

The Role of Central Banks in Financing the Transition to the Green Economy

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Summary:

Environmental projects are an important input to economic growth because they play an important role in ensuring the sustainability of economic development. Thus, today's trend among the world's developed and developing countries is to improve the green investment climate and to encourage environmental investment projects. As funding is the nerve and lifeline of the economy, so every project needs to be active in this important element, which has emerged as one of the most important issues of concern to governments as well as entrepreneurs and institutions. The international financial institutions have added a new prerequisite for projects to finance them: Its environment and its work with clean technologies and its production of friendly and / or environmentally friendly products. Therefore, the central banks and financial institutions in all countries of the world have to provide a mechanism or tools that encourage the financing of the green economy. So this research discusses the role of the central banks in financing the green economy. Given the huge investments needed to achieve a transition to a green economy, the financial sector will have to play a key role in allocation of resources for green economy - and halting environmentally damaging financing activities. In light of this, the research examines the impact of environmental factors on the traditional objectives of the Central Bank and provides a theoretical analysis of the situations faced by and against central banks to meet environmental challenges and sustainability. In addition, it discusses the potential role of macro-prudential fiscal instruments and measures: modifying the incentives and constraints faced by banks in defining their lending strategy could expand the scope of credit creation for low-carbon sectors. It also examines the role of sustainable development of central banks, and the need to divide labor between central banks and other institutions so that the transition can turn into the green economy.

Keywords: green investment; green finance; central bank; credit; macroprudential regulation; green economy

Jel Classification Codes : E58, G21, Q56

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I-Introduction :

The emergence of global crises over the past four decades has led to an in-depth analysis of current economic models and their ability to increase human well-being and social equality; traditional measures of economic performance, which largely focus on GDP, do not show the increasing social inequalities and associated environmental risks and responsibilities Current consumption and production patterns. At present, economic activity consumes more biomass than the Earth's sustainable production capacity, which undermines the services of ecosystems that are a key component of the lives of the poor and thus perpetuates and increases poverty and economic inequalities. This activity has also caused external impacts, such as pollution, climate change and scarcity of natural resources, threatening the productive capacity of the Earth to generate wealth and ensure human well-being.

The concept of a "green economy" has emerged in response to these multiple crises. It seeks to transform the drivers of economic growth and calls for the transfer of areas of focus - public and private, local and international - towards green sectors, to greening existing sectors and changing unsustainable consumption patterns. This transformation is expected to generate the sustained economic growth necessary to create jobs and reduce poverty, as well as reducing the intensity of energy use, resource consumption, and its production.

Countries recognize that a green economy can involve diverse opportunities, such as promoting innovation, creating new markets, creating jobs and contributing to the eradication of poverty. This can be achieved along with respect for the limits of the planet and to promote sound management of the natural resource base upon which human production and consumption.

The opportunities offered by the green economy may vary from country to country. For developed countries, the green economy may be an opportunity to open new paths to job creation, reduce dependence on fossil fuels and increase resource efficiency. For emerging economies, the green economy can provide opportunities to place their economies on a low-carbon, energy-efficient and resource-driven development path and provide them with a comparative advantage in the global market, while ensuring rapid growth is sustainable to meet their development aspirations. In many developing countries, particularly low-income countries, the green economy can provide an opportunity to leapfrog development stages and apply advanced but locally appropriate technologies for food security, rural access to energy, clean water supply, housing and sanitation And public transport, which can create jobs and contribute to the eradication of poverty.

The financial sector should play a major role in allocating resources for sustainable investments and halting environmentally damaging financing activities. Awareness has grown that the financial system needs to take into account the environmental and climate risks facing the real economy, and a large and growing number of central banks and regulators in both developing and developed economies have already begun to address this challenge in recent times.

