

Print ISSN: 2288-4637 / Online ISSN 2288-4645
doi: 10.13106/jafeb.2016.vol3.no4.17

Information Cascade and Share Market Volatility: A Chinese Perspective

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Received: June 29, 2016 Revised: September 27, 2016 Accepted: October 10, 2016

Abstract

The purpose of this paper is to understand the underlying dynamics for the share market bubbles in China during the most recent decade. By using the behavioral finance theory and the Shanghai Composite index prices during the periods from 2005 to 2008 and from 2014 to 2015 as the study samples, we find that the large volatilities in the Chinese share market are closely related to information blockage, which impedes share prices to timely respond to economic conditions as well as external shocks and increases (decreases) the demand of shares when the supply is difficult to adjust. Although the Chinese government has introduced a series of programs designed to increase more reliable information to the public, the share market still tends to confront issues of information asymmetry. The potential reason is that the reforms did not change the long-stand situation in China, where individuals or groups related to government bureaucracy who play a dominant role in the society are given priority to gain access and obtain information that benefits. By identifying the main reasons for the large volatilities in the market, policy makers are given advice as to which areas they may need to focus on to improve future market performance.

Keywords: Information cascade, Share market volatility, China.

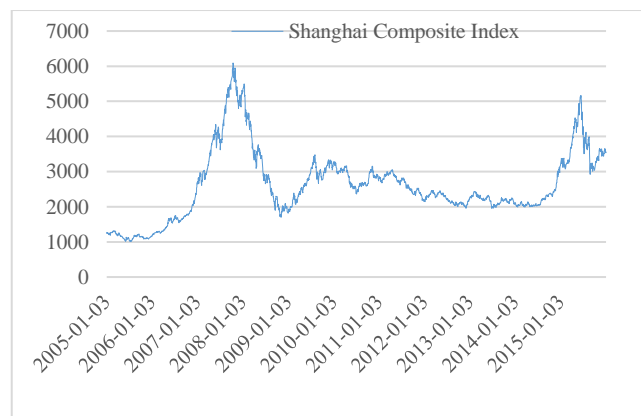
JEL Classification Codes: G02, G11, G18.

1. Introduction

The Chinese share market has attracted considerable interests from investors particularly since 2005 when the Spilt Share Structure Reform (SSSR)¹, which is claimed to open a new era for the market, was finally implemented. But with extreme performance and large volatility, investors are subject to an enormous risk of big losses. Figure 1 shows the daily performance of the Shanghai Composite index during the period from January 2005 to December 2015.

In this recent decade, we observe the formation and burst of two large asset bubbles, i.e. the ones in the periods from 2005 to 2008 and from 2014 to 2015. According to Figure 1, from its trough in July 2005, to its peak in October 2007 and subsequent trough in November 2008, share prices as measured by the Shanghai Composite index rose more than 5 times, followed by a subsequent fall of 72 percent. It again rose around 1.5 times from its trough in July 2014 to its peak in June 2015, with an ensuing fall of more than 40

percent to its trough in August 2015. This raises the questions as to why was the Chinese share market so volatile? And why has the high level of volatility persisted even after the government has *endeavored* to improve market conditions since 2008.



Source: Yahoo Finance

<Figure 1> Daily Performance of the Shanghai Composite Index: 2005-2015

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The purpose of this paper is to answer these questions by using the information cascade model. We argue that in China, where information is relatively opaque due to institutional limitations, which leads to high costs of information acquisition, information cascades are more likely to arise. Although the Chinese government has introduced a series of programs designed to increase more reliable information to the public in recent years, it did not fundamentally improve the current regulatory system and therefore the market is still plagued by information asymmetry. A suggestive way is to establish a coordinated regulatory mechanism which may help reduce information procurement costs without overhauling the entire structure.

Authors such as Yao and Luo (2009) and Bellottie, Taffler and Tian (2010) consider how both economic and psychological factors are important drivers for steering the market bubble in China. However, in contrast to examining greed, envy, speculation or even unconscious fantasy that may determine investor behavior, this paper will examine the phenomenon of the Chinese share market volatility from a different behavioral perspective. Furthermore, rather than focusing on just one particular market episode during the period from 2005 to 2008, as previous studies do, this paper will provide a more comprehensive account by comparing and analyzing the reasons for both the 2005-2008 and the most recent 2014-2015 market bubbles.

