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Spiral of Silence: Consumer Attention, Media Emotion, and Pork Price Fluctuations

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Abstract: This study utilized web crawling and text analysis to collect weekly data from July 2018 to March 2022. Using the spiral of silence theoretical framework, it explores the relationship between consumer online attention during sudden animal epidemics and pork price volatility. The research found that consumer online attention, influenced by animal disease outbreaks, significantly intensifies pork price volatility both directly and indirectly through changes in media sentiment and consumer expectations. On the one hand, the sentiment in official media reports partially mediates the relationship between consumer attention and pork price volatility. As consumer attention increases, positive sentiment in official media also rises, exerting an indirect stabilizing effect on pork prices. On the other hand, consumer expectations also have a partial mediating role, and the volume of negative news reports from unofficial media significantly amplifies the impact of consumer attention on pork price volatility. These findings provide valuable insights into the relationship between consumer online attention and market fluctuations in the agricultural sector and offer practical recommendations for enhancing demand-side management strategies.

Keywords: pork price fluctuation; consumer attention; media sentiment; emotional contagion effect; spiral of silence

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1. Introduction

Pork significantly contributes to food security in China, constituting the primary meat source for its residents and accounting for approximately 60% of the nation's meat consumption. The livestock sector has been severely affected by major animal disease outbreaks, including mad cow disease in the UK in 1985, foot and mouth disease in East Asia in 2000, blue ear disease in China in 2007, the swine flu (H1N1) in North America in 2009, H7N9 avian influenza in China in 2013, and the first detection of African swine fever in China in 2018, all posing substantial threats to public health and safety. The WEB2.0 era has provided consumers with access to extensive, real-time information, facilitating communication channels that enhance the speed and breadth of information dissemination online [1]. The rapid online spread of significant animal event information captivates consumer attention, which, influenced by the emotional contagion effect in news reporting, alters consumption decisions, thereby affecting pork market supply and demand dynamics and ultimately leading to price fluctuations.

Although previous studies have analyzed agricultural price fluctuations from supply and demand perspectives, examining the impacts of agricultural production costs, circulation costs, natural conditions, technical conditions, and agricultural risks on outputs, much of this research emphasizes a traditional economic viewpoint. These studies largely overlook the influence of market sentiments, cognition, and behaviors on price volatility [2–5]. Consumer attention to specific events significantly influences their decision-making processes, affecting commodity prices notably, and consumer behavior driven by their attention to events can lead to significant impacts on price dynamics [6,7].

Consumer focus on specific events significantly influences their decision making, especially during major swine disease outbreaks where limited disease knowledge and unclear future impacts reduce consumers' control, prompting them to seek more market information for decision making [8] (Fritsche et al., 2017). This heightened consumer attention during outbreaks can lead to price fluctuations, with market information playing a pivotal role [9]. On the one hand, media reports are a crucial source of market information, where the reporting bias not only shapes consumer market expectations but also significantly impacts market prices [10–12]. On the other hand, consumer expectations serve as a significant forward-looking indicator of economic activities, often signaling economic expansions or contractions, particularly in periods of economic instability or uncertainty, where a decline in consumer confidence can significantly curb consumer spending, thereby impacting the overall economy [13,14].

This study employs the spiral of silence theoretical framework to explore the mechanisms through which consumer internet attention and media reporting influence pork price fluctuations. When Noelle-Neumann introduced the concept in 1974, she highlighted that to avoid isolation, individuals often express opinions that align with the majority, while silencing dissenting views, leading to a spiral where one opinion becomes increasingly dominant as the other recedes. Initially, opinions are shaped and amplified by the media, and through the spiral of silence effect, they eventually become the prevailing public opinion. This theory underscores that information provided by mainstream media is acknowledged by the audience, altering their attitudes and behaviors. Moreover, news media, beyond their fundamental role of information provision, also play a crucial role in emotional contagion. As media outlets mine information, some opt for sensational language to garner more public attention, conveying emotionally charged opinions to guide public sentiment [15]. Notably, following major events, the public, in a state of "information hunger", becomes more sensitive to media reports, influencing their emotional and decision-making responses [16]. Utilizing African swine fever as a case study, this paper aims to unravel how sudden animal disease outbreaks that capture consumer internet attention can influence pork prices through the emotional contagion effect of media reporting.

The main innovations of this paper are twofold: First, it employs the spiral of silence theoretical framework to explore how sudden animal epidemics, which trigger consumer online attention, influence pork price volatility from the perspective of media reporting. Second, by utilizing machine learning-based text analysis for sentiment analysis, the study constructs media sentiment indices and consumer expectation indicators, effectively quantifying shifts in media reporting tendencies and consumer expectations.

2. Theoretical Analysis and Research Hypothesis

2.1. Spiral of Silence Theory

The spiral of silence theory, introduced by Noelle-Neumann (1974), suggests that individuals tend to endorse widely accepted opinions when expressing their views [17]. If their opinions contradict mainstream beliefs or might provoke strong opposition, they often choose to remain silent, even if those opinions align with their personal beliefs. As a result, widely supported opinions are amplified, while dissenting views gradually diminish, creating a cyclical process. The media, as a crucial channel for information dissemination, plays a significant role in shaping public opinion and social attitudes. Due to the professionalism, legal constraints, and reputation mechanisms in financial media, the public tends to place high trust in media reports. This trust facilitates the spread of media-induced emotions, further reinforcing the spiral of silence effect.

While economic models often assume individuals act as rational agents, cognitive psychology research indicates that people vary in their memory, perception, and judgment, which affects how they process information. Media, as a critical external stimulus, profoundly influences the "cognition–judgment–action" process in society, thereby driving the spiral of silence effect. This study applies the spiral of silence theory to examine how me-

dia sentiment influences consumer behavior, particularly the relationship between online consumer attention and pork price volatility. First, the media amplifies certain viewpoints through the spiral of silence effect, making them mainstream. Second, to capture public attention, some media outlets may use emotionally charged and biased language, guiding public emotions and attitudes. This process illustrates how consumer attention, influenced by media sentiment, affects purchasing decisions, ultimately leading to price fluctuations.