However, the academic literature on central banks has largely ignored this issue so far. The years since the outbreak of the global financial crisis have seen the extensive analysis of the changing roles of central banks and their role in protecting financial stability. As stated in the recent G30 report on the fundamentals of central banking, important questions have been raised regarding the proper roles, duties, and obligations of central banks in the coming years. However, it is dedicated to the role of central banks in addressing environmental and climatic challenges despite the physical risks they pose to real economies and financial stability in countries

As a result, this paper examines the impact of environmental factors on the traditional objectives of central banks and provides a theoretical analysis of the arguments against central banks with environmental goals. The paper also explores how central banks can influence investment decisions and establish and allocate credit through monetary policies and overall prudential safety. Potential instruments include requirements for disclosure and stress testing related to climate and the distinction between setting interest rates and changing reserves or capital requirements in accordance with environmental impact or restrictions on certain types of investment or lending. While this paper highlights the role of central banks and financial institutions in greening finance.

The paper is divided as follows. Section 2 briefly reviews recent discussions on the roles and responsibilities of central banks. As a result of the global financial crisis, the previous consensus that central banks should target inflation has been questioned. A discussion has developed Countries recognize that a green economy can involve diverse opportunities, such as promoting innovation, creating new markets, creating jobs and contributing to the eradication of poverty. This can be achieved along with respect for the limits of the planet and to promote sound management of the natural resource base upon which human production and consumption.

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In other objectives, particularly financial stability, which central banks need to focus on and the tools to achieve. In this context, the paper expands the discussion on the responsibilities of central banks to include sustainability objectives and their potential for conflict with other objectives or supplement them. Section 3 analyzes the status of central banks to respond to sustainability challenges and the relationship between possible sustainability objectives, financial stability, and growth objectives. Section 4 then discusses the policy toolkit that can be used by the Central Bank and financial regulation to achieve sustainability objectives. Finally, the fifth section discusses the restrictions and advantages of central banks in financing the green economy

II-The Role of Central Banks:

There was a relatively broad consensus on the role of central banks and monetary policy. Most economists explained that the best contribution that central banks can make to community prosperity is to secure low and stable inflation rates. This conviction was embodied in the so-called inflation targeting framework that dominated the economic thinking prevailing since the early 1990s(UN, 2017). Although maintaining financial stability has historically been one of the three main objectives of central banks, high inflation targeting has tended to delegate financial supervision functions from central banks to dedicated financial regulatory authorities. Although the concept of inflation targeting has been a central objective of central banks, it has come under intense criticism since the global financial crisis because other concerns

other than price stability have not been addressed and, most importantly, ignored for financial stability. Unsurprisingly, financial stability has once again become a central concern of central banks since the crisis began. And that any central bank faces a potential conflict between price stability or macroeconomic stability on the one hand and financial stability on the other. If there is one lesson to be drawn from this crisis, is that this construction was not true. The truth is that there are many goals and there are many tools. How you can set tools on goals, and how to use these tools better to solve a very complex problem, this is the problem that we have solved (Goodhart, 2010).

In fact, there are many potential targets for the central bank, as well as a number of tools that can be used to achieve them. Figure 1 provides an overview of possible tools, policy tools, medium targets and policy objectives. The policy objectives of central banks can be divided into three main functional roles: maintaining price stability, maintaining financial stability, and supporting broader economic policy objectives. The latter could include objectives such as high employment, economic growth, stable exchange rates, fixed interest rates, external stability, creation / development of financial markets and possibly sustainable development(Buiter .2012).

The goals will not necessarily be equal in ranking. Price stability is defined as a key objective in most central bank legislation. Broad price stability is also essential for real and sustainable real growth. However, price stability does not need to be an individual objective or a primary objective. Since the global financial crisis, financial stability has been rediscovered as a major objective, even in cases where it has not been identified as the central bank's central bank policy. In the context of the elimination of the inflation targeting framework and the discussion on a broader mandate from the central bank, the following analysis needs to be developed for the potential environmental role of central banks. Indeed, as will be seen in the next section, the renewed focus on the role of central banks in protecting financial stability can be directly linked to the state of response to environmental challenges and sustainability. Even when environmental objectives and sustainability goals are not part of the explicit objectives of the central bank, the effective integration of sustainability factors may be relevant to stabilize prices or to protect financial stability in different countries (Blanchard, 2011).

