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SOCIO-ECONOMIC EFFECTS OF BORDER TRADE AND SUSTAINABLE DEVELOPMENT PATHWAYS

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Abstract: This study analyzes the socioeconomic impacts and sustainable pathways of border trade, highlighting its role in regional integration and development. It details growth, income distribution, job creation benefits, social cohesion, and cultural exchange. The paper addresses infrastructure, policy, inequality, and environmental concerns, emphasizing the need for cooperation, regulation, and regional coordination for sustainable development. Future research should focus on region-specific strategies for border trade growth.
Keywords: Border trade; Socio-economic effects; Sustainable development; Regional economic integration

1 INTRODUCTION

Border trade refers to commercial activities occurring near the national or regional borders, typically connecting the markets of both sides through land or water routes[1]. Its development's characteristics vary due to many factors such as geographical location, policy environment, and economic level. For instance, border trade in Southeast Asia and Africa is often integrated with traditional marketplaces and market economic models, enhancing the diversification of the local economy and market vitality. In Europe, with the advancement of regional economic integration and establishing the Schengen Area, border trade focuses more on policy coordination and infrastructure development, promoting market integration. In recent years, global border trade has exhibited a trend towards diversification and modernization, extending from traditional commodity exchange to service trade and technology transfer, accompanied by the deepening of regional economic cooperation and upgrading logistics networks[2]. Moreover, establishing border economic special zones or free trade areas has provided institutional guarantees and policy support for border trade.

Against the backdrop of economic globalization, border trade plays a pivotal role in promoting regional economic integration. It optimizes resource allocation, expands market size, and advances local fiscal, employment, and infrastructure development, bringing new opportunities for regional cooperation[3]. However, border trade also faces multiple challenges such as weak infrastructure, policy volatility, and social issues, which constrain its sustainable development. Specifically, insufficient infrastructure limits trade facilitation and economic potential[4], policy uncertainty increases trade risks[5], and issues such as overpopulation, labor structural imbalances, illicit trade, and environmental pollution affect social stability and ecological sustainability.

This study aims to systematically analyze the socio-economic effects of border trade, uncover its profound impact on the development of border areas, and explore pathways to achieve sustainable development, providing theoretical foundations and practical guidance for relevant policy formulation.

2 THEORY OF SOCIAL AND ECONOMIC EFFECTS OF BORDER TRADE

The socio-economic effects of border trade have been elucidated by various economic theories, which provide a crucial theoretical foundation for analysis: The theory of regional economic integration suggests that trade liberalization can optimize resource allocation and market integration by reducing border barriers, thereby promoting regional economic development[6].The comparative advantage theory posits that exchanging goods and services between regions based on resource endowments can lead to mutually beneficial outcomes. Border trade, as a form of local trade, exemplifies this advantage[7].The theory of social change induced by trade is applicable in the context of border trade. It emphasizes that trade not only drives the economy but also triggers changes in social structures through cultural exchange, population movement, and technology diffusion[8].

2.1 Impact of Border Trade on Economic Growth

Existing research indicates that border trade promotes regional economic growth through the cross-border flow of goods and services[9]. Border areas often serve as hubs for the movement of transnational goods and labor due to their geographical location, driving infrastructure construction and increased investment, attracting transnational corporations to establish offices or factories, and stimulating local economic development. Additionally, border trade attracts transnational corporations to invest in factories or establish offices in border regions, further stimulating local economic activity. However, the impact of trade varies by region due to differences in trade types, primary structures, and policy environments.

2.2 Impact of Border Trade on Income Distribution

The impact of border trade on income distribution has been debated in academia. Some studies show that border trade helps narrow the income gap between regions, especially in economically underdeveloped border areas where trade provides residents with more employment opportunities and income sources[10]. However, other research suggests that because border trade is often dominated by a few large enterprises, SMEs and residents may be disadvantaged in trade activities, potentially exacerbating income inequality. Moreover, there are significant differences in the impact of different types of border trade (such as formal versus informal trade) on income distribution, with informal trade often leading to uneven distribution of benefits and exacerbating social inequality[10].

2.3 Impact of Border Trade on Employment

The impact of border trade on employment is seen on both direct and indirect levels. The vitality of border trade directly creates many employment opportunities for residents in border areas, particularly in trade transportation, logistics, and border port services. Indirectly, the economic growth and infrastructure development brought about by border trade can stimulate the development of other related industries, thus expanding employment channels[11]. However, the positive impact of border trade on employment also depends on trade policies, regional economic structures, and the labor supply in border areas. In unstable policy environments or regulated border trade, the promotional effect of border trade on employment may be limited[5].

In conclusion, as a special form of trade, border trade plays a significant role in social and economic development. Its impacts, not only on economic growth but also on social structures and cultures, are profound. Therefore, the need for in-depth research into the multiple effects of border trade is of great academic and practical significance. Such research is crucial for promoting the sustainable development of border areas and advancing broader regional economic integration.

3 IMPACT OF BORDER TRADE ON SOCIAL DEVELOPMENT

Border trade drives economic growth and provides opportunities for cultural exchange and social integration [3, 9]. As trade activities become more frequent, border areas emerge as the frontlines of contact between different cultures and ethnic groups, with trade facilitating the mutual transmission and fusion of cross-border cultures. Cultural exchange is manifested in the mutual influence of languages, lifestyles, and dietary habits and in the collision and integration of values, customs, and traditions. This cultural interaction helps to break down cultural barriers between regions and ethnic groups, enhancing the understanding and tolerance of cultural diversity and laying the foundation for the harmonious development of society. Moreover, the social capital accumulated through cultural exchange contributes to promoting economic cooperation and forming transnational social networks[12].

Additionally, the promotion of border trade has led to increased interactions between different social groups, which helps to enhance social integration[13]. With the increase in cross-border population movement, interactions between residents, foreign business people, and workers have become more frequent, forming social relationship networks based on trade activities[11]. This interpersonal communication facilitates economic cooperation and promotes the accumulation of social trust and social capital, thereby strengthening the social cohesion of border areas.

Yet, the social integration fostered by border trade is not without its challenges. The increased population movement can lead to cultural conflicts, social differentiation, and identity crises, especially in areas with unstable border policies or weak social governance. Issues such as illegal trade, cross-border crime, and smuggling activities can also disrupt the social order and security of border areas. Therefore, to ensure the sustainable development of border trade, it is crucial to manage and guide the social integration process effectively. This involves strengthening border governance capabilities and promoting the establishment of cross-border cooperation mechanisms. These measures are essential to achieve a balance between economic development and social harmony[3].

4 THE MECHANISM OF BORDER TRADE'S IMPACT ON SOCIOECONOMIC DEVELOPMENT

The influence of border trade on socioeconomic development is primarily realized through income effects, employment effects, and social structural changes.

4.1 Income Effects

As a transnational economic activity, border trade bridges international economic cooperation and significantly promotes the economic growth and social development of border areas. The income effects of border trade are mainly manifested in increasing residents' income and improving their living standards, thereby driving the socioeconomic development of the entire region[10].

4.1.1 Increase in local residents' income

Border trade creates numerous employment opportunities for residents in border areas, particularly in transportation, warehousing, logistics, tourism services, retail, and catering sectors. The frequency of trade activities and the increase in market demand drive the development of these industries, directly raising employment rates and wage levels in border regions. Additionally, residents can gain extra economic income by participating in border trade activities, such as importing and exporting small commodities and cross-border e-commerce. This income increase improves household financial situations and enhances consumer capacity, further stimulating the local consumer market[6].

4.1.2 Improvement of living standards

With the development of border trade, infrastructure construction is gradually strengthened, including improving roads, railways, bridges, and ports, which helps to enhance the quality of life. Better infrastructure improves public services such as healthcare, education, and cultural entertainment, allowing residents to enjoy a higher quality of life. Moreover, as the economy grows, public fiscal revenues in border areas also increase, enabling the government to allocate more funds to welfare and public service improvements, which positively affects residents' quality of life[11].

4.1.3 Comprehensive impact on socioeconomic development

The income effects of border trade are not limited to the individual and household levels; they also have a profound impact on the overall socioeconomic development of the region through various channels:

Promotion of Industrial Structure Optimization: With the growth of border trade, local governments and businesses may increase investments in modern logistics, processing manufacturing, and high-value-added products, which helps optimize and upgrade the local industrial structure and promotes sustainable economic development[9].

Advancement of Regional Economic Integration: Border trade can strengthen economic ties with neighboring countries and promote the region's free flow of goods, capital, and labor. This economic closeness helps foster regional economic integration, improves the efficiency of resource allocation, and enhances overall competitiveness[3].

Alleviation of Poverty and Reduction of Income Inequality: Border areas are often less economically developed, and border trade, by increasing income sources and improving infrastructure, helps alleviate poverty, narrow the income gap between urban and rural areas, and promote social harmony and stability[12].

In summary, border trade positively promotes socioeconomic development by increasing residents' income and improving living standards. By optimizing the industrial structure, advancing regional economic integration, and alleviating poverty, border trade not only improves economic benefits but also lays a solid foundation for the sustainable development of border areas. These multiple effects make border trade an essential means of promoting socioeconomic development and offer significant references for formulating economic policies for border areas and the entire country.

4.2 Employment Effects

The impact of border trade on employment is reflected not only in the increase in job opportunities but also in the significant improvement of job quality[11]. With the prosperity of border trade, the regional employment market has become increasingly diverse, encompassing industries such as transportation, logistics, wholesale and retail, tourism, financial services, and cross-border e-commerce. This diverse job market meets the needs of people with different skill levels and career preferences, providing suitable job opportunities for both high-skilled and low-skilled labor, effectively reducing the unemployment rate in border areas. Additionally, border trade attracts substantial investment and factory establishment by multinational corporations, driving the development of manufacturing, processing industries, and high-value-added service sectors. The demand for high-skilled labor in these emerging industries further enhances job quality.

As trade activities expand and the economy develops rapidly, the role of human capital accumulation becomes more prominent[6]. Trade not only increases job opportunities but also promotes the demand for education and vocational training. This prompts local governments and businesses to invest in educational resources, improve the vocational training system, and enhance the overall quality of the labor force. For instance, vocational education institutions in border areas may offer courses related to cross-border logistics management, international trade law, and e-commerce operations to meet the demand for technical professionals in border trade. This not only raises the skill level of workers but also enhances their ability to adapt to industrial changes and the stability of long-term employment.

Moreover, the infrastructure upgrades and public service improvements brought about by border trade also positively impact job quality. With the improvement of transportation networks and logistics facilities, businesses in border areas can better access market information and supply chain support, creating a more efficient environment for production and operations[12]. This environment helps businesses to enhance the quality of job positions, offering better wages and benefits. At the same time, the economic benefits generated by border trade increase government revenue, providing financial support for local governments to strengthen the social security system, further improving the security and attractiveness of employment.

The enhancement of job quality due to border trade is also evident in promoting cross-border labor mobility and expanding international perspectives[2]. As the frequency and scale of trade expand, residents in border areas have more opportunities to engage with international markets, enhancing their foreign language proficiency, cross-cultural communication skills, and knowledge of international trade rules. This strengthens their competitiveness in a globalized context and provides a more dynamic talent base for socio-economic development, further promoting the sustainable development of border areas.

4.3 Social Structural Changes

As a transnational economic activity, border trade has a profound impact on the social structure and economic development of border areas. The long-term development of border trade not only drives economic growth but also leads to significant changes in the social structure of border regions. These changes encompass population mobility, social stratification, and cultural integration and profoundly influence the regional social development and social order

model. The following sections will detail the social structural changes and their mechanisms induced by the long-term development of border trade.

4.3.1 Changes in population mobility

The prosperity of border trade is often accompanied by significant migration and population mobility, particularly in border areas. The employment opportunities created by border trade attract many incoming populations, including trade practitioners and labor forces in related industries such as logistics, retail, catering, and tourism[13]. As the number of incoming populations increases, the demographic structure of border areas changes, with the proportion of residents to incoming populations gradually adjusting. Additionally, the movement of cross-border labor becomes frequent, and some border cities even see a phenomenon of dual-city living, where residents frequently commute between two countries, thus forming transnational social networks.

4.3.2 Changes in social stratification

The development of border trade alters the distribution of wealth and resources, leading to new phenomena of social stratification. In border areas, emerging merchants, trading companies, and professionals in related industries, especially those with higher capital and technology, may rapidly accumulate wealth, forming a new elite social class[1]. Simultaneously, those less involved in border trade activities may find themselves at a relative disadvantage regarding income growth and social status, expanding the wealth gap. Therefore, while border trade promotes economic prosperity, it also brings about issues of social inequality, which may solidify into a new structure of social stratification over time.

4.3.3 Cultural integration and change

Long-term border trade facilitates the circulation of goods and promotes cultural exchange and integration. Residents in border areas, through prolonged trade interactions, frequently encounter and interact with the languages, diets, religious beliefs, and customs of neighboring countries[1]. This cultural exchange helps create a multicultural coexistence, making the cultural characteristics of border areas diverse and international. However, this cultural integration may also lead to a cultural identity crisis, as local traditional cultures may weaken or even disappear under the impact of external cultures. Thus, the challenge of protecting local cultures while promoting cultural integration becomes an issue to be addressed in the long-term development of border areas.

4.3.4 Changes in political and governance structures

With the long-term development of border trade, the governance needs of border areas are also evolving. Firstly, the changes in population mobility and social stratification require local governments to adjust policies to adapt to new social conditions, such as household registration management, distribution of social welfare, and public services[1]. Secondly, the frequency of cross-border economic activities may increase issues such as illegal trade, smuggling, and human trafficking, posing higher demands on the security management of border areas. Therefore, border governance must transition from traditional administrative management to a diversified governance model, strengthening international cooperation, enhancing governance capabilities, and improving laws and regulations to adapt to the new social structure and governance needs.

4.3.5 Acceleration of urbanization

The long-term development of border trade also accelerates the urbanization process in border areas. As economic activities concentrate and populations aggregate, the size of border cities expands, urban infrastructure improves, and urbanization gradually increases. During this process, the functions of border cities are also changing, transitioning from traditional centers of administration and defense to hubs of regional economic and cultural exchange[7]. Accelerating urbanization brings more employment and business opportunities but may also increase environmental pressure and land resource scarcity. Coordinating the relationship between urbanization and sustainable development becomes a new challenge.

The long-term development of border trade not only has a significant role in promoting regional economic growth but also triggers profound changes in the social structure of border areas. These changes are manifested in population mobility, social stratification, cultural integration, governance structures, and urbanization, and are complex and diverse[3]. Therefore, understanding the long-term impact of border trade on social structure is of great importance for formulating economic development policies and social governance strategies in border areas. To achieve sustainable development in border areas, it is not just necessary, but our responsibility to consider the social structural changes brought about by border trade and adopt corresponding policy measures to ensure the coordination of economic and social development in border areas.

In conclusion, border trade significantly drives regional economic growth, promotes social development, and achieves sustainable development. However, its impact on socioeconomic development must be balanced and subject to various constraints. Future research should continue to focus on the complexity and diversity of border trade, explore sustainable development paths that adapt to the characteristics of different regions, and strengthen cooperation among policymakers, academia, and society to promote healthy development.

5 EXPLORATION OF PATHS FOR THE SUSTAINABLE DEVELOPMENT OF BORDER TRADE

In achieving the sustainable development of border trade, academia has proposed various paths for exploration. Some studies emphasize that policy formulation should focus on the economic characteristics and social conditions of border areas, with targeted optimization of the policy environment for border trade. Additionally, scholars have pointed out that improving border infrastructure is crucial for the sustainable development of border trade. By strengthening the

construction of infrastructure such as transportation, logistics, and communication, trade efficiency can be increased and transaction costs reduced, thereby promoting long-term stable economic growth in border areas[14].

In terms of environmental protection, scholars suggest integrating the concept of sustainability into border trade policies, with particular emphasis on ecological protection and the rational use of natural resources in border areas. Measures are urgently needed to regulate informal trade activities in border areas to reduce their negative environmental impact. Furthermore, it is crucial to strengthen transnational cooperation in regional environmental governance, resource management, and disaster prevention and mitigation. This collaboration is essential to ensure the sustainability of border trade and to address the challenges that transcend national borders.

