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CARBON PRICING BY THE IMPACT OF CLIMATE CHANGE ON THE US ECONOMY

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Abstract

Climate changes greatly affect the economy of individual States and whole regions. Individual countries adapt differently to changing conditions, focusing on climate and environmental issues in the development of long-term socio-economic development strategies. The issues of forecasting the impact of climate on the economy and the financial sector are becoming an important part of the political process in the United States. Today it is possible to see how the state authorities are interested in changing vector of environmental policy, and as a consequence is reforming the mechanisms of social protection of population. The implementation of flexible economic policies in the field of taxation and efforts to control the emission of greenhouse gases into the atmosphere, bring to the foreground the issue of carbon pricing. Researchers who work on the relationship between climate and socio-economic processes pay close attention to the fact how economic activity cut into parameters of the climate system: temperature fluctuations, changes in humidity and rainfall, and ultimately global warming scenarios. The efforts of scientists are supported by the state, and the desire to understand how natural changes lead to economic consequences, goes to a qualitatively new level. In this paper are analyzed the existing scientific approaches that estimate the amount of socio-economic resources needed to minimize the negative effects of natural changes on the economy. An individual subject of analysis is scientific approaches that reflect the efforts of modern economists to consider, as well as qualitative and quantitative assessment of economic damage caused by climate change.

Keywords: Economic damage, climate change, carbon pricing, environmental policy.

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1. Introduction

Nowadays socio-economic history of the United States shows that by planning of economic policy, the state tends to pay more attention to environmental issues. Modern science, at the same time, provides the state with great assistance in this survey, and significant efforts of many teams of scientists are aimed at finding out how and for what reasons the concentration of greenhouse gases in the atmosphere is continuously increasing. However, an individual subject of scientists' research remains the role of the human factor in these processes.

2. Problem Statement

The efforts of scientists who have long been working on the problem of theoretical modeling and forecasting the impact of toxic emissions into the atmosphere on the socio-economic situation in the world, find practical implementation in climate models. These models are quite complex, and reflect regional and global changes in the earth's surface temperature, rainfall, humidity, and the ecological state of the oceans. The information obtained in this way is systematized, and on its basis comprehensive assessments are developed, reflected in turn in scientific works in this area.

3. Research Questions

If we look at the reports of the intergovernmental team on Climate Change (ITCC), published in 1990-2014, we can note the fact that since the beginning of the industrial revolution in the XVIII century, the average surface temperature of the earth has increased by 0,85 degrees Celsius. The researchers have a question: how warming has shaped the global process in which the earth's surface temperature continues to rise steadily (Bigano, Hamilton, & Tol, 2007). In this regard, scientific papers raise questions about the causes of warming, the role of the human community in this process, and its impact on the global and regional economy. By comparing the work of researchers and the efforts of different states, it is also reasonable to ask how climate change leads to negative economic consequences (Albouy, Graf, Kellogg, & Wolff, 2016). For this purpose, it is important to take into account the fact that long-term environmental policy planning requires a clear understanding of all existing economic costs (Bigano, Hamilton, & Tol, 2007). However, revealing this issue it is worth noting that the quantification of greenhouse gas emissions into the atmosphere is complicated by several circumstances. Local emissions to the atmosphere form an overall global picture that is difficult to track in time and space (Greenstone, Kopits, & Wolverton, 2013). Also, damage varies depending on the duration of exposure and concentration in certain areas for many years and decades to come (Auffhammer, Hsiang, Schlenker, & Sobel, 2013).

4. Purpose of the Study

These issues require the formulation of research objectives, among which are the analysis of research teams of scientists looking to calculate the so-called social pricing of carbon, designed to streamline and systematize all currently available approaches in this area. Using the experience gained, it is important to identify trends that generate both economic benefits and economic losses (Fisher,

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Hanemann, Roberts, & Schlenker, 2012). Also, an important task is to appeal to modern science, allowing the use of a wide range of econometric methods in order to determine the parameters of the damage, as well as to form its overall quantitative indicators (Burke & Emerick, 2016).