It is important to adhere to the Tinbergen Rule, under which the number of policy objectives cannot exceed the number of policy instruments (Tinbergen, 1952). This is not a trivial matter, as (Mundell,1963) points out: "To achieve a certain goal there must be an effective tool and to achieve different independent goals there must be at least an equal number of effective tools." If the program contains more objectives than tools, achieve at least one goal in full; while if it contains more tools than goals, there will be more than one way to achieve a set of goals.

Therefore, when discussing whether central banks should incorporate sustainability objectives, it would be important to analyze whether they could be incorporated into a coherent and effective policy regime. There is also a risk of overstressing central banks' mandates, which could lead to financial instability if the number of targets exceeds the tools they use. But before that, it will be debated whether the central bank can incorporate sustainability goals into its policy functions.

III-Central Banks and Environmental and Sustainability Challenges:

There is a set of arguments that justify why central banks should respond to environmental challenges and sustainability (UN, 2017):

III-1- The Market Failure Argument

Banks that provide credit for socially undesirable activities - such as carbon-intensive or polluting - are described as a failure in the credit market. The failure of the credit market lies in the inconsistency between the legitimate pursuit of private interests by commercial banks - which create the majority of the money supply - and the development goals that a society determines for itself and is conditional on the availability of financial resources and a certain degree of monetary stability. In the presence of externalities, the allocation of credit by commercial banks may hence be suboptimal from a social perspective, often allocated to carbon-intensive activities (Campiglio, 2016).

Carbon pricing and environmental regulations are the preferred policy tools to correct, prevent or discourage such market failures. However, as long as carbon pricing markets are not working, environmental policies are not being implemented or effectively implemented; the central bank may have powers to influence the

creation and allocation of credit. In this sense, the argument of the failure of the credit market for green financial regulation is the application of the theory of the second best theory, which means that if the best policies are not implemented first to determine the credit market failure, the government may resort to the second best policy by using the tools available to him. Under certain circumstances, central banks may have a role in developing stock markets, for example by developing procedures to encourage disclosure or develop a secondary market. In this way, the issue can be provided to central banks to support the building of lost market segments to promote green financing, such as the green bond market. Assistance in establishing new green markets would also ensure that conventional monetary policy instruments are made environmentally consistent.

III-2-Central Banks as Credible and Powerful Actors in Developing Countries

The environmental role of central banks can be drawn from the strong institutional status of central banks in the policy frameworks of developing countries. While the issue of including environmental sustainability in their analytical frameworks, in principle, applies in principle to all central banks and financial regulators, the case of an environmental mandate to central banks and financial regulators may be stronger in developing and emerging economies, where regulation The environment is often weak or weak or even overlooked because weak public institutions lack leverage. In developing economies, central banks and financial regulators are often among the most developed and powerful public institutions. Through their leadership of the banking sector, they can exercise their influence effectively on private investment decisions. Furthermore, the experience of the financial market of central banks and their transnational networks can help them promote "best practices" reforms in the financial sector. To some extent, this argument is an extension of the market failure argument discussed above, thus applying the second best theory. This argument may be more important for central banks of developing countries than in developed countries, because market failures, especially lost or underdeveloped markets (such as local currency bond markets) tend to be a more widespread problem in developed countries.

III-3-Argument of the Financial and Macroeconomic Risk

One of the arguments regarding the role of central banks as custodians of financial and macroeconomic stability, To begin with, climate change and environmental damage may have very direct effects on price stability through their impact on food and energy prices. Floods and drought associated with climate change may affect agricultural production, which in turn affects food prices. At the same time, the need to mitigate the effects of climate change affects the patterns of energy production and energy prices. Monetary policy must take into account changes in food and energy prices (Macklem, 2011). While the central bank may not be able to directly influence them, these changes can have indirect effects on core inflation. Thus, the factors driving food and energy prices need to be included in the analysis of long-term central bank inflation expectations.

