

# **The Effect of Dividend on Stock Returns in Chinese Market: Is There a Clientele Phenomenon?**

**Yi Jiang**  
**Macau University of Science and Technology**

**Xia Pan**  
**Clark University**

**Qiang Zhou**  
**Hong Kong Shue Yan University**

*We study the ex-dividend day price behavior in China stock market, specifically how the share price react to this event. Our major findings are consistent with the tax hypothesis. With higher dividend yield, investors care more about the tax effect and the price reacts significantly different from the theoretical way. With low dividend yield, the price differs statistically insignificant from the theoretical value, which implies as dividend yield gets smaller, the tax effect seems to be more ineffective. Different from previous studies, the price drops more in China market than the dividend amount, unexplainable by the tax clientele hypothesis.*

## **INTRODUCTION**

There are a lot of events that seems affect the firm's stock returns (perform as stock prices), such as government policy adjustment, annual financial report publication, issue of new share, and even special festival. Actually the share price in the stock market of a certain company is not only base on the company's real asset value or financial performance, but also highly base on the investors' confidence to a certain company. In other words, how much they "trust" on a certain company will affect the company's share price a lot.

Especially in such a society with highly information delivery speed and information transparency, the react of the investors to a contingency event or a burst out event affect the stock market significantly. For example, if an industry leader company announces that it will acquire one of its main competitor companies within next year; obviously it is an event with positive affection, and the share price may drive up as the shareholders predict that the future financial performance will be better and the company will get a higher market share and advanced competitiveness. And sometimes this kind of news might be known in advance because of leak out of information, and the stock market may wave before the formal announcement.

Dividend is also a kind of "event" that may wave the stock price in the stock market. But does it really effective? Statistic method will help us to find the right answer, and it is the main objective of this paper.

Most mature public companies pay a cash dividend to shareholders. A dividend actually is a distribution to a company's owners (stockholders) of a part of the company's earning. The company's board of directors must authorize (declare) payment of the dividend. When the dividend is declared, the company will announce the record date, which is the date the company will determine who is a shareholder of record, and the payment date. Here is the chain of the events for each dividend:

<b>Declaration date</b>	This is the date the board of directors announces the dividend to the shareholders and the markets generally.
<b>Record date</b>	The dividend is paid only to those who own the stock of record. The record date is the date on which the company determine who owns the stock and will be entitled to receive the dividend.
<b>Ex-dividend date</b>	The ex-dividend date (the ex-date) is the dividing line for determining whether or not the buyer of a stock gets the dividend. Those who buy the stock before the ex-date will receive the dividend. Those who buy it on or after the ex-date will not.
<b>Payment date</b>	The payment date is the date the company mails out dividend checks. It usually is a week or so after the record date.

The ex-date is always one or two business days before the record date. In order to get the dividend, you must buy the stock before the ex-dividend date. Before the ex-date, the stock is said to trade "with dividend", because buyers of the stock will receive the dividend. On and after the ex-date, the buyer will not receive the dividend and the stock is said to trade "without dividend".

Once the dividend has been announced, the market prices it into the stock. For example, if a company should announce a \$1 per share dividend, the market will add that \$1 into the stock price. So a \$9 stock would usually increase to \$10, unless the dividend was considered to already have been priced in. Thus if you buy the stock after the dividend announced, you will not received a "free" dividend, you will have paid for the impending dividend in the stock's price.

When a stock goes ex-dividend, the stock price will be driven downward because the dividend payment reflects a distribution of corporate assets, and thus some of the share's value. The stock simply is not worth as much once the stock trades without dividend.

The amount the stock price the stock price will decline on the ex-date cannot be ascertained exactly in advance. Some research indicates that the stock price falls in an amount equal to the dividend, other research that it falls but by an amount less than the dividend paid. But the stock will almost certainly fall on the ex-date, and you should figure on a drop in roughly the amount of the per-share dividend.

Since one purchasing a stock on or after the ex-date does not receive the dividend, no one would rationally pay the same price on or after the ex-date as paid before the ex-date. That is, the market prices the dividend in before the ex-date and prices it out on the ex-date. Whatever the amount is, whether all or only a portion of the dividend, the stock will fall on the ex-date. If the investors buy the stock after the dividend announcement, you must hold the stock until at least the ex-date so that you receive the dividend. Otherwise, you pay for the dividend priced into the stock but does not receive the dividend.

The dividend could also affect the stock option as well. It's easier to pinpoint how dividends affect early exercise. Cash dividends affect option prices through their effect on the underlying stock price. Because the stock price is expected to drop by the amount of the dividend on the ex-dividend date, high cash dividends imply lower call premiums and higher put premiums. While the stock price itself usually

undergoes a single adjustment by the amount of the dividend, option prices anticipate dividends that will be paid in the weeks and months before they are announced. The dividends paid should be taken into account when calculating the theoretical price of an option and projecting your probable gain and loss when graphing a position. This applies to stock indices as well.

For this study, we only focus on how the prices react to the ex-dividend date, in other words, ex-dividend date price behavior. In order to test the ex-dividend date price behavior, we collect the data from both theoretical and practical way. Our initial samples is made of 330 listing companies quoted on the Shanghai and Shenzhen stock exchange respectively, and all of them have delivered dividend distribution on year 2006. In the next section, we will take an overview of the previous study. Sample selection is described in section 3. Section 4 explains how China tax system work on stock market. Section 5 presents the methodology. The results are presented in sections 6. In section 6, we summarize the results and conclude. An appendix gives additional results.

## **LITERATURE REVIEW**

### **General Event Study**

An event study measures the impact of a specific event on the value of the firm and relies on market efficiency. The advantages of event study is widely, for example, expected effects of event will be reflected immediately in security prices, while may take months or years for effects to show in productivity measures. Event study also takes risk into account, while accounting measures do not. And accounting conventions vary across firms and accounting measures could be manipulated while event study could not.

Most event studies select period prior to event, ending sometime before beginning of event window, some studies also include period after event, to allow for change in risk caused by the event. Both daily data and monthly data can be used as observations in event study. The more observations used across time, the greater the statistical accuracy of the beta. Different models for estimating expected returns, such as Constant Mean Return Model, Index Model (Market-Adjusted Return Model), Market Model and Capital Asset Pricing Model. Event studies could also use different periods for calculating model parameters and use different periods for calculating CARs.

Event studies have been widely adopted in financial economics to investigate market response to new information. Economists use a variety of market models to estimate normal returns and calculate the abnormal returns which are the actual post-announcement return of security over the event window minus the normal return of the security. The unbiased abnormal return should be the return different caused solely by the dividend event announcement.

