Effects of Cap-and-Trade Mechanism

Subjects: Economics

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Toward sustainability, the insurer explicitly captures the credit risk from the borrowing firms, participating in the cap-and-trade scheme to reduce carbon emissions, an essential issue of carbon emission and environmental protection when facing gray rhino threats. In addition, the energy economics and policy analysis are from the fund-providing insurer's perspective. Green lending policies and life insurance policy loans (i.e., disintermediation related to insurance stability) are crucial to managers and regulators, particularly bridging the borrowing-firm carbon transactions for carbon emission reductions toward sustainability.

Keywords: cap-and-trade ; capped barrier option model ; financial gray rhino ; policyholder protection ; policy loans

1. Introduction

Green lending has become a common concern worldwide since it can promote and hinder a cleaner environment, affecting health and life [1]. The cap-and-trade mechanism is one of the most effective carbon emission reduction regulations for production [2][3][4]. Flachsland et al. [5] point out several limits to the cap-and-trade mechanism for carbon emission reductions from an international viewpoint. First, international carbon emissions trading may not be welfare-enhancing for all countries due to market distortions or terms-of-trade effects. Second, political benefits come from the reinforced commitment to international climate policy. Still, this reinforcement must accord with the possible incentive to adjust national cap-and-trade transactions in anticipation of linking. Third, regulatory disadvantages may be from the international linked system's inconsistency with domestic policy targets. However, carbon emissions have a significant link to a life insurance business model since environmental carbon pollution may stimulate the life insurance need for health and life protection [6]. Insurers must invest the life insurance policy premiums they collect from policyholders to pay claims and benefits on their policies and to cover their total liabilities in the asset–liability risk matching management. More specifically, insurers' primary role is to protect the policyholders. From the standpoint of risk, the emergency fund hypothesis proposes life insurance policy loans used to fund current expenses in economic hardship [7]. Huang [8] also argues that gray rhinos (i.e., highly possible yet ignored threats) are likely to have adverse consequences in the insurance industry. In addition, the International Cooperative and Mutual Insurance Federation reported doubling investment in insurer green finance to USD 84 billion in 2015 and increasing this investment fivefold to USD 420 billion in 2020 (See https://www.icmif.org/blog_articles/insurers-are-significantly-engaged-in-the-climate-debate/, accessed on 27 June 2022). The statistics have indicated that insurers understand the risk associated with climate change and can model their potential impacts on greenness. The green finance provided by insurers is at the very heart of creating resilience toward sustainability. Particularly, this research aims at a vital issue of life insurance policyholder protection under the cap-and-trade mechanism, considering policy loan activities and financial gray rhino threats. Thus, the essential features of the research emphasize the insurer's green finance toward sustainability. Toward that end, the insurer explicitly captures the credit risk from the borrowing firms, participating in the cap-and-trade scheme to reduce carbon emissions, an essential issue of carbon emission and environmental protection when facing gray rhino threats. In addition, the analysis is from the fund-providing insurer's perspective. Green lending policies and life insurance policy loans (i.e., disintermediation related to insurance stability) are crucial to managers and regulators, particularly bridging the borrowing-firm carbon transactions for carbon emission reductions toward sustainability.

It is essential to elaborate on the issue of policyholder protection under the cap-and-trade scheme for environmental protection. Insurers, as fund providers, operate their investment strategies so that expected returns exceed what is guaranteed. In a regulatory carbon emission reduction environment, insurer green/brown lending strategies are most likely related to borrowing-firm productions. The high carbon emitter funded by the insurer's brown loans must buy a carbon quota in the carbon trading market due to excessive carbon emissions. The low carbon emitter financed by the insurer's green loans can sell the surplus quotas to earn profits [9]. The insurer's lending function with borrowing-firm cap-and-trade transactions creates the need to model its equity explicitly considering credit risks from the borrowing firms [10].