6 CONCLUSION AND POLICY RECOMMENDATIONS

This study has comprehensively assessed the socio-economic effects of border trade and explored pathways to its sustainable development. The findings reveal that border trade not only promotes economic growth in border areas through increased employment and income but also enhances residents' living standards by improving infrastructure, promoting industrial upgrading, and driving regional economic integration. Policy environments, market demand, and regional cooperation influence the sustainable development of border trade. While border trade helps alleviate poverty, narrow income gaps, and enhance regional competitiveness, it also faces challenges such as inadequate policy coordination, uneven infrastructure development, and market fluctuations. Therefore, the sustainable development path for border trade should strengthen regional coordination, improve institutional frameworks, and optimize resource allocation to achieve a win-win situation for economic and social benefits.

6.1 Policy Recommendations

To promote the sustainable development of border trade, the following specific policy recommendations are proposed:

Enhance Cross-Border Cooperation: Increase the depth and breadth of transnational cooperation in border areas and strengthen coordinated development with neighboring countries in infrastructure construction, investment, and trade facilitation. Establish bilateral or multilateral cooperation mechanisms to coordinate the resolution of issues such as tariffs, transportation, and health quarantines, reducing institutional barriers to cross-border trade. Cooperation models such as cross-border free trade areas and special economic zones should also be explored to promote industrial clustering and efficient resource allocation in border areas.

Improve Regulatory Mechanisms: The complexity of border trade requires a robust regulatory framework to ensure the stable operation of the market. Improve the institutional frameworks for customs, border defense, and import-export licensing to enhance regulatory efficiency and reduce unnecessary administrative burdens. Introduce advanced technological means such as blockchain and big data analytics to increase border trade's transparency and regulatory level. Additionally, strengthen systems related to intellectual property protection, food safety management, and environmental protection to promote the normalization and healthy development of trade activities.

Promote Regional Coordination: Foster economic ties between border areas and the hinterland to promote the rational flow and distribution of economic resources within the region for shared development. Develop differentiated regional development policies to support industrial transformation and upgrading and the development of emerging industries in border areas while improving the equalization of public services. Prioritize the development of education, healthcare, and social security to narrow the gap between border areas and developed regions, enhancing the positive socio-economic effects of border trade.

6.2 Future Research Directions

Many research issues in border trade warrant further exploration to address rapidly changing economic environments and policy needs. Future research could focus on the following directions:

Impact of Digital Transformation on Border Trade: With the development of the digital economy, the role of cross-border e-commerce and digital payments in border trade is increasingly prominent. Research could explore how the application of digital technologies in border trade affects transaction efficiency, trade costs, and market structure, as well as the issues of risk management and data protection brought about by digitalization.

Changes in the Cross-Border Labor Market: The vibrant development of border trade often accompanies the cross-border flow of labor, which profoundly impacts local employment structures and income distribution. Research could delve into the patterns of cross-border labor flow, changes in skill demands, and the short-term and long-term impacts on local labor markets.

Through these future research endeavors, evidence can be provided to inform policies more aligned with the actual needs of border areas, offering scientific guidance for the sustainable development of border trade.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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FINANCIAL REPORT FRAUD IN LISTED COMPANIES: ACCOUNTING STRATEGIES INDUCED BY PERFORMANCE APPRAISAL STANDARDS

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Abstract: This study aims to explore the inducement effect of performance appraisal standards on financial report fraud in listed companies. Through literature review and theoretical analysis, it examines the accounting manipulation tactics and motivations employed by management under stringent performance standards from the perspectives of agency theory, behavioral economics, and corporate governance structure. The results show that excessively high performance appraisal standards significantly increase the likelihood of management engaging in inappropriate accounting strategies, such as inflating revenues, reducing costs and expenses, and adjusting fair values, leading to financial misreporting. The study suggests optimizing performance standards, strengthening corporate governance and external supervision, and utilizing big data and artificial intelligence to reduce financial fraud and enhance the transparency and fairness of capital markets.
Keywords: Financial report fraud; Performance appraisal standards; Accounting strategies; Corporate governance; Agency theory; Behavioral economics

1 INTRODUCTION

In the capital market, the financial reports of listed companies serve as critical information sources for investors, regulators, and other stakeholders in decision-making. The accuracy and transparency of financial reports are crucial for maintaining market order, protecting investors' rights, and promoting healthy economic development. However, financial report fraud not only undermines market fairness and efficiency but also erodes investor confidence and distorts resource allocation [1].

Financial report fraud refers to the manipulation of accounting data by listed companies, intending to mislead stakeholders about the company's financial status and operating results. This behavior typically involves tactics like inflating revenues, reducing costs and expenses, and manipulating the timing of asset and liability recognition, aiming to boost profits, beautify financial conditions, or meet performance targets.

Performance appraisal standards are crucial criteria for evaluating the performance of listed company management, directly influencing the company's operational decisions and financial reporting behavior. Under performance pressure, some listed companies may adopt inappropriate accounting strategies to meet market expectations and performance targets, thereby inducing financial report fraud [2]. This phenomenon reflects that performance appraisal standards might induce financial fraud in listed companies to some extent.

This study aims to investigate the impact of performance appraisal standards on financial report fraud in listed companies, analyzing the motivations and methods of financial fraud under different performance standards. By conducting an in-depth study, this paper aims to reveal the relationship between performance standards and financial fraud, providing theoretical support and practical guidance for financial management, internal control, and external auditing of listed companies.

2 FRAUD MOTIVATION AND TACTICS

2.1 Motivations for Financial Report Fraud

From the perspective of motivation, one of the core drivers of financial fraud by management is to meet performance targets. Many studies indicate that management often manipulates financial data based on the motivation of maximizing short-term interests to enhance the company's market and stock performance, thereby maximizing personal or corporate short-term benefits [3]. Specifically, factors like salary incentives, equity incentives, and maintaining the company's listed status are key contributors to fraudulent behavior. Multidimensional design in performance appraisal standards inspired by interdisciplinary research can reduce fraud risk induced by single evaluation indicators [4].

Additionally, the setup of performance appraisal standards directly impacts the frequency and approach of financial fraud. Research suggests that high standards in profitability, asset quality, and capital return often impose significant performance pressure on company management, which then transforms into fraudulent motivations [5]. For instance, performance targets like "three consecutive years of profitability" or "achieving a 10% return on equity" may induce companies to engage in financial manipulation to meet the appraisal targets, including tactics like inflating revenues, underestimating costs, and reducing provisions for impairment and depreciation.

2.2 Tactics and Strategies of Financial Fraud

Research indicates that under performance appraisal pressure, listed companies often adopt various accounting strategies to commit fraud. Revenue inflation is the most common tactic, typically achieved by overstating accounts receivable, notes receivable, and inventory [6]. This strategy enhances revenue and asset size without increasing actual business activities, thus beautifying financial statements. However, such tactics negatively affect cash flow, asset quality, and business performance in the long term, potentially leading to financial crises.

Reducing costs and expenses is another common fraud tactic. Listed companies often achieve this by reducing depreciation expenses, credit impairment losses, and asset impairment losses, thereby inflating profits [7]. This is often seen in capital-intensive and highly leveraged industries, such as manufacturing and real estate. Studies indicate that this manipulation not only impacts the accuracy of financial reports but also negatively affects the company's future business development, as it will face higher cost and expense pressures in subsequent years.

Fair value measurement is also a common strategy for financial fraud. Fair value changes directly impact corporate profits, especially in the valuation of financial assets and investment properties. Company management can utilize market fluctuations or changes in valuation models to manipulate fair value, thereby artificially adjusting profit levels [8]. This tactic is particularly prevalent in financial and real estate sectors, where fraudulent behaviors are harder to detect by external auditors and regulatory authorities.

2.3 Impact of Performance Appraisal Standards on Fraudulent Behavior

Studies have found that the setup of performance appraisal standards significantly influences financial fraud in listed companies [9]. High-performance targets, such as "three consecutive years of profitability" or "achieving a 10% return on equity," can exert immense pressure on management, encouraging them to engage in fraudulent financial behavior. Furthermore, performance standards that overly emphasize short-term performance while neglecting long-term development often lead to short-sighted management decisions.

In different market environments and regulatory contexts, the impact of performance appraisal standards on financial fraud varies. In less regulated markets, financial fraud is more common, while in strictly regulated markets, although fraudulent behavior is somewhat suppressed, performance appraisal standards remain a key factor inducing fraud. This phenomenon suggests that financial fraud cannot be entirely eliminated through external supervision and auditing; improvements in internal control and corporate governance are also necessary [10].

2.4 The Role of Internal Control and External Auditing

Existing literature indicates that internal control and external auditing have some effect in curbing financial fraud, but the results are not ideal [11]. On one hand, the effectiveness of internal control depends on the enforcement of management and the improvement of internal supervision mechanisms. On the other hand, while external auditing can detect and correct financial fraud to some extent, its effectiveness is often limited by resources and the concealment of fraudulent behavior.

With the advancement of big data, artificial intelligence, and other technologies, financial fraud detection methods have improved. Studies show that using big data analytics and machine learning models can enhance the efficiency of detecting financial fraud [12]. However, the application of these new technologies still faces challenges such as data privacy, technical costs, and legal compliance.

To summarize, existing literature explores the motivations, tactics, and impacts of financial report fraud from different perspectives. Excessive performance appraisal standards play a significant role in inducing financial fraud, while internal control, external auditing, and new technologies can alleviate this issue to some extent. To further explore the relationship between performance appraisal standards and financial fraud, this study will conduct an in-depth theoretical analysis in the next section.

3 INDUCING FACTORS OF FRAUD

The occurrence of financial report fraud is closely related to the performance pressure faced by management in listed companies. In financial reports, performance appraisal standards not only reflect the performance goals of a company but also directly influence the decision-making behavior of management. To analyze the inducement effect of performance appraisal standards on financial report fraud more thoroughly, this section conducts a theoretical analysis from the perspectives of agency theory, behavioral economics, and corporate governance structure.

3.1 Agency Theory Perspective

Within the framework of agency theory, there exists a conflict of interest between shareholders (principals) and management (agents). Shareholders aim to restrict and motivate management through performance appraisal standards to maximize corporate interests. However, due to information asymmetry, management possesses more internal information about the company than shareholders do, motivating management to manipulate financial reports to meet performance targets and gain personal benefits. Particularly when facing stringent performance targets, management may inflate revenues or reduce costs to beautify financial data and avoid negative consequences from failing to meet targets.

Agency theory suggests that management's fraudulent behavior originates from the inconsistency of interests between shareholders and management. Some studies have indicated that the application of feedback mechanisms can improve management's adaptability to performance appraisal, reducing fraudulent motivations [13]. Although performance appraisal standards are designed to reduce this inconsistency, improper design may instead encourage management to engage in short-term speculative behavior, ignoring the company's long-term sustainable development. Higher performance standards, especially those overly focused on short-term profit indicators, may induce management to adopt inappropriate accounting strategies, resulting in financial misreporting.

3.2 Behavioral Economics Perspective

Behavioral economics reveals the behavioral biases that exist in management's decision-making process. According to Prospect Theory, decision-makers often exhibit strong risk preferences when facing losses, meaning they are more inclined to adopt aggressive strategies to avoid potential losses. Under performance appraisal pressure, management may believe that failing to meet performance targets will result in shareholder dissatisfaction or market value decline, thereby motivating them to commit financial fraud to conceal poor performance.

Furthermore, behavioral economics also indicates that management, when incentivized by short-term targets, tends to neglect long-term goals. Management may prioritize immediate benefits over long-term sustainability, especially when performance appraisal emphasizes short-term profits. This short-sighted behavior not only damages the company's long-term interests but also increases financial risks in the future. From the perspective of psychological intervention, appropriate mental adjustment can help management make more rational decisions under performance pressure, rather than resorting to short-sighted financial fraud strategies [14].

3.3 Impact of Corporate Governance Structure

Corporate governance structure significantly affects the quality of financial reports and the fraudulent behavior of management. A well-structured corporate governance framework can effectively restrict improper behavior by management, enhancing financial report transparency. Conversely, inadequate governance structures may provide opportunities for financial fraud. As part of corporate governance, performance appraisal standards should consider the company's long-term development strategy instead of merely focusing on short-term financial indicators.

In companies with weaker governance structures, the board's ability to supervise management may be limited, and internal control systems may be lax, providing management with more opportunities to manipulate financial reports. Under such circumstances, even strict external audits may find it challenging to detect management's fraudulent behavior. Additionally, if the audit committee lacks independence and expertise, or if the company lacks sufficient risk management mechanisms, performance appraisal standards may further induce management to commit fraud.

3.4 Specific Use of Accounting Strategies

Under performance appraisal pressure, management often employs various accounting strategies to achieve financial fraud. First, management may inflate revenues to meet short-term profit targets, typically by overstating accounts receivable and inventory, thus increasing sales and asset size. Second, reducing costs and expenses is also a key fraud strategy; management may lower credit impairment losses or understate depreciation expenses to reduce costs and increase net profits. Finally, management may manipulate fair value changes, particularly in investment properties or financial instruments, to adjust profits.

These accounting strategies allow management to artificially enhance financial performance in the short term. However, in the long run, these strategies inevitably harm the company's financial health and market reputation. Once exposed, financial fraud not only leads to legal penalties but also results in a loss of investor trust, potentially causing corporate bankruptcy. Therefore, although these strategies may appear effective in the short term, they actually increase financial risks and business instability.

3.5 Optimization of Performance Appraisal Standards

To prevent the inducement effect of performance appraisal standards on financial fraud, theoretical research suggests that performance appraisal systems should emphasize long-term performance and corporate sustainability. First, appraisal indicators should include long-term financial health and non-financial performance metrics, such as innovation capability, market share, and employee satisfaction, prompting management to focus on comprehensive development rather than merely pursuing short-term profits. Second, performance targets should be set reasonably to avoid overly aggressive targets that induce extreme accounting strategies. Integrating long-term performance rewards into appraisal systems can effectively reduce short-term fraudulent behavior.

Moreover, improving corporate governance structure is crucial to preventing fraudulent behavior. Enhancing the independence of the board of directors, increasing the audit committee's professional capabilities, and strengthening the internal control mechanism can effectively reduce financial report fraud risks. Continuous improvements in external regulation and market oversight also help increase the transparency and reliability of financial information in listed companies.

In summary, performance appraisal standards, as important management tools, may unintentionally induce financial fraud if poorly designed. Analyzing the impact of performance appraisal standards on financial fraud from the perspectives of agency theory, behavioral economics, and corporate governance structure can provide theoretical support and practical guidance for improving corporate governance and financial management.

4 DISCUSSION AND RECOMMENDATIONS

This study explores the relationship between performance appraisal standards and financial report fraud in listed companies, analyzing how these standards induce fraudulent behavior in financial reporting. The results indicate that financial report fraud is not merely a result of individual decisions by management but is also influenced by internal appraisal mechanisms, market environment, and corporate governance structure.

4.1 Relationship Between Performance Appraisal Standards and Financial Fraud

The research reveals that excessively stringent or singular performance appraisal standards exert immense pressure on management, prompting them to adopt inappropriate accounting strategies to achieve short-term performance targets. Under such circumstances, financial fraud becomes more prevalent and concealed. Management often utilizes multiple strategies, such as inflating revenues, reducing costs, and adjusting fair value, to beautify financial statements and meet both external market expectations and internal appraisal requirements. Specific targets, such as "three consecutive years of profitability" or "achieving a specified return on equity," further encourage management to engage in short-sighted behavior, leading to distorted financial information.

4.2 Consequences of Financial Fraud

Financial report fraud not only undermines the fairness and transparency of the capital market but also significantly impacts the company’s long-term development and market reputation. Exposure of financial fraud typically results in stock price declines, loss of investor trust, and potential legal risks. More importantly, such behavior may adversely affect the overall health of the industry and capital market, increasing market volatility and instability. Therefore, preventing financial fraud is not just an internal management task of companies; it requires the joint efforts of regulatory agencies, investors, and other stakeholders.