The rest of the paper is organized as follows. Section 2 describes the information cascade model, including its definition, features and process. Section 3 focuses on the evidence of the relationship between information cascades and share market performance in emerging markets. Section 4 analyzes how the model can be applied to the Chinese case, taking due account of the relevant literature. In Section 6 it derives policy implications for the government. Section 7 concludes.

2. Information Cascade Model: How Does It Work?

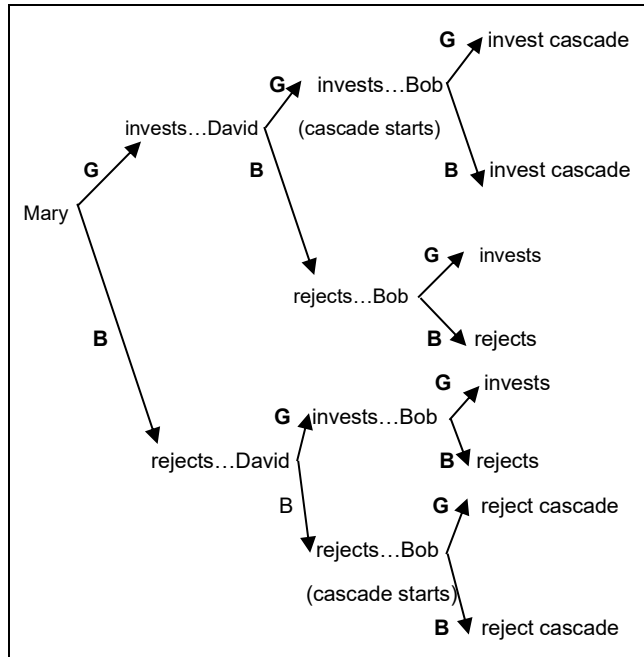
An information cascade has been typically defined as behavior tendency to follow the lead of other traders when investors experience high information asymmetry (Sias, 2004; Goeree, Palfrey, Rogers & McKelvey, 2007; Chiao, Hung & Lee, 2011). In a market where information procurement costs are high, investors tend to infer private information from prior trades while ignoring their own 'noisy' information. This therefore leads to their tendency to follow predecessor's actions and starts herding. Both information and decisions are then poorly aggregated in the cascade even when the signals obtained by investors themselves

can be aggregated to precisely predict the market. However, such a process cannot sustain as investors will finally realize that the accuracy of the information aggregated from predecessors' actions is open to question. Even a small shock could cause a sudden switch of popular behavior, consequently exacerbating volatility, destabilizing the market and increasing the fragility of the financial system (Shiller, 1987; Furman & Stiglitz, 1998).

According to Hirshleifer and Teoh (2003), the key features of the information cascade are: (1) path-dependent, with market actions depending on the order of decisions and information arrival; (2) idiosyncratic, given that a small difference in the first few decisions can make a big difference to the actions of subsequent followers; (3) fragile, since even a small shock can end up the current cascade. This is further illustrated in Figure 2, which describes the process of the cascade. Suppose investors face similar investment decisions under uncertainty and have their own private (yet imperfect) information on the outcome of an action. Hereby, all the information relevant to investment is public, with the quality being unknown *ex ante*. Private information can be obtained through research efforts of investors who make inference from each other's action. Suppose again several investors make decisions about whether or not to invest in a share in an order externally determined. Let V be the payoff of investing relative to the sub-optimal option, which is either -1 or $+1$ with equal probability. Each investor observes a private signal about the payoff of the investment, either good G or bad B . If $V = +1$, the probability of the signal being G is equal to p and the signal being B is equal to $1-p$, where $0.5 < p < 1$. Likewise, if $V = -1$, the signal being B (G) has the probability of p ($1-p$).