There are also some other approaches that could also be used in financial studies besides event study approach. Rosenbaum and Rubin (1983) propose a propensity-score matching approach, they match the treatment and comparison units with a function of all characteristic variables, which is nothing but a balancing score given that the distribution of characteristic variables is the same for the treatment and comparison groups. Briefly, this method summarizes all the characteristics into a single index making multi-dimensional matching possible. Compare to the event study approach, the propensity score matching approach has fewer restrictions and assumptions.

### **Event Study Relating to Dividend Policy**

Actually dividend policy is one of the most controversial issues in corporate finance. Economists have tried to identify the role of dividend for a long time period, but have not been research a consensus. The significant wealth effects of earnings and dividend announcement have been widely studied in the accounting and finance literature. The dividend irrelevance proposition of Miller and Modigliani (1961) provides a benchmark for research on dividend policy. They demonstrate that in a perfect market, dividend policy does not affect a firm's value and is therefore irrelevant.

After that, several theories have been developed. Bhattacharya (1979; 1980) models dividends and finds they are good signals of expected future cash flows whether dividend income is taxable and non-

taxable. Asquith and Mulins (1986), John and Williams (1985), and Miller and Rock (1985) propose a signaling hypothesis. They argue that dividends represent favorable signals about the future prospects of firms and the reduction of agency cost, and also advocate a dividend information hypothesis that investors value dividends, and dividend changes signal credible and permanent increases in the future cash flow of the firms.

The usefulness and the justification of the dividend policy constitute one of the most debated topics of the finance theory. For Black (1976), “the harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don’t fit together.” Studies also show the influence of firm size (Mozes and Rapaccioli, 1995), the branch of industry (Firth, 1996), the firm’ informational environment or institutional shareholders (Mittra and Owers, 1995) on dividend informational effect.

The results of those studies seem to suggest that dividend announcement may convey information to the market but it depends, for instance, on the type of announcement, the firm size or the number of institutional shareholders. Similarly, to test the dividend clientele hypothesis, researchers have introduced different classes of shareholders (Lakonishok and Vermaelen, 1983, 1986; Michaely and Vila, 1995) or different sorts of common stocks (Eades, Hess and Kim, 1984 or Hubbard and Michaely, 1997). They also observed stock price reactions, before and after major tax reforms, in countries without taxes (Frank and Jagannathan, 1998) or on different stock market characterized by different tax systems.

Most of the previous empirical studies do not consider the stability of the dividend policy, however, from empirical and theoretical perspectives, we are aware that firms are reluctant to cut dividends (Lintner, 1956; Kalay, 1980; Baker, Farelly and Edelman, 1985; or John and Williams, 1985). The previous empirical evidence (Benesh et al. 1984, Venkatesh 1989 and Rimbey and Officer 1992 also report similar results.) shows that dividend initiation announcements have positive effects on stock returns.

The concept of positive stock price reactions to dividend initiations is widely accepted in the empirical literature in finance research. Asquith and Mulins (1983) investigated 168 firms that initiated dividends during the period 1963 to 1980 and reported a 3.7 percent cumulative excess return over a 2-day announcement period. The result also shows that the positive excess returns are positively related to the size of the initial payment.

Heal and Palepu (1988) confirm the significantly positive impact of dividend initiations on stock returns, and also find that firms that initiate dividend have significant increases in their earnings for at least the year prior to, the year of, and the year following dividend initiation. Mickaely, Thaler and Womack (1995) test both short-run and long-run effects of dividend initiation on stock returns and report a 3.4 percent excess return over a three-day horizon and a much larger excess return in post-dividend initiation years.

### **Ex-dividend Day Price Behavior Research**

In 1970 Elton and Gruber observed that stock prices on the ex-dividend day fall by a smaller amount than the dividend paid. They attributed this difference to the fact that the dividend is taxed. They showed that if taxes enter investors’ decisions, then the fall in price on the ex-dividend day should reflect the post-tax value of the dividend relative to the past-tax value of capital gains on that day. Because dividends in most time periods are taxed more heavily than capital gains, the theory suggest that if taxes affect investors’ choices, the fall in stock price in general be less than the dividend, and the drop could be used to infer marginal tax rates.

Since Elton and Gruber rose their opinion in 1970, many researchers follow up, either supporting or questioning the relating tax explanation of ex-dividend day behavior. Most of the following studies agree with Elton and Gruber’s findings. Green and Rydqvist (1999) provide evidence consistent with the tax explanation of ex-dividend day stock price behavior. They study the behavior of prices of Swedish lottery bonds, These bonds have a unique tax treatment; their coupon payments are tax-exempt while their capital gains are taxed.

As the authors point out, because the coupon payments received by bondholders are random, interest is not accrued prior to a coupon payment. Instead, the entire price of the bond paid prior to the coupon

distribution constitutes the investor's tax basis, and the price drop associated with coupon distribution is considered as capital loss. Thus, these bonds are taxed as if they were stocks offering a tax-exempt dividend. Consistent with the tax effect, since the coupon distributions are taxed at zero percent while the capital losses generate tax credits, the bond price should fall by more than the coupon distribution when the bond goes ex-distribution; an empirical finding that the authors report.

But there are also many studies challenge Elton and Gruber's point of view. One of the challenges to the tax explanation of ex-dividend day behavior arises from microstructure arguments.

Bali and Hite (1998) state that the drop in price less than the dividend is really due to discreteness in prices rather than taxes. They hypothesize that because of discreteness in prices the ex-dividend day price should fall by amount equal to or smaller than the amount of the dividend and that this has been mistakenly attributed to tax effects.

Frank and Jagannathan (1998) hypothesize that the collection and reinvestment of dividend is bothersome for individual investors but not for market makers, this means that individuals want to sell the stock before it goes ex-dividend and are anxious to buy it back after it goes ex-dividend. They argue that because of this that market makers can purchase stock at the bid price before the stock goes ex-dividend and sell at the ask price after it goes ex-dividend. They then state that in absence of taxes this means that the fall in price on the ex-dividend date will be less than the dividend. They argue that this bid-ask bounce contributes to, if not totally explains, a phenomenon others attribute to tax effects.

Both of the two articles have recognized the fact that prices fall by less than the dividend, however, the microstructure arguments described above do not explain a price drop more than the dividend.

As known that China stock market is very special as it is highly affected by the government's macro-control and policy adjustments, and the underground manipulation and speculation in China stock market also exist and could not be eliminate in a short term period. There has been quite some research on the behaviors of Chinese financial market from various aspects. Examples include Pan (2006) and Pan (2007), Jarrett et al (2009), Pan et al (2012), Feng et al (2015), among many others. The objective of this paper is to add to the understanding of stock price reactions at the ex-dividend day, in other words, show that how the market response to the signal event under such complicate market environment.

