Frontiers in Business, Economics and Management
ISSN: 2766-824X | Vol. 13, No. 1, 2024

The Impact of MLF Collateral Expansion Policy on Total Factor Productivity of Polluting Firms

Shaofen Guo

School of Business, Nanjing Normal University, Nanjing 210000, China

Abstract: Since the reform and opening up, China's economy has developed rapidly and has become a global economic powerhouse. However, for a long time, the economic development model has been rough, resource consumption is high, and growth relies heavily on heavy industry, which is not sustainable.In 2018, China's central bank proposed to incorporate green credit into the qualified collateral framework, an initiative that has the dual function of resource allocation and environmental regulation. Considering that polluting enterprises are more susceptible to this policy, the article chooses polluting enterprises as the research object, quasi-natural experiments based on the MLF collateral expansion policy introduced in June 2018, and adopts a double difference model to analyze whether the new policy can enhance the total factor productivity of enterprises. The results of the study show that the MLF collateral expansion policy can significantly enhance the total factor productivity of heavy pollution enterprises. Finally, based on the obtained results, this paper puts forward targeted recommendations.

Keywords: Central Bank Collateral, Total Factor Productivity, Polluting Enterprises.

1. Introduction

After the international financial crisis in 2008, the traditional transmission channels of monetary policy were affected by the recession, which led to the damage of corporate balance sheets and the destruction of the traditional credit transmission mechanism due to the high risk premium in the market (Borio et al., 2012). At the same time, traditional monetary policy does not actively regulate credit resources, leading to industrial structural imbalances (Vespignani, 2015). As a result, the status of the new monetary policy tool collateral system and gradually increased, and the literature on the impact of monetary policy tools on the market through the collateral channel has also gradually increased.

Since 2013, in order to achieve the purpose of targeted regulation and improve the efficiency of resource utilization, the central bank has implemented a number of structural monetary policy tools.In June 2018, the central bank expanded the collateral framework of the structural monetary policy tool MLF, and for the first time, green loans were included in the framework.This policy has the functions of financial resource allocation and environmental regulation at the same time, and it not only expands the collateral framework, directs the The policy has both financial resource allocation and environmental regulation functions, which not only expands the collateral framework and accurately directs funds to the field of green development, but also increases the policy's support for ecological protection (Lu Jing et al., 2021).

Compared with non-polluting industries, enterprises belonging to polluting industries face relatively high financing constraints, and the implementation of this policy will polluting industries will face higher financing constraints, which will force polluting enterprises to innovate in green technology (Li Junfeng, 2014). Theoretically, in the face of the positive stimulus of the collateral expansion policy, polluting enterprises will realize that they should improve the level of innovation to match the new policy regulation. Therefore, compared with other firms, polluting firms will be more motivated to improve their green development through technological innovation under the influence of the expansion policy (Porter et al., 1995). The inclusion of green credit in the scope of collateral will significantly enhance the green innovation ability of polluting enterprises, forcing polluting enterprises to actively carry out innovative activities to improve their own level of green technological innovation, in order to enhance their total factor productivity.

Zorn (2011) studied that in the financial market central bank collateral policy can play a positive role.Koulischer (2014) found that collateral has a good policy role, but the quality of the assets is unstable, and the cost of transferring risk and transferring cost of the collateral assets is high.BIS (2015) argued that the People's Bank's collateral policy can be utilized in the structural channel, the scarcity channel, or the both channels simultaneously to have an impact on the market. Some researchers have utilized the U.S. and European economies as research samples, arguing that new and traditional monetary policies complement each other and simultaneously generate positive impacts for economic development, which can better cope with financial risks (Bernanke, 2020). Deng Wei et al. (2022) argued that MLF is able to utilize the collateral channel to produce an impact, which can significantly increase the total amount of credit investment by commercial banks and other financial institutions, and the impact produced will continue to strengthen with the increase of time. Zhu Xinrong (2022) argues that although the collateral expansion policy can be conducive to the implementation of structural monetary policy, but at the same time, the impact on the behavior of financial institutions credit financing directed regulation is more limited.