The decision-making process begins with the first investor, Mary, who follows her own signal: if she observes G , she invests. Alternatively, if she observes B , she does not invest. The second investor, David, knows this and can infer Mary's signal from her action: if his signal is G and he observes an investing action by Mary, he will also invest. Alternatively, if his signal is B and he observes Mary's investing, David will be indifferent between investing and not investing, and will make a random decision. Accordingly, if Mary invests and David rejects, the third investor, Bob, would infer that Mary saw G and David saw B . His prior belief is that $V = -1$ and $V = +1$ are equally likely and he, being in the same position as Mary, will follow his own signal. In contrast, if Mary and David both invest (reject), Bob would conclude that they both saw G (B). In this case, Bayes's rule indicates that Bob should always invest (reject) irrespective of his own signal. Moreover, the fourth investor and also the followers are in exactly the same situation as Bob and would also invest (reject). The probability that the cascade might start after the first few investors is very high. Even with a noisy signal, i.e.

p being close to 0.5, a cascade is likely to occur after the first four investors with a probability greater than 0.93 based on Bayes' theorem.



Source: Bikhchandani and Sharma (2000)

<Figure 2> The Process of Information Cascade

In summary, an information cascade starts with the individual who finds out that the number of predecessors who invested (rejected) exceeds that of predecessors who rejected (invested) by roughly two. Accordingly, together with the subsequent investors, this investor chooses to invest (reject) without resorting to his own signal. Once the cascade starts, public information stops accumulating as beliefs in investing (disinvesting) have established. However, this process cannot sustain since the model is rational and investors will finally realize that information aggregated from prior trades is far from being accurate.

3. Evidence of Information Cascades in Emerging Markets

As one of the topics of behavioral economics, an information cascade is often used to explain cumulative and excessive price movements in emerging markets, which has caused market turmoil and turbulence in the past few decades. For example, Lai and Lau (2004) link the performance of the Malaysian share market which was

badly affected in the Asian financial crisis to information cascades. Further evidence is from Khanthavit (2012) who examines the information and trading behavior of investors in the Thai market around the same time, and supports the occurrence of information cascades. By studying 200 constituent stocks in the Hang Seng Composite index (HSCI) after the Internet Bubble in 2003, Zhou and Lai (2009) find the presence of information cascades. Lai, Chen and Huang (2010) empirically test the effects of technical signals attributable to psychological biases in the Taiwan market. Due to the significant impact on trading signals, which influences market outcomes, they determine that information cascades indeed exist between 1987 and 2008.

In an information cascade, both individual and institutional investors follow the lead of prior trades (Lobao & Serra, 2002; Voronkova & Bohl, 2005; Tan, Chiang, Mason, & Nelling, 2008; Shyu & Sun, 2010; Chiao, Hung, & Lee, 2011). Although institutions have immense resources as well as professional teams to collect and process information and trade based on this type of specialized knowledge, they tend to follow other traders especially those who have the power to influence the market, just like individuals. Shyu and Sun (2010) propose that the soundness of a market influences institutional investors' behavior. As these investors only have access to limited information in emerging markets, it is likely that they mirror one another on which shares to trade.

We argue that the large volatilities in the Chinese share market in the most recent decade can also be attributed to information cascades. Like other emerging markets, China tends to be depicted by various media and research reports as opaque (Eun & Huang, 2007). In such a market where reporting requirements and accounting standards are relatively poor to developed markets with information acquisition being costly, information cascades are more likely to be prevalent. This is supported by Tan, Chiang, Mason, and Nelling (2008) and Yao, Ma, and He (2014) who show the presence of information asymmetry in the Chinese share markets (both A- and B-share markets). Evidence is also from Han, Cui, and Meng (2015). By studying the case of Everbright Securities Ltd.,² who placed large erroneous buy orders on the Shanghai Stock Exchange 180 constituent stocks from 11:05 to 11:07 on the 16th August 2013, to examine market quality and investors' responses, the authors find that investors change their beliefs and actions quickly, consequently leading to large price swings. This is consistent with the information cascade theory. We follow the concept of Han, Cui and Meng (2015) to examine whether the theory also applies to our case, which will be further explained in the next section.

4. Can Information Cascades Explain Large Volatilities in the Chinese Share Market?

The Chinese share market has attracted substantial attention from the media who tend to describe the market as opaque, chaotic, inefficient, and rather irrational (Eun & Huang, 2007). This is primarily due to the institutional limitations: China adopts socialism with the system of one-party rule, that is, the communist party plays a dominant role in society with tight ideological control and state surveillance, severely curtailing the production of ideas (Coase & Wang, 2012). The system therefore leaves spacious room for rent-seeking activities by the government bureaucracy with an attempt to obtain economic rent by manipulating the social and political environment in which economic activities take place. Specifically, for example, the government is responsible for both regulating and supervising the share market, including Initial Public Offerings (IPOs), stock trading and delisting. Bondt, Peltonen, and Santabarbara (2011) show policy actions significantly contribute to the misalignment of the Chinese share market with its long-term equilibrium. As the government can significantly influence the allocation and prices of financial resources, investors need to establish good connections with them in order to secure insider information. These connections are often established through a bribe paid by investors and to guarantee that they receive the necessary information to make a profit from the market.