4.3 Measures to Prevent Financial Fraud

To prevent financial fraud induced by performance appraisal standards, several measures can be adopted. First, optimizing the design of performance appraisal standards is crucial. These standards should emphasize long-term performance and corporate sustainability rather than focusing solely on short-term financial indicators. Studies suggest that incorporating ethical education into performance appraisal systems can improve management’s ethical behavior, reducing fraudulent activities [15]. The diversification of appraisal indicators, including non-financial metrics such as market share, customer satisfaction, and innovation capability, can discourage management from adopting inappropriate strategies aimed solely at meeting specific targets. Research in educational models demonstrates that introducing diverse assessment methods helps cultivate more comprehensive professional skills, which can be applied to diversify corporate performance appraisal standards, thereby reducing financial fraud [16].

Strengthening corporate governance structures is another essential measure. Enhancing the independence of the board, improving the professional capacity of the audit committee, and increasing the effectiveness of internal supervision mechanisms can all contribute to reducing financial fraud. Improving internal control systems ensures that management adheres to generally accepted accounting principles in financial reporting, minimizing the risk of fraudulent behavior.

In addition, enhancing external supervision and auditing is vital. Regulatory agencies should intensify oversight of financial reporting in listed companies through random inspections, disclosure requirements, and market monitoring, ensuring timely detection and prevention of financial fraud. External auditing should play a more proactive role, utilizing big data analytics and machine learning technologies to enhance the efficiency and accuracy of fraud detection.

Lastly, adopting new technological methods is key to preventing financial fraud. Big data and artificial intelligence offer new possibilities for identifying fraudulent behavior. By conducting intelligent analyses of financial data, these technologies can help detect abnormal signals related to financial fraud early on, thereby increasing vigilance among management and auditing institutions.

4.4 Future Research Directions

While this study reveals the relationship between performance appraisal standards and financial report fraud, it also has some limitations. Firstly, the diversity and complexity of performance appraisal standards may be influenced by different corporate governance environments in practical applications, requiring further empirical research to verify the effects in different contexts. Secondly, future research could explore industry-specific differences in performance appraisal standards and financial fraud to provide more targeted recommendations for industry regulation and policy formulation.

In summary, listed companies should fully consider potential financial fraud when designing performance appraisal standards and improve corporate governance structures and internal control to achieve transparent and reliable financial reporting. The healthy development of the capital market relies on the accuracy and fairness of financial information. Therefore, curbing financial fraud is crucial for boosting investor confidence, optimizing resource allocation, and promoting sustainable economic development.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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THE IMPACT OF INSURTECH ON RISK-TAKING BEHAVIOR IN INSURANCE COMPANIES: EVIDENCE FROM CHINA

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Abstract: In the realm of risk management, InsurTech is not only pivotal for insurance companies to maintain their financial stability, but also serves as a significant gauge of a healthy insurance market. Drawing upon data from the insurance industry at the provincial level in China from 2010 to 2021, this paper investigates the impact of InsurTech on risk-taking capacity in the context of the COVID-19 pandemic shock. Using the shock of the pandemic as a natural experiment, this study successfully identifies a causal relationship between InsurTech and risk-taking in the insurance industry, unveiling a mechanism of influence spanning from InsurTech to risk identification and management efficiency, and subsequently to risk-taking capacity. Our findings suggest that, under the pandemic shock, InsurTech considerably augments risk-taking behavior in the insurance industry. The insights derived from this study bear significant practical implications for managing risk-taking at the provincial level in the insurance industry, particularly in the context of emerging technology adoption and pandemic shocks, thereby fostering stability and healthy development in the insurance sector.
Keywords: InsurTech; Risk-taking; COVID-19; Difference in difference

1 INTRODUCTION

The rise of InsurTech has brought significant transformations to the insurance industry, revolutionizing the way insurance products are developed, distributed, and serviced [1]. InsurTech, which encompasses the innovative use of technology such as artificial intelligence, big data analytics, and blockchain, has the potential to reshape traditional insurance practices and enhance operational efficiency [2]. Amidst this technological revolution, it is crucial to assess the impact of InsurTech on key aspects of the insurance sector.

In the context of risk management, understanding how InsurTech influences the risk-taking behavior of insurance companies is of paramount importance. Risk-taking is a fundamental aspect of the insurance industry, as insurers assess and assume risks in order to provide coverage and fulfill their obligations [3]. However, the adoption of InsurTech may introduce new dynamics and alter the risk profile of insurance companies.

This study aims to examine the relationship between InsurTech and risk-taking in the insurance industry, with a specific focus on the Chinese market. By analyzing data from the insurance sector in China over a specific timeframe, this research seeks to provide empirical evidence and insights into the impact of InsurTech on risk-taking behavior. In addition, the study aims to identify potential mechanisms through which InsurTech affects risk-taking in the insurance industry.

The timing of this research is particularly relevant, as it coincides with the COVID-19 pandemic, a crisis that has posed unprecedented challenges to the global economy and the insurance sector [4-5]. By exploring the impact of InsurTech on risk-taking during this crisis, this study can shed light on the resilience and adaptability of insurance companies in the face of significant disruptions.

The findings of this research have practical implications for insurance industry stakeholders, including insurers, policymakers, and regulators. Understanding the interplay between InsurTech and risk-taking can inform strategic decision-making, risk management practices, and regulatory frameworks in order to ensure the stability and sustainability of the insurance sector in China.

The research makes a valuable contribution to the existing literature on insurtech and insurance risk-taking, particularly by providing empirical evidence from a large and dynamic emerging market. This research adds to the understanding of the effects of insurtech innovation on risk-taking behavior within the insurance industry. The findings of this study have significant implications for policymakers and practitioners who are tasked with managing the delicate balance between reaping the benefits of insurtech and mitigating its associated risks.

To structure the paper effectively, we have divided it into several sections. Section 1 provides a concise overview of the development and regulation of insurtech in China, setting the context for our study. In Section 2, we conduct a comprehensive review of the relevant literature and develop our research hypotheses based on the gaps identified. Section 3 outlines the data sources and methodology employed in our empirical analysis. The subsequent Section 4 presents and thoroughly discusses the results obtained from our analysis. Finally, in Section 5, we conclude our paper by summarizing the key findings and offering suggestions for future research directions in this field.

2 THEORETICAL ANALYSIS AND HYPOTHESES

2.1 InsurTech and Risk Taking in the Insurance Industry

The emergence and rapid development of InsurTech have transformed the insurance industry, introducing new digital technologies and innovative business models [6]. While the potential benefits of InsurTech are widely acknowledged, its impact on the risk-taking behavior of insurance companies remains a topic of interest and debate. This section provides a comprehensive literature review to examine the existing knowledge on the relationship between InsurTech and risk taking in the insurance sector. InsurTech has revolutionized various aspects of insurance operations, including underwriting, claims processing, distribution, and customer engagement [7]. These technological advancements offer opportunities for insurance companies to improve efficiency, enhance customer experiences, and gain a competitive edge. However, the adoption of InsurTech may also introduce new risks and challenges, potentially influencing the risk-taking behavior of insurance companies. Several studies have explored the effects of InsurTech on risk-taking in different contexts. For instance, research conducted in developed markets has examined the relationship between InsurTech and risk-bearing capacity, finding mixed results [8]. Some studies suggest that InsurTech can enhance risk-taking by facilitating more accurate risk assessments and enabling insurers to expand into new markets [9].
However, other studies highlight potential risks associated with InsurTech, such as increased operational complexity and cyber threats [10]. In the specific context of China, limited empirical research has been conducted to investigate the relationship between InsurTech and risk-taking behavior in the insurance industry.

2.2 Risk Identification and Risk Taking in the Insurance Industry

The ability of insurance companies to identify and manage risk is critical to their operational viability and success. The advent of InsurTech, a portmanteau of "insurance" and "technology," has been heralded as a game-changer for the industry, purportedly leading to more informed and strategic risk-taking decisions [11].
Emerging technologies such as big data analytics, artificial intelligence (AI), and blockchain have demonstrated potential in reshaping risk identification strategies of insurance companies. For instance, big data analytics enables insurers to handle vast volumes of data, thereby enhancing the precision of risk identification and pricing [12]. AI, specifically machine learning, can be utilized to create more accurate risk models, allowing for more precise segmentation and personalized insurance pricing [13].
Blockchain technology, on the other hand, provides an immutable and transparent platform that could potentially mitigate fraud risk and streamline claims processing [14].
Moreover, the Internet of Things (IoT) devices, such as wearable technology, connected vehicles, and smart home devices, provide insurers with real-time data, enabling them to dynamically assess and manage risk exposure. This direct data input improves the precision of risk identification and fosters more informed risk management and underwriting decisions [15].
However, the integration of InsurTech also introduces new types of risks, notably cybersecurity threats. As insurance companies increasingly adopt digital solutions, they become potential targets for cyber-attacks [16]. Therefore, a holistic risk identification process should take into account these emergent risks associated with the use of technology.
Given the unique characteristics of the Chinese market and the rapid growth of InsurTech in the country, it is essential to examine how InsurTech influences the risk-taking decisions of insurance companies in China. Building on the existing literature, we propose the following hypothesis:
H1: InsurTech increases the risk-taking behavior of insurance companies in China

3 STUDY DESIGN

3.1 Samples and Data Sources

To examine the impact of InsurTech on risk-taking behavior and risk identification capabilities in the Chinese insurance industry, we construct a comprehensive dataset comprising a large sample of insurance companies operating in China. Our empirical analysis covers the period from 2007 to 2021 using provincial-level unbalanced panel data.Data related to the insurance industry are sourced from two primary and authoritative outlets: the annual China Insurance Yearbook and the China Banking and Insurance Regulatory Commission (CBIRC). Additionally, macroeconomic data are collected from the reputable "China Statistical Yearbook". To assess the level of InsurTech development and its influence on the insurance industry, we utilize data from the China Digital Inclusive Finance Index compiled by the Digital Finance Research Center at Peking University. This index serves as a comprehensive measure of the progress and penetration of digital inclusive finance in China, encompassing various dimensions of technological advancements and financial inclusivity.
By employing these rigorous data sources, we ensure the reliability and validity of our study, enabling a comprehensive examination of the relationship between InsurTech, risk-taking behavior, and risk identification capabilities in the Chinese insurance industry.

3.2 Definition of Variables

(1) Independent Variables:In line with the research this study examines two key risk variables: total risk-taking (RiskTotal), underwriting risk (UWRisk). RiskTotal represents the variability in risk exposure and is operationalized as the standard deviation of the ratio of pre-tax income plus interest to net admitted assets. To account for data availability,

we adopt the approach of using the standard deviation of the proportion of operating revenue to total assets over the preceding three years as a proxy for RiskTotal.
Similarly, underwriting risk is assessed by measuring the standard deviation of claims divided by earned premiums over the past three years.These risk variables provide a comprehensive framework for capturing different facets of risk exposure within the insurance industry.
(2) DTS_i represents the level of digitization in the insurance sector of each province. To measure the level of InsurTech development, we adopt the sub-indicator of insurance business under the dimension of usage depth from the China Digital Inclusive Finance Index, compiled by the Digital Finance Research Center at Peking University. To optimize our measurement, we apply standardization to the DTS data involved. Specifically, we subtract the minimum value from each variable value, then divide the result by the difference between the maximum and minimum values of the variable. This procedure yields a digitization level score ranging from 0 to 1 for each province. Thus, we establish a uniform and balanced scale for the evaluation of digitization levels across different provinces.
(3) Control variables. Referring to other factors that may affect the risk taking behavior of insurance industry, this paper selects eight variables, such as Total Assets (LnAsset), Insurance Penetration(Ip), Insurance Density(LnId), Investment Return(Ir), Macro Socioeconomic Variables(GDP), Urbanization Rate(UrbanRate).

3.3 Model

This article investigates the impact of a company's level of digitalization prior to a crisis on its resilience, with reference to the works. Accordingly, the following econometric model is established:

$$Risk_{it} = \alpha_0 + \beta_1 \times DTS_i \times time_t + \gamma \times CONTROLS_{it} + \delta \times CONTROLS_i \times time_t + \theta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

The dependent variable, $Risk_{it}$, denotes the overall, underwriting risk assumed by province i in year t. We represent the level of digitalization in province i's insurance industry, our proxy for Insurtech, by DTS_i. This measure is derived from the sub-index reflecting the depth of insurance utilization in the China Digital Inclusive Finance Index, compiled by the Digital Finance Research Center of Peking University. Our temporal dummy variable, $time_t$, defines the post-COVID-19 era (from 2020 onwards) as the digital shock period, and assumes a value of 1; otherwise, it is 0. The interaction term $DTS_i \times time_t$ serves as our principal explanatory variable, illustrating the influence of digitalization level on risk-taking during the digital shock period.
$CONTROLS_{it}$ signifies the set of control variables for province i in year t, encompassing total assets (LnAsset), insurance penetration (Ii), insurance density (LnId), and investment returns (Ir), with γ denoting the corresponding regression coefficients. $CONTROLS_i$represents the control variables for province i, including GDP and urbanization rate. The interaction term $CONTROLS_i \times time_t$ allows us to control as much as possible for factors impacting risk-taking, thereby isolating the independent relationship between digitalization and risk assumption.
The fixed effect for province i is symbolized by θ_i, controlling for province-specific factors that do not vary over time. λ_t signifies the time t fixed effects, managing influences that all provinces concurrently experience and change over time, such as macroeconomic trends or national policies. ε_{it}stands for the random error term.

4 EMPRICAL RESULTS AND ANALYSIS

4.1 Descritive Statistical Analysis

The descriptive statistics provide an overview of the variables under study in the present research. The dataset comprises 268 to 341 observations, depending on the variable.The average total risk (RiskTotal) across the 268 observations is 0.073, with a standard deviation of 0.057, indicating a moderate variability. The underwriting risk (UWRisk) has a much larger spread. Across the 265 observations, the mean value stands at 0.674, but with a substantial standard deviation of 5.257. The variable ranges from 0.005 to a notable 58.48, reflecting significant discrepancies in the underwriting risk across different provinces.
The level of insurtech, as proxied by the digital transformation score (DTS), ranges between 0 (lowest) and 1 (highest), with a mean value of 0.51 and standard deviation of 0.225. This showcases a moderate degree of digitalization across the provinces. The control variables show diverse patterns. The total assets (LnAsset), with a mean of 23.928 and standard deviation of 2.599, shows a moderate degree of variation in the size of companies across provinces. Both the insurance penetration (Ip) and insurance density (LnId) show a wide range of values, suggesting substantial differences in the development of the insurance market across provinces (Table 1).

Table 1 Descriptive Statistics

variable	sample capacity	mean	standard error	least value	crest value
RiskTotal	268	0.073	0.057	0.003	0.348
UWRisk	265	0.674	5.257	0.005	58.48
DTS	341	0.51	0.225	0	1
DTS×Time	341	0.124	0.268	0	1

Time	341	0.182	0.386	0	1
lnAssets	279	23.928	2.599	18.05	30.658
Ip	341	3.499	1.196	0.05	7.36
LnId	341	7.447	0.659	5.534	9.354
InvestReturn	279	-6.698e+10	2.018e+11	-1.523e+12	4.415e+09
LnGDP	341	10.818	0.451	9.682	12.123
UrbanRate	341	0.586	0.131	0.227	0.896
LnGDP Time	341	2.028	4.31	0	12.123
UrbanRate Time	341	0.117	0.252	0	0.893
DTS normalized	341	0.51	0.225	0	1

4.2 Benchmark Regression

Table 2 presents the benchmark regression results of our study, capturing the relationship between digital transformation (DTS) and risk-taking behavior of the insurance industry.In model (1), the dependent variable is the total risk (RiskTotal), while in model (2), the dependent variable is the underwriting risk (UWRisk). The core explanatory variable is the interaction term of DTS and time (DTS×Time), which captures the impact of digitalization on risk-taking during different time periods.

In both models, DTS×Time is significant, indicating that the level of digitalization is associated with risk-taking behavior in the insurance industry. In model (1), a one-unit increase in DTS×Time is associated with a 0.4662-unit increase in the total risk, significant at the 1% level. Similarly, in model (2), a one-unit increase in DTS×Time is associated with a 52.8148-unit increase in the underwriting risk, significant at the 5% level. The adjusted R-squared figures, 0.2521 and 0.5983 for Models (1) and (2) respectively, offer confidence that our models adequately encapsulate a notable degree of the variation in risk-taking tendencies.

