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Net-Mediated Pubic Opinion Analysis of China's Real Estate

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Recommended Citation

Zhu, Jianping; Shia, Ben-Chang; Luo, Xiangyu; Fan, Xinyan; Zen, Wuxiong; and Zheng, Chenlu, "Net-Mediated Pubic Opinion Analysis of China's Real Estate" (2016). *ICEB 2016 Proceedings*. 16.
https://aisel.aisnet.org/iceb2016/16

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ABSTRACT

With the development of Internet technology, the analysis of net-mediated public opinion based on text mining, has become increasingly concerned by the academic community in recent years. In this paper, we do research on net-mediated public opinion of China's real estate in the second quarter of 2015empirically with the association rules, text tendency analysis and other technology of data mining and visualization. On the basis of the demonstration, a basic framework of net-mediated public opinion analysis is constructed. According to the analysis of this paper, the distribution and association of hot topics in this quarter were found, and the overall tendencies of the topics were reviewed, also some relevant policy recommendations were given.

Key words: Net-mediated public opinion, real estate, association rules, text tendency

INTRODUCTION

Public sentiment refers to a series of attitudes arose and held by the public towards social administrators, their political opinions or other objects as the intermediary social events arise and evolve under certain social conditions. It is a complex which includes views, opinion and feelings delivered by most of the people regarding current social phenomenon. Since ancient times, public sentiment has always been an integral part of economic and social development. As the old saying goes, the flooding of public opinion is much more disastrous than that of rivers, which clearly states the significance of public sentiment. With the rapid development of information as a result of technology advancement and with wider access to the Internet, Internet has more and more become a key means to spread and obtain public sentiments. According to the report of We Are Social 'Digital in 2016', due to January 2016, the population of China is 1.379 billion, which is 57% of global population while the internet user of China is 680 million, which is 49% of global internet user. The internet user of China has increased by 5.91% compared to that of the same period of last year. Analysis of public sentiment on the internet has become more and more important in public sentiment analysis.

Food, clothing, housing and transporting are necessities in people's common life. Real estate, which meets the need for housing, is always one of the most important topics in public opinion. Nowadays, with the development of the domestic economic and the improvement of people living standard, real estate industry has played more and more important role in domestic regional economy. In 2015, under the incentive of the New Normal, domestic real estate industry is facing new opportunity and challenge. From April, 2015, the transaction volume started to pick up. Meanwhile, a large number of post 90s also get engaged in the housing transaction, adding new element for the real estate public sentiment analysis at this period of time. When the housing market and transaction volume start to pick up in general, how to maintain the stable development of the housing market so as to safeguard sustained economic growth is not only the policy target of the government officials, it has also captured the attention from the online media and the public.

Recent years, the approaches of Internet text mining and statistical research are growing prestigious in academia. Regarding the text association rules, Hany Mahgoub, Dietmar Rösner (2008)[1] propose text mining technology based on the automatic association rules. Also, they evaluate, compare and contrast various generating algorithm of association rules in common use. Wang Aiping and some other scholars (2010)[2] introduce the classical algorithm of association rule mining –Apriority and classify discuss the association rule mining from several perspectives such as width, depth, partition, sampling and incremental updating. Then they summarize the commons algorithms of association rule mining through querying documents and comparative analysis and prospect the association rule mining. Regarding the text semantic orientation, XuXin (2011) [3]introduces the model and technology of text classification, proposes pattern matching based on the extraction and text classification algorithm, and describes the technical implementation of text semantic orientation. Li Xiaojun (2011) [4]summarizes the basic flow and three methods of text sentiment orientation analysis and proposes the research perspectives of basic problem and implementation method of specific application. Wang Lancheng (2013)[5] designs algorithms of tendency analysis based on text classification, semantic rules pattern and sentiment word based on the study of the text tendency recognition method. He studies the combination of the sentiment ontology construction and the emotional concept selection method based on How Net and subject areas corpus. He uses machine learning methods to analyze online texts for thematic public opinion. Generally, some of the existing research focuses on the certain link in online text or online public sentiment mining and analysis framework, while empirical studies on overall framework analysis is less commonly seen. In particular, the analysis of real estate online public sentiment is rarely seen.

In this paper, we do research on net-mediated public opinion of China's real estate in the second quarter of 2015 empirically

with the association rules, text tendency analysis and other technology of data mining and visualization. The authors first introduce the resources of the public opinion on domestic real estate, summarize and make the screening and sorting rules of the hot topics in the second quarter of 2015, apply association algorithm to analyze the correlation among the topics, review the overall tendencies of the topics, and finally come to a conclusion of the online sentiment on China's real estate.

TEMPORAL AND SPATIAL DISTRIBUTION OF PUBLIC SENTIMENT INFORMATION

With the help of targeted information crawling, this paper has obtained 58,387 pieces of real estate related public sentiment information from 13 major web portal's real estate section or authoritative real estate portals.

The temporal distribution of the information is showed in Figure 1:
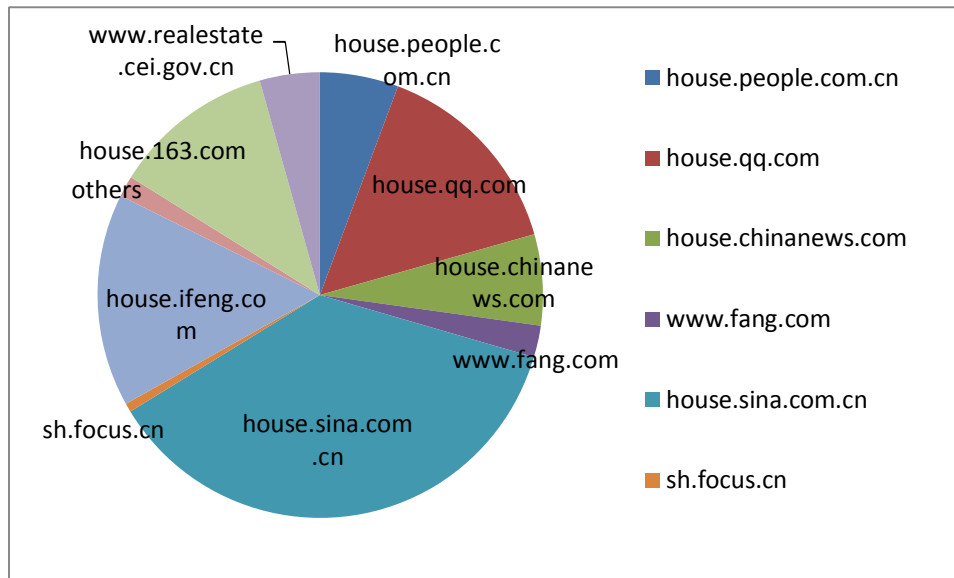

Figure 1: Temporal Distribution of Public Sentiment Information

The obtained public sentiment information was released from April to June, 2015, among which, 28.83% of the information came from April, 31.45% from May, 39.72% from June. This can truly reflect the features of attention paid by the public on the topic of real estate market to certain extent.