2.2. Research Hypothesis

In the digital age, the process by which internet users acquire information and express opinions is recorded as big data, reflecting public attention to specific events [18]. User search behavior on search engines serves as an indicator of public attention, and due to its low cost and timeliness, internet search data is widely used in predictive research. For example, Yang and Lv (2014) utilized the Baidu search index to investigate the relationship between unexpected events and stock market fluctuations, finding that public attention to such events effectively explains stock price volatility [19]. Similarly, social behavior decisions influence agricultural product prices, particularly in the context of unexpected animal epidemics [20]. Increased public attention may affect market participants' behavior, leading to fluctuations in agricultural prices. According to the compensatory control theory, consumers seek additional information during unexpected events to make informed decisions, meaning that consumer attention is a directed response to these events. This underscores the critical role of information in this mechanism.

As a key source of information, the media plays a vital role in shaping the "cognition–judgment–action" process of individuals, affecting the structure of market information and influencing commodity prices through changes in supply and demand. The impact of media reports on the market primarily depends on three factors: the source of information, the medium of dissemination, and the content. Vyncke et al. (2015) empirically analyzed 12 different information sources and found that the influence on public expectations varies with the source [21]. Furthermore, the content and emotional tone of the information also significantly impact the public [22]. Media not only serves as a conduit for information but also conveys emotions to the audience through biased language. Thus, this study examines the differing mechanisms of official and unofficial media in influencing consumer behavior.

There are notable differences between official and unofficial media in China. As the government's mouthpiece, official media typically conveys positive information to mitigate public panic, particularly during emergencies, and carefully adjusts its emotional tone based on the level of public attention. In contrast, unofficial media, with its rapid dissemination and high interactivity, directly influences consumer expectations and decision making. While official media sentiment directly affects consumer emotions and behavior, unofficial media influences consumer expectations primarily through the level of attention it garners. As shown in Figure 1, the theoretical framework developed in this study illustrates the pathway through which consumer attention, triggered by a major animal epidemic, influences purchasing decisions, market demand, and price fluctuations via media sentiment and consumer expectations.Thus, this study employs "media sentiment" and "consumer expectations" as variables to describe the influence of official and unofficial media, respectively, on consumer behavior.

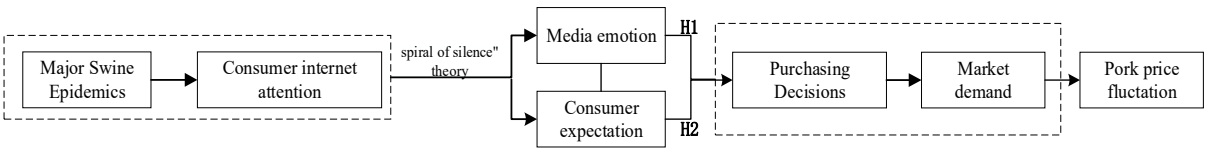


Figure 1. Theoretical analysis framework. Source: compiled by the author.

Based on the above analysis, the following hypotheses are proposed:

H1. *The increase in consumer attention triggered by an animal epidemic influences the emotional tone of official media reports, which in turn affects consumer purchasing behavior. When supply remains relatively stable, changes in consumer purchasing behavior directly lead to fluctuations in market demand, ultimately causing pork price volatility.*

H2. *Compared to official media, unofficial media has a weaker "emotional contagion" effect on consumers. Consumer expectations are not influenced by the emotional tone of unofficial media reports but are instead determined by their own online attention. As consumer attention increases, changes in expectations directly affect purchasing decisions, leading to shifts in market demand and price volatility.*

3. Research Design and Descriptive Statistics

3.1. Variable Description and Data Sources

3.1.1. Dependent Variable: Pork Price Fluctuations

Pork price volatility is used in this study as an indicator to quantify the fluctuations in pork prices over time. Specifically, pork price volatility has been selected as a proxy variable to analyze changes in pork price trends. The data for this study were obtained from the Bric database. Based on Figure 2, which illustrates the time series of pork price volatility from late July 2018 to March 2022 (Due to a significant reduction in relevant reports from official and online media after 2022, as well as a lack of corresponding public comments, there was a severe data gap for sentiment analysis. As a result, this study only includes data from July 2018 to March 2022, without incorporating more recent data.), we observe significant fluctuations in pork prices, particularly during early 2020. During this period, pork price volatility reached nearly 40%, a substantial increase compared to the relatively stable fluctuations observed during other periods. This spike indicates a "large fluctuation" in pork prices, which we define in this study as instances where the price volatility exceeds ±5%. Therefore, examining the impact of African swine fever provides a valuable opportunity to explore the relationship between consumer online attention and pork price volatility.

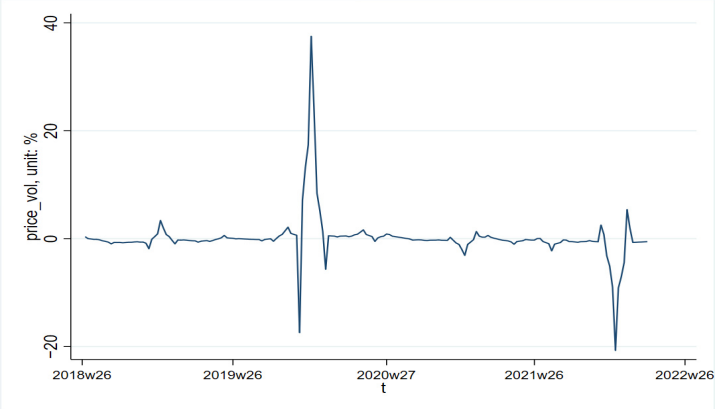


Figure 2. Pork price volatility time series from July 2018 to March 2022 (weekly data). Source: compiled by the author.

3.1.2. Independent Variable: Consumer Internet Attention

According to the previous analysis, consumer attitudes can be used as a proxy indicator to measure purchasing behavior. In the fast-changing internet era, consumers access information they care about in a variety of ways via the internet and express their feelings and opinions online. The process of information acquisition and expression of opinions will be recorded by the internet, which will become a massive information base. Internet search data reflects user attention to events and can be of great help for low-cost and timely prediction in various industries. It has been widely used to predict social and economic behavior, and its feasibility has been verified. For the first time, researchers have applied

internet search data to the healthcare industry. Ginsberg et al. (2008) proposed a method to track influenza cases in a population by analyzing many Google search queries [23]. This approach has attracted much attention from the academic community and has been rapidly extended from the medical and health domain to the social and economic domain with rich results. For example, Venkataraman et al. (2018) used Google search volume data to predict housing price changes in India [24]; Yang and Lv (2014) used the Baidu search index as the measurement index, focused on the relationship between emergencies and stock market fluctuations, and found that the attention degree of emergencies had a good explanatory power for stock price fluctuations. From the perspective of internet attention [19], Liang et al. (2017) explored the relationship between iInternet attention and grain price by using Google Trends data from 2004 to 2015, autoregressive distributed lag model and Granger causality analysis [7].