Table 2 Benchmark Regression Results

	(1)	(2)
	RiskTotal	UWRisk
DTS×Time	0.4662***	52.8148**
	(0.0039)	(0.0377)
lnAssets	0.0054	-0.1251
	(0.2802)	(0.5620)
Ip	-0.0006	-0.0604
	(0.9039)	(0.7382)
LnId	-0.0007	1.9975
	(0.9816)	(0.1527)
InvestReturn	-0.0000***	-0.0000
	(0.0015)	(0.1586)
LnGDP_Time	-0.1035***	-5.3926
	(0.0013)	(0.1113)
UrbanRate Time	0.1107*	-23.3973**
_cons	0.0436	-2.9989
	(0.8679)	(0.7494)
N	260	265
adj. R2	0.2521	0.5983

Note: p-values in parentheses p < 0.1, ** p < 0.05, *** p < 0.01

4.3 Robustness Test

4.3.1 Parallel trend test

In order to corroborate the validity of the Difference-in-Differences (DiD) model, we carried out a parallel trends test. Echoing the approach, we established interaction terms between the dummy variables and the dummy variables of the treatment group, considering periods both before and after the implementation of InsurTech and for the current year, and then performed regression analysis. According to the regression outcomes reported in Table 3, the coefficients of the pre-treatment terms (pre_1, pre_2, and pre_3) are not statistically significant. Meanwhile, the coefficients of the post-treatment terms 'current' and 'post_1' are significant at the 10% and 1% levels respectively. This observation aligns with the critical assumptions of the DiD model, thereby supporting the credibility of the empirical results derived from our model. These results illustrate that, prior to the introduction of InsurTech, the insurance industry across provinces exhibited parallel trends. This bolsters the credibility of the findings of the DiD model, implying that InsurTech has a substantial influence on the RiskTotal of insurance companies.

Table 3 Parallel Trend Test

	RiskTotal
pre3	0.0284
	(0.1356)
pre2	0.0277

	(0.1416)
pre1	0.0138
	(0.5396)
current	0.0373*
	(0.0990)
post1	0.0587***
	(0.0099)
lnAssets	0.0057
	(0.3481)
Ip	0.0025
	(0.6713)
LnId	-0.0099
	(0.7678)
InvestReturn	-0.0000
	(0.2071)
LnGDP Time	-0.0524
	(0.1529)
UrbanRate_Time	0.1482
	(0.1905)
N	268
adj. R2	0.0625

Note: p-values in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

4.3.2 Placebo test

To further exclude the influence of other unobservable factors on the research results and verify our empirical findings, we conducted a placebo test by setting fictitious time points for the implementation of InsurTech: 2011-2012, 2014-2015, and 2017-2018. Consequently, we redefined the time dummy variables. Treated_placebo represents the product of different experimental groups and DTS. If the regression results are not significant, we can conclude that the change in corporate risk-taking behavior is due to the implementation of InsurTech. Conversely, if the regression results are significant, this conclusion will not stand.

The data in the table shows that the company's risk-taking tendency did not have significant differences in the periods of 2011-2012, 2014-2015, and 2017-2018. Specifically, as shown in the first column, for the period of 2011-2012, the coefficient of "Treated_placebo" is 0.2360 (p-value=0.5096). This insignificance indicates that the fictitious experiment during this period did not have a significant impact on corporate risk-taking behavior. Similarly, for the period of 2014-2015, the coefficient of "Treated_placebo" is -0.0622, with a p-value of 0.538, indicating insignificance. For the period of 2017-2018, the coefficient of "Treated_placebo" is 0.1762, with a p-value of 0.242, also indicating insignificance. This further confirms that the fictitious experiment did not significantly change corporate risk-taking behavior.

In sum, these placebo tests further enhance the reliability of our main findings, confirming that InsurTech did indeed cause changes in corporate risk-taking behavior during the pandemic, and these changes are not simply caused by other unobservable factors (Table 4).

Table 4 Placebo Test

	2011-2012	2014-2015	2017-2018
Treated_placebo	0.2360	-.0622334	.1762167
	(0.5096)	(0.538)	(0.242)
lnAssets	0.0074	0.0066	0.0071
	(0.2522)	(0.2967)	(0.2941)
Ip	-0.0016	-0.0011	0.0006
	(0.7309)	(0.8211)	(0.8930)
LnId	-0.0055	0.0004	0.0082
	(0.8899)	(0.9913)	(0.8294)
InvestReturn	-0.0000**	-0.0000*	-0.0000**
	(0.0260)	(0.0646)	(0.0360)
LnGDP Time	-0.0224	-0.0247	-0.0135
	(0.3693)	(0.3164)	(0.6211)
UrbanRate_Time	0.1777**	0.1759**	0.1739**
	(0.0342)	(0.0330)	(0.0329)
treated_placebo2_DTS		-0.0622	
		(0.5377)	
treated_placebo3_DTS			0.1762
			(0.2416)
cons	-0.0184	-0.0297	-0.0973
	(0.9526)	(0.9217)	(0.7672)
N	268	268	268
adj. R2	0.1528	0.1497	0.1620

Note: p-values in parentheses p < 0.1, ** p < 0.05, *** p < 0.01

5 CONCLUSIONS

Our research provides a deep understanding of the relationship between insurance technology and risk taking behavior in the insurance industry, especially during periods of crisis impact. The core findings of our research can be summarized as the following two points: firstly, insurance technology significantly enhances the risk-taking behavior of the insurance industry. Our benchmark regression evidence shows that the improvement of the degree of digitalization, especially during the impact period of the COVID-19 epidemic, is related to the increase of the overall risk and underwriting risk of insurance companies. Secondly, we have successfully tested the causal relationship between insurance technology and risk taking. The Double Difference (DID) model is robust, and parallel trend testing aligns with the key assumptions of the DID model, supporting the effectiveness of our empirical findings.

Overall, with the advancement of insurance technology, decision-makers of insurance companies need to adopt more cautious and proactive risk management strategies. This may include deeper risk identification, assessment, and monitoring, as well as establishing an appropriate risk taking culture within the organization. For regulatory agencies, this study suggests that insurance technology may exacerbate risk taking behavior in the insurance industry. Therefore, regulatory agencies need to remain vigilant about the development and use of insurance technology, and timely update relevant regulatory policies and guidelines to ensure the stable and healthy development of the insurance industry.

Future research can further understand how different aspects of Digital transformation, such as artificial intelligence and blockchain, may have different impacts on the risk-taking behavior of the insurance industry.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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CRYPTOCURRENCY VOLATILITY AND ITS IMPACT ON EMERGING MARKETS: QUANTITATIVE ANALYSIS

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Abstract: Cryptocurrency, a booming decentralised asset designed based on the blockchain architecture, is particularly important to the market at the present time by studying the volatility risk of cryptocurrencies. In this paper, we empirically analyse the volatility risk of cryptocurrencies through quantitative analysis models, comprehensively using the Markov state transition GARCH model with skewed distribution (Skew-MSGARCH) and the autoregressive conditional volatility density ARJI model introducing the Poisson jump factor, and selecting the earliest developed and the most mature currency price volatility daily return series, to deeply explore the volatility risk of digital cryptocurrencies. risk. Finally, it can be seen through in-depth analyses that the expectation factor and information inducement are the main reasons leading to the exacerbation of the volatility risk of digital cryptocurrencies. It is recommended that this situation be optimised and improved in terms of the value function of digital cryptocurrencies themselves and the implementation of systematic risk management and regulatory innovation.As an important component of the digital economy, blockchain technology can effectively regulate and improve the volatility of digital cryptocurrencies under macroeconomic policies, thereby maintaining the security and stability of emerging financial markets.
Keywords: Cryptocurrency; Volatility; Emerging markets; Quantitative analysis

1 INTRODUCTION

With the development of blockchain technology and artificial intelligence, digital encrypted currency has gradually entered people's vision.The types of digital encrypted currencies are becoming more and more diversified, and there are various kinds of digital encrypted currencies in the world.And is greatly improved on the original basis,For example, the design of mining procedures has changed from complexity to simplicity, the flexibility of transactions and the increasing standardization of bankers.On the one hand, its existence is a reflection of the development of blockchain technology and artificial intelligence.On the other hand, it threatens national financial security and emerging finance because of its decentralization, anonymity, speculative attributes and volatility.Compared to other currencies, cryptocurrency has greater price fluctuations. Unsecured encrypted assets have no fundamental value, so their valuation mainly depends on highly volatile speculative demand. A stable currency will also be affected by price fluctuations. Because their prices in the secondary market are not always linked to the reference currency, and there is a risk of a run on the market. May cause them to deviate significantly from the pegged exchange rate. The concentration of token ownership may also affect price fluctuations in the secondary market. Therefore, the study of cryptocurrency volatility is currently the primary issue in cryptocurrency research. In recent years, due to changes in macroeconomic conditions such as policy changes, major domestic and international events, and related information disclosures, market volatility behavior has changed, leading to increased volatility risks and causing huge losses for investors, further increasing financial market risks. The risk of cryptocurrency price fluctuations is related to the cryptocurrency technology itself. Cryptocurrency technology is becoming increasingly mature, and new application scenarios are constantly emerging, all of which will have an impact on the sentiment of the cryptocurrency market. In addition, policy changes can also pose significant risks to the price of cryptocurrencies. Many countries have different attitudes towards cryptocurrencies, and policy changes often trigger severe market fluctuations. Finally, some political events in the market, such as wars, earthquakes, etc., can also pose risks to cryptocurrencies. At this point, investors usually change their investment direction, causing fluctuations in their prices.Due to risk spillover effects, it may even threaten national financial security and stability, which will have serious impacts at both the micro and macro levels. Therefore, research on the volatility of digital cryptocurrencies has become an urgent task for the development of emerging financial markets. It determines the stability of the overall monetary and financial markets and has significant significance for creating favorable international monetary order conditions.

2 EMPIRICAL ANALYSIS OF THE VOLATILITY RISK OF CRYPTOCURRENCIES

2.1 Sample Data Selection and Inspection

2.1.1 Selection of sample data

In order to better analyze the volatility behavior characteristics and volatility risks of digital cryptocurrencies, this paper takes Bitcoin as the research object and compares the volatility risks of Bitcoin.For Bitcoin, its sample data is longer than that of other cryptocurrencies, so this study is based on Bitcoin. The currency market data, as the research object, is

persuasive for studying the risk of jumping fluctuations in the digital cryptocurrency market.
Currency market data, as the research object, is convincing to study the jump volatility risk of the digital encrypted currency market. able 1 shows the top five cryptocurrencies by market capitalization.

Table 1 Top 5 Cryptocurrencies by Market Capitalization (USD)

Currency	name	Price	Circulating market value (hundred million)	Proportion of market value (%)
BTC	Bitcoin	51442.13	9622.79	59.71
ETH	Ethereum	1609.70	1850.37	11.48
ADA	Ida coin	1.25	398.49	2.47
BNB	Coin An Coin	247.49	382.46	2.37
DOT	Poca chain	37.45	363.16	2.25

As can be seen from Table 1, the market value of Bitcoin accounts for the highest proportion, as of March 3, 2023, the market value of Bitcoin accounts for 59.71%.The weight of the market value of the digital encrypted currency can show the position of the currency in the digital encrypted currency market.The larger the market value, the more dominant it is, that is, the currency can determine the trend and development of the digital encrypted currency market.

2.1.2 Descriptive statistics of sample data

Table 2 shows the descriptive statistical characteristics of the time series of the daily yield of Bitcoin. From the table, we can see that the average yield is positive.It shows that the overall return of Bitcoin is good during the sample period. From the analysis of the maximum and minimum value of its yield,The results are quite different, which shows that its income can double, but its risk can also double, and its volatility risk can not be small.From the value of its standard deviation, we can also see that the volatility of its earnings is more intense. Observing the skewness and kurtosis data, from the skewness data,The skewness of the sample yield of Bitcoin is not zero, and it is left-biased, while the kurtosis coefficient is 15.01.It is much larger than kurtosis value 3 under the standard normal, which shows that the daily return series of Bitcoin has the characteristics of sharp peak and fat tail.And from the test value of the statistic, the value is a 22069, the probability of following the standard normal distribution is 0,This also confirms the original assumption that the return series of Bitcoin does not obey the normal distribution.

Table 2 Descriptive Statistical Characteristics of Daily Return Series of Bitcoin

Sequence	Mean value	Maximum value	Minimum value	Standard deviation	Skewness	Kurtosis	J-B value	obs
Rb	0.0033	0.4246	-0.4915	0.0536	-0.267	15.627	22063	3655

2.1.3 Sample data inspection

In the data test, this study uses stationary test to analyze, which mainly includes ADF test, PP test, DF-GLS test and KPSS test.In this paper, the commonly used ADF test is mainly used. Let the original hypothesis H.There is no unit root in the time series of the yield of the digital encrypted currency, and after the ADF stationarity test,If the statistical value of ADF obtained by the test is greater than critical value, the null hypothesis is accepted, indicating the existence of a unit root.That is to say, the time series of Bitcoin yield is unstable. If the statistical value of ADF obtained by the test is less than critical value, the null hypothesis is rejected.It shows that there is no unit root, that is, the time series of Bitcoin yield is stationary.Since the perturbation term in the ADF test may be autocorrelated, a higher order ADF test is considered,First of all, the maximum lag order should be determined. According to the formula, the maximum lag order = 12 is obtained.The last order lag term is L4D, which means that when the lag order is 4, it is significantly different from zero at the 5% level.The results of the stationarity test of the daily return series of Bitcoin are summarized in Table 3 below. $P_{\max} = \left[12*\left(T/100\right)^{1/365}\right] P_{\max}$

Table 3 Stationarity Test Results of Bitcoin Daily Return Series

Sequence	ADF statistics	Prob	Significant level%	Corresponding ADF critical value
Bitcoin	-26.527	0.000	1	-3.42
			5	-2.86
			10	-2.54

In Table 3, it can be seen from the table that the ADF test statistic is significant at the 1%, 5%, and 10% significance levels.And the ADF statistics are less than critical values corresponding to the three significance levels, that is, the null hypothesis is rejected.It shows that there is no unit root in the return series of Bitcoin, and its time series is stable.GARCH modeling and parameter estimation can be carried out.

2.2 Analysis of volatility model

2.2.1 Model selection and parameter estimation

Volatility model here refers to the compound model formed by introducing volatility factors on the basis of GARCH

model.This section also shows the constant volatility density assuming a fixed volatility intensity.
Model Jump-GARCH and an autoregressive conditional volatility density model ARJI assuming time-varying volatility intensity.In this model, the value of the jump density parameter, which measures the strength of the volatility of Bitcoin, is a fixed value λ;The volatility density parameter of ARJI family model changes with time, which reflects the time-varying behavior of volatility.Because of the difference of their fluctuation density parameter equation, the influence factors of the fluctuation density parameter value are also different.
As can be seen from Table 4, in terms of model fitting, according to the report results of the maximum likelihood value LL of each volatility model,
As a result, it is found that the LL value of the constant fluctuation density model is the smallest, while the LL value of the ARJI-ht model is the largest, and the estimated results of the parameters are more significant.According to the rule that the larger the maximum likelihood value is, the better the model fitting is.It is found that the constant volatility density model with a fixed value of the volatility density parameter fits the Bitcoin yield with volatility behavior.The goodness-of-fit is not good for volatility, while the goodness-of-fit of the ARJI family model assuming that the volatility intensity is time-varying is better.Because the ARJI family model belongs to the conditional volatility density,The parameterized ARJI model allows the conditional volatility density parameter value λ to change over time,Unlike the constant volatility model, the volatility density is a fixed value, so it can improve the likelihood value.