Peng Xingyun (2015) finds that the PBoC can utilize the collateral system to increase the liquidity of the assets in the framework, while mitigating the liquidity premium problem arising in the collateral interest rate, and ultimately alleviating the risk compensation requirements of commercial banks for such assets. Wang Yongqin et al. (2019) take the bond market as a research entry point to explore the impact of the collateral expansion policy, and find that the policy has a lowering effect on the credit spreads of bonds within the collateral

framework, which can ultimately reduce the cost of corporate financing. Guo Ye and Fang Fang (2021) utilize the policy of prioritizing green loans as MLF collateral for the first time by the central bank in 2018 as a quasi-natural experiment, and the study shows that this initiative makes the availability of financing increase to have an impact on green firms located in environmentally friendly industries, while it is an impact on the cost of financing for those firms located in heavily polluting industries. In sum, the literature to date has not reached consistent conclusions on the effects of adjustments to the monetary policy collateral framework.

After combing through the literature, the following problems can be found: first, at this stage, most of the literature on the collateral channel of structural monetary policy selects the monetary policy tools of Europe and the United States as the object of study, and the domestic literature is still relatively small. Whether in terms of theory or empirical evidence, there is still controversy over the structural adjustment effect of structural monetary policy at this stage, and a consensus view has not been achieved. Second, research on total factor productivity mainly focuses on measuring and discussing its influencing factors, but lacks research on the impact of central bank collateral expansion policy on total factor productivity. Third, there are some conclusions about the impact of central bank collateral expansion policy on the intensity of R&D investment and technological innovation of enterprises, but there is no research that directly analyzes the impact of central bank collateral expansion policy on the productivity of enterprises.

Therefore, this paper explores whether the inclusion of green loans in the MLF collateral framework affects the total factor productivity of polluting firms and understands its mechanism of action.

2. The Mechanism of MLF Collateral Expansion Policy on Total Factor Productivity of Polluting Firms

Structural monetary policy has a directional regulatory role, taking the medium-term lending facilitation tool as an example, the collateral system of MLF can effectively regulate the direction of credit allocation and flow credit funds to specific industry sectors.

First of all, the collateral system of the People's Bank of China can influence the decision-making activities of polluting enterprises through two channels, namely, bank and enterprise balance sheet channels, to carry out green transformation and promote the enhancement of production efficiency. On the one hand, using the bank balance sheet channel, the PBoC includes green loans in the scope of MLF collateral, which is equivalent to the PBOC utilizing the national credit to endorse enterprises holding green loans, and financial institutions, such as commercial banks, can give the PBOC collateral for green credits held by them to obtain liquidity from the PBOC. On the other hand, the inclusion of green loans in the MLF eligible collateral framework in the corporate balance sheet channel will release a policy signal. Influenced by this favorable policy signal, specific enterprises will compete to increase the proportion of green loan holdings and carry out green transformation, so as to enhance the productivity of enterprises.

Secondly, from the perspective of signaling effect, market players will take the decision made by the PBOC as a signal, and use it to judge the direction of future economic development, continuously improve information, and reasonably predict the price of financial assets to benefit. The central bank's collateral expansion policy can, through the signal channel, allow commercial banks and investors to form reasonable expectations, influence the green credit market, promote financial institutions to actively invest in green loans, increase asset liquidity, enhance liquidity, alleviate the difficulties of enterprise financing, and then promote the orderly development of enterprise green production activities. In order to meet the needs of survival and achieve long-term goals, rational enterprises will generally adopt a positive mindset to cope with, enhance technological innovation capabilities, improve green production efficiency to adapt to policy regulations, and actively strive for policy dividends.

Finally, from the perspective of policy incentives, in the context of the current financial system, enterprises mainly obtain liquidity through bank credit financing. after the expansion of MLF collateral, green enterprises are able to obtain financing more easily because they hold more green assets, hold more pledges, and have more leverage to pledge with banks. The expansion policy has resulted in polluting enterprises being placed in an unfavorable position, and after the implementation of the policy, the financing space for polluting enterprises will inevitably be seriously compressed. In this context, the development situation of the polluting enterprises is threatened, will face a more severe financing situation, capital difficulties are more difficult to solve. The implementation of the expansion policy will force the polluting enterprises to carry out transformation and upgrading, from rough to intensive production, in order to adapt to the severe survival environment.

Therefore, this paper believes that the implementation of the collateral expansion policy will promote the total factor productivity of polluting enterprises.

3. The Analysis of Intermediation Effects

The ultimate purpose of incorporating green credit assets into the qualified collateral framework is to help enterprises achieve green transformation and sustainable economic and social development through optimizing the credit structure, especially to help heavily polluting enterprises achieve structural upgrading and green transformation.

First, according to Porter's hypothesis and the innovation compensation effect, the collateral expansion policy will incentivize enterprises to carry out green technological innovation. The collateral expansion policy is equivalent to giving a strong environmental regulation to heavy polluting enterprises. According to the innovation compensation effect, because of the increasing pressure of external environmental protection, companies will make rational planning for long-term interests, adjust their production and operation activities, increase the proportion of innovation and R&D inputs, introduce cleaner production technologies, and improve their total factor productivity.