This paper employed a web crawling method to collect data from the Baidu index using "African swine fever" as the keyword to construct a measure of consumer internet attention. The data was sourced from www.baiduindex.com.

3.1.3. Mediator Variable: Media Emotion and Consumer Expectations

Firstly, Sina Weibo, as one of China's largest social media platforms, possesses a vast user base and a wealth of user-generated content. According to Sina Weibo's financial report data, as of the third quarter of 2023, Sina Weibo's Monthly Active Users (MAU) reached 605 million, and Daily Active Users (DAU) reached 260 million. The high activity level of users ensures the timeliness and dynamism of the data, providing a unique and comprehensive source to capture real-time changes in consumer sentiment and public opinion. By analyzing posts and comments on Weibo, we can gain insights into consumer sentiment and expectations at the micro level, which is crucial for understanding the impact of specific events (such as outbreaks of animal epidemics) on market behavior. Secondly, the media sentiment index and consumer expectations indicators based on Sina Weibo data offer a more immediate and dynamic analytical perspective than traditional surveys and reports, allowing researchers to track rapid changes in sentiment and expectations and assess their impact on market price fluctuations. For this reason, this paper constructs a media sentiment index and consumer expectations based on the reports and comment texts from official and unofficial media on the Sina Weibo platform.

According to the ranking of circulation (page view), influence, reports and availability, this paper divides the media into two categories: official financial media and unofficial financial media (Financial media are selected for this analysis because they provide comprehensive daily reports on the price trends of various agricultural products. These reports offer a rich and diverse textual data sample, which is essential for analyzing the impacts on consumer expectations and market behavior). Among them, official financial media include China Economic Times, China Business Daily, Economic Observer and 21st Century Business Herald, while unofficial financial media include Sina Finance, NetEase Finance, National Business News and CCTV Finance (Chinese Economic Times, China Business Journal, Economic Observer, and 21st Century Business Herald are the four major official financial media in China; Sina Finance, NetEase Finance, National Business Daily, and CCTV Finance are the four major unofficial financial media). This paper attempts to explore the impact of consumer internet attention on pork price fluctuation under the guidance of media reports sentiment. Consumers can be sensitive to reports of pork prices when a sudden swine flu epidemic attracts their internet attention, and media reports of pork prices will have a more direct impact on consumer purchasing decisions. Therefore, this paper sets the keyword "pork price" to search the official Weibo containing the keyword in the main text and the corresponding comments and uses the web crawler technology to crawl the text content. The text content is crawled using a crawler technique, and the crawled content is reviewed by manual reading. The purpose of the review was to confirm, item by item, that the content and comments were indeed related to trends in pork prices. The source of the data is www.weibo.com.

Having identified the content of media reports, the next step is to construct a media sentiment index. Referring to the treatment of You and Wu (2012) [25], this paper constructs the media sentiment index from the two dimensions of the tone of the report and the degree of exposure. The tone of the report reflects the attitude of the media towards the trend of pork price (positive, neutral and negative), which is the core indicator to judge the media sentiment. The "degree of exposure" reflects whether the news reports are intensive and continuous, which is measured by the number of news reports. Thus, the construction of the media sentiment index can be formulated as follows:

$$Mood_{jt} = \sum_{1}^{n} Tone_{it} \quad (1)$$

where, $Tone_{it}$ denotes the tone of the media reports on the sentiment of pork price, and n denotes the number of media reports on the trend of pork price in period t. The larger the value of $Mood_{jt}$ is, the more optimistic the media sentiment is about the pork price in period t, and vice versa.

Since the tone of media reports is the most central component in constructing sentiment index, it is crucial to measure the tone of news reports accurately and objectively. In this paper, we implement sentiment classification based on SnowNLP, which was developed and established by Harbin Institute of Technology and is python-based. Its focus on Chinese text will significantly improve the accuracy of sentiment classification results. In machine learning based text sentiment classification, naive Bayes classification algorithm and Logistic algorithm are the most used [26]. In this paper, we determine the tone of news reports based on a naive Bayesian classification algorithm and a Logistic algorithm to synthesize a media sentiment index. Figure 3 depicts the number of price increases, price reductions and price stabilizations report by the official and unofficial media, respectively. It can be seen from the figures that after the outbreak of swine fever in August 2018, both official and unofficial media tended to report on price reduction while avoiding negative reports such as price increase. Moreover, during the period of pork price surge, the media still reported with the keyword of "price reduction". The difference lies in the neutral reports of price stability. Compared with unofficial media, official media has more neutral reports of price stability. Since media reports play a role in guiding public opinion [27], to reduce the public's panic about ASF, official media are more inclined to neutral and positive news reports, while unofficial media are more inclined to positive and negative news reports to attract public attention. Overall, there is a clear distinction between official and unofficial media reports, proving the need to distinguish official and unofficial media from one another.

The measurement of consumer expectations is similar to the approach of media reports tone, specifically, the sentiment propensity score of this paper is implemented based on SnowNLP (SnowNLP was developed and established by Harbin Institute of Technology and is python-based. Its focus on Chinese text will significantly improve the accuracy of sentiment classification results. In machine learning based text sentiment classification, naive Bayes classification algorithm and Logistic algorithm are the most used). The larger the value, the more positive it is and the less negative it is. In the previous analysis, it was pointed out that consumers react differently to print and unofficial media reports, and consumer expectations are more affected by official media reports [28]. Therefore, this paper also distinguishes consumer expectations, including consumer expectations under the "emotional contagion" of official media and unofficial media. Figure 4 shows the corresponding consumer expectations for official and unofficial media. As can be seen from the figure, the overall fluctuation range of consumer expectations corresponding to official media is not large and generally fluctuates around the mean value. The fluctuation range of consumer expectations corresponding to unofficial media is relatively large. In terms of media sentiment, there was more positive and neutral reports in the official media, with a corresponding fluctuation in consumer expectations around neutral sentiment. There are more positive and negative reports in unofficial media, but the corresponding consumer

expectations do not show a similar trend, which also verifies that the contagion effect of consumer expectations by official media is more obvious.

