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# CLIMATE CHANGE AND MONETARY POLICY: Some Preliminary Thoughts

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## Background

The Philippines is highly vulnerable to natural hazards, given its geographical location, its archipelagic form, and its coastlines that are among the world's longest. The natural hazards that the country is exposed to include floods, droughts, typhoons, landslides, earthquakes, and volcanic eruptions. On average, there are 20 tropical cyclones that enter the Philippine Area of Responsibility every year. In 2021, the INFORM<sup>2</sup> Global Risk Index categorized the Philippines as a high-risk country to climate change and natural hazards. Likewise, the 2021 Global Climate Risk Index ranked the Philippines as the fourth most affected country by extreme weather events—at risk of either frequent events or rare but extraordinary catastrophes<sup>3,4</sup>—for the period 2000 to 2019.

The existential risks associated with drastic climate change underscore the need for consensus- and broad-based policy actions from policymakers. While governments are the primary actors, central banks also play an important role in managing the impact of climate change, which affects their ability to deliver on their price and financial stability mandate.

Based on preliminary scoping of literature, we assess the potential impact of climate change on the conduct of monetary policy and how it can be integrated systematically into the current monetary policy framework of the Bangko Sentral ng Pilipinas (BSP). We also identify key challenges ahead as climate change is embedded in the decision-making process of monetary authorities. With more visible effects of climate change and the acceleration of policy transition in many major economies, we present an action plan for the BSP to strengthen its analytical capacity and ability to manage these risks with appropriate policy responses.

## Why should the BSP care about climate change?

Climate change-related risks may affect a central bank's price and financial stability mandates through at least three channels. First, physical risks associated with climate change tend to have a direct impact on inflation dynamics. Second, the consequences of climate change could indirectly attenuate the transmission of monetary policy measures to financing conditions. Third, climate-related physical and transition risks can impact financial stability.

**Impact on inflation dynamics.** Climate-related shocks could influence supply and demand conditions, which, in turn, hamper the central bank's ability to deliver on its price stability mandate. Climate-related shocks could result in supply shocks, which affect inflation dynamics and expectations formation. As climate change amplifies the frequency, breadth, and severity of supply shocks, making them more persistent, the traditional approach of "looking through" such shocks may become increasingly difficult for central banks.

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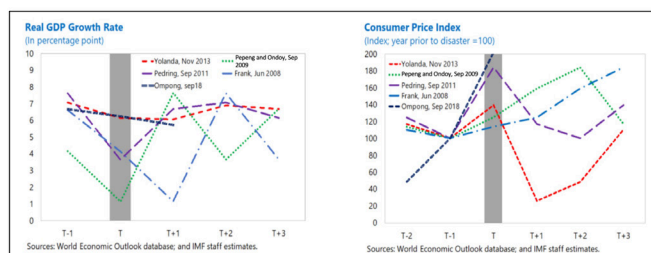
<sup>2</sup> INFORM is a collaboration of the Inter-Agency Standing Committee Reference Group on Risk, Early Warning, and Preparedness, and the European Commission. It publishes humanitarian crises and disaster risk indices based on a country's hazards and exposure, vulnerability, and lack of coping capacity dimension.

<sup>3</sup> The Global Climate Risk Index (CRI), which quantifies the impact of extreme weather events in terms of the fatalities and the economic losses that occurred, indicates a level of exposure and vulnerability to extreme events.

<sup>4</sup> [https://weltrisikobericht.de/wp-content/uploads/2021/09/WorldRiskReport\\_2021\\_Online.pdf](https://weltrisikobericht.de/wp-content/uploads/2021/09/WorldRiskReport_2021_Online.pdf)

The International Monetary Fund (IMF) summarized the key attributes of the top five recent natural disasters and their economic impact on the Philippines (Figure 1). The graph shows that real Gross Domestic Product (GDP) growth rates drop; while inflation pressures, as measured by the Consumer Price Index (CPI), increase due to supply shock disruptions amid the disaster years observed during different typhoons (Typhoons Frank in June 2008; Pepeng and Ondoy in September 2009; Pedring in September 2011; Yolanda in November 2013; and Ompong in September 2018).