CONFIRMATION OF HOT TOPICS OF PUBLIC SENTIMENT

An Overview of Topics of Public Sentiment

Built on the needs of Chinese real estate market's development and online public sentiment analysis, this paper chooses to track the following 11 real estate related topics of great public attention:

Topic 1: Rising housing price.

On March 30th, 2015, the People's Bank of China, Ministry of Housing and Urban-Rural Development of the P.R.C together with China Banking Regulatory Commission jointly released the housing loan policy to adjust housing fund and downpayment. Ministry of Finance and State Administration of Taxation jointly launched the *Announcement on Adjusting Sales Tax of Homes Sold by Individuals*. Stimlated by these policies, second-hand housing market boomed. In May, 2015, the housing price witnessed a 0.45% increase, and it was further expanded to 0.56% in June. Notably, the housing price of different cities demonstrated different patterns in the firt half of 2015. Tier-1 cities' housing price increased by 2.53% compared with the same period last year, registering a 5.16% growth. While the housing price in tier-2 cities fell by 0.75%, representing a decrease of 0.35%. As for tier-3 cities, the price declined by another 0.37%, with an accumulative decrease of 1.25%. The apparent housing price changes touched the public sentiment greatly, becoming one of the real estate related hot topics.

Topic 2: Tansaction's volume starts to pick up.

In the second quarter of 2015, the People's Bank of China further lower the interest rate and reserve ratio. Meanwhile, the new housing market policy issued on March 30th start to show its effectiveness. The transaction volume started to pick up. The transacted area in May of typical cities eached 31.91 million square meters followed by another increase to 34 million square meter in June. In terms of the performance of individual cities, the transaction volume of different tier cities kept growing. Tier-1 cities grew by 45%, with average monthly transacted area of 750,000 square meters, 18.5% growth and 660,000 square meters for tier-2 cities and 37% growth, 310,000 square meters for tier-3 cities. Driven by the policy, the transaction volume reflects the policy result directly and it can be seen as an indicator for house purchasement by individuals.

Topic 3: New policy on housing fund and down payment.

After the new housing policy issued on March 30th, local governments came up with their policies as well. The adjustment centered around the following 3 areas: 1. Lower the down payment ratio, the minimum loan for housing provident fund to buy the first house was lower to 20% of the housing price, where as the figure for buying second house decreased to 30% of the housing price; 2. Increase the loan commitment for housing provident fund; 3. Loosen the policy on the usage of housing provident fund. These related policies have a direct bearing on the individual's interest.

Topic 4: Business tax reform.
According to the new housing policy issued on March 30th, for individual home buyers, if they have bought the houses for over 2 years, no sales tax will be charged. This policy reduces the pressure of second-house buyer's pressure and facilitates the transaction. This policy reform is closely related to the well-being of the public.

Topic 5: Real estate and stock market.
In the second quarter of this year, China's stock market experienced great fluctuation, highlighting the stable quality of property investment. The much waited housing market regained the attention from investors. After the plunge of A-shares, the total market value evaporation was 21 trillion yuan. Many investors changed their investment strategy, which further leads to the booming housing market. Thus, the "Seesaw Effect"between real estate market and stock maket became another heatedly discussed topic by the public.

Topic 6: Real estate developer's capital chain.
Since the second quarter of 2015, many Chinese real estate developers have been confronted with frequent capital crisises and the situation is still worsening. Due to over-borrowing, many real estate developers find it difficult to get back the money or second-round financing. As the Internet Finance evolves, the P2P era has come. After gaining the land and related rights, many real estate developers started online financing with the land or the houses as morgage. This could shorten the loan cycle, trim the financing cost and improve the capital performance.

Topic 7: Lower interest rate.
Under the incentive of the New Normal, a substantial reserve ratio cuts is followed by another round of interest cuts, leading to the booming of housing market transaction. From the demand side, lower interest rate could reduce the mogage cost and unleash the potential of home buying; on the supply side, lower interest rate could be conducive to the expansion of land investment. The result brought by interest cuts is also another hot topic.

Topic 8: Land market.
After the slugish land market in the first qurter of 2015, the land market nationwide showcases an overall declining trend since the second quater. After May, despite the signal of a warmer land market in tier-1 cities, the land market in tier-3 and tier-4 cities remained inactive.

Topic 9: Real estate trust.
In 2015, the Real Estate Trust sector witnessed another round of cash out peak and some of the real estate companies were caught by a shortage of capital. In the second quarter, the perperty market went up against the odds. Although the housing price was sluggish and the transaction volume decreased, the trust fund went to the real estate sector increased. Against the backdrop the tier-1 city's housing market stabalization, the pick up of Real Estate Trust would be another area of interest.

Topic 10: Shanty town renovation.
In recent years, while the shanty town renovation goes on, local governments come up with a series of guidelines based on the local conditions. Through monetary indemnity, incentive measures, tax and fees reduction and exemption, the relocation of shanty town dwellers moves on smoothly and can contribute to the de-stocking. Shanty twon renovation policy's impact on China's real estate market captured much attention from all related parties.

Topic 11: Affordable housing.
In the early 2015, given the result achived last year, Ministry of Land and Resources together with Ministry of Housing and Urban-Rural Development of the P.R.C jointly released the *Announcement on Optimizing housing and land'Supply Structure for the Sound Development of Real Estate Market in 2015*. It is proposed that housing supply should be optimized so as to adjust the land use structure and coordiante affordable housing projects. From these measures, one can tell the attitude of the central government to regulate the overheated market and reduce stock. The construction of affordable housing will affect the household's living conditions and it is the key for the sound development of the housing sector, thus, receiving much attention from the public.

Screening of Topics and Distribution Statistics
In order to obtain the online public sentiment information about the popular topics, based on the possible scenarios and various key words combinations, we make the following screening and topic sorting rules as Table 1.

Table 1:Rules for Screening Hot Topics and Sorting Principles

Hot Topics	Rules for Screening and Sorting
Rising housing prices	Public sentiment information with all key words that include "Rising housing prices"
Transaction volume's pick up	Public sentiment information with all key words that include any word both from "transaction, transaction volume" and "housing price pick up"
New policy on housing fund and down payment	Public sentiment information with all key words that include any word both from "housing fund for down payment" and "loans granted for first house and second house"
Business tax reform	Public sentiment information with all key words that include both "business tax" and any word from the phrase"shift from 5 years exemption to 2 years "
Real estate sector and stock market	Public sentiment information with all key words that include any word from both "capital, capital turnover" and "stock, stock market, security and financial market"
Real estate developer's capotal chain	Public sentiment information with all key words that include both "developer" and "capital chain"
Lower interest rate	Public sentiment information with all key words that include any word in the phrase of "lower interest rate"
Land market	Public sentiment information with all key words that include any word from "land market, land price" and Public sentiment information with all key words that include any word from both"land block" and "circulation and auction premium"
Real estate trust	Public sentiment information with all key words that include "trust"
Shanty town renovation	Public sentiment information with all key words that include "shanty towns"
Affordable housing	Public sentiment information with all key words that include "affordable housing"

CORRELATION ANALYSIS OF THE PUBLIC SENTIMENT TOPICS

Correlation is the knowledeg that reflects the dependency or asociation bewteen one event and the others. The corelation among topics about public sentiment is an important factor that constiues the overall framework of the public sentiment information. This paper introduces the method of asocciation rules, and apply the algorithm to further analyze the coreation among real estate related topics. Further analysis and explaination is made for the overall framework of the public sentiment information.

