ISSN: 2181-3906 2025

*International scientific journal*
*«MODERN SCIENCE AND RESEARCH»*
*VOLUME 4 / ISSUE 11 / UIF:8.2 / MODERNSCIENCE.UZ*

# CLIMATE CHANGE: ECONOMIC IMPACT AND SOLUTIONS: DISCUSS POLICIES LIKE CARBON PRICING

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*https://doi.org/10.5281/zenodo.17523784*

***Abstract.*** *This paper explores the economic impacts of climate change and the role of carbon pricing as a key policy instrument for mitigation. Drawing upon the theoretical contributions of Nicholas Stern, William Nordhaus, Joseph Stiglitz, and Jeffrey Sachs, the study examines how economic frameworks interpret and address the intersection between environmental degradation and economic growth. Stern's and Sachs's analyses emphasize moral responsibility and global inequality, while Nordhaus and Stiglitz focus on cost efficiency and market-based solutions.*

***Key words:*** *Stern Nordhaus, William Nordhaus, Dice model, carbon pricing, global GDP, the long-term economic, critical evaluation.*

# ИЗМЕНЕНИЕ КЛИМАТА: ЭКОНОМИЧЕСКИЕ ПОСЛЕДСТВИЯ И РЕШЕНИЯ: ОБСУЖДЕНИЕ ТАКИХ МЕР ПОЛИТИКИ, КАК ЦЕНООБРАЗОВАНИЕ В ОТНОШЕНИИ ВЫБРОСОВ УГЛЕРОДА.

***Аннотация.*** *В данной статье рассматриваются экономические последствия изменения климата и роль ценообразования в отношении выбросов углерода как ключевого инструмента политики по смягчению последствий. Опираясь на теоретические труды Николаса Стерна, Уильяма Нордхауса, Джозефа Стиглица и Джеффри Сакса, исследование рассматривает, как экономические модели интерпретируют и учитывают взаимосвязь между ухудшением состояния окружающей среды и экономическим ростом. В своих исследованиях Стерн и Сакс делают акцент на моральной ответственности и глобальном неравенстве, в то время как Нордхаус и Стиглиц фокусируются на экономической эффективности и рыночных решениях.*

***Ключевые слова:*** *Стерн Нордхаус, Уильям Нордхаус, модель Дайса, ценообразование в отношении выбросов углерода, мировой ВВП, долгосрочная экономическая перспектива, критическая оценка.*

## Theories review

The economic consequences of climate change have been extensively discussed by leading economists and environmental scholars. Nicholas Stern (2006), in his influential Stern Review on the Economics of Climate Change, argued that the long-term economic damage caused by inaction would far exceed the short-term costs of mitigation. Stern emphasized that without substantial policy intervention, global GDP could shrink by up to 20%, primarily due to reduced agricultural productivity, extreme weather events, and rising sea levels.

His analysis positioned climate change as the greatest market failure in human history, requiring immediate economic and political responses.

Similarly, William Nordhaus, Nobel Prize-winning economist, developed the DICE model (Dynamic Integrated Climate-Economy) to assess the economic effects of carbon

emissions on global output. Nordhaus (2018) concluded that implementing a globally harmonized carbon price is one of the most efficient ways to internalize environmental externalities. He demonstrated that carbon pricing aligns private incentives with social welfare by making polluters pay for the true cost of their emissions.

In addition, Joseph Stiglitz and Nicholas Stern (2017) jointly published a report through the High-Level Commission on Carbon Prices, recommending that the optimal carbon price should range between $40 and $80 per ton of $CO_2$ by 2020 to achieve the Paris Agreement targets. Their research reinforced the idea that well-designed carbon pricing policies not only reduce emissions but can also stimulate innovation and green investment.

From a broader macroeconomic perspective, Jeffrey Sachs highlighted that climate change intensifies inequality between nations, as poorer economies are more exposed to environmental shocks and lack adaptation capacity. Sachs (2019) argued that economic resilience requires both domestic policy reforms and international cooperation through financial transfers and technology sharing.