Table 4 Parameter Estimation Results for Various Types of Volatility Jump Models

Parameter	Constant jump density model	ARJI model	ARJI- R_{t-1}^2 Model	ARJI- h_t Model
μ	0.0014（0.00）	0.0013（0.00）	0.0015（0.00）	0.0015（0.00）
Φ_1	0.0080（0.65）	-0.0081（0.63）	-0.1172（0.00）	-0.1481（0.00）
Φ_2	-0.0281（0.11）	-0.0350（0.04）	-0.0395（0.01）	-0.0484（0.00）
ϖ	0.0000（0.17）	0.0000（0.00）	0.0000（0.04）	0.0000（0.02）
α	0.1413（0.00）	0.1037（0.00）	0.0493（0.00）	0.0382（0.00）
β	0.7387（0.00）	0.6010（0.00）	0.7758（0.00）	0.7492（0.00）
ζ_1	0.0552（0.00）	0.0436（0.00）	0.0352（0.00）	0.0220（0.00）

Next, analyze the meaning represented by the estimated result value of each model parameter in Table 4 in Table 4, observe and analyze the parameter estimate results of each fluctuation model, and select several important parameter estimates here to explain to distinguish the effect of different models on the fluctuation fitting of cryptocurrencies. The main explanation only exists in the ARJI family model. Parameter estimates, and analyze the fluctuation characteristics of cryptocurrencies in combination with the parameter estimates. We discuss and further understand the fluctuation behavior of cryptocurrencies based on the following points:
(1) For the parameter estimate μ , this parameter can be used to judge whether the jump direction is asymmetrical. It can be seen from the table that the constant jump model and the standard ARI model cannot recognize the asymmetry of the jump behavior, andARJI- R_{t-1}^2 AndARJI- h_t Model's μ , the parameters can well portray the asymmetry of jump fluctuations, that is, the impact of negative jumps and positive jumps on future fluctuations is inconsistent. However, it can be seen from the data in the table thatARJI- R_{t-1}^2 AndARJI- h_t , model's μ , the parameter value is significantly positive, indicating that during the sample survey, there is no asymmetrical feature of the jump fluctuation of Bitcoin after the collapse of the value.
(2) And the parameter estimate ϖ .It can be used to describe the probability of jumping behavior jumping from one period to another. For example, for the standard ARII model, its ϖ The estimated value of the parameter is 0.9787, which corresponds to ϖ The value is 0.00, indicating that the high jump behavior during this period often follows the probability of a high jump in the future. And forARJI- R_{t-1}^2 Model andARJI- h_t Model's ϖ The parameter estimates are 0.9878 and 0.9870 respectively, and the corresponding ϖ The value is very significant, which further shows that the jumping behavior is agglomeration.
(3) Parameter estimate α , it indicates that the jump intensity parameter is relative to the past impact. ζ_t The sensitivity of -1, for the ARJI family model, its sensitivity is also different due to the different factors affected by its jump intensity coefficient. For example, for the standard ARI model, when ζ_{t-1}, each additional unit will lead to the inhibitory effect of the jump density in the next period of 0.2099: forARJI- R_{t-1}^2 In the model, the inhibitory effect of its past impact on the next period is 0.1051; while for the ARII model, the inhibitory effect of its past impact on the next period is only 0.0591. From the empirical results, we can find that the better the model fitting, the weaker the inhibitory effect of the past impact on the future, that is, the better the model fit, the more it can portray the impact of the past impact on the future fluctuations of cryptocurrencies.

2.2.2 Drawing instructions for the volatility intensity of cryptocurrency

In order to have a more intuitive visualization of the price fluctuation jump intensity characteristics of digital cryptocurrencies, such as time change and aggregation understand, we draw the time series diagram of the jump intensity parameter of Bitcoin during the sample survey as shown in Figure 1.In order to have a deeper understanding of the risk of jumping fluctuations of digital cryptocurrencies.

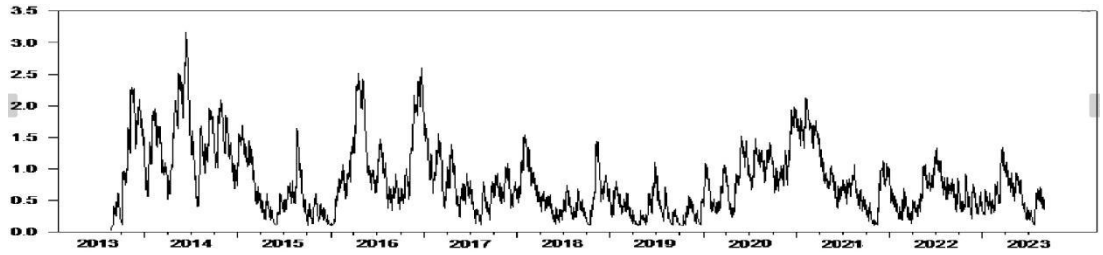

Figure 1 Fluctuation Intensity Chart

It can be seen from Figure 1 that the density parameters of cryptocurrency fluctuations can change over time, indicating that the fluctuation intensity value is time-variable, and it is inappropriate to assume that the constant fluctuation density model is a fixed value. It is not difficult to see from the figure that the characteristics of fluctuation behavior are continuous and aggregate, that is, at some times, the number of fluctuations will increase, and the magnitude of fluctuations will sometimes increase. Specifically, during the selected sample inspection period, the cryptocurrency price fluctuated sharply for the first time around 2011 and the price reached $1 for the first time, and the cryptocurrency price reached its peak at the end of 2017 and 2019, especially at the end of 2017, from It can also be seen from the figure that the volatility intensity of cryptocurrencies during these periods has also increased.

Of course, we can also see from the figure that the size and value of the fluctuation intensity in different periods of time are also different, sometimes higher and sometimes lower. Is this speculation whether this result is related to the fluctuation of yield? It is speculated that the relationship between the fluctuation of yield and the corresponding fluctuation intensity value is: the greater the fluctuation of the yield, the higher the corresponding conditional fluctuation density value may be. On the contrary, the lower the fluctuation of the yield, the lower the corresponding conditional fluctuation density value. In order to prove this conjecture, this paper selects the data of the end of 2021 and the first 15 days of the end of the second quarter of 2023, and draws its yield fluctuation and its corresponding fluctuation intensity parameter values as shown in Figure 2.

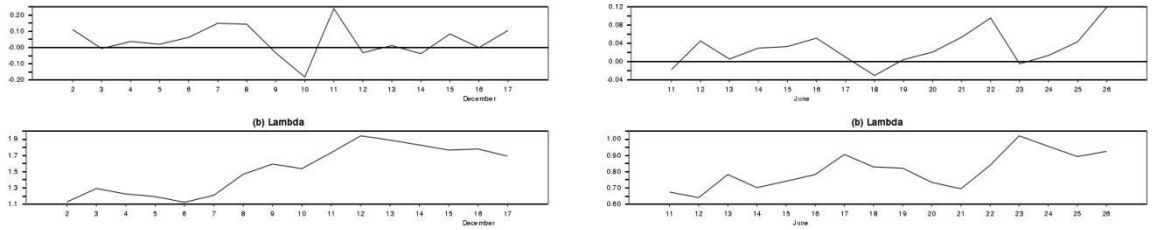

Figure 2 The First 15-day Yield R (above) and the Corresponding Fluctuation Intensity λ (Part 2) Trend Chart

It is best to observe the changes in the conditional volatility intensity coefficient before the peak of cryptocurrency by observing the volatility of the yield and its corresponding volatility intensity values in Figure 2. No one can say for sure that there is still room for the value of cryptocurrency to rise before reaching its peak. In addition to mining capabilities and investor sentiment, it may also be related to external environmental factors such as macro policy regulation. To be precise, the price of cryptocurrency reached its first historical peak on December 17, 2017, with a price equivalent to approximately 120000 US dollars, which is an unprecedented historical high. On June 26, 2019, it reached its second historical peak with a price equivalent to approximately 87000 US dollars. When the value of a currency reaches its peak, its value cannot continue to rise. Because we know the numbers from the above theory. There are a lot of speculative foam in the price of cryptocurrency. Once the foam bursts, the price will fall. Collapse is inevitable.

In addition, observing Figure 2, it was found that the fluctuation of λ before the peak of the two cycles showed an overall upward trend.

This indicates that the results show that the intensity of volatility increases with the increase of returns, and after reaching a certain level, there will be a decline, ultimately leading to a price drop in the cryptocurrency market. Just like the mortgage crisis in 2008, it is only a matter of time before the foam will burst.

2.2.3 Discussion and analysis of results

In this section, constant fluctuation density models and autoregressive conditional fluctuation density ARJI family models were used. In this study, for ARJI family models with jump distribution, it is assumed that the jump intensity values are time-varying. It can better explain the jumping phenomenon of price fluctuations in digital cryptocurrencies represented by Bitcoin. In addition, to examine the relationship between the volatility of cryptocurrencies and emerging markets, we chose two significant fluctuations in the development of Bitcoin over the past 10 years as the analysis objects. Comparing the returns of the first 15 days before the peak of the two sub sample intervals with the

corresponding jump intensity values, it was found that volatility increases with the development of the market. Therefore, we need to explore the nature of the development of emerging markets, whether it is the foam or the cryptocurrency market, which is the key to its research and also its rationality

3 Conclusion

The inherent financial properties of cryptocurrencies and the potential of decentralized technology behind them have attracted widespread attention. It has gradually become a popular research field in financial technology. However, in the process of development and promotion, the fluctuation trend of cryptocurrencies. This will have a serious impact on the prices and markets of emerging financial currencies.Therefore, in the empirical part of the research, this article further explores, including analyzing the reasons for the jumping volatility of cryptocurrencies and the impact of jumping volatility on investment and financial markets. Based on this, relevant policy recommendations and inspirations are given for the future development of digital cryptocurrencies from the perspectives of their value function and risk regulatory measures.In the future, with the development of the digital cryptocurrency market, the correlation between the spot and futures markets of digital cryptocurrencies and the financial market relationship will increase. Here, new models can be established to analyze their dynamic relationship, or to examine the impact of important news on the market, analyze the correlation between markets and their risk spillover effects, and gain a deeper understanding of the volatility of digital cryptocurrencies.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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EFFECT EVALUATION AND FUTURE TREND OF FEDERAL RESERVE'S INTEREST RATE REDUCTION POLICY —— BASED ON THE ANALYSIS OF AMERICAN ECONOMIC SITUATION

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Abstract: Under the background of the increasingly close connection of the global economy, the Federal Reserve, as the leader of the financial system in the United States and even the world, undoubtedly affects the nerves of the global market with every adjustment of its monetary policy. As an important means for the Federal Reserve to cope with the downward pressure on the economy, stimulate economic growth, ease the pressure of deflation and stabilize the financial market, interest rate reduction policy has been frequently adopted in recent years. This paper aims to deeply analyze the multi-dimensional impact of the Federal Reserve's interest rate cut policy, and carefully evaluate its far-reaching impact on economic growth, inflation level, employment situation and financial market operation by comprehensively applying economic theoretical analysis and empirical research methods. At the same time, based on the current internal and external challenges facing the US economy, this paper will reasonably predict the future adjustment direction of the Federal Reserve's monetary policy and the possible economic effects, with a view to providing valuable reference for investors, policy makers and even global economic participants.
Keywords: Fed cuts interest rates; Economic analysis; Empirical research

INTRODUCTION

With the increasing uncertainty of the global economic environment, including trade tensions, geopolitical risks and the global epidemic of COVID-19, the adjustment of the Fed's monetary policy has once again become the focus of market attention. As an effective tool to cope with the downward pressure on the economy, the interest rate reduction policy's effect evaluation and judgment of its future direction are not only related to the stability and development of the American economy, but also have a far-reaching impact on the global economic structure. This paper will not only review the historical practice of the Federal Reserve's interest rate cut policy, but also focus on the current challenges facing the American economy, and deeply discuss the actual effects of the interest rate cut policy in promoting economic growth, controlling inflation, improving employment and stabilizing financial markets. At the same time, combined with the domestic and international economic situation, this paper will make a forward-looking discussion on the possible adjustment direction of the Federal Reserve's monetary policy in the future, with a view to providing useful insights for global economic participants.

1 THE HISTORICAL BACKGROUND AND THEORETICAL BASIS OF THE FED'S INTEREST RATE CUT POLICY

1.1 Historical Background of Interest Rate Reduction Policy

Since the establishment of the Federal Reserve in 1913, the interest rate reduction policy has become one of its key control measures in the economic field, especially to cope with the severe situation of economic recession and deflationary pressure. Looking back at history, in the long river of economic development, the interest rate reduction policy has played an important role many times. The global financial crisis in 2008 swept like a huge storm, which dealt a heavy blow to the world economy. After that, the Fed quickly implemented a round of quantitative easing policy that lasted for several years. In this process, through a series of measures, such as reducing interest rates on a large scale, buying a large number of government bonds and mortgage-backed securities, it is like injecting a steady stream of fresh water into the dry market, that is, injecting huge liquidity into the market. The purpose of this series of operations is clear, aiming at stimulating economic growth and building a protective wall under the haze of deflation to prevent the economy from falling into a more serious deflationary dilemma.

In recent years, the global economic structure has changed rapidly, and the uncertainties are increasing day by day, like a haze hanging over the road of economic development. At the same time, the pace of domestic economic growth in the United States has gradually slowed down, which undoubtedly brings new challenges to economic development. Under this dual pressure, the Fed had to start the interest rate cut cycle again. The logic behind this decision is clear, that is, I hope to inject new vitality into economic activities by reducing the borrowing cost, thus boosting the whole economic system and enabling the economy to return to the track of stable growth.

1.2 Theoretical Basis of Interest Rate Reduction Policy

The theoretical basis of interest rate reduction policy is deeply rooted in the two core areas of monetary policy transmission mechanism and liquidity effect. As an important means of economic regulation, monetary policy exerts influence on economic activities by carefully adjusting the interest rate level, and this influence is realized through various channels. Among them, the transmission mechanism of monetary policy mainly covers many important aspects such as interest rate channel, credit channel, asset price channel and exchange rate channel.

When the interest rate reduction policy is implemented, its impact is multi-dimensional. From the perspective of enterprises and individuals, interest rate cuts can effectively reduce their borrowing costs. This is like reducing their burden in economic activities, making enterprises have more funds for investment activities such as expanding production, R&D and innovation, and individuals are more willing to spend, such as buying real estate, cars and other commodities or increasing daily consumption expenditure. This increase in willingness to consume and invest is like injecting strong power into the engine of economic growth, thus effectively stimulating economic growth.

In addition, interest rate cuts also play a vital role in the financial market. It can significantly improve the liquidity of the financial market and make the funds flow more smoothly in the market, just like dredging the meridians of the financial market. This will not only help financial institutions to carry out their business better, but also reduce the risks faced by financial markets. In terms of the stability of the financial system, the role of interest rate cuts cannot be ignored. It can enhance the stability of the financial system and make the whole financial system more resilient in the face of internal and external shocks, just like laying a solid foundation for the financial building and providing a strong guarantee for the stable development of the economy. These rich and profound theoretical foundations have built a solid and incomparable support for the Fed to implement the interest rate reduction policy, so that it has rules to follow on the road of economic regulation.

2 EVALUATION OF THE EFFECT OF THE FED'S INTEREST RATE CUT POLICY

2.1 Impact on Economic Growth

During the period from July 2019 to March 2020, the Federal Reserve cut interest rates three times, which made the federal funds rate drop from 2.5% to the extremely low level of 0%-0.25%. In this process, although the global economy suffered the sudden and huge impact of the COVID-19 epidemic, like a storm that caused serious damage to the economic order, the GDP growth rate of the United States showed an upward trend in the short term. It climbed from 2.1% in the fourth quarter of 2019 to 3.5% in the third quarter of 2020. This data change strongly demonstrated the positive role of interest rate reduction policy in promoting economic growth to a certain extent.

The interest rate reduction policy mainly plays a role through the core mechanism of reducing borrowing costs. When the cost of borrowing is reduced, it is like opening a more relaxed door for the economic activities of enterprises and individuals. As far as enterprises are concerned, they can obtain funds at a lower cost, so they have more motivation to expand production scale, increase investment in new technology research and development, or carry out new investment projects, such as building new factories and purchasing advanced equipment. For individuals, the lower borrowing cost makes it more attractive to buy real estate, cars and other large-scale consumption, and it will also stimulate the increase of daily consumption. This increase in consumption and investment willingness is like two powerful engines, which jointly push the wheel of economic growth forward.