There are risks to financial stability from environmental damage and climate change. As previously mentioned, the protection of financial stability has traditionally been a central responsibility of central banks. Post-crisis deliberations have produced a relatively broad consensus that central banks need to move away from narrow states that focus on price stability and once again take responsibility for financial stability. Moreover, the experience of the financial crisis has shown that financial regulation and supervision need to go beyond the traditional focus on overall prudential safety and to develop prudential policy frameworks aimed at reducing systemic risk in the financial sector. Central banks must, therefore play a central role in mitigating systemic risk by identifying systemic weaknesses and using their broad vision of the financial system (IPCC, 2014).

There are three types of financial sector risks associated with climate change. The first is what is commonly referred to as "transitional risks". Climate change and the need to mitigate its effects will require drastic policy action and adjustments by companies and households. While policymakers have not yet hesitated to take action, and the private sector, in general, continues to operate as usual, pressure for more aggressive action on climate change and the reduction of carbon emissions will inevitably increase. The costs of adaptation will increase delays in mitigation actions. New environmental regulation and changes in carbon pricing will have a significant impact on carbon-intensive work and may even threaten their survival. As an example, because of the new environmental regulations, "a large share of the fossil fuel reserves of oil, gas and coal companies will be at risk of becoming" stranded assets "- and left undeveloped - if global policy action is taken to reduce warming to 2 degrees "(Kernan 2014).

However, the risk extends not only to fossil fuel companies but also to the economy at large. "If climate change policy actions at the global level are progressing progressively if anything happens, the pace of implementation will accelerate as the risks of climate change increase, even if efforts to reach a global [global] agreement fail" (Kernan 2014). Furthermore, the development of new technologies in response to climate change mitigation and adaptation pressures may make some persistent commercial technologies and practices redundant, leading to a reassessment of asset valuations. In the case of a gradual repricing of risks, the risks to financial stability will be limited, but financial authorities may have a role in ensuring that these risks are addressed.

The second risk facing economies is physical risk, defined by the Bank of England (2015) as "the first risks arising from weather events such as floods and storms", which include "the direct effects of such events, such as damage to property, Those that may arise indirectly through subsequent events, such as disrupting global supply chains or scarcity of resources. " Apart from any potential environmental regulation aimed at mitigating climate change or any adaptation measures taken, the risks of proliferation may be disturbances in individual businesses, entire industries or even economies arising from climate change are significant. This, once again, could have a systemic effect at the regional or national level and could even affect sovereign credit risk. However, it seems neither business nor financing is factoring enough in these risks at the moment. Although public awareness of the risks of extreme weather and climate change is on the rise, the Center for Climate and Energy Solutions has found an assessment of business resilience to climate change that the vast majority of companies are not prepared for the effects of climate change. The vast majority of companies recognize the risks of extreme weather and climate change, and many see these risks in the near or near term. Uncertainty about the nature, timing and severity of micro-climatic impacts often prevents investment in "business as usual" resilience. A few leading companies are taking steps to address climate risks where they see great opportunities to become more efficient, reduce costs, or provide greater value to customers - in other words, where there is a clear working situation to do. However, the business response so far is largely a continuation of existing practices based on a historical picture of past risks and often fails to adequately consider climate change and weather conditions. Thus, the most common strategy to address climate-related risks leaves most companies without the flexibility they need to address the future physical impacts of climate change.

