf>

Samarina, A., & Nguyen, A. D. M. (2019). Does Monetary Policy Affect Income Inequality in the Euro Area? *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3352371>

Schacht, H. (1967). *The Magic of Money*. Osbourne.

Schnabel, I. (2020a, July 17). *Never waste a crisis: COVID-19, climate change and monetary policy* [Speech]. Virtual roundtable on “Sustainable Crisis Responses in Europe.” www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200717~1556b0f988.en.html

Schnabel, I. (2020b, September 28). *When markets fail – the need for collective action in tackling climate change* [Speech]. European Sustainable Finance Summit, Frankfurt am Main. www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200928_1~268b0b672f.en.html

Schnabel, I. (2021, May 27). *Societal responsibility and central bank independence* [Speech]. VIII. New Paradigm Workshop, Frankfurt am Main. www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210527_1~ae50e2be97.en.html

Schoenmaker, D. (2021). Greening monetary policy. *Climate Policy*, 1–12. <https://doi.org/10.1080/14693062.2020.1868392>

Siklos, P. L. (1991). *War Finance, Reconstruction, Hyperinflation and Stabilization in Hungary, 1938–48*. Palgrave Macmillan UK. <https://doi.org/10.1007/978-1-349-21325-2>

Smits, R. (2021). *Memo on monetary policy and climate change, biodiversity loss* (p. 2) [Conference contribution]. https://renesmits.eu/wp-content/uploads/2021/03/Memo-on-monetary-policy-and-climate-change-biodiversity-loss_210221.pdf

Solana, J. (2019). The Power of the Eurosystem to Promote Environmental Protection. *European Business Law Review*, 30(4), 547–575.

Spier, J. (2020). ‘The “Strongest” Climate Ruling Yet’: The Dutch Supreme Court’s Urgenda Judgment. *Netherlands International Law Review*, 67(2), 319–391. <https://doi.org/10.1007/s40802-020-00172-5>

Stern, N. (2007). *The Economics of Climate Change: The Stern Review*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511817434>

Sustainable Finance Lab. (2021, February 18). Every Avenue Available: Lessons from monetary history for tackling climate change. *Sustainable Finance Lab*. <https://sustainablefinancelab.nl/en/every-avenue-available-lessons-from-monetary-history-for-tackling-climate-change/>

TCFD. (2017). *Recommendations of the Task Force on Climate-related Financial Disclosures* (p. 74) [Final Report]. <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>

The ECB podcast. (2021, May 12). *Tackling climate change as a central bank: Between motivation, obligation and limitation* (No. 16) [Podcast]. www.ecb.europa.eu/press/tvservices/podcast/html/ecb.pod210512_episode16.en.html

Tucker, P. M. W. (2018). *Unelected power: The quest for legitimacy in central banking and the regulatory state*. Princeton University Press.

van 't Klooster, J., & van Tilburg, R. (2020). *Targeting a sustainable recovery with Green TLTROs*. Positive Money Europe. www.positivemoney.eu/wp-content/uploads/2020/09/Green-TLTROs.pdf

van Tilburg, R., & Simić, A. (2020). *The New Unconventional: Fiscal and monetary policy options for the eurozone in times of economic, political and climate crisis* [Discussion paper]. Sustainable Finance Lab. <https://sustainablefinancelab.nl/wp-content/uploads/sites/334/2020/04/SFL-The-New-Unconventional-2.pdf>

van Tilburg, R., & Simić, A. (2021). *Every Avenue Available: Lessons from monetary history for the road ahead for central banks to help prevent climate change* [Working paper]. Sustainable Finance Lab.

Verheyen, R. (2021). *Legal options for implementing climate criteria in the monetary policy of the European Central Bank*. <https://greenpeace.at/assets/uploads/pdf/ecb-legal-opinion.pdf>

Weidmann, J. (2019, October 29). *Climate change and central banks* [Welcome address]. Deutsche Bundesbank's second financial market conference, Frankfurt am Main. www.bis.org/review/r191029a.pdf

Whelan, K. (2020). The ECB's mandate and legal constraints. In *The ECB's mandate: Perspectives on general economic policies: Compilation of papers*. European Parliament. https://op.europa.eu/publication/manifestation_identifier/PUB_QA0120313ENN

Woodford, M. (2003). *Interest and prices: Foundations of a theory of monetary policy*. Princeton University Press.