Many empirical studies also fully show that the interest rate reduction policy has a positive impact on economic growth. For example, in the interest rate cut cycle from 2019 to 2020, the Federal Reserve effectively promoted economic growth by lowering the federal funds rate. However, it should be noted that the effect of interest rate reduction policy does not exist in isolation, and it will be influenced by many other factors. Fiscal policy is one of the important factors, and the government's fiscal expenditure and tax policy will work together with the interest rate reduction policy on economic growth. For example, if the government increases fiscal expenditure for infrastructure construction during the interest rate cut, the promotion of economic growth may be more significant; On the other hand, if fiscal tightening, it may offset the positive effect of interest rate reduction policy to some extent. The international trade environment can not be ignored. The increase or decrease of trade barriers and the change of international market demand will affect domestic economic growth. In addition, technological progress will also have an impact on the effect of interest rate reduction policy. The application of new technologies may change the industrial structure and production efficiency, thus jointly shaping the trend of economic growth with interest rate reduction policy.

2.2 Impact on Inflation

During the period when the Federal Reserve cut interest rates from 2019 to 2020, the year-on-year growth rate of the consumer price index (CPI) in the United States showed a relatively stable fluctuation state between 1.5% and 2.5%, and there was no obvious upward trend. The appearance of this phenomenon may be the result of the joint action of many factors. On the one hand, the domestic supply-demand relationship kept a good balance during this period, and the coordination between production and consumption made the price not fluctuate greatly. For example, the production capacity of various industries can better meet the needs of consumers, and there is no serious shortage or oversupply in the market. On the other hand, international commodity prices remained stable at this stage, which also created favorable external conditions for the stability of domestic prices. The prices of international commodities such as oil and metals have not risen or fallen sharply, which makes the costs of enterprises relying on these raw materials relatively stable, thus avoiding the sharp price fluctuations caused by cost changes.

In September 2024, after the Federal Reserve cut interest rates by 50 basis points again, the inflation rate of PCE (Personal Consumption Expenditure Price Index) and core PCE declined slightly, but it still fluctuated between 2% and 3%. This situation fully reflects that the impact of interest rate cuts on inflation is highly complex and uncertain.

By stimulating economic activities, interest rate cuts may theoretically increase aggregate demand. When enterprises and individuals increase their investment and consumption due to the reduction of borrowing costs, the demand for goods and services in the market will increase accordingly, which may push up the inflation level to some extent. However, the change of inflation is not only determined by the interest rate reduction policy, but also affected by a variety of complex factors. The relationship between supply and demand is one of the key factors. When the market supply can be flexibly adjusted to meet the changes in demand, even if the demand increases, inflation may not rise significantly. On the other hand, if the supply is limited, the increase in demand will easily lead to inflation. The expected effect should not be underestimated. Consumers' and enterprises' expectations of future prices will affect their current consumption and pricing behavior. If the expected prices are stable, the promotion of inflation will be weakened. In addition, the fluctuation of international commodity prices will also have an important impact on inflation, and the rise and fall of commodity prices in the international market will be directly or indirectly transmitted to the domestic price system. Empirical research also clearly shows that the impact of interest rate cuts on inflation is very uncertain. In some specific cases, interest rate cuts may lead to an increase in inflation, such as in a market environment with less supply elasticity and strong demand; In other cases, due to the imbalance between supply and demand (such as oversupply) or the falling international commodity prices, interest rate cuts may not effectively stimulate economic activities and thus have a significant impact on inflation.

2.3 Impact on Employment

During the Federal Reserve's interest rate cut from 2019 to 2020, the unemployment rate in the United States dropped from 3.7% to 3.5%. This data change directly reflects the positive impact of interest rate cut policy on the job market.

After the interest rate cut in September 2024, although the unemployment rate forecast has increased, it still maintains a relatively strong trend from the perspective of the overall job market. Behind this phenomenon may be the result of the interweaving of many factors. The change of labor market structure is one of the important factors. With the development of economy, the composition and characteristics of labor market may have changed. For example, the rise of emerging industries may attract more labor, and the requirements of these industries for labor skills are different from those of traditional industries, which may lead to the structural adjustment of the job market. At the same time, the improvement of production efficiency brought by technological progress has also had an impact on the job market. The application of new technology may enable enterprises to increase production without increasing a large number of labor, which changes the relationship between supply and demand in the job market to a certain extent, but it may also create some new employment opportunities, such as jobs related to the research and development and maintenance of new technologies.

The positive impact of interest rate reduction policy on employment is mainly achieved by promoting economic growth. When the interest rate reduction policy reduces the borrowing cost of enterprises, the profitability of enterprises is improved. Enterprises have more funds to expand production scale or start new business, which will increase the employment demand for labor. From the perspective of empirical research, the conclusion that interest rate reduction policy has a positive impact on employment is supported by a large number of data. However, the improvement of the job market is a complicated process, which is also influenced by many other factors. In addition to the aforementioned labor market structure and technological progress, the international trade environment will also have an effect on employment. For example, international trade friction may lead to the reduction of orders of some export-oriented enterprises, thus reducing the number of employees; A good international trade environment may promote the development of related industries and increase employment opportunities. These factors are intertwined, which may lead to differences in the impact of interest rate reduction policies on employment in different regions and industries.

2.4 Impact on Financial Markets

During the Federal Reserve's interest rate cut from 2019 to 2020, the S&P 500 index of the United States rose by about 20%, which clearly reflected the positive impact of the interest rate cut policy on the financial market.

After the interest rate cut in September, 2024, the S&P 500 index and the Nasdaq index rose all the way to a new high, which further proved conclusively that the interest rate cut policy had a powerful boosting effect on the financial market. However, when analyzing the impact of interest rate cuts on financial markets, we can't ignore the possible impact of fluctuations in international financial markets on its effectiveness.

The interest rate reduction policy has a significant and multi-dimensional impact on the financial market. From the perspective of risk reduction, interest rate cuts can reduce the risk of financial markets. The lower interest rate environment reduces the debt repayment pressure of enterprises and financial institutions and the risk of default, thus enhancing the stability of the entire financial market. In terms of improving market liquidity, interest rate cuts promote the smooth flow of funds in the financial market. Investors are more willing to put money into financial markets, because lower interest rates make other investment channels less attractive. This inflow of funds has increased the liquidity of the financial market and made the trading of financial assets such as stocks and bonds more active. From the perspective of rising asset prices, interest rate cuts have promoted the rise of asset prices such as stock market and bond

market. For the stock market, the lower interest rate reduces the financing cost of enterprises and improves the profit expectation of enterprises, thus attracting more investors to buy stocks and pushing the stock price up; For the bond market, the bond price is inversely related to the interest rate, and the interest rate cut makes the price of issued bonds rise. Empirical research also fully shows that under normal circumstances, interest rate cuts have a positive impact on financial markets.

3 THE FUTURE TREND OF THE FED'S INTEREST RATE CUT POLICY

3.1 Current US Economic Status and Challenges

In the third quarter of 2024, the annualized growth rate of GDP in the United States was 2.6%, which was lower than market expectations, reflecting the trend of slowing economic growth. In the third quarter of 2024, the inflation rate of PCE in the United States was 2.3%, which was higher than the 2% target set by the Federal Reserve, indicating that inflationary pressure was rising. At the end of 2024, the unemployment rate in the United States is predicted to be 4.4%, which is higher than the pre-epidemic level, reflecting the uncertainty in the job market.

At present, the American economy faces multiple challenges. On the one hand, economic growth is slowing down, inflationary pressure is rising, and the job market remains strong but uncertain. On the other hand, the international trade environment is complex and changeable, and geopolitical risks increase, posing a potential threat to the American economy. These challenges make the Fed need to weigh various factors when formulating monetary policy to ensure the maximum policy effect.

3.2 Possibility and Uncertainty of Future Interest Rate Reduction Policy

The market expects the Federal Reserve to cut interest rates by 25 basis points in November and December 2024, respectively, but there are variables. This reflects the uncertainty of the market's expectation for the adjustment of the Fed's monetary policy.

Nomura Securities economists predict that the Fed will cut interest rates only once in 2025, while Goldman Sachs economists believe that the Fed will cut interest rates by 25 basis points in June and September 2025, respectively. This further proves that there are differences in the market's prediction of the future direction of the Fed's interest rate cut policy.

The possibility and uncertainty of the Fed's interest rate cut policy in the future will increase significantly. On the one hand, the slowdown of economic growth and rising inflationary pressure provide reasons for the Fed to cut interest rates. However, on the other hand, the strong job market, the uncertainty of the international trade environment and geopolitical risks limit the Fed's interest rate cut. In addition, we also need to take into account the financial market's response to the interest rate cut policy, changes in market expectations and the development of the international economic situation.

3.3 Forecast of the Impact of Interest Rate Reduction Policy on American Economy

The impact of future interest rate cuts on the US economy is uncertain. On the one hand, interest rate cuts may promote economic growth, improve the job market and reduce financial market risks. On the other hand, cutting interest rates may also lead to rising inflation, increasing debt levels and increasing financial market volatility. Therefore, the Fed needs to weigh various factors when formulating the interest rate reduction policy to ensure the maximum effect of the policy. At the same time, it is necessary to pay close attention to the development and changes of the domestic and international economic situation and adjust monetary policy in time to deal with potential risks.

Empirical prediction and risk assessment;

If the Fed continues to cut interest rates, it may promote economic growth to around 3%, but inflation may rise to above 2.5%. This reflects the inflationary pressure that the interest rate reduction policy may bring while promoting economic growth.

If the Fed suspends interest rate cuts or interest rate increases, it may control inflation but restrain economic growth. This further proves that the Fed needs to weigh the balance between economic growth and inflation when formulating monetary policy.

4 POLICY RECOMMENDATIONS AND CONCLUSIONS

4.1 Policy Recommendations

In view of the uncertainty of the current US economic situation and the future interest rate reduction policy, this paper puts forward the following policy suggestions:

Strengthen the coordination between monetary policy and fiscal policy: by strengthening the coordination between monetary policy and fiscal policy, improve the policy effect, promote economic growth and stabilize inflation. This will help to form a policy synergy and better cope with the downward pressure on the economy.

Pay close attention to international trade and geopolitical risks: Pay close attention to the changes of international trade environment and geopolitical risks, and adjust monetary policy in time to deal with potential threats. This helps to

enhance the resilience and stability of the economic system.
Strengthen financial supervision and risk prevention: strengthen financial supervision to prevent financial market risks and ensure the stability and development of financial markets. This will help maintain the healthy operation of the financial system and provide strong support for economic growth.

4.2 Conclusion

Through the in-depth analysis of the effect evaluation and future trend of the Fed's interest rate reduction policy, this paper draws the following conclusions:
The interest rate reduction policy has a significant impact on economic growth, inflation, employment and financial markets. By reducing borrowing costs, stimulating economic activities, improving the job market and reducing financial market risks, the interest rate reduction policy has had a far-reaching impact on the US economy.
The uncertainty of the future interest rate cut policy has increased significantly. At present, the American economy is facing multiple challenges, and the possibility and uncertainty of future interest rate reduction policy have increased significantly. When formulating the interest rate reduction policy, the Fed needs to weigh various factors to ensure the maximum effect of the policy. At the same time, it is necessary to pay close attention to the development and changes of the domestic and international economic situation and adjust monetary policy in time to deal with potential risks.
Policy recommendations are targeted and operable. In view of the uncertainty of the current American economic situation and the future interest rate reduction policy, the policy suggestions put forward in this paper are targeted and operable. These suggestions help to enhance the resilience and stability of the economic system and provide strong support for economic growth. At the same time, it also provides useful insights and references for global economic participants.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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PATHWAYS TO REGIONAL COORDINATED DEVELOPMENT FROM THE PERSPECTIVE OF EMERGING PRODUCTIVE FORCES

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Abstract: This study aims to explore the mechanisms and pathways through which new-quality productivity (NQP) drives regional coordinated development. By systematically reviewing existing literature and analyzing case studies, this paper delves into the contributions of NQP to regional economic development, particularly in terms of technological innovation, industrial structure optimization, and balanced factor mobility. The results indicate that NQP, with its efficient resource utilization and innovation-driven characteristics, effectively promotes the transformation and upgrading of traditional industries within regions and narrows development gaps between regions by facilitating the cross-regional flow of factors. The study concludes that the promotion of NQP requires not only policy support and infrastructure development but also the formulation of tailored development strategies based on regional characteristics to achieve coordinated and sustainable regional economic development.
Keywords: New-quality productivity; Regional coordinated development; Industrial structure optimization

1 INTRODUCTION

Regional coordinated development serves as a key foundation for high-quality development, an essential component of achieving common prosperity, and a critical factor in advancing Chinese-style modernization. Since the 18th National Congress, China has actively pursued a regional coordinated development strategy. Anchored in six major regional strategies and supported by four major regional clusters, this approach has shaped a new pattern of high-quality development characterized by regional synergy. A significant objective outlined during the 20th National Congress is to advance regional coordinated development. In his report, the Chinese President highlighted the importance of promoting regional coordination by deeply implementing regional development strategies, major regional initiatives, functional zoning strategies, and new urbanization strategies, as well as optimizing the distribution of major productive forces to build a complementary, high-quality regional economic and spatial system.

Since the concept of NQP was mentioned twice during the Chinese President's inspection in Northeast China in September 2023, research on NQP has been on the rise. However, existing studies mostly focus on internal development within single economies or productivity improvements in specific industries, with limited attention to the specific mechanisms and pathways of NQP in regional coordinated development [1]. With increasing demands for quality development across regions, it has become a research hotspot to examine how NQP can drive regional coordination through technological progress, industrial structure optimization, and rational allocation of human resources. In March 2024, the Chinese President proposed "developing NQP according to local conditions," making the understanding and implementation of this approach an important direction for the next phase of regional and industrial economic development in China.

NQP, as a fundamental outcome of breakthrough technological innovations and cross-disciplinary integration, possesses two dimensions: sustainable and leapfrogging drives. It is pivotal for less-developed regions to catch up and surpass. While developing NQP brings new opportunities for regional economic coordination, it also poses new challenges. The critical question that urgently needs answering is how to develop NQP without exacerbating regional disparities and promote regional economic coordination by optimizing the layout of NQP.

This paper explores the application and impact mechanisms of NQP in regional economic development to provide theoretical support for new models of regional coordinated development. First, it reviews the literature to summarize the basic concept and development trends of NQP and analyze its potential for regional economic integration. Next, it theoretically investigates the mechanisms through which NQP influences regional coordinated development and uses case studies to examine the practical effects and lessons of NQP across different regions. Finally, based on research findings, it proposes policy recommendations to provide feasible pathways for regions with varying levels of development to leverage NQP for coordinated development. Through these analyses, this study aims to offer policymakers, enterprises, and research institutions effective strategies for the application of NQP in regional coordination.

2 LITERATURE REVIEW

2.1 New-Quality Productivity and Balanced Factor Mobility

Existing studies indicate that NQP is characterized by its efficient resource integration capabilities and low environmental burden. By leveraging technological innovation and information technology, NQP enhances productivity while reducing resource consumption. Research highlights that the introduction of advanced information technologies

and management models enables NQP to optimize production processes while increasing product value, thereby having a profound impact on sustainable regional economic development [2].

Notably, NQP is highly innovative. It not only relies on traditional production factors but also emphasizes the use of knowledge, data, and managerial innovation, which collectively drive the intelligent transformation of regional economies. Meanwhile, regional coordinated development is a focal point for governments and scholars worldwide. Originating from regional economics, this concept refers to the balanced economic development across regions through the rational allocation and effective utilization of resources within and beyond regions. Regional coordination does not imply complete homogeneity in regional development; rather, it stresses mutual complementarity and promotion of economic activities based on reasonable resource and industrial distribution, achieving overall balance and synergy [3].

Classical regional development theories, such as growth pole theory, location theory, and regional innovation systems, provide a theoretical foundation for understanding the mechanisms of regional coordination [4]. These theories generally suggest that through industrial clustering, regional specialization, and technological innovation, regions can achieve mutual benefits and resource sharing, thus improving overall economic efficiency and mitigating regional imbalances [5].