The third risks facing companies - financial and non-financial - are climate or environmental risks, and these are the risks that could arise if agents suffering losses related to climate change or environmental damage seek compensation from those who are responsible for their damage, including Carbon offsets or polluters and environmental contaminants in general. Through third party liability insurance, liability risk can also become a major problem for the insurance sector (Bank of England 2015b). Moreover, financial companies

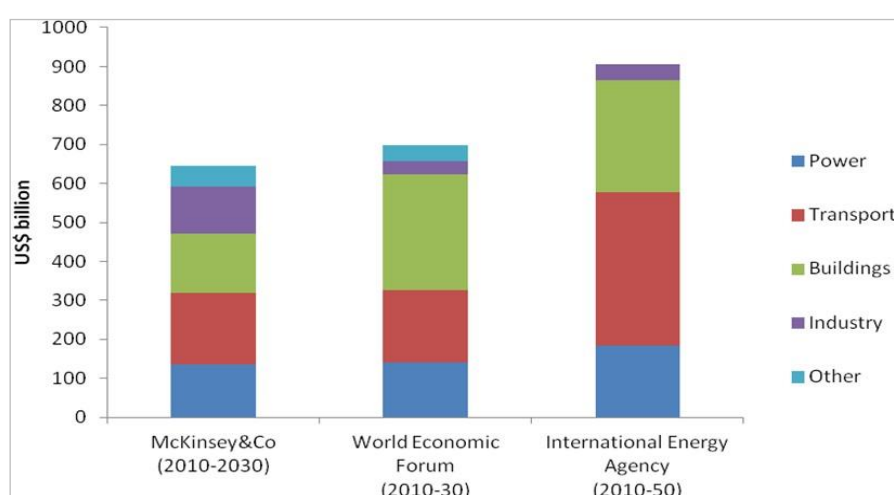
can be responsible for breach of credit duty in order to consider long-term investment value factors, which include environmental and social issues and governance, in investment practice is the failure of the credit obligation.

IV-Possible tools and procedures of the Central Bank to influence investment decisions:

The transition to a sustainable economic system requires economic resources to flow into low-carbon productive sectors. Although the transition to a green economy is systemic in nature and should encompass the entire economy, there are three main sectors: Energy production from clean and renewable sources (eg solar panels and wind turbines); Improving energy efficiency Private); Conservation and intelligent use of natural capital (sustainable agriculture, fishing, water, waste and other sectors).

Despite the upward trend of the past decade, there is still a significant gap between the current amount of green investment and what is required to remove carbon from the economy and to respect the 2 ° C threshold for increasing the temperature, agreed as a target at the 2009 Copenhagen Conference On climate change 2009). Figure 1 shows some recent estimates of this "green investment gap". Size of additional - higher than current and projected values - Investments in low-carbon activities each year over the next few decades ranges from \$ 650 to \$ 900 billion. This scale is confirmed by McCollum et al. (2014), which use a number of integrated assessment models to find that climate policies that are consistent with the second-order target will entail additional investments in energy, supply and demand of about \$ 800 billion.

Figure(1): The green investment gap: required additional annual investment in low- carbon sectors



Source: IEA (2012), McKinsey (2010), WEF (2013). Data from McKinsey (2010) have been transformed from Euros to US\$ using an exchange rate equal to 1.4 US\$ per Euro.

The United Nations Environment Program (2011) calculates that the annual incremental investment required for the establishment of a green economy - a broader goal than de-carbonization of the economic system - will average about 2% of global GDP during 2010-2010 (\$ 1 trillion to \$ 2.6 trillion)

Thus, the green investment gap appears to be very wide, and there is no certainty as to the means to fill this gap. There is a set of tools and procedures that central banks in different countries must use, and these tools and procedures help to flow economic resources in larger quantities too low carbon sectors (Campiglio, 2016).

There is a set of tools that central banks can use to influence investment decisions, establish and allocate credit for green investments and away from environmentally harmful activities. Some are differences in traditional monetary policy instruments that can be used to promote green investments, including different rates of recapitalization and capital or reserve requirements that affect the multiplier of funds, and can be used to stimulate green lending, while others can be classified as non- traditional policy instruments. Central banks can also use their regulatory power to encourage financial institutions to consider climate and

environmental risks in their operations and develop their capacity to deal with them. Moreover, central banks - or other financial authorities in the event of responsibility for financial regulation outside the central bank - may request financial institutions to disclose climate-related risks and conduct climate-related stress tests (UN, 2017).