Introduction to the Association Rules

Association rules mining is an important subject in data mining and it has be widely applied and researched in recent years by the relevant community. The major purpose is to sort out the association or corelation among item sets in mass data. Let I be the set of m different projects, I_p as data item (item for short), data item set I as data item set (item set for short).

$$\tag{1}$$
$$\tag{2}$$

Each hot topic in this analysis constitute a separate data item set and the set of 11 topics forms the overall data item set. As for any nonvoid subset X in the I, if there are k items in the X, then it is called k-item set. For instance, the nonvoid subset X which contains "rising housing price" and "transaction volume pick-up", there are 2 items, then, it is called 2-item set. Association rule's transaction T_k is the nonvoid subset of I, the set of item set constitutes the transaction set and it is defined as D.

$$\tag{3}$$
$$\tag{4}$$

When it comes to online public sentiment analysis for the real estate market, each piece of housing market public sentiment information forms a transaction, and those many public sentiment information forms the transaction set D. If , then implication is called the association rule. Item set X and Y are the antecedent and consequent of that rule respectively. Support, confidence and lift are three major concepts in association rules.

Support is the ratio of the transaction number in X and the transaction number in D. When "rising housing price" and

"transaction volume pick-up" occur at the same time, then make the transaction set as *X*, then the news that include both "rising housing price" and "transaction volume pick-up" would be the number of transactions of the item set *X*, the number of total pieces of news is the number of transactions contained in *D*, and the ratio of these two figure is the support of the item set *X*. Confidence is conditional probability. The confidence of "rising housing price" and "transaction volume pick-up" is the ratio of number of news pieces which contains both "rising housing price" and "transaction volume pick-up" and the number of news that include "rising housing price". Lift is the ratio of confidence and successor item set's support. In general, the higher lift of association rules, the more valuable it is.

In the mining of association rules, when a certain item set's support is greater than a given minimum support value, then, this item set is called the frequent item set; and when the confidence of the association rules comprised of this frequent item set and its subset is greater than the given minimum confidence value, it is called a strong association rule; In a strong association rule, if its lift is larger than 1, then it is called an effective strong association rule, which is the object worth of closest analysis.

In terms of algorithm implementation, association rule mining algorithm can be divided into two parts: one is to get frequent item sets based on minimum support, that is the frequent item sets generation process; the other is the rule pruning of frequent item sets based on the minimum confidence level so as to produce strong association rules, i.e., the association rules output process. In this paper, we adopt the Apriori algorithm proposed by Agrawal R. et al., which is one of the classical ideas to solve the frequent item sets generation in association rules problem. The essence of this algorithm is derived from the following two monotone propositions: the prerequisite for k-item set *X* to be a frequent item set is defined as follows: all of the (k -1)-sub item set in the *X* must be frequent item set; If any of the (k -1)-sub item set in the k- item set *X* is non-frequent item set, then *X* must be non-frequent item set. To be more specific, the process to obtain the strong association rule in this paper's public sentiment is shown as follows:

Based on topic screening rules, match the real estate public sentiment corpus, construct topic transaction sets, is the set that contains the topics in each piece of public sentiment information, and let min_supp be the minimum support and min_conf be the minimum support;

Go through the 11 topics listed in this paper, i.e., to construct the cadidate 1-item set, k=1;

Calculate the support of all elements   in the transaction set   for candidate k-item set, and screen according to the requirement and get the frequent K-item set.

Follow the Apriori's principle, construct advanced candidate (k+1)-item set   from frequent k-item set , among which, K-sub item set of all elements in   should be frequent k-item set;

k=k+1；

Repeat step 3,4,5 until the number of set   items in frequent k-item set in step 3 is ≤1, then end the cycle and get the set for all frequent item sets ;

Conduct   rule generation to all the frequent item sets in   and calculate the confidence   (is the precursor item set for). Conduct pruning according to   and output all the qualified results.

Empirical Analysis of Topic Association Rules
By processing the corpus of public sentiment information, based on a support of greater than 0.03 and a confidence greater than 0.6, 31 pieces of asscociation rules were obtained. To demonstarte the result in a more vivid manner, we choose to present it in the fofllowing chart. In Figure2, the direction of arrow reflects the direction pointed to by the association rules. The bigger the dot, the higher support it has. And the darker of the dot color, the higer lift it has.
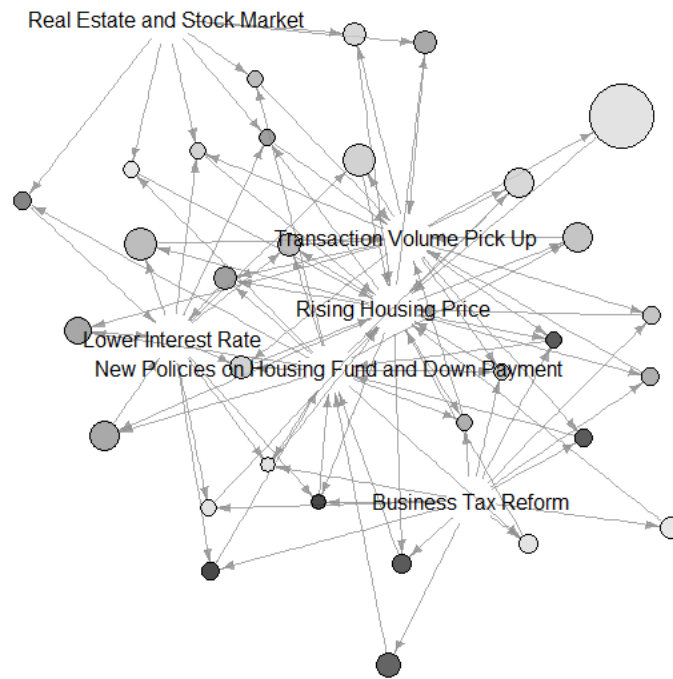
Figure 2: Housing Market Public Sentiment Topic Association Rules

Table 2 :Excerpt of Hot Topics Association Rules

Rule	Support	Confidence	Lift
{ business tax reform, lower interest rate } => { new policies on housing fund and down payment }	0.04506872	0.9229091	2.734542
{rising housing price, business tax reform, lower interest rate }=> { new policies on housing fund and down payment }	0.03018788	0.9061834	2.684984
{ new policies on housing fund and down payment, housing market and stock market }=> { lower interest rate }	0.04361260	0.7566235	2.075831
{ rising housing price, Transaction pick-up, new policies on housing fund and down payment }=> { lower interest rate }	0.06843769	0.6633391	1.819900
{rising housing price, housing market and stock market,lower interest rate }=> { Transaction pick-up }	0.03849842	0.7475862	1.787971
{ rising housing price, new policies on housing fund and down payment,business tax reform }=> { Transaction pick-up }	0.03587030	0.6908345	1.652240
{ Transaction pick-up, new policies on housing fund and down payment,business tax reform }=> { rising housing price }	0.03587030	0.8258381	1.460165
{ Transaction pick-up, housing market and stock market, lower interest rate }=> { rising housing price }	0.03849842	0.7569832	1.338422