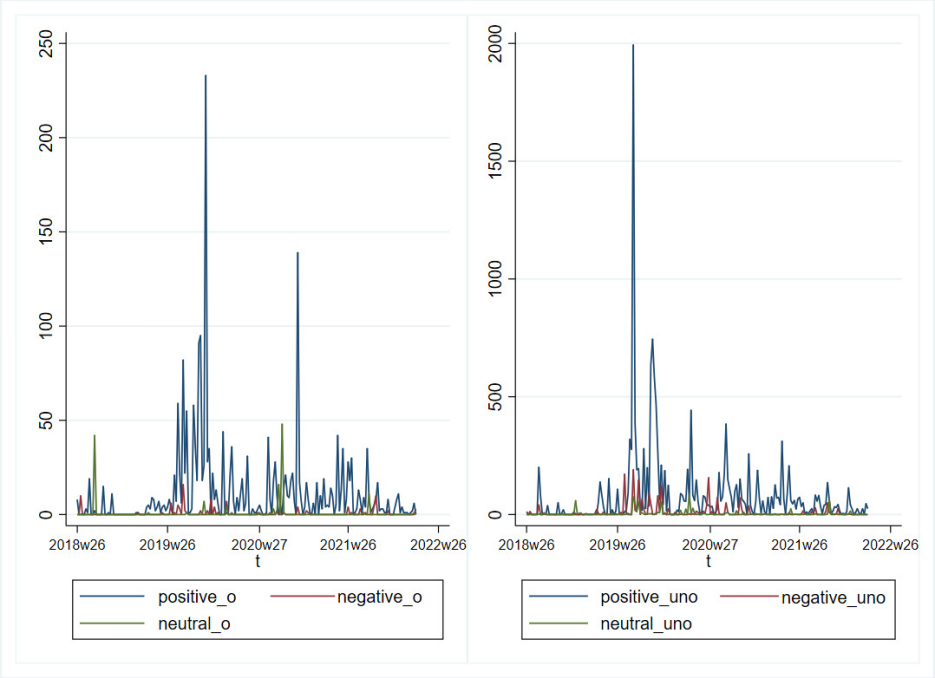


Figure 3. Timing diagram of the tone of media reports from July 2018 to March 2022 (weekly data). Source: compiled by the author.

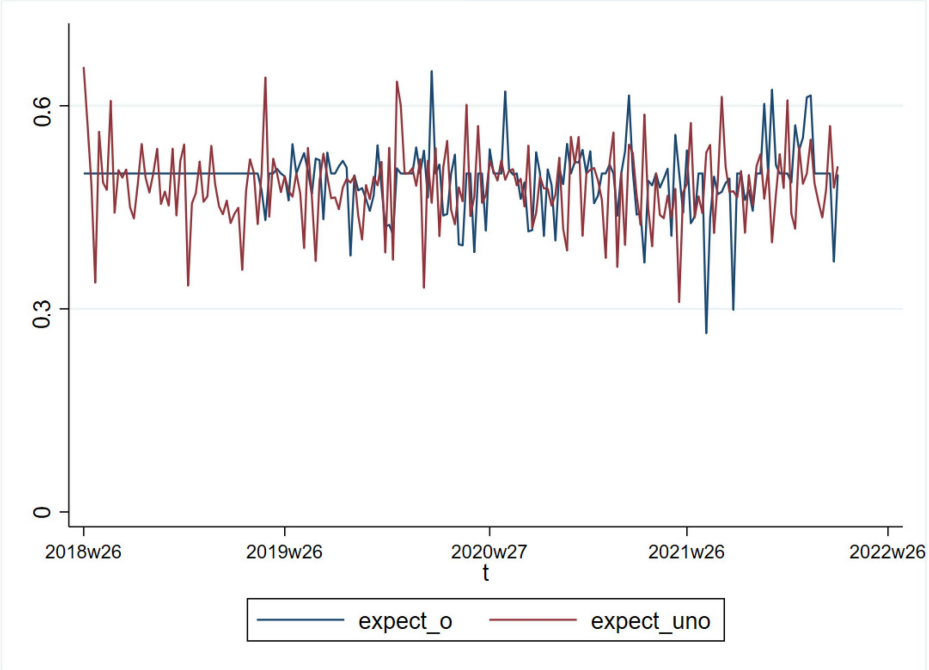


Figure 4. Time sequence diagram of consumer expectations from July 2018 to March 2022 (weekly data). Source: compiled by the author.

3.1.4. Control Variables

This paper selects regional population density, consumer confidence index, hog output, beef price fluctuations, chicken price fluctuations and mutton price fluctuations as control variables, among which population density and consumer confidence index reflect market

demand, pig output reflects market supply, and beef, chicken and mutton price fluctuations reflect the price fluctuations of substitutes. Among them, the regional population density data is from the China Statistical Yearbook, the Consumer Confidence Index is from the China Statistical Yearbook, and the data on hog production, beef, chicken, and mutton price fluctuations are from the Bric database.

3.2. Data Source and Descriptive Statistical Analysis

This study utilizes weekly data from July 2018 to March 2022. The specific definitions and sources of the variables are presented in Table 1.

Table 1. Variable Descriptions and Data Sources.

Variable Type	Variable Name	Variable Description	Data Source
Dependent variable	Price_vol	Pork Price Volatility	Bric database
independent variable	lnAttention	Consumer Internet Attention	www.baiduindex.com
Mediate variable	Mood_o	Media Sentiment Index of official media	www.sina.com
	Lnexpect_uno	Consumer Expectations	www.sina.com
Moderator variable	Negative_uno	Negative news reports from unofficial media	www.sina.com
Control variable	beef_vol	Beef Price Volatility	Bric database
	sheep_vol	Lamb Price Volatility	Bric database
	chicken_vol	Chicken Price Volatility	Bric database
	lnCCI	Consumer Confidence Index	China Statistical Yearbook
	lnsupply	Volume of Live Pigs Slaughtered	Bric database
	Lnpop	Regional population density	China Statistical Yearbook

Source: compiled by the author.