IV-1-Carbon pricing

The first policy commonly referred to as the solution to the low carbon investment challenge is the introduction of a price on carbon (Nordhaus 2013; Weizman 2014). This should be able to correct the market failure to exclude environmental goods from the market pricing system, making it unattractive for the private sector to invest in green sectors. A comprehensive price system, capable of absorbing environmental externalities in economic decisions, should put households, businesses and financial institutions in a position to engage in low carbon sectors

IV-2-Directed Green Credit Policy Instruments

A set of targeted credit policy instruments are subsidized loan rates for priority sectors, differential discount rates, direct budget support, credit limits, credit limits, and the spread of specialized financial institutions. Among these tools, the most frequently used instrument is subsidized loan rates for priority sectors. To stimulate commercial banks to lend priority green sectors at lower interest rates, the central bank could use different rates of recalculation where banks offering credit to green investment could re-reduce bills at lower prices. This means that "financial institutions are partially or fully compensated or even compensated for lending at subsidized interest rates to priority borrowers when the central bank's priority loans are repaid on concessional terms" (Fry, 1995: 306).

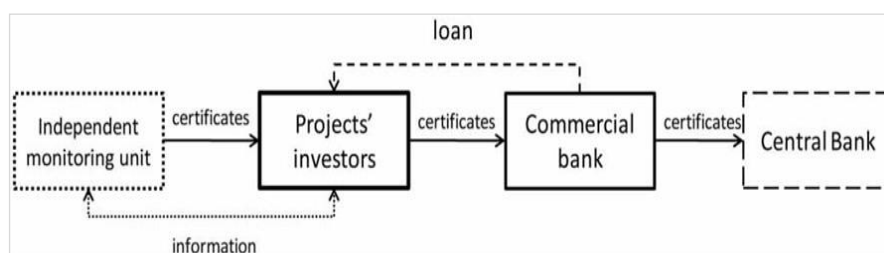
IV-3-Disclosure Requirements

The lack of effective disclosure of climate-related financial risks may not properly determine appropriate pricing by financial markets. The Financial Stability Board's Task Force on Climate-related Financial Disclosures therefore recommends mandatory disclosure requirements for all financial organizations - including banks, insurance companies, asset managers and asset owners - in their public financial cards (TCFD. 2016b). Improving the transparency of climate-related risks helps to make more appropriate pricing for risks and capital allocation, and provides the basis for green macro-prudential regulation and climate-related stress testing.

IV-4-Green Differentiated Reserve Requirements

Another way for the central bank to influence the allocation of credit is to use different reserve requirements, for example, related to the composition of commercial bank portfolios or the geographical location of the credit. As Epstein (2007) noted, the requirements for asset-based reserves are "widely usable ... to promote lending to the desired sectors." The proportion of reserve requirements is the share of deposits and other depository institutions such as savings institutions and credit unions must be held in reserve and non-lending. Reserve requirements have a significant impact on the ability of banks to create credit, and therefore on the stock of economic money. If the central bank cuts reserve requirements, banks can increase their lending. Permitting the minimum reserve required for green assets would be a means to favor green investments over traditional investments.

Figure 2: Green differentiated reserve requirements in Rozenberg et al. (2013)



According to Figure 2, developed by Rosenberg et al. (2013), the mechanism will make the company invest in low-carbon activities - for example, wind energy production. The details of the project are presented to an independent monitoring unit - for example, an agency of the Ministry of the Environment - which calculates the amount of polluting emissions that will be reduced by the project and exports a corresponding amount of certificates. The company then submits an application for a loan, and if the loan application is accepted, it delivers the certificates to the bank. Finally, the bank can then use the certificates in the central bank as part of the reserve requirements.

IV-5-Green Finance Guidelines and Frameworks

Another way is to issue green credit guidelines aimed at guiding banks towards more environmentally friendly lending. As of January 2017, 37 countries were represented in the Sustainable Banking Network, a knowledge exchange network between banking regulators and banking associations established in 2012 to support the development of environmental and social risk management institutions, lending. Thirteen member countries of the SBN network have already introduced guidelines on green financing, while other countries are currently developing such guidelines. Different guidelines for green financing vary across countries but typically include frameworks for environmental risk assessment as well as incentive schemes to promote green financing (UN, 2017).