Based on the chart and table, we can find that:

Among popular topics related with real estate market in this quarter, "Rising house prices", "transaction volume to pick up" are at the center of topics association with many association points to them. Among the 31 rules of association that meet the

confidence requirement, 13 of them point to the topic of "rising house price" and 8 to the topic of "transaction volume pick-up". This shows that among the 11 popular topics of public sentiment analyzed, it is possible to further discuss the "Rising house prices", "transaction volume to pick up" while addressing other topics. Therefore, we can further infer that these 2 topics are the core concern of the online public sentiment in this quarter.

"Business tax reform" and "Housing market and stock market" are often the satrting points for rules. From Figure 2, we can see that among the generated rules, "Business tax reform" and "Housing market and stock market" are both the the satrting points for arrows, indicating that these two topics are the lead topics for other topics.

In terms of rules' lift, most topics starting from "business tax reform" have high degree of lift, indicating that business tax constitutes a major support for the housing market pick-up lately. Relevant authorities should pay close attention to the related discussion about the housing market among the public sentiment information.

TENDENCY ANALYSIS OF PUBLIC SENTIMENT TOPICS

The tendency analysis of the text is an important link in the online public sentiment analysis. By identifying the tendency of public sentiment information towards various topics, it is helpful to form a better understanding of the preferences of the social groups on the related topics, so as to provide evidence for estimating the public sentiment information's impact on group behaviors. In this paper, the author adopts the adaptive adjustment method for the tendency analysis. It adjusts the emotional words banks according to different topics of the real estate, and adjusts the weight of the emotional words through the adaptive adjustment method so as to obtain the quantitative indicators of tendency about the online public sentiment information of the real estate market. If the indicator is less than 0, it means that the public sentiment information tends to be pessimistic; if the index result is greater than 0, it means that the public sentiment information tends to be optimistic. In addition, the larger the absolute value of the indicator, the greater the pessimism or optimism is in the corresponding tendency.

Introduction of Adaptive Adjustment Method for Tendency Analysis

Emotional word list matching is one of the simple ways to quantify the tendency in the text analysis. When the emotional word list is fairly abundant and accurate, it can be widely used in the recognition of the tendency of some simple online text, such as E-commerce comment or micro blog posts and etc. As prfessional textx with strong themes, public sentiment news has different tendencies features when compared with everyday language, and the characteristics as summarized as follows:

The public sentiment news corpus is highly professional and many common emotional words in everyday conversation do not occur in the news corpus, which leads to the sparse density of traditional emotional words in news corpus;

There are obvious differences in terms of the content of public sentiment news corpus under different themes. In the various public sentiment texts about the topic, the words expressing positive and negative emotion tendencies are different. Therefore, in the quantitative measurement of public sentiment tendency, the same emotional word may have different inclinations;

In a single subject of public sentiment, different emotional words may carry different tendentious weight, and the weight of the word represent its influence on that subject of public sentiment as well as its own degree of tendency. Whereas the weight contrast among the words in a document without marked tendency features can not be compared in a complete manner. Therefore, the whole corpus needs to be investigated.

Based on the above-mentioned features, this paper reconstructs and adjusts the emotional lexicon according to the content of public sentiment under different subjects and puts forward the adaptive adjustment analysis method. Based on the subjective properties of the text corpus, we classify the tendencies of key words in different subjects for second imposition calculation so as to reflect the differences of different words' tendency role under different topics of public sentiment. The subjective emotional words used in this method is extracted from texts selected through theme based sampling, and the public sentiment corpus has been tagged, and then adjusted with the Delphi Method.

Table 3: Notes to the Signs

Signs	Meaning
Ω_H	Thematic optimistic lexicon
Ω_D	Thematic pessimistic lexicon
$Hnum_k$	Number of optimistic lexicon occurred in the piece of news
$Dnum_k$	Number of pessimistic lexicon occurred in the piece of news

WH_i	Optimistic weight of the optimistic word
WD_j	Pessimistic weight of the pessimistic word
H_i	Number of the word in the optimistic news
D_i	Number of the word in the pessimistic news
H_{ki}	Number of the optimistic word in the piece of news
D_{ki}	Number of the pessimistic word in the piece of news
HD_k	Tendency of the piece of news
M	Number of the pieces of news

The adaptive adjustment tendency index is calculated as follows:

First, start segmentation of the collected words and get the word frequency matrix;

Based on the frequency of optimistic and pessimistic words, we can decide the attribute of the news. In this paper, it is defined that when , then it is optimistic news; when , then it is pessimistic news.

Adjust the optimistic weight based on the frequency of optimistic words in optimistic and pessimistic news and adjust pessimistic weight based on the frequency of pessimistic words in optimistic and pessimistic news. For those words that don't occur in the news, their weight is 1.

$$WH_i = \frac{H_i}{H_i + D_i}, i \in \Omega_H \tag{5}$$

$$WD_j = \frac{D_j}{D_j + H_j}, j \in \Omega_D \tag{6}$$

The optimistic and pessimistic attribute of the news is recalculated based on the optimistic and pessimistic lexical weights and the formula is shown as follows:

$$\mathrm{HD}_k = \sum_{i \in \Omega_H} H_{ki} WH_i - \sum_{j \in \Omega_D} D_{kj} WD_j \tag{7}$$

Calculate, and make sure the current news's orientation about the housing sector, and use it as the online public sentiment of the housing market.