Table 2 shows the results of the descriptive statistical analysis of the main research variables. It shows that following the outbreak of African swine fever, the volatility of pork prices increased significantly, with a notable range between the minimum and maximum values. Regarding the media sentiment index and consumer expectations, the average sentiment index for official media is −9.724, indicating a more neutral tone in official media reports. The average consumer expectation is 0.393, suggesting an overall pessimistic outlook among consumers. In terms of the price volatility of substitute goods, the price fluctuations were not significant after the outbreak of African swine fever. Compared to beef and lamb, chicken prices showed more noticeable volatility. As for market demand, there was no significant overall change. Finally, the ADF stationarity test results indicate that all variables are stationary in their original sequences.

Table 2. Descriptive statistics and Stationarity Tests.

Variable	Obs	Mean	Std.Dev.	Min	Max	ADF (*p* Value)
price_vol	196	0.099	4.400	−20.718	37.499	0.0000
lnattention	196	7.811	1.125	5.9510	11.719	0.0001
mood_o	196	−9.724	24.25	−233	48	0.0000
lnexpect_uno	196	0.393	0.038	0.27	0.505	0.0000
Negative_uno	196	9.6122	28.310	0	191	0.0000
beef_vol	196	0.151	0.906	−3.243	7.757	0.0000
sheep_vol	196	0.163	0.903	−2.812	6.460	0.0000
chicken_vol	196	0.058	1.070	−3.575	8.862	0.0000
lnCCI	196	4.609	0.312	1.561	4.795	0.0000
lnsupply	196	8.515	0.218	8.037	8.814	0.0000
lnpop	196	−4.22	0.002	−4.224	−4.217	0.0000

Before conducting regression analysis, this study tested the correlation among key variables, as shown in Table 3. The results indicate that the correlation coefficients between pork price volatility, consumer internet attention, media sentiment, and consumer

expectations were mostly significant, suggesting a presence of correlation among these key variables.

Table 3. Analysis of the correlation matrix.

	Price_Vol	lnattention	Mood_Paper	Mood_Media	lncomment_Paper	lncomment_Media
price_vol		0.21 ***	−0.11	−0.10	0.01	0.07
lnattention	0.03 ***		0.15 **	0.21 ***	0.06	0.03
mood_o	−0.01 ***	0.06		0.59 ***	0.10	0.06
mood_uno	−0.02	0.00	0.44 ***		0.18 **	0.06
lnexpect_o	−0.17	0.08	0.05	0.08		0.01
lnexpect_uno	−0.02 ***	0.09	0.02	0.04	−0.05	

Note: Lower-triangular cells report Pearson's correlation coefficients, upper-triangular cells are Spearman's rank correlation. *** $p < 0.01$, ** $p < 0.05$.

4. Empirical Analysis

4.1. Consumers Internet Attention, Official Media Reports of Sentiment, and Pork Price Fluctuation

In order to answer the question of "how will consumers' internet attention affect pork price fluctuations under the guidance of media reports", this paper designs the following empirical model, focusing on the mediating role of media sentiment in the process of consumers' influence on pork price fluctuations.

$$Price_vol_t = \alpha_0 + \alpha_1 lnattention_t + \alpha_2 X_t + \varepsilon_t \quad (2)$$

$$Mood_t = \beta_0 + \beta_1 lnattention_t + \beta_2 X_t + \mu_t \quad (3)$$

$$Price_vol_t = \gamma_0 + \gamma_1 lnattention_t + \gamma_2 Mood_t + \gamma_3 X_t + \rho_t \quad (4)$$

where, $Price_vol_t$ is the fluctuations of pork price; $lnattention_t$ is the natural logarithm of consumers' internet attention; $Mood_t$ is the media sentiment index, which will be divided into official media and unofficial media for empirical analysis in the following section; X_t is control variables, which included population density, consumer confidence index, pig output, beef price fluctuations, chicken price fluctuations and mutton price fluctuation, If H1 is established, the regression coefficients of $lnattention_t$, α_1 should be significantly positive, indicating that the higher the consumers internet attention is, the more drastic the fluctuation of pork price will be, otherwise, the lower the price fluctuation will be. ε_t, μ_t and ρ_t are all error terms.

Table 4 presents the regression results of the mediation effect test models for Equations (1) to (3). First, column (1) shows that consumer attention (*lnattention*) has a significant positive effect on pork price volatility (*price_vol*), indicating that an increase in consumer attention leads to heightened price volatility, while a decrease in attention reduces volatility. Additionally, beef supply (*beef_vol*) and chicken supply (*chicken_vol*) both have significant positive effects on pork price volatility, whereas sheep supply (*sheep_vol*) has a negative effect, suggesting that changes in the supply of substitutes significantly influence pork price volatility. In column (2), consumer attention has a significant positive effect on the sentiment variable (*mood_paper*), indicating that higher consumer attention is associated with increased positivity in media sentiment. However, the supply variable (*lnsupply*) and other meat supply variables do not show significant effects on sentiment. Column (3) reveals that sentiment, as a mediating variable, has a significant negative effect on pork price volatility, suggesting that media sentiment moderates price volatility—positive sentiment helps reduce volatility, while negative sentiment exacerbates it. This demonstrates that sentiment plays a partial mediating role between consumer attention and pork price volatility.

Table 4. Consumers' internet attention and pork price fluctuations.