## **THE DATA**

### **Sample Construction**

330 samples are constructed; 210 samples are chosen from the constituents of Shanghai and Shenzhen 300 index which have dividend announcement in year 2006, as the other ninety constituent stocks did not have dividend announcement in year 2006. The other one 120 samples are selected randomly from both Shanghai and Shenzhen stock market. The industry attribute of these 330 samples are variety, include financial industry, energy industry, chemicals industry, textiles industry, infrastructure industry, transportation industry, real estate industry, the electrical industry, mechanical industry, science and technology industry, communication industry and others (retail, garment and travel etc.).

Two different types of Index are used as comparative indicator in this research. One is Shenzhen Component Index and Shanghai Composite Index, the daily stock return observations of each sample will be compared to the corresponding index regarding to the stock exchange it listed. For example, if sample 1 is listed in Shanghai stock exchange, then its daily stock return observations will be compared to the Shanghai Composite Index. And if sample 2 is listed in Shenzhen stock exchange, then its daily stock return observations will be compared to the Shenzhen Component Index.

In order to promote the long-term infrastructure construction and the standardization process of the security market, Shanghai Stock Exchange restructured SSE 30 Index and renamed it SSE Constituent Index (SSE 180 Index) in June 2002. As the core of SSE Indices, SSE 180 has made major improvements in methodology on the basis of SSE 30 Index through taking China's current financial market situation into consideration and integrating international experience. Its objective is to select constituents that best represent Shanghai market through scientific and objective method, to establish a benchmark index that will reflect Shanghai market and serve as a performance benchmark and a basis for financial innovation.

SSE Composite Index is constituents for SSE Composite Index are all listed stocks (A shares and B shares) at Shanghai Stock Exchange. In order to ensure scientific methodology, transparency of index adjustment and fairness in constituent selection, Shanghai Stock Exchange has established an Index Advisory Committee, which will evaluate and provide advice for index methodology, constituent selection, index adjustment, and index operation standards.

The Shenzhen Exchange launched the blue-chip composite index in January 1995. It also directed a subsidiary, the Shenzhen Securities Information Co., to launch the Shenzhen Stock Exchange 100 Index on the first trading session of 2003, using 2002's final day of business as a benchmark. The new index is composed of major firms such as Shenzhen Development Bank, property developer China Vanke Co Ltd and Guangdong Electric Power Co. Index components account for about 40 percent of the Shenzhen bourse's capitalization, 61 percent of the combined after-tax profits of Shenzhen-listed companies, and 43 percent of turnover.

Another index we used in this research is Shanghai and Shenzhen 300 Index, which can be considered as the "Barometer" of the whole China stock market. It is published in April 8th year 2005. As we mentioned before, the Shenzhen Component Index and Shanghai Composite Index can only represent the tendency of the two markets separately, none of them could show the general tendency of the whole China stock market. Contrarily, the index samples of Shanghai and Shenzhen 300 Index are chosen from both Shanghai and Shenzhen stock exchange, which covered the major circulation of the market. And the constituents of Shanghai and Shenzhen 300 index which have good representation, high mobility, and active trading are the mainstream in stock investment market. They can reflect the income situation of mainstream investment.

In China, there are three general forms of dividend, for example, cash dividend, stock dividend and a combination of the two, the 330 samples which have dividend behavior in year 2006 are separate into 3 groups:

**TABLE 1**

<b>Dividend forms</b>	<b>Samples</b>
Cash dividend	281
Stock dividend	16
Combination of two	33
<b>Total</b>	<b>330</b>

Table 1 shows the dividend forms of the related 330 samples; it indicates that in the entire 330 samples, 281 companies have cash dividend behavior in year 2006, 16 companies have stock dividend behavior, and the remaining 33 companies have a combination of the two, both cash dividend and stock dividend are distributed. In order to make the test more accuracy, we only test the samples with cash dividend in year 2006, there is 281 cash dividend samples in total. Then the sample was further filtered, excluding some samples which have significant unusual price change, finally only 267 effective samples remain.

### **Taxation on Dividends**

The tax on an individual's income is progressive. An individual's income is taxed progressively at 5% - 45%. The corporate tax rate for domestic and foreign companies is 25%. Companies can enjoy the previous 15% tax rate or tax holidays for a period defined. Small companies pay 20% corporate tax in certain cases.

An individual's capital gains are taxable in China at the rate of 20%. Capital gains tax for a Chinese company is added to the regular tax. A 10% deduction at source is made from the capital gains of a foreign company in China. On taxing capital gains from the sale of real estate, when calculating the capital gain the purchase cost is deducted from the sale price at the 20% rate. When the capital gains are in excess of 50% of the purchase price, the rate of capital gains tax fluctuates between 30% - 60%. (It is 60% when the capital gain is over 200% when compared to the cost).

#### **INCOME TAX RATES IN CHINA FOR AN INDIVIDUAL**

Tax rate	Monthly Income (CNY)
5%	1 – 500
10%	501 – 2,000
15%	2,001 – 5,000
20%	5,001 – 20,000
25%	20,001 – 40,000
30%	40,001 – 60,000
35%	60,001 – 80,000
40%	80,001 – 100,000
45%	100,001 and above

#### *Taxation of Employees*

An employer is obligated to deduct tax at source on a monthly basis from a salaried employee and to make additional contributions to social security. Social security in China consists of 3 parts, basic pension, personal accounts and additional payment. The rates for the basic pension are employer - around 20%, employee - 7%. The following payments are subject to a deduction of tax at source:

- Dividend - 10%.
- Interest - 10%
- Royalties -10%.
- Capital gains -10%

#### *Potential Problems*

A number of potentially important problems are involved in the use of daily data in this event study. These can be summarized as follows: More than 60% of the sample companies are constituent stocks of Shanghai and Shenzhen 300 index. Constituent stocks mean the top companies of the relating industry, these companies can be consider as big, strong and able to undertake high level risk, their reaction to the dividend might be more stable than those which are non-constituent stocks.

Our study is based on the dividend payment, so we only select firms paying a dividend in year 2006, and in order to simplify the research procedure and make the test result more accurate, only the sample companies with cash dividend distribution were tested in this study.

## METHODOLOGY

We examine the impact of ex-dividend day company's stock returns using market adjusted returns. Elton and Gruber (1970) firstly used the Tax Clientele Model. According to this model, the tax rate of the marginal stockholders of a certain company should affect the ex-dividend day behavior of the company's common stock. It argue that, if without tax effect, the price drop should be exactly the amount of dividend distributed by the company. But as tax exist, a shareholder who want to sell his shares in hand, will think about whether to sell the shares before the stock goes ex-dividend or after the shares goes ex-dividend. For the shareholders to be indifferent as to the timing of the sale, the wealth received from either course of action should be the same. The following express was derived following this premise.