Collectively, these scholars emphasize that addressing climate change through economic mechanisms—particularly carbon pricing—can serve as both a preventive and corrective tool.

However, their differing assumptions regarding optimal pricing levels, social discount rates, and global coordination highlight the complexity of designing a universally effective climate policy.

**Analysis and discussion of theories**

While the arguments presented by Stern, Nordhaus, Stiglitz, and Sachs provide a solid foundation for understanding the economic dimensions of climate change, each theoretical perspective exhibits distinct strengths and weaknesses that shape contemporary climate policy debates.

The Stern Review has been widely praised for successfully reframing climate change as an economic rather than purely environmental problem. Its strength lies in emphasizing the long-term economic risks of inaction, thereby legitimizing public investment in mitigation strategies.

However, several scholars, such as William Nordhaus (2007), have criticized Stern's use of a low discount rate, which, they argue, overstates the present value of future damages and leads to excessive policy costs in the short term. From a methodological standpoint, Stern's projections rely heavily on uncertain climate models, which may not accurately represent real-world economic responses to environmental shocks.

By contrast, Nordhaus's DICE model has been celebrated for its integration of economic growth theory with environmental dynamics, providing a measurable framework for global policy assessment. The model's key advantage is its ability to estimate the social cost of carbon and evaluate policy efficiency across nations. Nevertheless, its reliance on neoclassical equilibrium assumptions has faced criticism for underestimating systemic risks and non-linear feedback loops in climate systems. Critics also argue that the DICE model prioritizes cost-efficiency over climate justice, as it assumes uniform global pricing without adequately accounting for regional inequalities in vulnerability and development.

The Stiglitz–Stern (2017) approach attempts to bridge the gap between theoretical and practical considerations by proposing feasible carbon pricing ranges.

This pragmatic perspective has been instrumental in policy design, offering governments a tangible economic target for emission reductions. Yet, the challenge lies in its political feasibility — countries with weaker economies or fossil fuel dependencies often resist high carbon prices due to fears of inflation, unemployment, and reduced competitiveness.

Jeffrey Sachs's perspective introduces a crucial ethical and geopolitical dimension to the discussion. His emphasis on global inequality and the moral obligation of rich nations to assist developing economies adds depth to the economic discourse. However, critics note that such cooperation mechanisms, including international carbon funds, often face bureaucratic inefficiencies and insufficient enforcement, limiting their real-world impact.

In synthesis, these theoretical frameworks collectively highlight that while carbon pricing remains a central pillar of climate economics, it cannot function in isolation. The economic rationale must be complemented by redistributive measures, technological innovation, and adaptive capacity-building. A balanced approach that integrates Stern's urgency, Nordhaus's efficiency, Stiglitz's pragmatism, and Sachs's equity-oriented insights offers the most promising path toward achieving sustainable and inclusive climate policy.

**Conclusions and suggestions**

The economic dimensions of climate change underscore the urgency of integrating environmental sustainability into macroeconomic and fiscal policies. The insights of leading economists such as Stern, Nordhaus, Stiglitz, and Sachs collectively demonstrate that the costs of inaction far outweigh the investments required for mitigation. While Stern's approach highlights the ethical and long-term imperative of immediate action, Nordhaus provides a structured economic model to quantify climate-related damages and assess optimal carbon pricing. Stiglitz and Stern's policy collaboration further operationalizes these theories by suggesting practical carbon price ranges, whereas Sachs introduces a moral and developmental perspective centered on global equity.

However, the analysis also reveals that no single theoretical model provides a universal solution. Effective climate policy must therefore combine efficiency, equity, and feasibility — ensuring that carbon pricing mechanisms are supported by complementary strategies such as technological innovation, international cooperation, and redistributive mechanisms. Only through a balanced integration of these perspectives can the global community achieve a sustainable economic transition while minimizing climate-induced disparities.

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