**Figure 1: Top Five Recent Natural Disasters and their Economic Impact on the Philippines**



Source: International Monetary Fund (2021)

**Indirect impact on the transmission of monetary policy support measures to financing conditions.** The consequences of climate change could impair the transmission of monetary policy with the rise in stranded assets, such as oil reserves, and increased credit risks amid more intense climate-related developments. For instance, the losses incurred from stranded assets that cannot be tapped as the global economy moves away from fossil fuels to a “green economy” could weigh down the balance sheets and income conditions of mining industries and other concerned stakeholders (IMF, 2021). Moreover, as the financial system is at the core of the monetary policy transmission mechanism, an abrupt rebalancing and repricing of assets potentially triggered by transition measures could put pressure on banks’ balance sheets and constrain their ability to provide credit to the economy.

**Impact on financial stability.** The impact of climate change on the financial sector and, thus, on financial stability is magnified through physical and transition risks associated with climate change. The climate-related physical risks can result in destabilizing losses for the insurance industry and other financial intermediaries with direct and indirect exposure to affected industries. Meanwhile, the transition risks posed by technological changes needed for a shift to a “green economy” could result in large losses in carbon-intensive energy sectors, such as utilities, transportation, and industrial, among others. The revaluation or repricing of carbon-sensitive assets entails losses for investors holding these assets, which, if not addressed, could lead to systemic risks in the financial system. Former Bank of England Governor Mark Carney illustrated this scenario as a “climate Minsky moment” when a sudden drop in asset prices caused by the carbon-price bubble could trigger broader financial instability.<sup>5</sup>

### **BSP’s Current Practices in Incorporating Climate Risks into its Conduct of Monetary Policy**

**Incorporating climate risks into the BSP’s inflation forecasts entails the use of monitoring tools for climate-related developments.** The BSP monitors climate developments through the ENSO (El Niño and the Southern Oscillation) Alert System. Moreover, the BSP regularly attends the monthly Climate Outlook Forum organized by the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA).<sup>6</sup> The BSP also gathers data, information, and updates from the Department of Agriculture on production and monetary losses from damaged crops or livestock due to weather disturbances. As climate change affects water security, the BSP likewise tracks the impact of the current weather situation on water sources and irrigation. At the same time, developments in the global commodities market and the impact of climate conditions in other jurisdictions on global agricultural production and prices are studied and closely monitored.

<sup>5</sup> <https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/a-transition-in-thinking-and-action-speech-by-mark-carney.pdf>

<sup>6</sup> PAGASA is the government’s weather bureau.



*ENSO Alert System Status: La Niña Advisory.* The ENSO Diagnostic Discussion, issued jointly by the Climate Prediction Center and the International Research Institute for Climate and Society, is the monthly surveillance tool for climate conditions. The BSP monitors the monthly updates on the forecast probabilities of ENSO events (e.g., El Niño or La Niña episodes) to assess the weather pattern in the succeeding quarters (e.g., possibility of more rains or persistent dry spells).

*PAGASA Climate Outlook.* Consequently, the ENSO forecasts are incorporated in the Climate Outlook released by PAGASA through a monthly forum attended by government agencies, including the BSP, as well as the private sector and other stakeholders. PAGASA's Climate Outlook focuses more on the climate conditions in the country over the near term. The PAGASA can provide a more detailed outlook on the weather pattern, including forecast rainfall in the different parts of the country, which is critical to identify whether the areas that would be affected are those that produce key crops like rice, corn, and vegetables.

*Data on Typhoon Damages and Losses to the Agriculture Sector.* The disruptive effect of climate-related shocks could result in inflationary pressures due to tighter supply of agricultural commodities. At the same time, the physical effects of extreme weather events in the country have been sizeable, given economic losses from damages to infrastructure, agriculture, and productive sectors. In this way, climate-related shocks could materialize as both a demand and supply shock to the economy. The increasing frequency of extreme weather events has contributed to larger negative supply shocks and increased the trade-off of balancing inflation and growth. More persistent supply shocks and the corresponding second-round effects could disanchor inflation expectations and exacerbate inflationary pressures.