2.2 New-Quality Productivity and Industrial Structure Optimization

Recent years have witnessed growing interest in the impact of NQP on regional coordinated development, prompting scholars to conduct multi-dimensional research. First, NQP plays a vital role in upgrading regional industrial structures [6]. Literature shows that as NQP advances, traditional industries within regions gain access to technological support and innovation resources, facilitating the extension of industrial chains and optimization of value chains [7].

For instance, studies highlight how NQP, through data-driven insights and intelligent manufacturing, accelerates the transformation of the manufacturing sector, further driving industrial renewal. This transformation not only improves production efficiency but also fosters the emergence and growth of new industries, injecting fresh impetus into regional economies. Particularly in high-tech industrial clusters, the application of NQP promotes specialization and resource integration, tightening internal and external economic linkages.

2.3 New-Quality Productivity and Technological Innovation

Many scholars have examined how NQP fosters synergistic effects in regional coordinated development [8]. For example, cross-regional collaboration is critical to unlocking the value of NQP. By enabling the cross-regional flow of innovation and technological resources, regions can share complementary resources and promote collective development. This process hinges on the establishment of intra- and inter-regional cooperation mechanisms, such as industrial clusters and regionally linked science parks, to facilitate the rapid circulation and rational allocation of innovative resources.

Studies reveal that cross-regional collaboration breaks down geographical barriers, promotes interregional knowledge exchange, reduces technological barriers, and offers underdeveloped regions innovation-driven development opportunities. In nations with uneven economic development, regional cooperation can leverage the linkage effects of NQP to promote balanced development across regions [9]. This is analogous to the synergistic effects observed in medical treatments involving combinations of drugs: by optimizing resource allocation and mechanisms, the overall therapeutic outcomes improve. Similar synergies apply in regional coordinated development, especially in underdeveloped regions where resource sharing catalyzes transformative growth [10].

Nevertheless, gaps remain in the current research on the relationship between NQP and regional coordinated development. First, most studies focus on case analyses of single regions or industries, lacking generalizable theoretical models. For instance, the outcomes of NQP applications may vary depending on regional characteristics and policy environments, necessitating comparative studies across regions to identify differentiated pathways for realizing the value of NQP.

Second, insufficient attention has been given to the intrinsic driving mechanisms of NQP. How NQP spreads across regions through specific industrial chains, as well as the potential obstacles in this diffusion, remain underexplored both theoretically and empirically.

Third, the role of policy support in facilitating NQP's contribution to regional coordinated development has not been systematically addressed. The expansion and application of NQP depend on supportive policies, such as infrastructure development, incentives for technological innovation, and talent cultivation. However, existing studies lack a comprehensive examination of the role of policy measures in NQP diffusion.

Lastly, there is limited research on how to develop NQP according to local conditions while avoiding the exacerbation of regional disparities. Most studies rely on qualitative analysis, with insufficient quantitative research to test whether the proposed theoretical approaches are suitable for specific regions' coordinated development.

3 THEORETICAL ANALYSIS

NQP profoundly impacts regional economic development through various pathways, including technological innovation, resource integration, and industrial structure optimization. Within the context of regional coordinated development, the mechanisms of NQP's influence are reflected in the following aspects:

3.1 NQP Drives High-Quality Growth in Regional Economies through Technological Innovation

In traditional production models, regional development is often constrained by resources, capital, and labor inputs. This limitation is particularly evident in resource-scarce or underdeveloped regions. The emergence of NQP changes this scenario by placing technological innovation at its core. Through the integrated application of advanced technologies such as big data, artificial intelligence, and the Internet of Things, NQP enhances resource utilization efficiency and production effectiveness.

Technological innovation not only directly improves the production efficiency of regional enterprises but also strengthens their market competitiveness, enabling them to gain an edge in regional competition. Additionally, the introduction and dissemination of new technologies allow different regions to integrate production resources more effectively, achieving a rational distribution of economic activities and efficient resource utilization. This dynamic interaction is akin to the interdependence of elements in a complex system. For example, scholars have applied traditional Chinese medicine theories to study the multidimensional representation and intrinsic connections of digestive ulcers, providing insights for understanding the collaborative relationships among economic activities across regions [11].

3.2 NQP Optimizes Regional Industrial Structures and Enhances Collaborative Development Capabilities

In regional coordinated development, optimizing the industrial structure is a crucial prerequisite for achieving high-quality economic growth. NQP facilitates the transformation and upgrading of traditional industries, making them more technologically advanced and competitive.

For instance, under the influence of NQP, the manufacturing industry is transitioning towards intelligent manufacturing. By incorporating smart technologies and automation equipment, production efficiency and product quality improve while costs decrease. Simultaneously, NQP supports the emergence of new industries, such as high-tech industries, green industries, and modern service industries, which are becoming increasingly prominent in regional economies.

This restructuring and optimization of the industrial structure enable greater synergy in internal and external regional economies. Resources can be shared, and comparative advantages can be realized on a larger scale. Just as karyotype analysis reveals how subtle genetic changes can profoundly impact overall function, the application of NQP in regions must consider localized characteristics to formulate more targeted strategies [12].

3.3 NQP Facilitates the Flow and Balanced Distribution of Factors across Regions

One of the core elements of regional coordinated development is the rational allocation and mobility of factors, including capital, technology, and labor. NQP enhances factor mobility and sharing by breaking geographical constraints, allowing resources, technology, and management expertise from developed regions to reach underdeveloped areas and reduce regional disparities.

For example, the widespread adoption of the digital economy enables enterprises in remote areas to access market information and technological resources from developed regions, improving their production capacity and competitiveness. Additionally, NQP fosters talent mobility between regions, attracting and cultivating skilled professionals to strengthen regional innovation capabilities and development potential.

NQP also contributes to the establishment of regional innovation ecosystems, which are crucial for regional innovation activities. Through the sharing of technological resources, policy support, and inter-enterprise collaboration, dynamic innovation networks are formed. NQP provides the technical and data foundation for these ecosystems, enabling more effective cooperation and resource sharing among enterprises, research institutions, and government entities within regions.

3.4 NQP Benefits from Policy-Oriented Advantages in Regional Coordinated Development

To promote the diffusion and development of NQP, governments at various levels are increasingly emphasizing support for technological innovation in regional coordinated development policies. This includes measures such as innovation funds, tax incentives, and infrastructure development to encourage the dissemination and application of NQP across regions.

Policy support not only accelerates the adoption of NQP in the short term but also ensures long-term collaboration and innovation activities across regions. For instance, policies designed to support innovative enterprises and research institutions can effectively incentivize innovation investment, fostering scientific and technological collaboration within and beyond regions. Moreover, governmental support in infrastructure development reduces the costs associated with factor mobility, providing essential conditions for regional coordination.

In summary, NQP positively impacts regional economies through technological innovation, industrial structure optimization, factor mobility, innovation ecosystem construction, and policy support. Its pathways for promoting regional coordinated development encompass not only the optimization of economic activities but also collaborative innovation and resource sharing across regions. By deeply understanding the mechanisms of NQP, regions can formulate tailored development strategies based on their unique characteristics, achieving effective resource allocation and complementary advantages to drive coordinated and balanced regional development.

4 CASE ANALYSIS

Guangdong Province, as a major economic powerhouse in China, has actively explored and practiced promoting regional coordinated development through NQP.

4.1 Practices in Shenzhen and Surrounding Areas

Shenzhen and its surrounding areas have achieved remarkable results in leveraging NQP to foster regional coordinated development. For instance, the "enclave economy" model between Pingshan and Lufeng employs strategies such as "headquarters + base," "R&D + production," and "production + services" to extend the "industrial chain +" across regions. This approach guides enterprises to expand capacity and deploy projects in Lufeng, optimizing resource allocation and fostering industrial collaboration between regions.

For example, high-tech enterprises in Pingshan have relocated production processes to Lufeng, taking advantage of the latter's land and labor resources to reduce production costs while bringing advanced technologies and management expertise to Lufeng. This initiative has contributed to industrial upgrading and development in Lufeng.

Similarly, the Shenzhen-Shantou Special Cooperation Zone serves as another exemplary case of regional coordinated development driven by NQP. Located at the easternmost edge of the Guangdong-Hong Kong-Macao Greater Bay Area, the zone capitalizes on its geographic advantage of "land-sea linkage and east-west connection." With the new energy vehicle industry as its core, the cooperation zone actively cultivates NQP. By attracting leading companies such as BYD, it has spurred the development of the new energy vehicle industry chain and established a modern industrial system featuring "one core and three auxiliaries," comprising new energy vehicles as the primary industry, supplemented by new energy storage, new materials, and intelligent manufacturing.

Moreover, the cooperation zone emphasizes infrastructure development and improvements in public amenities, achieving the integration of industry and city development to support regional coordination.

4.2 Multifaceted Innovations

In talent services, Guangzhou has introduced favorable policies to attract high-level talent and innovative teams. For instance, Nansha District has implemented the "Nansha Talent Card," providing preferential policies and convenient services in areas such as housing, healthcare, and children's education.

Additionally, Guangzhou strengthens talent cooperation with surrounding cities to build a regional talent hub and promote the flow of talent and the sharing of innovation resources across regions. The cooperation zone continually drives industrial innovation, advances new industrialization, and improves total factor productivity. Each phase reflects a commitment to innovation, characterized by:

The approach emphasizes continuous innovation by introducing new industrial concepts and technologies, maintaining a steadfast commitment to high-quality development, and leveraging advanced productivity as a driving force to accelerate regional economic growth.

4.3 Exploring New Technologies and Models to Enhance Soil Resource Utilization

Environmental protection departments in Guangzhou, in collaboration with research institutions, have conducted studies on soil remediation technologies. Through the application of methods such as bioremediation and chemical remediation, they have treated and restored contaminated soil to a usable state. Simultaneously, Guangzhou has strengthened soil resource management and protection, establishing a comprehensive soil environment monitoring system to ensure sustainable use of soil resources.

In conclusion, various regions in Guangdong Province have undertaken active exploration and practices in promoting regional coordinated development through NQP, achieving significant results. These practices provide valuable experiences and lessons for other regions, contributing to advancing regional coordination in China to a higher level.

5 CONCLUSION

Through a systematic analysis of the mechanisms by which NQP contributes to regional coordinated development, the following key conclusions can be drawn:

5.1 NQP Facilitates Economic Balance Among Regions

Driven by technological innovation, NQP enhances production efficiency and optimizes resource allocation, playing a vital role in promoting high-quality regional economic development. Unlike traditional resource-intensive productivity, NQP emphasizes sustainability and innovation, enabling it to contribute to economic balance among regions. While strengthening industrial competitiveness in developed areas, it also creates opportunities for underdeveloped regions to catch up, narrowing economic disparities between regions.

5.2 NQP Provides a Solid Foundation for Regional Coordinated Development

NQP effectively drives the transformation and upgrading of regional industrial structures, laying a robust foundation for coordinated development. Traditional industries are gradually transitioning towards intelligent and high-value-added directions, while emerging industries are rapidly growing and expanding. This restructuring and optimization of industrial structures enhance the collaborative effects of economic activities within and across regions. Each region can leverage its own resource advantages while achieving complementary benefits through cross-regional industrial cooperation.

5.3 NQP Promotes Balanced Factor Mobility and Distribution Across Regions

By leveraging digital platforms, intelligent management systems, and innovative production models, NQP breaks geographical constraints, enabling the free flow of technology, capital, and labor across regions. The digital economy, in particular, helps remote and underdeveloped regions connect to global markets and access innovation resources, improving resource allocation and enhancing regional competitiveness and sustainability.

5.4 NQP Development Relies on Government Policy Support

The diffusion and application of NQP are closely linked to government policies. Policies that incentivize innovation, improve infrastructure, and promote technological collaboration play a pivotal role in supporting the spread of NQP. These measures not only reduce the costs associated with NQP adoption but also create favorable conditions for scientific and technological cooperation within and across regions. Under the guidance of regional coordinated development strategies, policy support has proven effective in reducing regional disparities and enhancing the development levels of underdeveloped areas.

Based on the above conclusions, this paper suggests that governments should strengthen support for new-quality productivity (NQP), especially in underdeveloped regions, through funding, tax incentives, and talent recruitment to accelerate its adoption and mitigate regional disparities. Policies should also promote regional industrial collaboration by encouraging enterprises in developed areas to transfer industries or provide technological support to underdeveloped regions, fostering specialization and cooperation. Furthermore, priority should be given to improving regional infrastructure, particularly digital and information technology infrastructure, to facilitate the seamless mobility of NQP across regions. Finally, policymakers should tailor strategies to account for regional differences and specific needs, ensuring that NQP applications yield optimal outcomes in diverse contexts.

Despite its contributions, this study has certain limitations. First, the pathways for promoting NQP may differ across regions due to variations in resource endowments, economic development levels, and industrial structures. Future research could focus on comparative regional analyses to identify effective pathways suited to specific regional contexts. Second, the analysis in this study is primarily based on existing literature and theoretical models, lacking empirical data support. Future studies could incorporate data-driven and case study approaches to validate the actual impacts of NQP on regional coordinated development.

Lastly, this paper does not delve deeply into the specific mechanisms of policy support for NQP. Future research should further explore the critical roles of policies in facilitating the expansion and application of NQP.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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THE IMPACT OF PRICE HIKE OF PETROLUEM MOTOR SPIRIT ON INDIVIDUAL, HOUSEHOLD AND FIRMS IN NIGERIA (1970-2024)

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Abstract: This research looks at the impact examined the impact of PMS on individual, household and firms in Nigeria spanning from (1970-2024). The study utilized survey method was employed and the population of Nigeria was used for the study. The population was estimated at 144.3 million as of 2006 census. With the implementation of Taro Yamane formulae, the population size was reduced to 400 people. Two states and local government areas were selected from each of the four region of Nigeria out of the 400 questionnaires sent out, a total of 291 respondents from the 4 state returned. With a mean criterion of 3.0, the statistical tools of the Statistical Package for the Social Sciences (SPSS) were used to analyse the study's research questions. Findings from the study show that price hike of petroleum motor spirit brings about reduction of disposable income of individual and household, increase in cost of living, decrease in standard of living, increase in the cost of money spent on transportation, retrenchment of staff as a result of decrease in the demand for goods and services, unemployment, poverty, political instability, social unrest and food insecurity. The study gave some recommendations and concluded that price hike of petroleum motor spirit has negative effect on production which serve as a major problem to firms thereby reducing production and spending on goods and services in Nigeria which virtually increase prices of every good and service thereby reducing the purchasing power of individual and household income.
Keywords: Firms; Household; Individual; Nigeria; Petroleum motor spirit

1 INTRODUCTION

In Nigeria, the price of petroleum motor spirit (PMS/fuel) has been on the increasing side since 1970 till date. The Downstream section of the nations' oil sector is facing challenge which has become a serious problem to individuals, household, firms and the entire nation. Records has shown that changes in PMS pump price has been on the rising side since 1970 till date. From 1970 and 1980 the price rose from 3 kobo to 15 kobo, in 1981 it increased from 20 kobo to 70 kobo in 1990, in 1991 it also increased from 70 kobo to N22 in the year 2000. In 2001, it increases from N26 to N97 in 2013, in 2014 it was reduced to N94 and later increase to N165 in 2022, N238 in May 2023, on June 12th 2023, the president of Nigeria Hamed Bola Tinibu removed fuel subsidy which make the price to rise to N580/N688, in Q1 and N770 Q2 2024 the price increase again to N980 and later increase to N1300 in Q3 of same year. In mid-October 2024 Nigerian National Petroleum Company announce the various prices that petroleum motor spirit (PMS) are to be sold at various region of the country of which the least price is N1050 which is been sold at Lagos (South-West region). Although in all region and state in Nigeria, the price of PMS is being sold above the price ceiling reason been that the marketers of PMS bought the product from the government higher than the price the government fixed. In some that, PMS is being sold at N1300, N1350, N1500 etc. The government of Nigeria has been adjusting the price of PMS upwardly with the aim of eliminating fuel consumption subsidy in accordance to the free market system which finally in 2023 it was achieved. Since then, the rise in fuel price has brought about great impact to individuals, household and firms who depend more on fuel for transportation, source of energy and input to power factory machines in their production process. This situation has affected the activities of individuals and household and also the productivity of firms that they find it hard to take care of their rising energy cost.