Let:  $R_m$  = daily market return  
 $P_0$  = Stock price on the ex-dividend day  
 $P_{-1}$  = Stock price on the day before the ex-dividend day  
 $T$  = Tax rate on dividend  
 $D$  = Dividend payment amount

Define day '0' as the day of a hypothetical event (ex-dividend day) for a given company, and the day before the ex-dividend day can be defined as day "-1" accordingly. And then collect the related 3 days' market index (day 0, day -1 and day -2) as reference compare to the individual company's stock price. In order to make this comparison meaningful, we choose to compare the market index daily change percentage.

Take Company A as an example, its ex-dividend day is at Sep. 21st 2006, and then the date of Sep. 21st is defined as day '0'. And collect company A's stock price on Sep. 20th and Sep. 21st. And then calculate the daily market return according to the daily change percentage of market index between "from Sep. 19th to Sep. 20th" and "from Sep. 20th to Sep. 21st" respectively. The following equation expresses how to calculate the daily market return:

$$R_m = (\text{Market Index on Day 0} - \text{Market Index on Day -1}) / \text{Market Index on Day -1}$$

The key measurement of this paper is to measure the magnitude and sign of the ex-dividend stock price movement in relation to the stock price in the last cum day for these 267 taxable cash dividends. And also try to find how long the market needs to digest the negative effect of this event.

If the share was kept on the last cum day (day -1), the shareholder's wealth on the ex-dividend day (day 0) from hold one share will be made up of its price on that day ( $P_0$ ) plus the amount of the after-tax cash dividend ( $D$ ) he is entitled to receive. To prevent arbitrage, this value should not be any different from the share price that a seller has received on the last cum date ( $P_{-1}$ )

$$\begin{aligned} P_{-1} &= P_0 + D - t \\ P_{-1} &= P_0 + D - 10\%D \end{aligned} \tag{1}$$

Subtract  $P_0$  from both sides of this equation and divided by  $D$  we get the Raw Price Drop to Dividend Ratio (RPR):

$$RPR = \frac{P_{-1} - P_0}{D} = (D-t)/D = 0.9$$

$$RPR = \frac{P_{-1} - P_0}{D} = 0.9D/D = 0.9 \tag{2}$$



The Raw Price Drop to Dividend Ratio describes the price change from the last cum day to the ex-dividend day in terms of dividend paid; it always reflects the relative marginal tax rates of the stockholders of the firm's common stock. According to Elton and Gruber (1970), one should therefore be able to infer these tax rates by observing the raw price drop to dividend ratio of the common stock.

The left hand side of equation (2) shows how we should calculate the observed value of the raw price drop to dividend ratio. Accordingly, the right side of equation (2) gives the theoretical (predicted) value of raw price drop to dividend ratio, after tax adjustment, of each sample. As the equation shows, because the tax rate is fixed and stable, so the raw price drop to dividend ratio should also be fixed and stable at a level of 0.9.

In reality, the RPR is also subject to market influence between the two days. If the general market situation performances well, then the signal stock price may also performance better than the shareholder expects, as the investors might get confidence from the general economic development environment. The equation (3) should the Market Adjusted Price Ratio (MAPR) by discounting the price on the ex-dividend day by daily market return:

$$\text{MAPR} = \frac{p_{-1} - p_0 / (1 + R_m)}{D} \quad (3)$$

The right hand side of equation (3) also shows how we should calculate the observed value of market adjusted price ratio. And according to theory, the theoretical value of MAPR should be approximately equal to the right hand side of equation (2), in other words, the theoretical value of MAPR should be approximately at a level of 0.9.

The price different between day 0 and day -1 can also be express in terms of price, we use the stock price on the day before the ex-dividend day as the denominator instead of dividend, that is use  $P_{-1}$  as the denominator instead of  $D$ . We define the new outcome as raw price drop return (RPD):

$$\text{RPD} = \frac{p_{-1} - p_0}{p_{-1}} = \frac{D - t}{p_{-1}}$$

$$\text{RPD} = \frac{p_{-1} - p_0}{p_{-1}} = 0.9 \frac{D}{p_{-1}} \quad (4)$$

The left hand side of equation (4) shows how we should calculate the observed value of the raw price drop return. Accordingly, the right side of equation (4) gives the theoretical (predicted) value of raw price drop return, after tax adjustment, of each sample.

Similarly as the market adjusted price ratio, the RPD is also subject to market influence between the two days. Market adjusted price drop return (MAPD) can also be calculated according to equation (4) and discounting the price on the ex-dividend day by daily market return in the same way as in equation (3):

$$\text{MAPD} = \frac{p_{-1} - p_0 / (1 + R_m)}{p_{-1}} \quad (5)$$

Since there is no single stable and fixed theoretical value against which to test the mean of RPD and MAPD, we calculate the right hand side of equation (4) and use it as a reasonable approximation value in our test.

In summary, we test the following null hypotheses for those taxable cash dividend observations:

*H1a: the mean of RPR = the mean of the right hand side of equation (2)*

*H1b: the mean of MAPR = the mean of the right hand side of equation (2)*

*H2a: the mean of RPD = the mean of the right hand side of equation (4)*

*H2b: the mean of MAPD = the mean of the right hand side of equation (4)*

Moreover, we also would like to predict how long the market needs to digest the negative effect of ex-dividend day event. In order to achieve this purpose, we collect the share price and relating market index of 20 days before the ex-dividend day and another 20 days after the ex-dividend day, which we defined as day -20 to day 20 in total. The daily stock return and daily market index return are calculated in order to find out the Daily Adjusted Stock Return:

- Daily Stock Return:  $R_{it} = (P_t - P_{t-1}) / P_{t-1}$
- Daily Market Return:  $R_{mt} = (MI_t - MI_{t-1}) / MI_{t-1}$
- Daily Adjust Stock Return:  $r_t = R_{it} - R_{mt}$

In order to see the detail change of average adjusted stock return over the sample period, we separate the sample period into four sub-periods, each sub-period has ten days equally, that is, from the 20th day before the ex-dividend day to 11th day before the ex-dividend day is the first sub-period; from the 10th day before the ex-dividend day to one day before the ex-dividend day is the second sub-period; from the one day after the ex-dividend day to 10th day after the ex-dividend day is the third sub-period; from the 11th day after the ex-dividend day to 20th day after the ex-dividend day is the fourth sub-period. These four sub-periods can be summarized as follows:

- 1st 10 days: day -20 to day -11
- 2nd 10 days: day -10 to day -1
- 3rd 10 days: day +1 to day +10
- 4th 10 days: day +11 to day +20

The following formula is applied to calculate the cumulative growth:

$$AR = (1+r_1)*(1+r_2)*(1+r_3)...(1+r_n) \quad (6)$$

AR represents the accumulated standardized stock growth that the investor could get from a certain period. As the r represents daily adjusted stock return, so if the value of AR is large than 1, then it means the stock growth is increasing. And if the value of AR is small than 1, then it means the stock growth is declining.