*Impact of Weather Situation on Water Sources and Irrigation.* As climate change could alter the water cycle, dam elevation is included in the staff surveillance activity. This is to determine potential risks that may arise in cases when the water supply reaches critical levels (i.e., below normal high-water level due to drought conditions or beyond spilling level due to above normal amount of rainfall). These major dams or reservoirs supply water requirements for households, irrigation, and hydroelectricity.

*Developments in the Global Commodities Market and the Impact of Climate Conditions on Agricultural Production and Prices.* The surge in fertilizer prices in 2021 was also driven by extreme weather conditions in major producing areas. Global food prices, in general, remain elevated by end-2021 with recovery in demand, supply chain disruptions, government policy, and adverse weather. While normally high prices are expected to give way to increased production, the high cost of inputs, remaining mobility restrictions due to the pandemic, and uncertainties in climatic conditions may leave little room for optimism for more stable market conditions in the near term.

***Climate Risks and Inflation Forecasting.*** The information on the above items is considered in assessing the inflation outlook. At present, the impact of climate change-related variables and extreme weather events is not directly embedded in the BSP's suite of macroeconomic forecasting models. Instead, climate change-related risks are indirectly incorporated in the baseline inflation forecast or in inflation scenarios through their impact on agricultural production and food and energy prices. At the same time, food carries a large weight in the CPI basket and depends on agriculture sector performance. To the extent that climatic changes affect agricultural production, this would affect the level and volatility of inflation. Meanwhile, the impact of typhoons, La Niña/El Niño events, and other natural disasters is part of the risk assessment using (a) input-output tables and (b) event studies based on historical experience.

## BSP's Climate Change-Monetary Policy Action Plans

### **Close Coordination with the National Government and Clear Communication to the Public.**

While climate change-related risks are implicitly embedded in the inflation forecasting exercises that guide monetary policy formulation, the BSP also supports the implementation of policies and timely intervention by the National Government to address climate change-related and/or natural calamities-related risks. Meanwhile, the BSP's clear and careful communication to the public of the need for non-monetary policy measures aims to prevent second-round effects from spilling into inflation expectations.

### **Key Challenges Related to Climate Change and Monetary Policy**

The availability of climate-related variables and the upgrading or extending of our existing macro models to incorporate climate risks are the key challenges that BSP expects to encounter while conducting and assessing the impact of climate change on monetary policy, as well as the linkage between these two topics.

One, there is an increasing need to understand how climate-related events could affect demand-supply conditions, including CPI-heavy food items. This will entail the compilation and generation of data on climate-related variables, such as temperature and precipitation, to empirically analyze the potential impact of climate change on monetary policy, specifically on inflation.

Second, we consider how we can incorporate the relevant climate-related effects more specifically into the macroeconomic models. That said, the complexity of climate change means that more than one type of model might be needed to capture its potential impact on monetary policy. Some of the challenges related to modelling and forecasting techniques include the long-term nature of climate change, non-linearities, heterogeneities across economic sectors and regions, and the explicit role of climate change-related policies. Less structural models, such as forecasting or nowcasting models, can also be extended to incorporate climate-related data. As less structural models are more data-driven, these would require a large set of high-quality climate data.

The BSP plans to increase its research activities on the interaction of climate change and monetary policy. The BSP's future research undertakings on monetary policy and climate change mainly include: (1) assessing the linkage between climate change and monetary policy; (2) developing a model or framework suitable for the Philippine case that can be applied in the analysis of the potential impact of climate change on monetary policy; and (3) identifying possible implications of climate change on monetary policy and the BSP's price stability mandate.

The proposed research output includes a qualitative paper and an empirical (quantitative) paper. The qualitative paper will serve as the BSP's initial review of literature on the following: (a) the impact of climate change on the Philippine economy; (b) the impact of climate risks on monetary policy transmission channels; and (c) cross-country experiences and other central banks' initiatives related to climate change and monetary policy. Meanwhile, the planned quantitative paper intends to focus on estimating the impact of climate-related shocks, such as temperature and precipitation, on inflation using the database on Air Quality Open Platform of the World Air Quality Index, among others.

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