	(1)	(2)	(3)
Variables	**Price_Vol**	**Mood_Paper**	**Price_Vol**
lnattention	0.4977 **	2.2006 **	0.4891 *
	(0.2501)	(0.9169)	(0.2492)
mood_paper			−0.0039 **
			(0.0017)
beef_vol	3.3894 ***	9.6759	3.4276 ***
	(1.2780)	(7.5989)	(1.2826)
sheep_vol	−1.9286 *	1.7697	−1.9216 *
	(1.1311)	(2.2019)	(1.1364)
chicken_vol	2.2061 ***	−8.5831	2.1722 ***
	(0.2278)	(6.9941)	(0.2311)
lnCCI	−0.3842 **	−3.5921 ***	−0.3984 ***
	(0.1508)	(0.8740)	(0.1521)
lnsupply	−391.6799 **	−73.3082	−391.9693 **
	(172.9036)	(1677.5346)	(173.3604)
lnpop	−2.7219 ***	19.5068 ***	−2.6449 ***
	(0.9854)	(5.8214)	(0.9833)
Constant	−1624.1139 **	−487.0627	−1626.0369 **
	(720.3466)	(7048.2194)	(722.3474)
Observations	196	196	196
R-squared	0.7601	0.0643	0.7605

Note: *, ** and *** indicate significance levels at 10%, 5% and 1%, respectively, with robust standard errors in parentheses.

After the outbreak of African swine fever, the information conveyed by the media often becomes public opinion through the spiral of silence effect, influencing consumer attitudes and behaviors. Official media may use biased reporting to guide public sentiment and reduce panic, especially when consumer attention is high. Thus, ignoring media sentiment could obscure the relationship between consumer attention and pork price volatility.

The mediation effect of official media sentiment is shown in Table 4. Column (1) shows that consumer attention (*lnattention*) has a significant direct positive effect on pork price volatility (*price_vol*) at the 10% significance level. A one-unit increase in consumer internet attention raises pork price volatility by about 0.4891 percentage points. Columns (2) and (3) indicate a significant indirect effect, showing that official media sentiment (*mood_paper*) partially mediates this relationship. Specifically, an increase in consumer attention boosts positive media sentiment, which in turn slightly reduces pork price volatility, with an indirect effect of −0.0019.

In summary, official media sentiment partially mediates the impact of consumer attention on pork price volatility. While higher consumer attention directly increases price volatility, it also indirectly moderates this effect through changes in media sentiment. This suggests that in high-attention market environments, media sentiment can help stabilize price fluctuations by moderating consumer-driven volatility, thereby validating hypothesis H1.

4.2. Internet Attention of Consumers, Unofficial Media Reports of Sentiment, and Pork Price Fluctuation

In order to test H2, the following empirical model is designed, which focuses on the role of consumer expectations in mediating the process of consumer influence on pork price fluctuations.

$$Price_vol_t = \alpha_0 + \alpha_1 lnattention_t + \alpha_2 X_t + \varepsilon_t \quad (5)$$

$$lncomment_t = \beta_3 + \beta_4 lnattention_t + \beta_5 X_t + \mu_t \quad (6)$$

$$Price_vol_t = \gamma_4 + \gamma_5 lnattention_t + \gamma_6 lncomment_t + \gamma_7 X_t + \rho_t \quad (7)$$

$$Price_vol_t = \gamma_8 + \gamma_9 lnattention_t + \gamma_{10} lncomment_t + \gamma_{11} lncomment_t * increase_media_t + \gamma_{12} X_t + \rho_t \quad (8)$$

where $Price_vol_t$ denotes the fluctuations of pork price; $lnattention_t$ is the natural logarithm of consumers' internet attention; $lncomment_t$ is consumer expectation, which is divided into official media and unofficial media for empirical analysis in the following section; $increase_media_t$ denotes the frequency of negative media reports; X_t is control variables, we selects population density, consumer confidence index, pig output, beef price fluctuations, chicken price fluctuations and mutton price fluctuations as control variables. If H2 is established, the regression coefficients of $lnattention_t$, α_1 should be significantly positive, indicating that the higher the internet attention of consumers is, the more drastic the fluctuation of pork price will be, otherwise, the lower the price fluctuation will be. According to previous analysis, consumer trust in unofficial media reports is low, and the formation of consumer expectations is not significantly influenced by the "emotional contagion" effect of unofficial media. However, both official and unofficial media tend to report negative news (*price_increases*), suggesting a potential moderating mediation role for negative news. Therefore, this paper introduces the interaction term between consumer expectations and the volume of negative news reports ($lncomment_t * increase_media_t$) into Equation (7) to test the moderating mediation effect of negative news reporting.

For unofficial media, when an animal epidemic outbreaks, they report it with a strong tendency to do so for the sake of attention, which is less convincing to consumers. As a result, consumers are more susceptible to their sentiment. In other words, the online attention of consumers leads to a change in consumer sentiment, which ultimately leads to fluctuations in pork prices by affecting effective demand.

Table 5 presents the results of the mediation effect test for consumer sentiment in the relationship between consumer attention and pork price volatility. From the regression results in columns (2) and (3), we can see the mediating effect of consumer expectations (*lncomment_media*) between consumer attention (*lnattention*) and pork price volatility (*price_vol*). Column (2) shows that consumer attention has a significant negative effect on consumer expectations (*lncomment_media*), with a coefficient of -0.0071, significant at the 1% level. This indicates that as consumer attention increases, consumer expectations become more negative. Further, the results in column (3) show that consumer expectations (*lncomment_media*) have a significant negative effect on pork price volatility, with a coefficient of -4.2729, significant at the 10% level. This finding suggests that a decline in consumer expectations significantly reduces pork price volatility.

Overall, consumer expectations partially mediate the relationship between consumer attention and pork price volatility. Consumer attention not only directly reduces pork price volatility but also indirectly affects it by lowering consumer expectations. This finding underscores the impact of consumer expectations on consumer behavior during the information dissemination process, particularly in environments with high market attention, where changes in consumer expectations can act as a moderator to further stabilize pork price volatility.

Given that consumers are more sensitive to negative news from unofficial media, negative news may have a moderated mediation effect. Column (4) of Table 5 presents the moderated mediation effect test results for the volume of negative news reports. The interaction term between negative news volume and consumer sentiment is significantly positive at the 1% level, indicating that the volume of negative news (price increase information) has a positive moderated mediation effect. Specifically, the volume of negative news reports not only directly affects pork price volatility but also moderates the impact of consumer internet attention (*lnattention*) on price volatility. The volume of negative news reports may increase consumer panic and market uncertainty, thereby amplifying the impact of consumer attention on market fluctuations. Figure 2 illustrates the moderating effect of negative news.

Table 5. Consumer attention, consumer expectation and pork price fluctuations.