It is worth mention that if AR is small than 1, it does not mean that the stock return is reducing, it only means the “growth” of the stock return is declining. In other words, the stock is still under growth, but just does not grow as much as before. We could calculate the accumulated standardized stock growth of the above four sub-periods through equation (6) and compare the four results, and then we can get the conclusion of whether the stock return is under an increasing growth of decline growth. And also can predict the time that the market needs to digest the ex-dividend day effect.

## RESULTS

### Analysis for Entire 267 Samples

The differences of the means of Raw Price Drop to Dividend Ratio, Market Adjusted Price Ratio, Raw Price Drop Return and Market Adjusted Price Drop Return from their corresponding theoretical values are tested using the paired t-test. The result will be illustrated in the following table one by one.

**TABLE 2**

<b>Observations=267</b>			
<b>Variable</b>	<b>Mean</b>	<b>Median</b>	<b>Std. Dev.</b>
Dividend (D)	0.1642	0.1200	0.1362
Dividend Yield ( $d = D / P_{-1}$ )	0.0232	0.0178	0.0179
Price Drop = $P_{-1} - P_0$	0.3560	0.0900	1.449103
Raw Price Drop to Dividend Ratio (RPR) = $(P_{-1} - P_0) / D$	2.4806	0.7273	14.1250
Market Adjusted Price Ratio (MAPR)	2.8829	1.1080	16.8747
Raw Price Drop Return (RPD) = $((P_{-1} - P_0) / P_{-1})$	0.0307	0.0155	0.0771
Market Adjusted Price Drop Return (MAPD)	0.0336	0.0224	0.0824

Table 2 shows descriptive statistics of the entire 267 samples of cash dividends analyzed in this study. The mean dividend is RMB 0.1642, the median of the dividend is RMB 0.12, and the corresponding price drop ( $P_{-1} - P_0$ ) is RMB 0.356, indicating that the price drop is much greater than the dividend distributed. The mean raw price drop to dividend ratio is 2.4806 and the mean market adjusted price ratio is 2.88. The mean of raw price drop return is 0.0307 and the mean of market adjusted price drop return is 0.0336, both of the two are higher than the mean dividend yield (0.0232). These two numbers also support the fact that the price drops more than the dividend distributed, the market might over-react to the event of ex-dividend day. The median and standard deviation value is also provided for reference.

**TABLE 3**

<b>Entire Taxable Samples (Tax rate=10%) (N=267)</b>			
<b>Mean</b>	<b>Theoretical value</b>	<b>Observed Values</b>	<b>(p-value)</b>
Raw Price Drop to Dividend Ratio (RPR)	0.9	2.4806	0.068605
Market Adjusted Price Ratio (MAPR)	0.9	2.8829	0.055915
Raw Price Drop Return (RPD)	0.0208	0.0307	0.032284
Market Adjusted Price Drop Return (MAPD)	0.0208	0.0336	0.009602
Dividend Yield ( $d = D / P_{-1}$ )		0.0232	

Table 3 presents both the theoretical and observed mean values for Raw Price Drop to Dividend Ratio (RPR), Market Adjusted Price Ratio (MAPR), Raw Price Drop Return (RPD) and Market Adjusted Price

Drop Return (MAPD). The differences of the observed means from their corresponding theoretical value are tested using paired t-test and the corresponding p-values are show in the table as well.

As shown in Table 3, the mean raw price drop to dividend ratio for the entire 267 samples is 2.4806, the corresponding p-value is 0.069, suggesting that the difference of the mean form corresponding theoretical value of 0.9 is not statistically significant (at 0.05 level of statistically significant). The test for market adjusted price ratio also got the similar result; the observed mean market adjusted price ratio is 2.8829, while the theoretical value is 0.9. The p-value of 0.056 indicates that the difference of the mean market adjusted price ratio from the corresponding theoretical value is not statistically significant (at 0.05 level of statistically significant). These two comparisons also suggest that the stock price on the ex-dividend day drops more than the amount of dividend paid, because the mean of RPR and MAPR is higher than their corresponding theoretical value respectively.

Furthermore, the mean raw price drop return is 0.0307 with a p-value of 0.032; this number suggests that the difference between the mean raw price drop return from the corresponding theoretical value of 0.0208 is statistically significant (at 0.05 level of statistically significant). The mean market adjusted price drop return is 0.0336 with a p-value of 0.0096, while the theoretical mean value of market adjusted price drop return is 0.0208. The observed mean and theoretical mean of market adjusted price return are statistically significant different from each other at the 0.05 level of statistically significant. These results also suggest that the percentage stock price change (return) is more than the corresponding dividend yield (0.0232).

Based on the paired t-test of relating mean values, the evidence from Table 3 suggests that the hypotheses H2a and H2b can be rejected, and there is no evidence to reject H1a and H1b.

#### **Analysis 89 Samples with High Dividend Yield**

According to the tax clientele hypothesis, dividend yield, and not dividend size, should determine the level of price-drop to dividend ratio. To get additional insights of this issue, the overall 267 samples was rank by dividend yield from the highest to the lowest, and then broken into three parts and each part has 89 samples equally. Then as in Table-4, we get three sub-groups of sample companies, the “Top 1/3” group has 89 samples with highest dividend yield of the total 267 sample companies. Contrarily, the “Bottom 1/3” group has 89 samples with lowest dividend yield of the total 267 sample companies.

**TABLE 4**

	<b>Dividend Yield</b>	<b>Observations</b>
<b>Top 1/3</b>	0.096 – 0.0247	89
<b>Middle 1/3</b>	0.0246 – 0.0133	89
<b>Bottom 1/3</b>	0.0132 – 0.0006	89
<b>Total</b>		267

We use the same statistic method (paired t-test) to analysis the “top 1/3 dividend yield” group and the “bottom 1/3 dividend yield” group respectively, try to find out whether the stock return of the companies with high dividend yield acts different from the companies with low dividend yield.