Mr. Adedayo Toluwase the Managing Director, Sotice Investment Company Limited said several millions of Nigerians would live poorer and suffer more than they had ever done in recent history in 2012.He said, more than ever in the history of the country, more Nigerians will sink further below the poverty line. The prices of goods and services have increased as price of fuel rises at the same time that wages remain stagnant and unemployment remains a nationwide scourge. More than 70 per cent of Nigerians lack the usual or socially acceptable amount of money or material possessions needed to live a happy life. This unfortunate category of Nigerians lacks material comfort and in plain language they live from hand to mouth. This incessant increase in fuel price has effects on individual, household, firms, the economy and government as this capture the interest of the researcher in conducting this study. The study examined the impact of PMS on individual, household and firms in Nigeria spanning from (1970-2024). The study is divided into four sections which include; the introduction, review of literature, methodology, conclusion, recommendations and references.

2 LITERATURE REVIEW

Gatawa & Zakari [1] examines the effect of petroleum merchandise charge adjustments on family welfare in Zaria city of Kaduna state. Respondents groups have been stratified decided on primarily based totally on their geographical locations. Descriptive data and inferential data gear have been hired and use for statistics evaluation. Descriptive data become used to examine socio monetary traits of family head and to decide the charge adjustments of petroleum merchandise on families. at the same time as inferential statistical gear have been hired to mainly display how charge adjustments of petroleum merchandise have an effect on the family thru growth in expenses of petroleum merchandise which reasons lower in call for the goods, and now have multiplier impact on items and services. On the alternative hand, lower in expenses of petroleum merchandise additionally growth the call for the goods in Zaria city. To executed this objective, non-parametric chi-rectangular check become hired. The outcomes display that, the 3 petroleum merchandise this is, petrol (PMS), gasoline (LPG) and kerosene (DPK) have an effect on family welfare. This indicated that growth with inside the petroleum merchandise charge adjustments reason lower in call for of the goods, at the same time as however the lower of the petroleum merchandise expenses reasons growth in call for the goods which become in conformity with this study. The study additionally recommends, authorities must decontrol the downstream petroleum quarter to permit for growth participation and competition with the intention to instead bring about lowering expenses of petroleum merchandise Moreover, emphasis on opportunity reasserts of electricity along with gasoline, solar, wind and hydraulic reasserts must positioned into consideration. Government must enlarge intake potential impact with the intention to translate to multiplied call for various purchaser excellent and therefore multiplied income and profitability of some of Nigerians.

Stephen [2] observed the effect of gasoline charge growth at the Nigerian economic system. The study observed the effect of Fuel charge growth at the Nigerian economic system (Whether poor or positive). The study followed a survey studies layout technique to assess the extent of impact the gasoline charge growth has at the Nigeria economic system. The populace of the have a take an observe is made from Civil Servants -CS, marketplace guys and women-MMW and body of workers with inside the personal sectors SPS involved with petrol and gasoline affairs. A pattern length of a hundred and twenty people become decided on at random. It became disbursed as follows: Civil Servants (18), marketplace guys and women (55) and body of workers with inside the personal sectors (47). A pre-test become carried out and final results yield "r"= 0.ninety two indicating an excessive diploma of consistency and reliability. The tool become 8- time period survey questionnaire with a - five Likert scale reaction alternatives of Very Relevant (VR), Relevant (R), No Effect (NE) Irrelevant (I), and Very Irrelevant (VI). The questionnaire become dependent in keeping with the studies objectives. The Pearson product second correlation coefficient become used to verify formulated hypotheses. Finding found out that there's a giant courting among the latest will increase in gasoline expenses and monetary boom in Nigeria. It became additionally determined that the Nigeria economic system isn't growing due to the impact of gasoline charge hike on buying strength and sooner or later the locating confirmed that there's giant courting among growth in pump charge of petroleum and meals security. The paper consequently encouraged that Government must hold gasoline subsidy at the same time as expediting the development of the 3 proposed refineries; Fuel subsidy must be eliminated as quickly as those new refineries are commissioned; the proposed rehabilitation of the present refineries must be expedited; Government must vigorously pursue the revitalization of the railways. If handiest Nigerians had opportunity to avenue transport, all this noise approximately gasoline subsidy elimination might now no longer were there and Private agencies must be endorsed to begin constructing refineries now with the guarantee that subsidy might be eliminated earlier than they begin production.

Umar and Umar [3] Using the Household Expenditure Survey of 2010, measured the direct welfare effect of better gasoline expenses on distinct socio -monetary companies in Nigeria. The evaluation is completed with the aid of using segregating families into three distinct profits companies and the welfare effect because of subsidy reduce is measured. The outcomes display that the discount in welfare because of better charge is greater for the centre 40% in comparison to the pinnacle and the lowest 20%. This is because of the reality that the centre profits organization has a bigger finances percentage on gasoline. Fuel subsidies are observed to be high priced in protective terrible families because of considerable leakage of advantages to better profits organization however the welfare loss for the decrease profits organization because of subsidy reduce is relatively better because of the smaller length in their profits.

Gyoh [4] has argued that a growth of such importance with inside the cutting-edge Nigerian monetary context is without doubt inadvertently or intentionally conceived to take cash far from the wallet of all Nigerian profits earners, with over 70% of Nigerians who stay on under N360 per day. In reality, all and sundry on this class will come to be with over 50% of each day profits, which is set N155 in line with day, necessarily committed to move costs, at the same time as the household is anticipated to cater for own circle of relatives feeding, health, schooling and different social expenses. Looking on the above literature, not one of them have a take to observe approximately the impact of PMS on individual, household and firms in Nigeria. Base in this gap, the researches have a tendency to perform this research to look at the impact examined the impact of PMS on individual, household and firms in Nigeria spanning from (1970-2024).

3 THEORETICAL LITERATURE

Sociological theory may be used to rationalize market changes with respect to oil prices. Structural functionalism and Marxism offer rival explanations for the marked increase in fuel costs. The structural functionalist position would offer that though increasing costs may be inconvenient for many consumers, and disastrous for a few, ultimately the shift is functional for society at large. If gasoline prices don't rise to compensate for lower supply and higher demand, many gasoline companies, refiners, refiners and fuel distributors could be in trouble. Even if they did not go bankrupt, if any

single firm in the fuel industry failed to keep up with the market price of fuel it would suffer from lower profit margins and may have to lay off workers to compensate, increasing unemployment. In the long run fossil fuels cannot last forever. As the earth's population and technology increase demand for fuel will continue to rise while supplies will continually be diminished. Increasing fuel costs have already prompted several firms, and governments, to look at the possibility of creating or expanding other sources of energy (such as hydro-electric, wind, and solar energy). Though it may take time and financially strain many consumers, increasing fuel costs may help spur technological advances that help humanity make the necessary move from finite, diminishing fossil fuels towards energy sources that are more permanent and reliable.

Marxism, by contrast, might offer that there is something more sinister at hand. As fuel costs increase, the lower classes will face a far greater strain than the upper classes. Not just gasoline, but home heating and electricity will become increasingly difficult for lower classes to afford exacerbating the situation for those already at risk for poverty. Nation-state governments must be able to help lower classes cope with this strain or risk increasing political instability. Should the gap between the rich and the poor become too great and the lower classes unable to afford the high price of fuel; social unrest may flare up. Many consumers may blame the fuel corporations for the price increase (whether or not it is actually their fault) and think they are being manipulated so the corporations can enrich themselves and thus further cement their position as full-fledged members of the ruling class. These two theories have been applied to this research in this analysis to gain an understanding of how increase in the price of petroleum motor spirit affect individual, household and firms in Nigeria spanning from 1970-2024.

4 METHODOLOGY

the study adopts survey research design to examine the impact of price hike of petroleum motor spirit on individual, household and firms in Nigeria (1970-2024). Primary and secondary data were employed in the study. The population for this study consists of entire population of Nigeria. Its total population was estimated at 144.3 million as of 2006 census making it one of the largest states in Africa. With the use of Taro Yamane [5] the population size was reduce to 400. The research instrument adopt for this study is a self-structured questionnaire titled the impact of price hike of petroleum motor spirit on individual, household and firms in Nigeria (P.H.P.M.S.I.H.F). It enabled the researchers obtained relevant data for the research. Descriptive statistical tools of: tables, percentages, averages and more were used for data presentation. On the other hand, 5 Linkert scale with the use of Mean and Standard Deviation in Statistical Package for Social Science (SPSS) were used in analysing the three research questions. The research questions were analysed using a mean criterion of 3.0 for the research questions, an aggregate mean below 3.0 means the respondents disagree with the stated research question while an aggregate mean of 3.0 and above means the respondents agree with the stated research questions. The questionnaire was designed to elicit information from the respondents, and to suit the need and purpose of the study. The questionnaire was designed in two (2) sections. The first section looked at demographic data of the respondents such as; gender, age, occupation and academic qualification and the second section analyse the impact of price hike of petroleum motor spirit on individual, household and firms in Nigeria. The questionnaire adopted a 5-point Likert scale of Strongly agreed (SA), Agreed (A), Undecided (U), Strongly Disagreed (SD), and Disagreed (D). The instrument is made up of a total of 19 items. Purposive sampling techniques were adopted for the study. For the purpose of clarity, two (2) state were selected from each of the four (4) region [North (Abuja & Kaduna State), South (Rivers & Delta State), East (Anambra & Enugu State) and West (Lagos & Oyo State)] that made Nigeria.

5 DATA PRESENTATION

The data was presented based on the research objectives. Primary and secondary data were reviewed and questionnaire was distributed based on region, state, local government area, specific demographic characteristics such as age, gender, status and all other demographic variables are calculated using percentages.

Table 1 Regional, State and LGA Distributions of the Questionnaires

Region	No. of State in Region	Names of State Selected	Names of Selected L.G.A in State Selected	No. of Questionnaires Distributed and No. Returned
North	18	Abuja	Bwari	50/38
		Kaduna	Kaduna	50/32
South	6	Rivers	Port Harcourt	50/41
		Delta	Oshimili South	50/37
East	5	Anambra	Akwa	50/34
		Enugu	Enugu South	50/40
West	7	Lagos	Ikeja	50/38
		Oyo	Ibadan	50/31
				400/291

Source: authors compilation (2024)

Table 2 Respondents Socio-Demographic Characteristics

Socio-Demographic Characteristics	Frequency	Percentage
Gender		
Male	163	56.0
Female	128	44.0
Total	291	100
Status		
Individual/Single	84	28.9
Household/Married	115	39.5
Firms	92	31.6
Total	291	100
Age Range		
20-30 years	65	22.3
31-40 years	80	27.5
41-50 years	56	19.2
51 years and above	90	30.9
Total	291	100
Highest Educational Qualification		
FSLC/WAEC	92	31.6
NCE/ND	86	29.5
HND/BSC	73	25.1
MSC/PHD	40	13.8
Total	291	100
Total	291	100

Source: Authors Survey, 2024.

In Table 1 and 2, we can see the details of the regional, state and LGA distribution of the population. The population was distributed equally (100) among the 4 regions and 50 to each of the selected state. Among the 291 respondents, the majority of household/married men accounted for 39.5% of the total. The gender distribution is 128 females (44.0% of the total) and 163 males (56.0% of the total). In terms of age, most respondents are over 51 years of age; Similarly, when asked about their educational status, the highest respondents have FSLC/WAEC (31.6%) and the lowest respondents have MSC/PHD.

6 DATA ANALYSIS

In order to determine the appropriateness of the research questions, the data of this study are presented and analysed below using standard deviation and SPSS software.

6.1 Research Question

What are the impact of price hike of petroleum motor spirit on individual, household and firms in Nigeria?

Table 3 Respondents' views on the Impact of Price Hike of Petroleum Motor Spirit on Individual, Household and Firms in Nigeria

S/N	Factors	Mean	Standard Deviation	Decision
1	Price increase of PMS brings about reduction of disposable income of individual and household.	4.2	4.1	Agreed
2	It reduces the purchasing power of individual and household.	3.5	3.3	Agreed
3	Inability to purchase basic necessity of life.	4.3	4.1	Agreed
4	Reduction in the quality of life of individual and household.	3.6	3.4	Agreed
5	Increase in cost of living.	4.0	3.6	Agreed
6	Decrease in individual and household standard of living.	4.4	4.0	Agreed
7	It lead to increase in the cost of money spent on transportation.	4.1	3.7	Agreed
8	It reduce the consumption level of individual and household.	3.5	3.7	Agreed
9	Increase in house rent.	3.8	3.4	Agreed
10	Decrease in individual and household demand for goods and services produced by firm.	4.8	4.3	Agreed
11	Increase in the price of food stuff and other consumer goods.	4.8	4.2	Agreed
12	Increase in fees paid by individual and household for themselves and children/wards.	4.4	4.0	Agreed
13	PMS price increase lead to increase in firm's cost of transportation of goods produce.	3.4	3.3	Agreed
14	It lead to increase in cost of production.	3.3	3.2	Agreed
15	Increase in money spent on powering production plant.	3.6	4.0	Agreed
16	Decrease/reduction in firm's profit.	4.3	4.1	Agreed
17	Retrenchment of staff as a result of decrease in the demand for goods and services.	4.1	3.7	Agreed

18	It leads to unemployment.	3.9	3.6	Agreed
19	Poverty.	4.0	3.6	Agreed
20	Reduction in competition.	4.8	4.2	Agreed
21	Political instability.	3.6	3.4	Agreed
22	Social unrest.	3.5	3.7	Agreed
23	Increase in food insecurity.	3.8	3.4	Agreed
	Aggregate Mean	4.1	3.6	Agreed

Source: Authors survey, 2024.

See data in Table 3, 1-23. The table aims to discuss the impact of price hike of petroleum motor spirit on individual, household and firms in Nigeria. As shown in the table above, the aggregate mean for this research is above the aggregate mean of 3.0. Additionally, based on all responses, the standard deviation is 3.6 and the total mean is 4.1. According to the findings, anonymous respondents agreed that price hike of petroleum motor spirit have negative impact on individual, household and firms in Nigeria.

6.2 Discussion of Findings

Responses to the research questions revealed the impact of price hike of petroleum motor spirit on individual, household and firms in Nigeria. As illustrated in item 1-23, table 3 all of the respondents anonymously agreed that price hike of petroleum motor spirit has negative impact on individual, household and firms in Nigeria. The response shows that price hike of petroleum motor spirit brings about reduction of disposable income of individual and household, reduces the purchasing power of individual and household, reduction in the quality of life of individual and household, increase in cost of living, decrease in individual and household standard of living, increase in the cost of money spent on transportation, increase in house rent, decrease in individual and household demand for goods and services produced by firm, increase in the price of food stuff and other consumer goods, increase in firm's cost of transportation of goods produce, increase in cost of production, increase in money spent on powering production plant, decrease/reduction in firm's profit, retrenchment of staff as a result of decrease in the demand for goods and services, unemployment, poverty, reduction in competition, political instability, social unrest and food insecurity which is in line with the findings of Gatawa1 & Zakari, Stephen, Umar and Umar, Gyoh[1-4].

7 CONCLUSION

The study concluded that the effects of price hike of petroleum motor spirit have a negative effect on production which serve as a major problem to firms', because spending more on the importation of petroleum product will generally reduce production and spending on goods and services in Nigeria which virtually increase prices of every good and service thereby reducing the purchasing power of individual and household income.

7.1 Recommendation

The following are recommended for policy makers and government of Nigeria to:
i. executes the proposed rehabilitation of the existing refineries.
ii. reinstate fuel subsidy while expediting the construction of the more refineries.
iii. remove fuel subsidy as soon as these new refineries are commissioned.
iv. construct alternative source of transportation such as railways that will link all states.
v. private companies should be encouraged to build refineries as this will lead to competition that will bring about price fall.
vi. legislate against the cabal and unauthorized dealership in the sale and distribution of petroleum products to reduce the hazards of extortion, unwarranted fire incidence leading to economic and life loss during periods of fuel scarcity and fuel price hike.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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