On the liability side of the balance sheet, the insurer faces the uncertain withdrawals of life insurance policy loans: the unexpected disintermediation influences the asset-liability risk matching management. Understanding policy loan demand is essential to various stakeholders because policy loans are a form of disintermediation and disrupt insurer cash flow [7]. Huang [8] argues that a potential threat of a gray rhino (i.e., highly possible yet ignored threats, likely to occur with adverse consequences) affects the asset–liability matching management (The top five gray rhino risks in 2019 include US–China tensions, economic and financial fragilities, geopolitical uncertainty (the sum of the first two), cybersecurity/data integrity, and climate change and natural disasters [11]. Besides, EIOPA [12] reports there are more than 51 life insurers who failed in Europe during 1999–2016. NOLHGA [13] also indicates that the following insurance companies recently failed: American Network Insurance Company and Penn Treaty Network America Insurance Company in 2017, North Carolina Mutual Life Insurance Company in 2018, and Northwestern National Insurance Company of Milwaukee Wisconsin and Senior American Company in 2019. Thus, life insurance policyholder protection is crucial under the cap-and-trade system and gray rhino effect). As policyholder protection is crucial to insurer liquidity management, the issues of how it adjusts to uncertainty changes in the insurance environment under the cap-and-trade mechanism in a gray rhino environment deserve closer scrutiny.

2. Cap-and-Trade Mechanism and Financial Gray Rhino

A new substantial literature has emerged that discusses the impact of the borrowing-firm gray rhino on fund-provider policyholder protection considering the optimal guaranteed determination. Next, the researchers focus on the issue of a cap-and-trade mechanism for policyholder protection. The instrument has vital environmental improvement. The third strand is the policy loans on the policyholder protection. The last is the recent related literature to the aim the researchers analyze.

2.1. Gray Rhino

Ferguson [14] argues that either a coronavirus COVID-19 pandemic (which is a natural disaster) or a war (which is artificial) is a rare and sizeable scale–scale disaster that characterizes a black swan, a gray rhino, or a dragon king. Stressing pandemics surprised most people, despite numerous warnings of the likelihood of such a disaster. More specifically, Huang [8] develops a down-and-out call option to examine how capital regulation affects an insurer's optimal guaranteed rate and survival probability, considering the insurance grey rhino. The investment-oriented grey rhino effect increases the policies at an increased guaranteed rate (and thus, a decreased interest margin) and further decreases the insurer's survival probability. The policy-oriented grey rhino effect decreases the guaranteed rate and the survival probability. Thus, Huang [8] complements Ferguson [14] by distinguishing the features of the gray rhino in an insurance market. Lin et al. [15] also focus on the insurance gray rhino as an extension of Huang [8]. Li et al. [16] mainly evaluate the relevant research's objective setting by developing a contingent claim utility model. Their analysis shows that stringent capital regulation enhances policyholder protection but at the expense of the insurer's equity return, thus adversely affecting insurer survival. While the research discusses the financial gray rhino, considering the cap-and-trade mechanism and policyholder protection makes this research in a different direction.

2.2. Cap-and-Trade Mechanism

There is extensive literature regarding the pricing effect and carbon emission reduction under the cap-and-trade mechanism. For example, Debo et al. [17] studied the pricing and green technology selection problem of remanufacturing products and showed that remanufacturing products are profitable due to green technology choice. Su et al. [18] focus on two alternative green technologies for the market structures of green products and develop a nonlinear programming model to determine optimal and quality level products. Yang et al. [19] discuss the supply chain's pricing and carbon emission reduction decisions with vertical and horizontal operations. Chen et al. [20] explored a monopolistic firm's manufacturing, remanufacturing, and collection decisions under the cap-and-trade regulation. Hussain et al. [21] develop a simulation-based model to study the emission reduction subsidy policy on the decision of product pricing and green technology of companies in an imperfectly competitive market. Under the cap-and-trade mechanism, Yang et al. [22] study the effects of allowance allocation rules on green technology investment and product pricing. Xue and Sun [23] consider two competitive supply chains with consumers' low-carbon preferences under the regulatory cap-and-trade mechanism, each of which consists of one manufacturer and one retailer. Together, the research can model competition or integration in vertical and horizontal directions, four different supply chain structures. Xue et al. [24] investigate firms' incentive mechanisms for carbon emission reduction in a two-echelon supply chain under the regulatory cap-and-trade scheme, where consumers exhibit low-carbon awareness. Therefore, from the perspective of enterprises (i.e., borrowing firms) under the cap-and-trade mechanism, the present research endeavors to address this research gap by involving the

funding characteristic of brown/green loans and studying the optimal life insurance policy pricing to maximize insurer profits. A comparative analysis is on the impact of policyholder protection from the cap-and-trade mechanism.