**TABLE 5**

<b>Observations=89 (Top 1/3)</b>			
<b>Variable</b>	<b>Mean</b>	<b>Median</b>	<b>Std. Dev.</b>
Dividend (D)	0.2602	0.2000	0.1548
Dividend Yield ( $d = D / P_{-1}$ )	0.0432	0.0370	0.0169
Price Drop = $P_{-1} - P_0$	0.3140	0.1900	0.5197
Raw Price Drop to Dividend Ratio (RPR) = $(P_{-1} - P_0) / D$	1.0755	1.0000	1.1433
Market Adjusted Price Ratio (MAPR)	1.2362	1.1469	1.1776
Raw Price Drop Return (RPD) = $((P_{-1} - P_0) / P_{-1})$	0.0485	0.0381	0.0552
Market Adjusted Price Drop Return (MAPD)	0.0539	0.0484	0.0581

Table 5 shows descriptive statistics of the 89 samples with dividends yield is higher than 0.0246 analyzed in this study. The mean dividend of this high dividend yield group is 0.2602, and the mean dividend yield is 0.0432. The corresponding mean price drop is 0.3140 which is also higher than the mean dividend, indicating that the price drop amount is higher than the dividend paid. The mean raw price drop to dividend ratio is 1.0755 and the mean market adjusted price ratio is 1.2362.

The mean raw price drop return is 0.0485 and the mean of market adjusted price drop return is 0.0539, both of the two are higher than the mean dividend yield (0.0432). And then we compare the observed mean values for Raw Price Ratio (RPR), Market Adjusted Price Ratio (MAPR), Raw Price Drop Return (RPD) and Market Adjusted Price Drop Return (MAPD) to their theoretical value.

**TABLE 6**

<b>Taxable Samples, Dividend Yield &gt; 0.0247 (Tax rate=10%) (N=89)</b>			
<b>Mean</b>	<b>Theoretical value</b>	<b>Observed Values</b>	<b>(p-value)</b>
Raw Price Drop to Dividend Ratio (RPR)	0.9	1.0755	0.1512125
Market Adjusted Price Ratio (MAPR)	0.9	1.2362	0.0084652
Raw Price Drop Return (RPD)	0.0389	0.0485	0.0654841
Market Adjusted Price Drop Return (MAPD)	0.0389	0.0539	0.0088073

As shown in Table 6, the mean raw price drop to dividend ratio for the 89 samples is 1.0755, the corresponding p-value is 0.15, suggesting that the difference of the mean raw price drop to dividend ratio from its corresponding theoretical value of 0.9 is not statistically significant (at 0.05 level of statistically significant). Contrarily, the test for market adjusted price ratio gets different result, the observed mean

market adjusted price ratio is 1.2362, while the theoretical value is also 0.9, the p-value of 0.0085 suggests that the difference between the observed and theoretical mean market adjusted price ratio is statistically significant (at 0.05 level of statistically significant).

The mean raw price drop return is 0.0485; the p-value of 0.0655 suggests that it is not statistically different from the corresponding theoretical value 0.0389. Finally, the mean market adjusted price drop return is 0.0539 with an associate p-value of 0.0088, the t-statistic is significant (at 0.05 level of statistically significant), and suggesting that the mean market adjusted price drop return does differ from its corresponding theoretical value of 0.0389.

Based on the paired t-test of relating mean values, the evidence from Table 6 suggests that the hypotheses H1b and H2b can be rejected, and there is no evidence to reject H1a and H2a.

### Analysis 89 Samples with Low Dividend Yield

It is assumed that the tax effect will be weaker while the dividend is small, because the tax amount will be too small to consider by the shareholders. The paired t-test will also be use to test whether the assumption is true.

**TABLE 7**

<b>Observations=89 (Bottom 1/3)</b>			
<b>Variable</b>	<b>Mean</b>	<b>Median</b>	<b>Std. Dev.</b>
Dividend (D)	0.0841	0.0600	0.0729
Dividend Yield (d)	0.0081	0.0081	0.0029
Price Drop = P-1-P0	0.5238	0.0100	2.2056
Raw Price Drop to Dividend Ratio (RPR) = (P <sub>-1</sub> -P <sub>0</sub> )/D	5.4351	0.3846	24.0958
Market Adjusted Price Ratio (MAPR)	6.5360	1.0862	28.7577
Raw Price Drop Ratio (RPD) = (P <sub>-1</sub> -P <sub>0</sub> )/P-1	0.0269	0.0031	0.1087
Market Adjusted Price Drop Ratio (MAPD)	0.0299	0.0076	0.1144

Table 7 shows descriptive statistics of the 89 samples with dividends yield is lower than 0.0133 analyzed in this study. The mean dividend of this low dividend yield group is 0.0841, and the mean dividend yield is 0.0081. The corresponding mean price drop is 0.5238 which is also much higher than the mean dividend, indicating that the price drop amount is higher than the dividend paid. The mean raw price drop to dividend ratio is 5.4351 and the mean market adjusted price ratio is 6.5360.

The mean of raw price drop return is 0.0269 and the mean of market adjusted price drop return is 0.0299, both of the two are higher than the mean dividend yield (0.0081). And then we also compare the observed mean values for Raw Price Ration (RPR), Market Adjusted Price Ratio (MAPR), Raw Price Drop Return (RPD) and Market Adjusted Price Drop Return (MAPD) to their theoretical value.

**TABLE 8**

<b>Taxable Samples, Dividend Yield &lt; 0.00132 (Tax rate=10%) (N=89)</b>			
<b>Mean</b>	<b>Theoretical value</b>	<b>Observed Values</b>	<b>(p-value)</b>
Raw Price Drop to Dividend Ratio (RPR)	0.9	5.4351	0.07926
Market Adjusted Price Ratio (MAPR)	0.9	6.5360	0.06783
Raw Price Drop Ratio (RPD)	0.0073	0.0269	0.09151
Market Adjusted Price Drop Ratio (MAPD)	0.0073	0.0299	0.06562

As shown in Table 8, the mean Raw Price Ratio for the 89 samples is 5.4351, the corresponding p-value is 0.07, suggesting that the difference of the mean raw price drop to dividend ratio from its corresponding theoretical value of 0.9 is not statistically significant (at 0.05 level of statistically significant). Similarly, the observed mean Market Adjusted Price Ratio is 6.5360, while the theoretical value is also 0.9, the p-value of 0.0678 suggests that the difference is not statistically significant (at 0.05 level of statistically significant).

The mean raw price drop return is 0.0269; the p-value of 0.09151 suggests that it is not statistically different from the corresponding theoretical value 0.0073. Finally, the mean market adjusted price drop return is 0.0299 with an associate p-value of 0.0073, the t-statistic is insignificant (at 0.05 level of statistically significant), and suggesting that the mean market adjusted price drop return does not differ from its corresponding theoretical value 0.0073.