Secondly, from the point of view of the financial guidance mechanism, for the heavy polluting enterprises themselves, the original technical activities do not meet the green standards, the financing space is compressed, unable to adapt to the emerging policy requirements, the enterprise is bound to carry out the transformation and upgrading, the enterprise will choose to promote the development of green products by increasing R & D investment, improve the level of pollution

treatment technology, in order to improve the current unfavorable situation, the implementation of the expansion policy to stimulate the implementation of the heavy polluting enterprises green The implementation of the capacity expansion policy has stimulated the green transformation and upgrading of heavily polluting enterprises. Enterprises to improve production efficiency will certainly start from solving the capital problem, increase capital investment in R&D to improve production efficiency.

Next, from the perspective of risk transfer, the collateral expansion policy can make up for the crowding out effect of endogenous financing risks on R&D investment. After relaxing the scope of collateral, commercial banks can improve bank yields by pledging low-quality assets to the central bank and replacing them with collateral assets, which ultimately affects the transmission of the collateral policy to the banking market. For green loans to serve as eligible collateral, certain criteria must be met before high-quality green assets can enter the collateral framework, which allows funds to flow efficiently into green areas.

Finally, from the perspective of policy incentives, the policy of incorporating green loans into the collateral framework has a forcing effect on the improvement of total factor productivity of heavy polluting enterprises. Heavily polluting enterprises need to reduce the production of energy-intensive products and develop green technologies in order to consider survival. This enables highly polluting enterprises to innovate low-carbon technologies, realize energy saving and emission reduction, improve enterprise productivity, and achieve the purpose of economic growth and environmental governance.

To summarize, whether the MLF collateral expansion policy is based on the original intention of the policy or based on the long-term development of the heavy polluting enterprises' own considerations, this MLF collateral expansion can theoretically promote the green innovation of the heavy polluting enterprises, which in turn can enhance the total factor productivity of the enterprises.

4. The Heterogeneity Analysis

It has been shown that the market effectiveness of monetary policy will be affected by the degree of regional financial development, the nature of business property rights and other factors to produce heterogeneous conclusions.

(1) The level of regional financial development affects the role of QIP expansion policy. Since regions with high levels of financial development can create a favorable business environment for local enterprises, including better and more convenient financing conditions and means as well as a trading environment with more symmetrical information (Cao Tingqiu et al., 2021), in this context, when high-pollution enterprises have difficulty in obtaining funds through banking channels, they are able to make use of other channels of financing, for example, the use of direct financing, such as bonds and stocks. ways. Rich financing channels can help enterprises to alleviate the pressure of capital, but at the same time, it will also cause enterprises to be less motivated in the process of promoting green technological innovation activities. In contrast, for those highly polluting enterprises located in areas with a lower level of financial development, the enterprises can utilize a single financing method and rely more on bank credit, so the incentive effect of technological innovation brought about by the central bank's incorporation of green credit into the collateral framework of medium-term lending facilities will be more obvious, and the effect of the total factor productivity enhancement of heavily polluting enterprises will be stronger.

(2) Different nature of enterprise ownership will also affect the effect of collateral expansion policy. Because of the different nature of enterprise ownership, its required financing costs are different, and the sensitivity to national policies is not consistent. State-controlled enterprises usually have a good national credit guarantee, while the state-owned enterprises themselves have a certain policy-oriented responsibility, more sensitive to the policy, its financing costs and debt default risk is relatively low, the availability of financing is relatively stronger. In contrast, at this stage, other ownership nature of the company's banking relationship is not stable enough, the financing cost is higher, and the total amount of loans is limited. Although they actively respond to the national policy call and are committed to promoting green technology upgrading, they will also face harder financing constraints, and it is difficult for the external financing environment of enterprises to improve rapidly. Therefore, this paper argues that the state-owned heavy pollution enterprises compared with other property rights nature of heavy pollution enterprises, the sensitivity of the policy is higher, the collateral expansion policy has a stronger effect on its role.

5. Conclusion

Compared with developed economies, China's new type of monetary policy collateral system still needs to be improved, and related research has become the focus. The research background of the article is the inclusion of green credit into the scope of MLF collateral proposed by the central bank in June 2018, and the final conclusions of this article are mainly as follows:First, the implementation of the policy by the PBOC significantly promotes the total factor productivity of polluting enterprises. Second, the policy does promote the total factor productivity of enterprises by increasing their level of green technological innovation. Third, we discuss whether the policy has a heterogeneous effect on categorized firms in terms of two factors. The policy has heterogeneity of enterprise property rights and heterogeneity of regional economic development level.