Empirical Analysis for Tendency Analysis of Adaptive Adjustment
Rising housing price
From Figure 3, one can tell that with the stimulus of new housing market policy issued on March 30th, second-hand housing market in China is booming. In the early second quarter, public's attitude towards the rising housing price remains optimistic. Starting from mid May, affected by the closing date of properties with lower price, the public's tendency went down slightly. However, at the end of May and early June, capital inflow into the housing market warmed up the market and the public hold an optimistic attitude towards it.
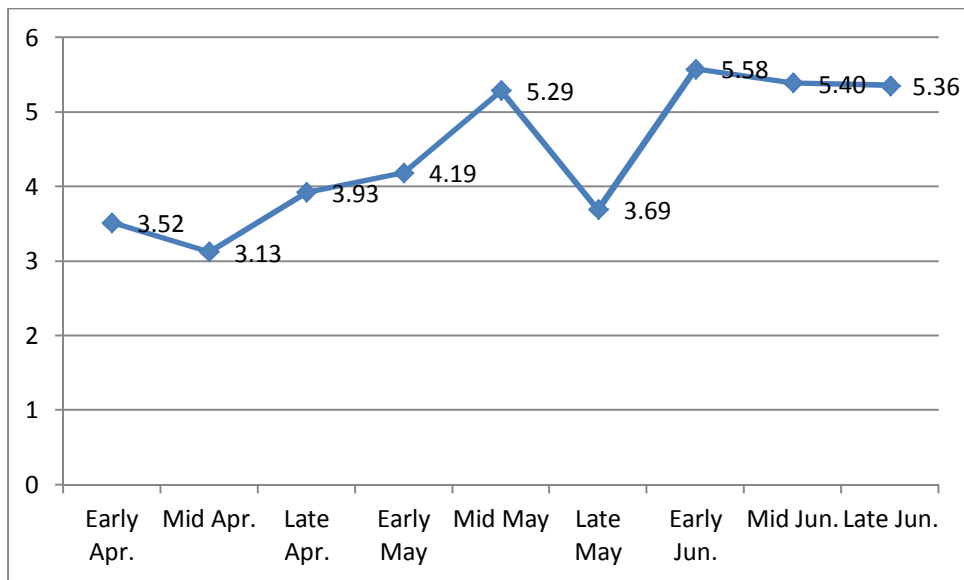
Figure 3: Avarage Tendency for the Topic of Rising Housing Price

Transaction voume pick-up

In 2015, housing policies changed from curbing demands to stimulating demand. And the government issued a series of stimulus policies at the end of March. As shown in Figure 4, the public have a high degree of optimism about the transaction volume pick-up. Since April, the transaction volume has been growing and the transaction volume of the first 6 months is the same as the second half of 2014.
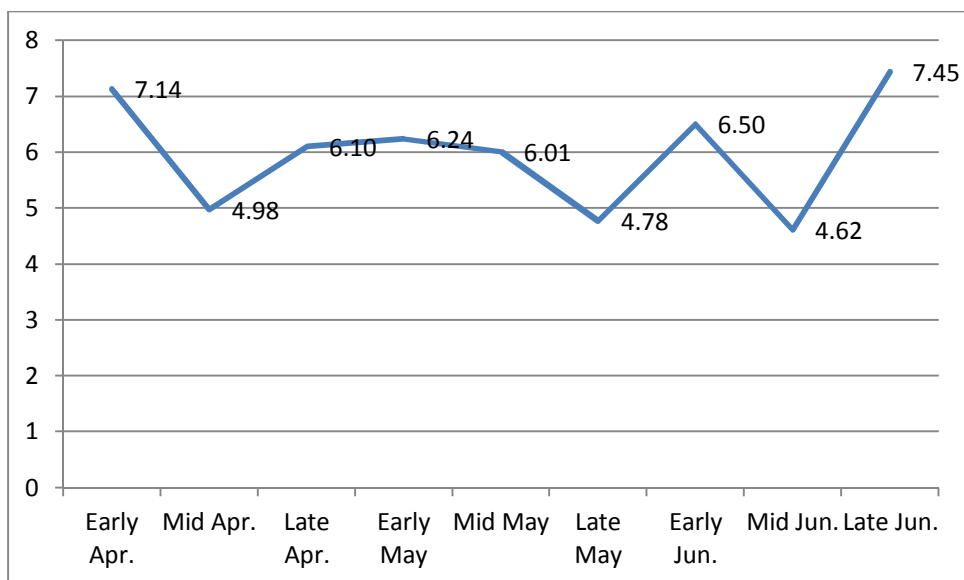

Figure 4 :Avarage Tendency for the Topic of Transaction Volume pIck-up

New policies on housing fund and down payment

As we can see from Figure 5, the public's attitude towards the housing fund policy in Q2 remained quite optimistic. After the launch of new policies released on March 30th, the new housing fund policies have been gradually implemented at all local levels, which greatly eased the pressure of home buyers, further unleashing the potential for home purchasement.
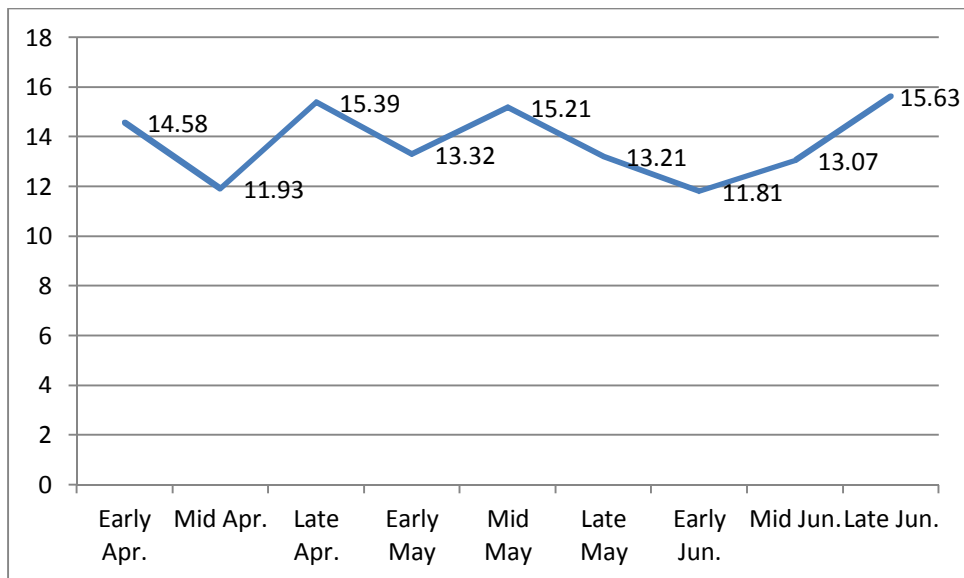
Figure 5 :Avarage Tendency for the Topic of New policies on Housing Fund and Down Payment

Business tax reform

As shown in Figure 6, the public maintained a positive attitude towards the new tax reform in Q2. The exemption of business tax's five year to two year shift is implemented since March 31st. It is shared by the industry insiders that this policy would stimulate the transaction of second-hand housing markets. Together with the proactive publicity of local governments, the general public have a high level of attention and recognition about the new tax policy.
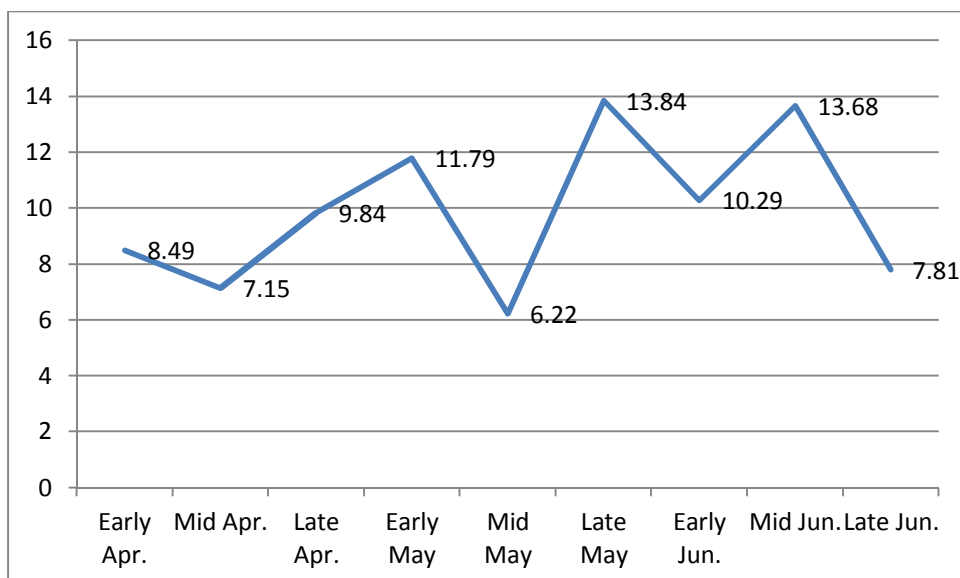
Figure 6 :Avarage Tendency for the Topic of Business Tax Reform