Based on the paired t-test of relating mean values, the evidence from Table 8 suggests that there is no evidence to reject hypotheses H1a, H1b, H2a and H2b.

### **Market Reaction Analysis**

According to overview the average stock price change trend and stock return of all the sample period (from day -20 to day +20), we found that the ex-dividend date is like a watershed. Before the ex-dividend date, the average adjusted stock returns of majority days are positive; and after the ex-dividend date, the average adjusted stock returns of majority days are negative. It is worth to analysis how long does the market need to digest this “ex-dividend day” event and goes back to normal development.

Therefore, according to equation 6, the accumulated standardized stock growth of the four sub-periods can be calculated through the daily market adjusted stock return. As mention before, in order to make the test more accurate, two different types of market index will be used in the study to compare whether the result will be different under different market index.

Firstly, we will use the Shanghai and Shenzhen 300 Index to test all the samples as the 300 index could represent the whole market change trend in China stock market. And then Shenzhen Component Index and Shanghai Composite Index will be used respectively to test the same sample companies again to see whether the result is consistent with using Shanghai and Shenzhen 300 Index.

- Using Shanghai and Shenzhen 300 Index

$$AR1=(1+r-19)*(1+r-18)*(1+r-17)...(1+r-11)=1.032$$

$$AR2=(1+r-10)*(1+r-9)*(1+r-8)...(1+r-1)=1.06$$

$$AR3=(1+r1)*(1+r2)*(1+r3)...(1+r10)=0.988$$

$$AR4=(1+r11)*(1+r12)*(1+r13)...(1+r20)=0.98$$

- Using Shenzhen Component Index and Shanghai Composite Index

$$AR_1=(1+r-19)*(1+r-18)*(1+r-17)...(1+r-11)=1.019$$

$$AR_2=(1+r-10)*(1+r-9)*(1+r-8)...(1+r-1)=1.054$$

$$AR_3=(1+r_1)*(1+r_2)*(1+r_3)...(1+r_{10})=0.9956$$

$$AR_4=(1+r_{11})*(1+r_{12})*(1+r_{13})...(1+r_{20})=0.9945$$

The two different indexes give us the similar results: the accumulated standardized stock growth increases stably before the ex-dividend date. The accumulated standardized stock growth of the first two sub-periods is both higher than 1 and  $AR_2$  is higher than  $AR_1$  as well, which means the entire market is under a normal development condition.

After the ex-dividend day, the negative effect of the event start and last until the end of the 20 days, the accumulated standardized stock growth of the second two sub-periods is both smaller than 1 and  $AR_4$  is lower than  $AR_3$  as well, which means the stock return growth is keeping decline. In summary, the negative effect of ex-dividend date event could last more than 20 days and seems keep lasting, this result prove that the market really need a long period of time to fully digest this event and goes back to normal development condition.

## SUMMARY AND CONCLUSIONS

This paper analyses the ex-dividend day effect on stock price in the Chinese stock market. The Chinese market is chosen because its history is still very short and so many uncertainties exist. It might be influenced by many other outside factors, such as government policy, tax issue, industry issue, etc.

Differently from the tax hypothesis, we could not find enough evidence to support that the entire samples' (267 taxable stocks) price on the ex-dividend day drop proportionally to the dividend paid, regardless of dividend yield. Contrarily, the price drop is significantly higher than the dividend distributing amount. The result suggests that the market is over-reacted to the ex-dividend day event in China stock market.

Consistent with the tax hypothesis, the samples with higher dividend yield, people care more about the tax effect and the price react significantly different from the theoretical way. In other word, these stocks do not drop as how much they "should" drop through our calculation, indicating that the tax effect is effective for these high dividend yield samples, people care more about the tax effect when they do the investment decisions. Because the tax charge amount is higher for the samples with high dividend yield, and in order to avoid this tax payment, shareholder might want to sell the shares in hand intentionally before the ex-dividend day. According to the definition of ex-dividend date, if the shareholders keep the shares until the ex-dividend day, then they will receive the dividend and have to pay the dividend tax.

However, for the samples with low dividend yield, the finding is contrast; the observed mean value of Raw Price Ratio, Market Adjusted Price Ratio, Raw Price Drop Return and Market Adjusted Price Drop Return are statistically insignificant different from their theoretical value, which implies as dividend yield gets smaller, the tax effect seems to be more ineffective. It is easy to understand the result because as the tax charge amount is small, the shareholders care less about it, and would not intentionally to trade it before the ex-dividend day. So the market price can stock return will not be affected significantly, that's why the observed value acts similar as the theoretical way.

The overall implication of this study is that the stock price behavior on the ex-dividend day observed in China market is consistent with the tax explanation, but the market just over-reacted and leads the price drop much higher than the dividend payment amount.

Empirical evidence prove that the dividend high affect the stock price. If the company earns more than it expects, then the possibility of distribute dividend will be higher. Generally speaking, the listing companies with well financial performance will pay highly attention on the stableness of the dividend distribution. When the economy situation is not as good as the market expects, they will use the reservation to do the dividend distribution, and even get a loan from the bank to do so, in order to built the confidence of the investors and make the share price stable.



Dividend should be one of the most important issue of earning from invest on stock market. Many invest researchers consider that the investment value of a certain stock, is based on its stable dividend. This point of view is support that the total investment amount should be used to buy the stock with highest dividend yield. And this kind of attribute is real “invest”, if the purpose of buying a stock is wants to make a capital gain from the price up and down, the method should be called as speculation instead of investment. Those invest researchers consider the dividend income should be the right course, because the share price is hard to predict and highly based on luck.

In China stock market, from the viewpoint of secondary market participator, stock speculation is one of major issues in China. The turnover rate in China stock market is very high. In addition, investor would mostly seek for speculation rather than investment. The capital gain from trading stock is treated as tax free under the tax system in China. Thus, mostly the short-term speculation of stock trading should be the major activity in China stock market. Many institutional investors may apply this event as the basis for manipulating stock price. The stock dividend from listed companies in China is a sample of this kind of phenomenon. The empirical results of this study prove that stock price behave significantly different from regular activities.

From the viewpoint of primary market supervisor, the stock dividend is a special phenomenon occurred in China which is very different from other countries. Listed companies in US market mostly distribute cash dividend rather than stock dividend. The history of China stock market is still short .The long-term development of stock market is deeply influenced by the immaturity and short-term speculation of investors. In addition, the China government should adopt a better information transparency policy to protect investors and improve the market development.