	(1)	(2)	(3)	(4)
Variables	**Price_Vol**	**Lncomment_Media**	**Price_Vol**	**Price_Vol**
lnattention	0.4977 **	−0.0071 ***	−0.5277 **	0.5270 *
	(0.2501)	(0.0015)	(0.2675)	(0.2683)
lncomment_media			−4.2729 *	−4.2050 ***
			(4.2729)	(1.2742)
$lncomment_t * increase_media_t$				0.0065 *
				(0.0028)
beef_vol	3.3894 ***	0.0013	3.2934 **	3.3105 **
	(1.2780)	(0.0225)	(1.3253)	(1.3334)
sheep_vol	−1.9286 *	−0.0017	−1.8503	−1.8509
	(1.1311)	(0.0166)	(1.1655)	(1.1709)
chicken_vol	2.2061 ***	−0.0023	2.2327 ***	2.2216 ***
	(0.2278)	(0.0079)	(0.2413)	(0.2418)
lnCCI	−0.3842 **	−0.0024	−0.3737 ***	−0.3802 ***
	(0.1508)	(0.0041)	(0.1401)	(0.1396)
lnsupply	−2.7219 ***	−0.0038	−2.7413 ***	−2.6367 **
	(0.9854)	(0.0112)	(0.9948)	(1.0213)
lnpop	−391.6799 **	0.1301	−404.6291 **	−404.9238 **
	(172.9036)	(0.1080)	(180.4611)	(181.2136)
Constant	−1624.1139 **	−0.9695	−1680.0784 **	−1682.1896 **
	(720.3466)	(1.1816)	(752.9232)	(756.1690)
Observations	196	196	196	196
R-squared	0.7601	0.0307	0.5614	0.4816

Note: *, ** and *** indicate significance levels at 10%, 5% and 1%, respectively, with robust standard errors in parentheses.

4.3. Endogeneity and Robustness Test

4.3.1. Granger Causality Test

Consumers may increase their internet attention to African swine fever outbreaks due to official media's reporting tendencies and rising consumer expectations. That is, there may be inverse causality between the core explanatory variables and the mediating variables, which would lead to an endogeneity problem. In this paper, we use the Granger causality test to verify whether there is inverse causality between variables.

As can be seen from the results in Table 6, for official media there is a reverse causality between consumer attention and media reports sentiment, while for unofficial media there is a reverse causality between consumer attention and consumer expectation.

Table 6. Granger test results.

Official Media				
Null Hypothesis	**chi2**	**df**	***p*-Value**	**Conclusion**
Consumer attention is not the granger cause of pork price volatility	3.0499	1	0.681	Accepting null hypothesis
Media reports sentiment does not granger cause pork price volatility	17.1740	1	0.000	Accepting null hypothesis
pork price volatility is not the granger cause of consumer attention	0.0533	1	0.817	Accepting null hypothesis
Media reports sentiment does not granger cause consumer attention	0.1605	1	0.009	Rejecting null hypothesis
pork price volatility does not granger cause sentiment in media reports	0.0605	1	0.806	Accepting null hypothesis
Consumer attention does not granger cause sentiment in media reports	0.0311	1	0.860	Accepting null hypothesis
Unofficial Media				
Consumer attention does not granger cause pork price volatility	1.9686	1	0.161	Accepting null hypothesis
Consumer expectation does not granger cause pork price volatility	0.5367	1	0.464	Accepting null hypothesis
pork price volatility is not the granger cause of consumer attention	0.0497	1	0.824	Accepting null hypothesis
Consumer expectation does not granger cause consumer attention	0.0093	1	0.023	Rejecting null hypothesis
pork price volatility does not granger cause consumer sentiment	0.1519	1	0.697	Accepting null hypothesis
Consumer attention does not granger cause consumer expectation	0.1438	1	0.705	Accepting null hypothesis

It is important to note that consumer attention may change in response to changes in media reports sentiment, as well as changes in consumer expectations. In order to test whether the above empirical analysis results are attributable to reverse causality, this paper refers to the processing of Shao and Li (2017) and Aghion et al. (2016) to consider the timing of variables and takes consumer attention as the dependent variable [28,29]. Media reports sentiment and consumer expectations are used as independent variables to construct the model, and the dependent and control variables are lagged by a period to see if changes in future explanatory variables predict changes in current explanatory variables. The results are shown in Table 7. As can be seen from the test results, the coefficients of media sentiment and consumer expectations are not significant when the same control variables are considered, that is, there is no reverse causality between media reports sentiment or consumer expectations and consumer attention.

Table 7. Results of reverse causality test.

	(1)	(2)	(3)	(4)
	Official Media		Unofficial Media	
Variables	**L.lnattention**	**L2.lnattention**	**L.lnattention**	**L2.lnattention**
mood_paper	−0.0003	−0.0010		
	(0.0013)	(0.0013)		
lncomment_online			−0.2286	−0.5047
			(0.9019)	(1.2997)
Constant	542.2426 ***	544.2071 ***	542.0921 ***	543.3727 ***
	(25.8808)	(26.3275)	(26.1010)	(26.1206)
Control variables	YES	YES	YES	YES
Observations	195	194	195	194
R-squared	0.8140	0.8135	0.8141	0.8133

Note: *** indicate significance levels at 1%, respectively, with robust standard errors in parentheses.

4.3.2. Robustness Test

As in previous benchmark regressions, this paper constructs a media sentiment index by subdividing the tone of media reports into price increase, price decrease and price stability using a naive Bayesian classifier technique. To ensure the robustness of the regression results, logistic techniques were used to sub-divide the tone of the news reports, and the regression analysis was again performed. The results are presented in the following Tables 8 and 9.

Table 8. Consumers internet attention, sentiment of official media reports and pork price fluctuation.