The consequences are well-defined private property being greatly challenged, the development of a sound legal infrastructure being impeded, and information disclosure falling short of global standards (Aharony, Lee, & Wang, 2000; Chen, 2003; Coase & Wang, 2012). All these lead to high information procurement costs so that investors rationally imitate predecessors' action as they can benefit to obtain higher payoffs than the alternative. According to Hirshleifer and Teoh (2003), in a general sense these predecessors are usually endorsers defined as an expert who has established a good reputation for accuracy in the area. In this paper, we introduce the People's Daily which is a state owned newspaper used by the government to transmit information and transform society in China as the endorser (Wu, 1994). Following the concept of Han, Cui, and Meng (2015), we will examine whether the formation and collapse of the market bubbles between 2005 and 2008 and between 2014 and 2015 are consistent with the features of information cascades as discussed in Section 2, i.e. path-dependent, idiosyncratic and fragile.

4.1. The case of market bubble I: 2005-2008

The story of the historical share market bubble in China

began in 2005 when the SSSR was finally implemented. Together with the booming Chinese economy and the endorsement of the People's Daily, the share market started to rally following a four-and-half-year slump. Figure 3 shows the market's responses after a series of reports relevant to the market from the People's Daily with red plus describing 'positive news' and green minus 'negative news'.

In July 2005 when the market was at its bottom of 998.22, the People's Daily published articles in solid support of the SSSR which was believed to change the Chinese share market fundamentally. According to Yahoo Finance, subsequently, the Shanghai Composite index climbed by 8.1% in January 2006, and rose a further 3.1% in February. On the 3rd April, the index went beyond the key level of 1,300 set by analysts and had succeeded to stay above. By the end of 2006, the index rose a further 60% from the level around 1,600 in May.



Source: Tencent News

<Figure 3> Reports of the People's Daily and Subsequent Performance of the Shanghai Composite Index: 2005-2008 and 2014-2015

By comparison, new shareholders' accounts in the Shanghai Stock Exchange (SSE) increased from 4.48 million by the end of 2005 to 15.36 million by the end of 2006, among which individual accounts grew from 4.42 million to 15.21 million and institutional accounts from 0.06 million to 0.15 million (SSE Statistics Annual, 2013). These shareholders not only include professionals but also investors like college students, bus drivers, retirees and even household women. Both the astonishingly growing number of new opening accounts and unusual good performance of the market index indicate that investors may have entered into an invest cascade.

Once the cascade starts, public information stops accumulating as beliefs about investing have solidly formed.

At this time, investors' actions do not convey any information on fundamentals. In both April and May 2007, articles in the People's Daily stressed that the current share market was overheated and was subject to speculation. After the Chinese government imposed a string of interest rate rises and increases in bank reserve requirements, the newspaper again warned the market against potential investment risks. However, the market seemed to ignore these negative reports with the index climbing to a new record high, the level of 4628.11, in August. This is in a sharp contrast to the US market which was stuck in turbulence in the credit market after Alan Greenspan, the former chairman of the Federal Reserve, warned in February 2007 that the US economy might go into recession by the end of 2007. The Chinese share market was thus considered as a closed market, irrelevant of the turmoil in the US, where the prices of shares, bonds and derivatives were driven down due to concerns about the sub-prime mortgages that might cause further economy slumps.