Companies may have to change the dividend amount that they pay out due to thei changes in earnings. As literature on dividend policy suggest that dividend amount per share should be stable rather than changing frequently, one of the possible future research directions should be how to monitor the changes in the dividend amount. Possible tools that can be used to monitor the dividend amount change are designed for general process monitoring such as those discussed in Pan 2005 and Pan 2006. These monitoring tools treat small changes being in the allowable/affordable range while some statistically significant large changes being abnormal. Therefore, combining the general process monitoring tools with economic, financial fundamental reasoning will enable the setting of criteria distinguishing the allowable/affordable and abnormal changes in dividend payout.

## REFERENCES

- Asquith, P., & Mullins, D. W. (1983). The Impact of Initiating Dividend Payments on Shareholders' Wealth. *Journal of Business*, 56.
- Bali, R., & Hite G. (1998). Ex-dividend Day Stock Price Behavior: Discreteness or Tax-induced Clientele? *Journal of Financial Economics*, 47.
- Barclay, M. (1987). Dividends, Taxes and Common Stock Prices: The Ex-dividend Day Behavior of Common Stock Prices Before the Income Tax. *Journal of Financial Economics*, 19.
- Bhattacharya, S. (1979). Imperfect Information, Dividend Policy and the 'Bird in the hand fallacy'. *Bell Journal of Economics*, 10.
- Bhattacharya, S. (1980). Non-dissipative Signaling Structure and Dividend Policy. *Quarterly Journal of Economics*, 95.
- Blcack F. (1976). The Dividend Puzzele. *Journal of Portfolio Management*, 2(4).
- Booth, L.D., & Johnston, D.J. (1984, June). The Ex-dividend Day Behavior of Canadian Stock Prices: Tax Changes and Clientele Effects. *Journal of Finance*.
- Boyd, J., & Jagannathan, R. (1994). Ex-dividend Price Behavior of Common Stocks. *Review of Financial Studies*, 7.
- Eades K., Hess P., & Kim E. H. (1984). On interpreting Security Returns during the Ex-dividend Period. *Journal of Financial Economics*, 13.
- Elton & Gruber. (1970). Marginal Stockholder Tax Rates and the Clientele Effect. *Review of Economics and Statistic*, 52.
- Feng, H.L., Pan, X., Tang, Y.L., & Xu, L.J. (2015). The Efficiency of China's Retail Companies and the Implications in the Stock Market. *International Business Research*, 8(4), 83-93.
- Firth M. (1996). Dividend Changes, Abnormal returns, and intra-industry firm valuations. *Journal of Finance and Quantitative Analysis*, 31(2).
- Frank, M., & Jagannathan, R. (1998). Why Do Stock Prices drop by less than the Value of the Dividend? Evidence from a Country Without Taxes. *Journal of Financial Economics*, 47.
- Green, R., & Rydqvist, K. (1999). Ex-day Behavior with Dividend Preference and Limitations to Short-term Arbitrage: The Case of Swedish Lottery Bonds. *Journal of Financial Economics*, 53.
- Han, K. (1994). The Effect of the 1986 Tax Reform Act on Ex-dividend day Return Behavior. *Journal of Financial Research*, XVII(2).
- Hubbard, J., & Michaely, R. (1997). Do Investors Ignore Dividend Taxation? A Re-examination of the Citizens Utilities Case. *Journal of Finance and Quantitative Analysis*, 32(1).
- Jarrett, J., Pan, X., & Chen, S.K. (2009). Do the Chinese Bourses (Stock Markets) Predict Economic Growth? *International Journal of Business and Economics*, 8(3), 201-211.
- John, K., & Williams, J. (1985). Dividends, Dilution and Taxes: A signaling equilibrium. *Journal Finance*, 40.
- Kalay, A. (1982). The Ex-dividend Day Behavior of Stock Prices: A Re-examination of the Clientele Effect. *Journal of Finance*, 37.
- Kato, K., & Loewenstein, U. (1995). The Ex-dividend Day Behavior of Stock Prices: The Case of Japan. *The Review of Financial Studies*, 8, Fall.
- Koski J. (1996). A Microstructure Analysis of Ex-dividend Stock Price Before and After the 1984 and 1986 Tax Reform Acts. *Journal of Business*, 69(3).
- Lakonishok J., & Vermaelen T. (1983). Tax Reform and Ex-dividend Behavior. *Journal of Finance*, 38.
- Lamdin, D.J., & Hiemstra, C. (1993). Ex-dividend Day Share Price Behavior: Effects of the Tax Reform Act of 1986. *The Review of Economics and Statistics*.
- Lasfer, M. A. (1995, July). Ex-day Behavior: Tax or Short-term Trading Effects. *Journal of Finance*.
- Michaely, R., & Vila, J. (1995). Investors' Heterogeneity, and Volume around the Ex-dividend day. *Journal of Finance and Quantitative Analysis*, 30(2).
- Michaely, R. (1991). Ex-dividend Day Stock Price Behavior: The Case of the 1986 Tax Reform Act. *Journal of Finance*, 46.

- Miller M., & Modigliani, F. (1961). Dividend Policy, Growth and the Valuation of Shares. *Journal of Business*, 34.
- Miller M., & Scholes, M. (1982). Dividend and Taxes: Empirical Evidence. *Journal of Political Economy*, 90.
- Miller, M., & K. Rock. (1985). Dividend Policy under Asymmetric Information. *Journal of Finance*, 40.
- Mitra, D., & Owers, J. (1995). Dividend Initiation Announcement Effects and the Firm's Information Environment. *Journal of Business, Finance and Accounting*, 22(4).
- Mozes H., & Rapaccioli, D. (1995). The Relation among Dividend Policy, Firm Size, and the Information Content of Earnings Announcement. *Journal of Financial Research*, 18(1).
- Pan, X. (2006). Cross-country barometer effect of stock market: Evidences from U.S and Japan. *Asia Pacific Management Review*, 11(4), 255-261.
- Pan, X. (2006). Computer-Aided SPC: The Cybernetic View on Quality Control. *International Journal of Quality and Reliability Management*, 23(9), 1192-1203.
- Pan, Xia. (2005). Notes on Shift Effects of T2-type Charts for Residuals of Multivariate ARMA Processes. *Computers & Industrial Engineering*, 49(3), 318-352.
- Pan, X. (2007). The Linear Dependence and Feedback Spectra between Stock Market and Economy. *International Journal of Theoretical and Applied Finance*, 10(3), 437-447.
- Pan, X., Jarrett, J., & Peng, X.H. (2012). Evaluating Microfinance in Rural China. *International Research Journal of Applied Finance*, 3(3), 280-291.
- Porter, J., & Summers, L. (1984). New Evidence that Taxes Affect the Valuation of Dividends. *Journal of Finance*, 39.
- Robin, A. (1991). The impact of the 1986 tax reform act on ex-dividend day returns. *Financial Management*.