IV-6-Total precautionary control

Total precautionary control must take into account external factors that may lead to financial instability and the identification of ecological imbalances that may cause substantial financial risks. The direct way to address systemic environmental risks is to set ceilings on credit extension for some carbon or polluting activities. Credit limits have stopped fashion because they are non-market instruments, but in the past they have been used by central banks to limit credit expansion without increasing interest rates (Zysman 1987). Exemptions from credit ceilings can also be used to channel investments to priority sectors.

V-The merits and the restrictions that central banks face when they encourage the green finance:

- All the countries of the world highly encourage the green finance. The central banks should play an important role in sustainable development, but there might have been restrictions on exceeding the mandates of central banks that we can discuss as following:
- If central banks strive to achieve many purposes, especially they don't have enough tools. According to the economist Tinbergen, a number of objectives must be achieved, equal to the number of tools used. Therefore, it must be stressed that the financial challenges and macroeconomic risks resulting from climate change within the traditional responsibility of central banks, as long as they seek financial stability. But some believe that these goals are new and understanding how climate risks are best integrated into precautionary analysis still needs to be examined in so far as there are concerns that the central bank's objectives are opposed to encouraging specific sectors such as the green economy to run counter to the central bank's financial stability objectives.
- There is also the risk that increasing the mandate of central banks may reduce their key role in achieving financial stability, especially in decisions concerning the allocation of public spending. For example, the EU Treaty states in Article 127 that price stability is a central objective of the European system of central banks, but states that without prejudice to the goal of price stability, the Economic and Social Council The general economic policies of the Union which aim at achieving the objectives of sustainable development in Article 3 of the Treaty of the European Union.

Therefore, they avoid conflicting objectives; there is a need for general and political support for the central bank to carry out its assigned role.

- There can be no resistance to change from within the central banks, and there must be harmonization. There is no single monetary policy system suitable for all countries, or at all times, and there is no one-size-fits-all solution to incorporate environmental considerations into central bank objectives, with central banks' support for government policies on sustainability.
- Central banks can encourage banking institutions to provide financing to the low- carbon economy. For example, the German Development Bank was one of the most active banking institutions followed by the China Development Bank. Multilateral development banks were among the most stimulating institutions to deploy green bonds with strong potential to drive financial resources towards low-carbon sectors, especially if it occurs in large quantities and in a unified manner. The market is in a phase of rapid expansion, and the amount owed to green bonds is about \$ 346 billion. The UK Green Investment Bank's experience in helping the country achieve environmental goals on how to reduce greenhouse gas emissions, improve energy efficiency, and reduce waste is a good example. But the problem is that it can't expand its budgets independently, it lacks the ability to borrow from markets, which may hinder its objectives (GIB, 2001).

VI-Conclusions:

This paper discussed various methods and tools that the monetary and financial authorities can influence investment decisions and the creation of credit through monetary policies, as well as total precautionary policies. The research also discusses the limitations and advantages of central banks to achieve their objectives related to sustainable development and the risks of exceeding the powers of central banks.

Although environmental considerations are within the framework of financial stability pursued by central banks, some may see them as exceeding the mandate of central banks. I believe that central banks have a role to play in supporting green stability, which is essentially a political issue that requires extensive studies to ensure that goals are necessary, which is one of the pillars of the well-being of human beings.

As long as there is a key role for central banks in achieving financial stability, including the various risks of climate change, other institutions have an active role to play in supporting and supporting the role of the central bank in financing the green economy, which Including the Ministry of Finance which can use taxes and subsidies to direct investment towards green stability, the Ministry of the Environment that can prohibit investments that harm the environment, and other banking institutions within each country that have a role in promoting green financing, as well as political leadership within each country should encourage their institutions to finance the green economy.

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