Through the analysis and consideration of the findings of this paper and the related existing problems, although the implementation of the MLF collateral expansion policy promotes the total factor productivity of polluting enterprises in general, the promotion effect on non-state-owned enterprises as well as polluting enterprises with a high level of regional economic development is not significant or relatively small. In order to give full play to the policy effect, the recommendations put forward in this paper mainly include:

(1) Expanding the scope of collateral and the range of trading objects

The implementation of this policy has constructed an incentive-compatible mechanism at the level of banks and enterprises by improving the quality and scarcity of new-named assets, which has an important guiding role in promoting the sustainable development of polluting enterprises. Therefore, the PBOC should attach great importance to the impact of the expansion of the new monetary policy on the behavior of microenterprises, and

further improve the management framework of qualified collateral from the perspective of the scope of collateral and trading objects along the direction of effective policy application. Appropriately lower the entry threshold of trading objects. Further expand the scope of green financial products in the central bank's collateral framework. The PBOC can conduct prudential investigation and assessment, and consider the reasonable broadening of the collateral framework through the three factors of safety, liquidity and operability, so as to provide national credit endorsement for enterprises investing in green projects and encourage the development of green finance and the enterprise sector.

(2) Strengthening the bank's risk assessment system

In the management process of the central bank's collateral framework, changes in the scope of collateral, discount rates and other changes will increase the level of the People's Bank's own risk-taking, which may increase systemic risk in the banking sector, so the formulation and implementation of collateral-related policies need to do a good job of central bank risk assessment. Continuously optimize the PBOC's internal rating system and enhance the reliability and independence of the rating process. On the one hand, drawing on the advanced experience of developed countries, improve the internal evaluation mechanism of commercial banks and other trading objects, highlighting the evaluation of important indicators such as capital adequacy ratio, liquidity risk, asset quality, profitability and other important indicators, as well as targeting the construction of the indicator system in consideration of the characteristics of green credit assets; on the other hand, fully applying the results of the development of financial science and technology, developing advanced rating models, and strengthening the value of collateral attributes and timely tracking and evaluation of credit risk.

(3) Formulate differentiated standards for non-state-owned enterprises

Non-state-owned enterprises are an important market force in promoting the high-quality development of China's economy, however, they have a natural disadvantage in obtaining medium- to long-term, low-cost credit funds, so it is necessary to formulate corresponding policies for non-state-owned enterprises to improve their financing environment, and provide financial support for the green upgrading of enterprises. Reasonable use of the PBOC's internal rating method for collateral assets. The People's Bank of China uses a combination of qualitative and quantitative methods to internally rate financial assets, and only enterprises that meet the credit rating standards can have their credit assets included in the collateral scope. Therefore for credit assets provided by non-state-owned enterprises in the green economy, the internal rating threshold can be lowered within a reasonable range.

(4) Promoting the construction of regional multi-level capital markets

In terms of financing channels, the level of financial development in coastal areas is relatively high, its financial system is more complete, green financial products are diversified, the enterprise financing channels are diversified, the central bank collateral expansion policy on enterprise total factor productivity may be diluted. On the contrary, the degree of financial development in the western region is relatively low, the development of its financial market is not perfect, enterprises have limited access to capital, and often rely more on indirect financing channels such as commercial banks. And due to the characteristics of green projects such as high risk and long cycle, the cost of enterprises applying for medium to long-term, stable credit funds from banks is higher, so the central bank collateral expansion policy, which plays a role through the intermediary of the bank, can accurately and effectively alleviate the financing pain points of the enterprises in the western region, and the policy signals can profoundly influence the behavior of the enterprises.

(5) Continuously strengthen the awareness of corporate social responsibility

Enterprises in the pollution industry should maintain a high degree of sensitivity to the policy. On the one hand, they should actively adjust their corporate development strategy to comply with the policy guidance, increase the reform and improvement of internal governance management system, strive to improve the balance sheet condition, optimize the relationship between banks and enterprises, enhance corporate social responsibility, and commit themselves to high-quality development. Transformation and upgrading are carried out according to the direction guided by the policy, actively participate in the construction and investment of projects in green-related fields, and improve the utilization efficiency of resources. On the other hand, enterprises do a good job of researching the industry to which they belong, define their own positioning, and rationally plan their industrial layout.

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