Housing market and stock market

On March 30th, 2015, series new policies were introduced, including the down payment for the second house buying lowered to 40% and the business tax exemption period shifted from 5 years to 2 years. Coupled with the central bank interest rate and reserve ratio cut policy introduced in succession, real estate sector gradually picked up. On the other hand, since last year, A-shares have been going all the way up, encountered "a bull market caused by reform" in a decade, China ushered in the prosperous period for both stock market and property market. As can be seen from Figure 7, from April to mid-May, the public's attitude towards real estate remains high. Beginning in late May, A-share market continued to strengthen, the real estate market funds may be outflow, and public attitudes towards real estate also went slightly down. In June, A shares plummeted; many investors changed their investment strategy, shifting part of the funds out from the stock market to the property market, promoting the property market to pick up further, and people tend to be more optimistic.
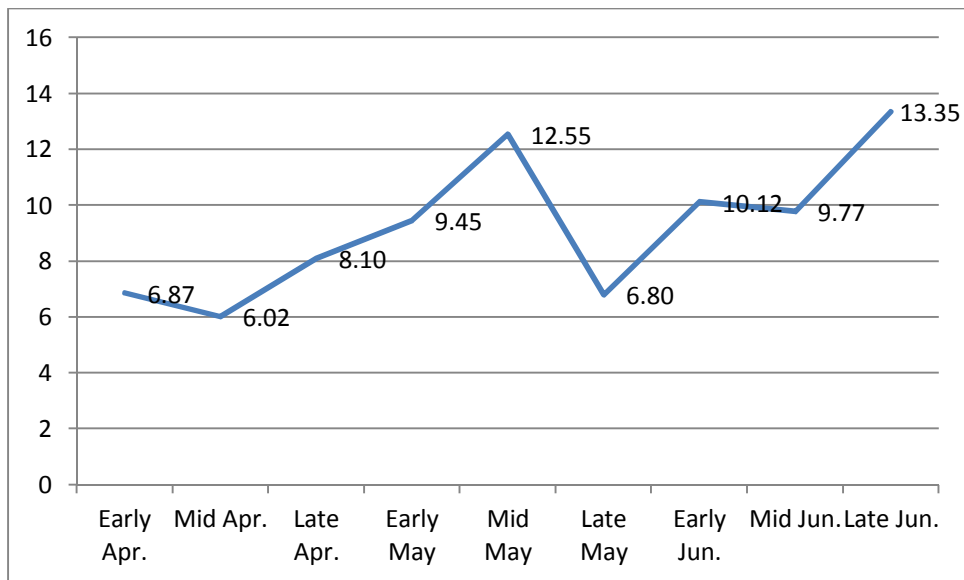
Figure 7 :Avarage Tendency for the Topic of Housing Market and Stock Market

Real estate developer's capital chain

As shown in Figure 8, in Q1, Real Estate Developer's Capital Chain is tightening. A growing number of companies suffered from capital chain rupture. Therefore, in Q2, public sentiment was quite pessimistic. As more peroperty companies started to control their risks and rolled out capital chain strategies, people's attitude towards the capital chain turned optimistic. However, given the intense economic downward pressure, Real Estate Developer's Capital is still a source of concern. Afterwards, Real Estate capital chain entered the phase of "P2P". The rosy signs in tier-1 and 2 cities boosted the public sentiment.
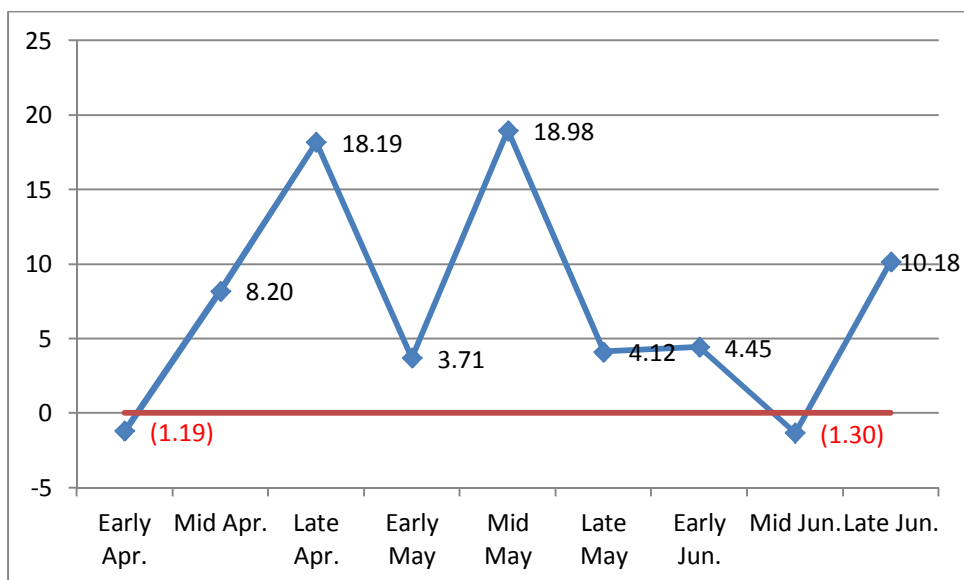

Figure 8 :Avarage Tendency for the Topic of Real Estate Developer's Capital Chain