Information cascades are born quickly and idiosyncratically, and shatter easily. When the devastating impact of the US recession on China's manufacturing industry became more evident to the public, the investors realised the inaccuracy of the information that they had aggregated from predecessors' action and went into a panic. The market began to collapse in October 2007. Although in both April and July 2008, the People's Daily published articles in full support of market stabilisation, the market only had a slight rise on the next date but continued to decline afterwards. By the end of 2007, the Shanghai Composite index was down by more than 50% from its peak, the level of 6,124, on the 16th October 2007, wiping out almost all the gains from this round of increases. This was accompanied by dramatically dipping new opening trading accounts. Based on the SSE Statistics Annual (2013), the number of new shareholders' accounts in the SSE 2008 was 72.23 million, a substantial drop from 187.32 million in 2007 when the market reached its culmination. The situation began to moderate after the government announced an injection of 4 trillion RMB into the economy in November 2008.

4.2. The case of market bubble II: 2014-2015

Market bubble II which began in late July 2014 is in essence different from market bubble I as it did not built up on the grounds of economic growth. Instead, according to Yin (2015), the background was the easing monetary policy to reduce high financing costs and the desire of bank financial capitals to gain high profits.³ These allow the injection of sufficient funds into the market when investment opportunities emerge.

The endorsement of the People's Daily again plays a leading role in this round of increases. Based on Figure 3, in July 2014 when the People's Daily released 'positive' news about the market, reporting that foreign investors unanimously expect the A-share market to rise, the market started to rally after it reached its local bottom. According to Yahoo Finance, the Shanghai Composite index increased 20% from the end of October, the level of 2,682.63, to 3,210.36 by the end of December. After the newspaper boosted market confidence when the market became volatile early in 2015, the index broke a thousand-point threshold again by the end of March to the level of 4,441.65 which is more than double higher than a year previously. The index continued its upward trend though the People's Daily reminded investors of potential risks in May.

The soaring market is also associated with a significant increase in new shareholders' accounts. Based on a report from the securities research institute of Tencent (2015)³, the average new trading accounts in the SSE for the first 6 months in 2014 was round 5 million. The accounts reached 8 million in September 2014. Between the 16th and the 20th March 2015, it went over 11.39 million, which broke the historical record since June 2007. This was followed by another high level of 44.28 million between the 25th and the 29th May 2015, just two weeks before the market peak on the 12th June in the same year.

All the information indicates that the Chinese share market may undergo another information cascade. As the market bubble this time was not supported by a solid economic foundation, it did not last long and burst out quickly. After the China's Securities Regulation Commission (CSRC) imposed a ban on illegal leverage funds from investing in the share market on the 12th June 2015,⁴ other related risks like bank trusts and umbrella trusts (i.e., trust companies sell wealth management products and loan hedge funds the proceeds from those sales) were also exposed. The Shanghai Composite index started to slump on the first trading day and declined 30% in the following 3 weeks. Although in July the People's Daily emphasized that most economic indexes were generally positive in China and the government also started to take steps to stabilize the market, the index still responded by further decreases. Until the end of August 2015, the index fell almost 40% from its peak, the level of 5,178.19, to the level of 3,052.78. According to the same report from the securities research institute of Tencent (2015), new shareholders' accounts dropped all the way after the market crash without any sign of rebound. This situation started to improve in October after more positive policies towards the market were adopted and were released to the public.

<Table 1> Policies to Enhance Information Provisions in the Chinese Share Market

Category	Year	Content
Information Source	2010	allowance of margin trading, short selling and trading of stock index futures
	2011	allowance of offshore RMB to invest in the Chinese share market
	2013	allowance of QFIIs to invest in the stock futures
	2014	allowance of Shanghai-Hong Kong stock connect program
Information Quality	2008/2013	improve the quality of information disclosure by listed companies
(Nine Policies of State Council/New Nine Policies of State Council)		

5. Policy Implication

Herein, we use the information cascade model to explain the large volatilities in the Chinese share market in the most recent decade: information blockage impedes share prices to timely respond to economic conditions as well as external shocks and increases (decreases) the demand of shares when the supply is difficult to adjust, which distorts relative prices and consequently results in considerable market volatilities.

Our analysis highlights that information asymmetry is still present and affects the development of the Chinese share market even in the recent years. The result indicates that a series of programs introduced by the government to increase reliable information to investors after the market collapse in 2007 may not fundamentally change the long-stand situation in China. These programs include but are not limited to the allowance of margin trading, short selling, trading of stock index futures, the allowance of Qualified Foreign Institutional investors (QFIIs) as well as offshore Ren Minbi (RMB) to invest in the Chinese capital market and the allowance of the Shanghai-Hong Kong stock connect program to increase the source of information to domestic investors, and strengthen the punishment of illegal behavior of information disclosure by listing companies to improve the quality of information (see Table 1).