2.3. Life Insurance Policy Loan

One of the related streams of the literature is the life insurance policy issue under the cap-and-trade mechanism. Carson and Hoyt [25] investigate the impact of redesigned life insurance policy loans on the demand for policy loans. The results suggest that policy loan demand has altered because of the introduction of variable loan rates and the redesign of policies. Specifically, their findings are the need for policy loans driven by reducing arbitrage potential. Liebenberg et al. [7] provide a shred of evidence supporting the hypothesis of the policy loan emergency. Their findings are that the more detailed emergency fund reveals a significant positive relation between loan demand and the expense of income shocks. Srbinoski et al. [26] contribute by providing the most comprehensive systematic review that integrates alternative fields, besides encapsulating studies on demand for life-insurance policy loans. They indicate the most critical drivers of life-insurance policyholder behavior during their lifetime. Li et al. [27] developed a two-stage contingent claim model to determine the optimal guaranteed rate and technology choice. One finding is that increasing life-insurance policy loans decreases insurance businesses at a reduced guaranteed rate. The research also finds that increased advanced technology involvement enhances insurance businesses at an increased guaranteed rate. An increase in the policy loan also increases the policyholder protection. Srbinoski et al. [26] contribute by providing the most comprehensive systematic review that integrates alternative fields, besides encapsulating studies on the demand for life-insurance policy loans. The most critical drivers of life-insurance policyholder behavior appear during the policyholder’s lifetime. The literature remains silent on their funding investment. In particular, the funded borrowing firms get involved in the cap-to-trade carbon reduction transactions. Therefore, it is necessary to make asset-liability matching decisions on policyholder protection and environmental protection to investigate insurer performance.

2.4. Recent Related Literature

Chiaramonte et al. [28] demonstrate that sustainability has received growing attention from alternative stakeholders, but focusing on the insurance sector is little. The existing literature presents evidence of the positive effect of green finance toward sustainability on financial stability but remains silent on insurance stability. Alam [29] investigates the relationships between inflation, short-term interest rate, money supply, and crude oil price in Saudi Arabia. The research shows a negative relationship between short-term interest rate and crude oil price. A study’s central finding contributes to the combined effect of macroeconomic variables and oil price shocks on the Saudi stock market. The researchers' theoretical model could treat oil price shocks in Alam [29] as financial gray rhino threats. Thus, Alam’s [29] study could expand an alternative implication of the cap-and-trade mechanism. Alam et al. [30] explore the relationship of interest margin return on assets, bank investment, and bank lending capacity with gross domestic product in India. A central result indicates a significant relationship between interest margin and asset returns with economic growth. The research complements Alam et al. [30] by studying the optimal insurer interest margin determination, focusing on the green finance issue. Fazal et al. [31] modify Peter and Clark algorithm to determine the causal nexus between monetary policy and inflation. The results show that energy prices and monetary policy have cost-side effects on inflation; however, the latter becomes counterproductive whenever a high interest rate decreases energy-push inflation. Although this research remains silent on energy-push inflation, the researchers examine the effect of the energy-related cap-and-trade mechanism on insurer performance. The researchers believe that their model can accommodate energy-push inflation as a further avenue of research. Idrees et al. [32] develop a financial liberalization index for Pakistan. The research suggests the liberalization index considering the real-time change in the implementation process. Besides, liberalization reduces the cost of capital and improves corporate governance. One of the vital policies of financial liberalization could be insurer interest margin determination. Corporate governance is one of the essential factors toward sustainability (i.e., the cap-and-trade mechanism in this research). The conceptual framework of Idrees et al. [32] implicitly paves the way for modeling their research. Overall, the previous literature as a study background enriches this research.

In sum, most literature did not simultaneously consider the gray rhino impact, the regulatory cap-and-trade mechanism, and life insurance policy loans for the insurer’s guaranteed rate determination.

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