Lower interest rate

From Figure 9, we can find the public's attitude experienced slight change but in general it's quite optimistic. In the early Q2, the public were still hesitant about the impact exerted by lower interest rate on the housing market. After the official announcement was made, followed by   lowered benchmark lending and deposit rates of RMB in the financial institutions since May 11th,2015, a series favorable credit policies reduced the cost of home buying, which had a positive impact on the public's attitude towards this topic.
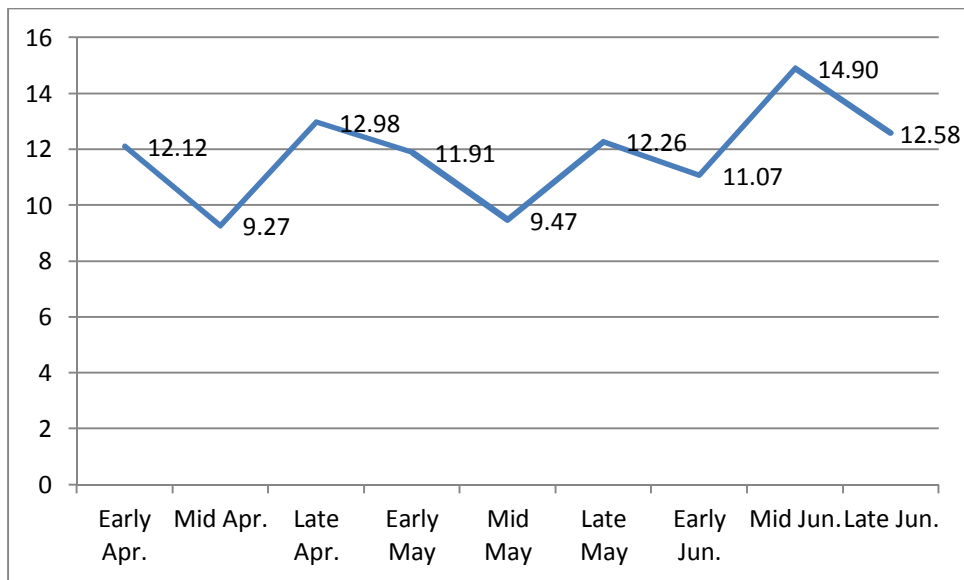
Figure 9 Avarage Tendency for the Topic of Lower Interest Rate

Land market

From Figure 10, one can tell that in the first half of the Q2, public's attitude towards the land market was quite optimistic. After the new policy issued on March 30th, the housing market transaction started to pick up. As the tier-1 cities' land market continue to boom, the situation in non-tier-1 cities are far from satisfying. The tier-2 cities have been given a cold shoulder and the land market in tier-3 and 4 cities are even more sluggish. The land market nationwide further dropped, thus the level of optimism went down as well. When a new round of interest cuts came into being at the end of Q2, the land market got better and the public sentiment turned tobe optimistic gradually.
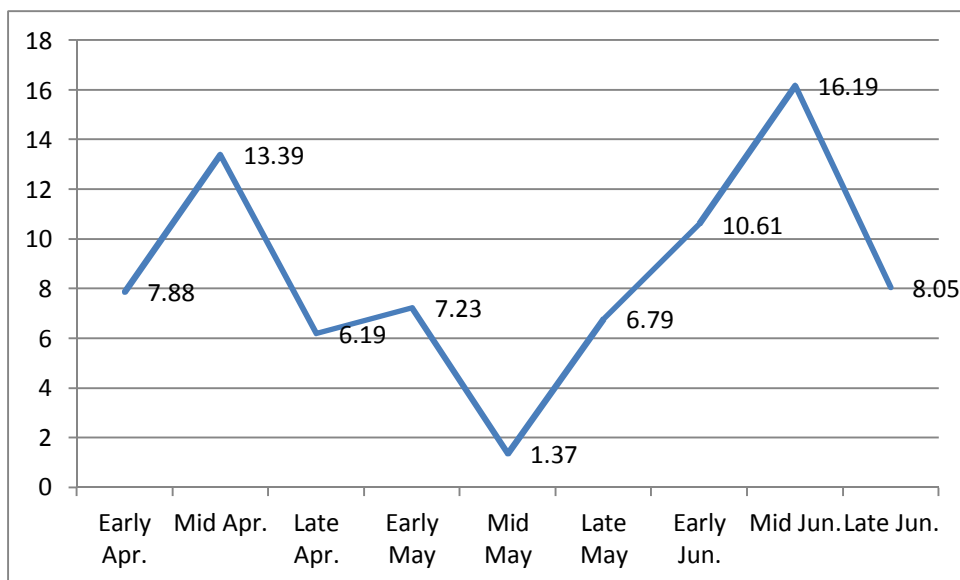

Figure 10:Avarage Tendency for the Topic of Land Market

Real estate trust

As shown in Figure 11, despite thereal estate trust witnessed another round of cash out peak in 2015, given the better performance of A-share in the early Q2, securities and investment trust embraced rapid growth and the public's attitude is quite optimistic. In the late April, as the real estate default popped up one after another, investors got panic and they started to cash out and the public's sentiment also got skeptical about the trust as their attitudes swung. However, the table has turned as the first publicly offered REITs was about to come to the market, together with the growing returns and the expected return rate for real estate trust, the general public's attitude towards this topic was changed.
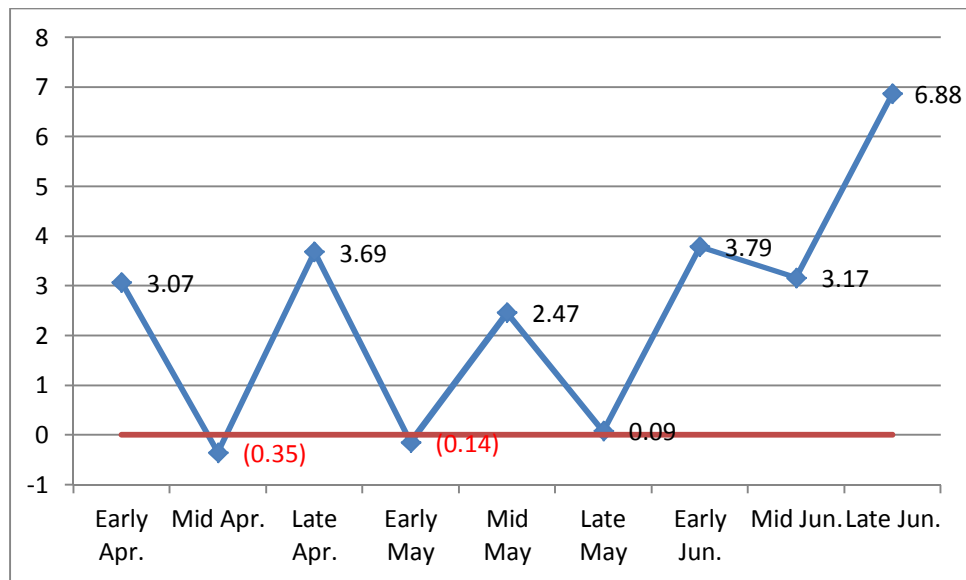
Figure 11 :Avarage Tendency for the Topic of Real Estate Trust

Shanty town renovation

Figure 12 illustrates that the atitude towards shanty town renovation fluctuated slightly in Q2, but in general, it demonstrated an upward trend. In April, 2015, Premier Li Keqiang made a statement, requesting   support for shanty town renovation. Later on, Ministry of Housing and Urban-Rural Development of the P.R.C announced that they will work hard to attain this year's goal, which boosted the public's confidence. In May, the China Development Bank's provision of loans for shanty town renovation exceeded 1 trillion, injecting great support to this plan. In June, the State Council announced that the 18 million shanty twon will be renovated in 3 years. It is encouraged that one should use the existing housing in stock and monetary incentives to carry out the renovation and the central governent will allocate 10 billion yuan to support this initiative.