	(1)	(2)	(3)
Variables	**Price_Vol**	**Mood_Paper**	**Price_Vol**
lnattention	0.4977 **	3.4717 *	0.4708 *
	(0.2501)	(2.3145)	(0.2451)
mood_paper			0.0083 **
			(0.0029)
beef_vol	3.4048 ***	−4.9890	3.4306 ***
	(1.2723)	(5.1277)	(1.2777)
sheep_vol	3.3894 ***	−2.1534	−1.9107 *
	(1.2780)	(1.7282)	(1.1385)
chicken_vol	−1.9286 *	5.4808	2.1608 ***
	(1.1311)	(4.4341)	(0.2269)
lnCCI	2.2061 ***	1.2141*	−0.3942 **
	(0.2278)	(0.6947)	(0.1532)

Table 8. *Cont.*

	(1)	(2)	(3)
Variables	**Price_Vol**	**Mood_Paper**	**Price_Vol**
lnsupply	−2.7219 ***	−6.2712	−2.6700 ***
	(0.9854)	(3.8311)	(0.9807)
lnpop	−391.6799 **	−1723.9457	−377.4177 **
	(172.9037)	(1157.9017)	(170.4627)
Constant	−1624.1139 **	−7197.5314	−1564.5689 **
	(720.3466)	(4862.4015)	(710.1245)
Observations	196	196	196
R-squared	0.7601	0.0405	0.7609

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively, with robust standard errors in parentheses.

Table 9. Consumers' internet attention, sentiment of unofficial media reports and pork price fluctuation.

	(1)	(2)	(3)	(4)
Variables	**Price_Vol**	**Lncomment_Media**	**Price_Vol**	**Price_Vol**
lnattention	0.4977 **	−0.0016 ***	0.5031 **	0.5042 *
	(0.2501)	(0.0003)	(0.2529)	(0.2558)
lncomment_media			−3.3489 **	−3.2019 *
			(1.5222)	(1.8834)
cor				0.0016 **
				(0.0001)
beef_vol	3.4048 ***	0.0003	3.3884 ***	3.3787 ***
	(1.2723)	(0.0088)	(1.2715)	(1.2898)
sheep_vol	3.3894 ***	0.0030	−1.9386*	−1.9384 *
	(1.2780)	(0.0058)	(1.1187)	(1.1181)
chicken_vol	−1.9286*	−0.0032	2.2169 ***	2.2226 ***
	(1.1311)	(0.0039)	(0.2327)	(0.2477)
lnCCI	2.2061 ***	−0.0033	−0.3730 ***	−0.3660 ***
	(0.2278)	(0.0042)	(0.1417)	(0.1364)
lnsupply	−2.7219 ***	0.0146	−2.7707 ***	−2.8321 ***
	(0.9854)	(0.0108)	(1.0189)	(1.0553)
lnpop	−391.6799 **	−1.9061	−385.2966 **	−383.3400 **
	(172.9037)	(2.7343)	(170.1153)	(170.9924)
Constant	−1624.1139 **	−7.7692	−1598.0961 **	−1589.2567 **
	(720.3466)	(11.4939)	(709.1050)	(712.5110)
Observations	196	196	196	196
R-squared	0.7601	0.0278	0.7608	0.7610

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively, with robust standard errors in parentheses.

5. Conclusions

This study, based on the spiral of silence theory, investigates the relationship between consumer attention to sudden animal disease outbreaks, media sentiment, and pork price volatility. Using web scraping and text analysis techniques, we compiled weekly data from July 2018 to November 2022 to quantify online attention, media sentiment, and consumer expectations. A mediated moderation model was employed to analyze the mechanisms linking consumer online attention to pork price volatility.

The results show that outbreaks of animal diseases trigger consumer online attention, which has both direct and indirect effects on pork price volatility. Specifically, an increase in consumer internet attention directly affects pork price volatility and indirectly influences market fluctuations by altering media sentiment and consumer expectations. On the one hand, official media, in an effort to manage public opinion and reduce panic, often engage in biased reporting. Our findings indicate that the sentiment expressed in official media reports partially mediates the relationship between consumer attention and pork price

volatility. As consumer attention increases, positive sentiment in official media reports is enhanced, which can help stabilize pork price volatility. This suggests that official media play a critical role in guiding public opinion and stabilizing market price fluctuations. On the other hand, consumer expectations shaped by unofficial media reports partially mediate the relationship between consumer attention and pork price volatility. The results also show that negative news reports from unofficial media significantly moderate this mediation effect. Specifically, an increase in the volume of negative news not only impacts pork price volatility but also enhances the influence of consumer attention on pork price volatility by moderating this relationship. This highlights the important role of information dissemination, particularly negative news, in influencing consumer behavior and market price volatility.

These empirical findings provide new insights into the complex relationship between consumer online attention and pork price volatility and offer practical recommendations for demand-side management in the agricultural sector. Based on these findings, this study proposes the following policy recommendations: First, establish a 24 h public opinion monitoring team and set clear standards to enhance the authority and guiding power of official media, ensuring the timeliness and accuracy of information dissemination. Providing professional training and establishing an information-sharing platform can improve the sensitivity and effectiveness of regulators in handling animal disease information. Second, leverage big data technology to monitor consumer online behavior and strengthen demand-side management to respond quickly to market changes. Additionally, establishing a price monitoring system and emergency response plan can effectively combat illegal price hikes and maintain market order. Third, enhance cross-departmental collaboration, regularly evaluate policy effectiveness, and increase public awareness to reduce panic, stabilize the prices of essential goods, and ensure public welfare.

This study, grounded in the spiral of silence theoretical framework, examines the relationship between consumer online attention and pork price volatility during sudden animal epidemics. The findings reveal that consumer online attention during disease outbreaks significantly intensifies pork price volatility, either directly or indirectly through changes in media sentiment and consumer expectations. This aligns with the research by Peng et al. (2015), which highlights the strong influence of self-media in China on consumer behavior, particularly through the rapid spread of information by opinion leaders, especially when public trust in official media is low [30]. In this paper, positive reporting by official media helps alleviate price volatility by enhancing positive sentiment, whereas negative news from unofficial media amplifies the effect of consumer attention on price volatility by heightening negative consumer expectations. In comparison, in multiparty democratic countries, the diversity of media sources tends to diffuse such emotional contagion effects. It indicates that in these countries, the public often adopts a more critical stance toward both official and unofficial media, thereby reducing the direct impact of media sentiment on market dynamics. This highlights a potential direction for future research: comparing the influence of media systems on market volatility across different political regimes, to provide more targeted demand management strategies.

This study also has some limitations. First, due to technical constraints, data from other online platforms were not considered. Future research could integrate data from multiple platforms to further explore potential mechanisms. Second, this study focuses primarily on the case of African swine fever in China. Future research could expand to discuss other major animal disease events to verify the generalizability of these findings.

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