5. Research Methods

Social carbon pricing considers the discounted cost of damage from each ton of carbon dioxide emissions. Over time, carbon pricing increases cost, as the emission process increases the damage caused by the concentration of greenhouse gases in the atmosphere (Peng, Deschenes, Meng, & Zhang, 2018). Also, it is worth taking into account the GDP growth of individual countries, and the pairing with it of some types and categories of damage (Deryugina, Kawano, & Levitt, 2018). It is worth mentioning dynamic models of integrated assessment of climate impact on the economy: the model of W.D. Nordhaus, model of K. Hope, model of D. Enthof and R. Tol. The main common feature of these models is the ability to integrate into freely modeled scenarios of socio-economic development of individual regions and states both in the short and long terms (Auffhammer, 2018). Simple climate models take into account the scale of emissions and maximum allowable concentrations of carbon dioxide, create changes in the parameters of temperature, precipitation and humidity. Also, these models take into account the amount of damage that can be caused to the economy of individual regions at the local or global levels. The discounted difference in losses observed in comparison between the baseline value of future carbon dioxide emissions, and the same volume plus one ton of emissions, becomes the basis for calculating the social pricing of carbon. In General, simple climate models account for the additional cost of one additional ton of carbon dioxide emissions over a time period. When developing and implementing of a model for social carbon pricing is calculated, researchers have to consider many factors that directly affect the functionality and accuracy of the model (Dell, Jones, & Olken, 2014). It is necessary to consider the time frame of the study, clearly define the approach to discounting, and take into account the uncertainties and risks that may be included in this model. The main factors will always be the discount rate, the capabilities of the ecosystem of the research region and the acceptance of the scale of losses, that is, the regional or global context.

6. Findings

Approaches to assessing the role of greenhouse gas emissions adopted in modern times, mainly take the global effect (Burke, Hsiang, & Miguel, 2015). For example, in assessing the socio-economic costs of the release of methane products with strong but short-term greenhouse effects. The same researches and assessments are taken for carbon dioxide, nitrous oxide, hydrofluorocarbon, perfluorocarbon, sulfur hexafluoride, trifluoride (Butler & Huybers, 2013). To analyze the history of the issue of carbon pricing in the United States, it is necessary to refer to the estimates of the cost of carbon calculated in 2008 under the control of the government administration of D. Bush. The complexity and multidimensionality of the carbon pricing model can be traced through a number of parameters. The national Highway and Traffic Safety Administration (NHTSA) has conducted its own research and has developed recommendations for changes to the fuel standard of the national economy of the United

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States, based on this model and the assessment of total damage. A research was also conducted on the basis of the United States Department of energy (DOE) and carbon pricing was calculated using the adopted model for gas and refrigeration equipment, air conditioners and refrigerators. The environmental Protection Agency (EPA) conducted its own research and made recommendations on carbon pricing. By combining the efforts of the departments controlled by the ministries, significant progress was achieved on this issue, and Bush`s administration adopted the postulate that the fight against global air pollution is one of the fundamental principles of the American national economy. The costs, that is, the social cost of carbon, must be determined by economic policies that maximize the benefits to American society (Barreca, Clay, Deschenes, Greenstone, & Shapiro, 2016). Another important aspect of the issue was the assessment of the potential impact on the United States of global risk factors related to climate change caused by the activities of other countries (Pindyck, 2013). In 2009-2010, EPA researches looked at indicators that global warming and changes in temperature, humidity, and relative rainfall will inevitably put additional strain on the American economy (Deryugina, Kawano, & Levitt, 2018). For example, to assess the impact of warming on the economy, was taken the effect of the reaction of the population, who is living in the borders of the United States – in California and Florida. In this context, the use of air conditioners and household cooling systems in Florida was noticeable, while in California it remained at a relatively lower level. In climate change modelling for the short and long terms, it was found that demand for home air conditioning would increase year on year, and new buildings would be centrally equipped with fixed cooling systems (Auffhammer, 2018). Along with the negative effect caused by the influence of cooling systems, a hotter climate will lead to overestimated electricity consumption and their continuous growth (Deschenes & Greenstone, 2011).

7. Conclusion

Taking the continuity and duration of research in the field of climate change and its impact on the national economy, in the time period 2012-2018, researchers are adapting existing models to projected scenarios (Auffhammer, 2018). Thus, in order to estimate the economic damage from climate change, the model includes changes that may occur in different sectors of the economy during a given period. Taken that a hotter climate proportionally increases consumption, it is necessary to assess the intensive and extensive adaptation of the available stock of economic resources. If we include in the carbon pricing model damage to climate-sensitive sectors of the economy around the world, as well as phenomena caused by changes in temperature, humidity, rainfall, such as storms, hurricanes and other natural disasters, the social cost of carbon will increase many times over. In the econometrics of the carbon pricing model, a number of parameters for assessing the impact of climate change on the economy are grown up. In this context, the parameters of damage from weather conditions are raised, as well as the economic results obtained from certain sectors in the time period before and after climate change. The identification and assessment of changes and damage in the relationship between climate and economy takes place. The amount of damage directly affects the parameters of adaptation to the changed conditions of the existing resource base.

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