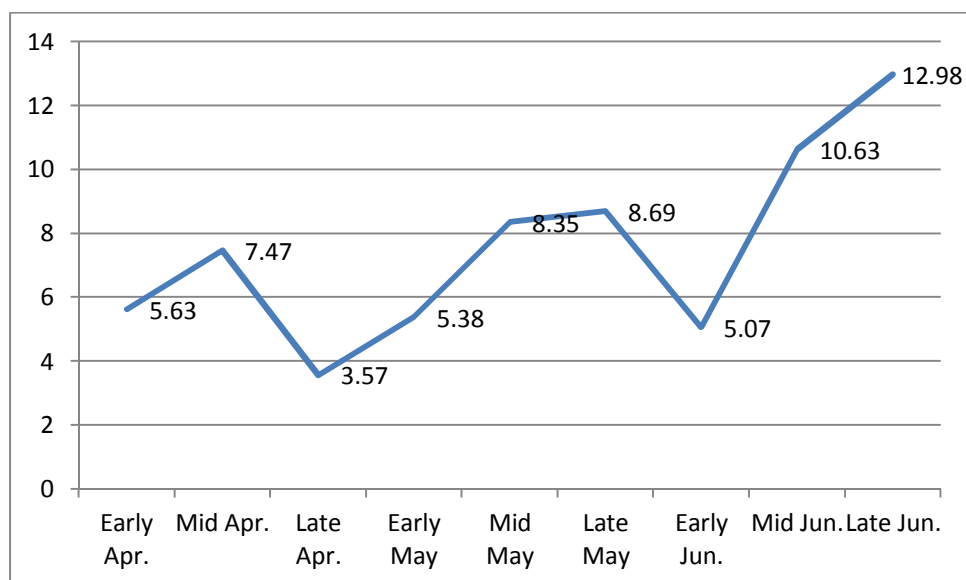All of the above mentioned measures keep the public's attitude towards the shanty town renovation upbeat.

Figure 12 :Avarage Tendency for the Topic of Shanty Town Renovation

Affordable housing

In the first quarter of 2015, as the scale of loans granted to the housing sector expanded rapidly, the loans provided for affordable housing also grew substantially. Although the affodable housing allieviated the housing problem of low-income families to certain extent, improper management, violation of rules in house allocation, issues in design and planning were found.   As we can see from Figure 13, these problems weaken the functions of affordable housing and the attitude towards it fell sharply in Q2. In late June, affordable housing trust fund started, diversifying the financing models for affodable housing. The public sentiment towards this topic went upward slightly.
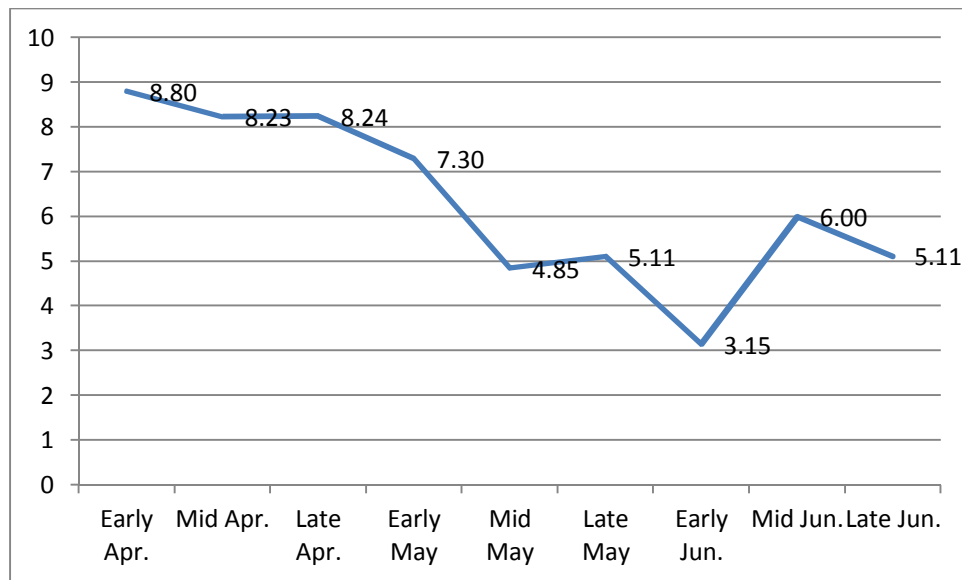
Figure 13 :Avarage Tendency for the Topic of Affodable Housing

CONCLUSION

This paper chooses several popular topics about public sentiment towards the housing market, including "rising housing price", "transaction volume start to pick up", "lower interest rate", "housing market and stock market". Together with the online public sentiment corpus from April 2015 to June, 2015, we sorted out the content feature of online public sentiment about housing market in Q2 of 2015 and made an analysis of topics corelation. It also reflects the attention given by the public towards different topics and their attitudes. These can be relevant and helpful for the housing market regulation at present. The following conclusions are found:

Firstly, rising housing prices and the transaction volume pick-up are of the top concern among the online public sentiment for this season's housing market. And the housing sector starts to stabalize. Based on the popular topics frequency counts, we find that "soaring housing prices" and the "transaction volume pick-up" are of the top 2 concern among the online public sentiment towards the real estate market for Q2 in 2015. Meanwhile, "lower interest rate", "new policies on housing fund and down payment" also gain much attention from the public as they are related to the housing market policy reform. The attention paid to the warming housing market and favorable house purchase policy shows the potential demand for household in the shor term is growing. It also indicates the demand side has contributed to a warming housing market.

Secondly, the six topics are correlated significantly, and business tax reform might further back up the booming housing market. With the help of corelation analysis, this paper finds that in Q2 of 2015, "soaring housing prices" and the "transaction volume pick-up", "business tax reform", "lower interest rate", "housing market and stock market" and "new policies on housing fund and down payment" possess some corelation and further examination of the mutual influence among the public sentiment focus in this season. Despite less attention paid to the "business tax reform" among the public sentiment information, all related association rules have been greatly lifted and demonstrates sound effectiveness . It further reflects that among the public sentiment information in Q2 of 2015, "business tax reform", "rising housing price" and "transaction volume starts to pick up" play a leading role and they have drawn the public's attention towards the property market to certain extent.

Thirdly, the overall online public sentiment towards the housing market is optimistic for this season, while some topics' average degree of tendency fluctuated slightly.   Through the tendency analysis of the 11 popular housing market topics, it is found that among the online public sentiment,   the average degree of tendency for most topics at different stages have remained an optimistic tune in Q2 of 2015. Among those topics, "soaring housing prices" and the "transaction volume pick-up", "lower interest rate" and   "new policies on housing fund and down payment" maintain a high degree of optimistic tendency while only "real estate developer's capital chain" and "real estate trust" experience some tendency shift. Thus, based on the analysis result, the overall optimistic online public sentiment towards the housing market in Q2 of 2015, which also reflect that neitizens and the media are satisfied with the housing market regulation to some extent and they hold a positive attitute towards the stabalization of the housing market and its sound development.

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