As argued at the beginning of Section 4, the potential reason for the poor flow of information in China is that this type of information blockage can prompt individual or group priority to access and obtain the information that benefits. And these individuals or groups are usually related to government bureaucracy who play a dominant role in the society. Clearing out the information blockage may infringe the interests of part of these bureaucrats. Therefore the recent policies although progressing a lot did not make real changes to the current situation and are not effective in its true sense.

However, a sound share market requires a sound system to regulate information transmission, rendering it open, fair and equitable. The interests of bureaucrats, described in Coase and Wang (2012) as 'secretive and insidious forces'

which 'promote narrow group interests detrimental to public interests', must be handled but with special care. A suggestive way might be to establish a coordinated regulatory mechanism which may help reduce the influence of bureaucrats on the capital market rather than those market-by-market adjustments. A good start is from the CSRC who is responsible for both regulating and supervising the share market. Different from the US where the Securities Exchange Commission (SEC) is given full legislative and judicial authorities as well as an independent enforcement authority, the CSRC is a ministry-level institution with the government playing a dominant role. Therefore without a radical reform on the current structure, China can still authorize the CSRC as a representative to supervise the capital market but also establish an oversight council composed of both professionals and non-professionals with authorities who represent investors. This is to ensure all the rules and regulations enacted by the CSRC are effectively implemented. In order to promote efficiency and continuation, the council can also set up a committee in charge of collecting reports of market misbehaviors from investors. Once a random inspection ensures the fact of misconduct, the council must assist the CSRC in enforcing severe penalties on market participants involved and timely report the case to the public. This solution may reduce the influence of bureaucrats on the market, which constitutes a primary source for high costs of information acquisition. It would therefore be a more practical approach to help China at least in the short term to lay a sound foundation in the working of a market economy for which the economy has been making an effort.

6. Conclusion

The Chinese share market has received considerable attention from investors as to its extreme performance and large volatility particularly since 2005 when the SSSR was finally implemented. The roller coaster market conditions and the ensuing big losses incurred raise a big concern about what potentially contributes to these market features.

Previous studies, such as Yao and Luo (2009), have made several propositions that help explain why the market performed very differently from developed markets.

In this paper, we employ the information cascade model to study the share market bubbles in China both from 2005 to 2008 and from 2014 to 2015. Our analysis shows that the two market episodes well reflect the features of the information cascade which is born quickly and idiosyncratically, and shatters easily, and therefore is consistent with the cascade theory. It also highlights that information blockage impedes share prices from reflecting their intrinsic value, thus imposing a deadweight loss on society and misallocating resources to less productive industries.

The results question the efficacy of both the policies and institutional arrangements that foster the market development in China and challenge the future planning of reforms. The information cascade model suggests that effective policies should address the detrimental issue by reducing information procurement costs so that the negative impact of the priority to access information that benefits would be greatly reduced. This allows share prices quickly back to their long equilibrium level, avoiding excessive volatilities. However, clearing out information blockage would infringe the interests of part of government bureaucrats. That is why the recent government policies are not effective to change the current situation in its true sense.

As China is determined to develop a sound share market in support of the market economy for which it is making an effort, the interests of government bureaucrats which are

detrimental to public interests must be handled but with special care. Without radically overhauling the current system, a more practical way is to establish a coordinated regulatory mechanism, which helps reduce the influence of bureaucrats on the capital market. This will help China at least in the short term to lay a sound foundation in the working of a market economy for which it has been making an effort.

Notes

1. The SSSR allows non-tradable shareholders to bargain with and pay compensation to tradable shareholders for gaining the right to trade.
2. Everbright Securities Ltd is a financial services company with business in asset management, direct investment, and brokerage and investment banking in both Mainland China and Hong Kong. Its parent company, China Everbright Group, is a state-owned enterprise under the supervision of the State Council of the People's Republic of China.
3. In China, bank financial capitals are usually invested in the money market with strong liquidity and high security. A fall in interest rates in the money market along with a cut-off of the access to the real estate market and local government-backed investment units forced these capitals to switch to the share market for high profits.
4. <http://stock.qq.com/original/zqjy/s591.html>

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