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使用馬可夫轉換矩陣分析股利政策之持續性
On the Stickiness of Dividend Policy: A Study Using Migration Matrix

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摘要

本研究利用新方法分析公司股利政策之持續性，樣本是 2005 至 2012 年之臺灣上市櫃公司。討論主題包含：公司發放傾向、發放規模，及除息日至發放日之間隔長短。本研究主要使用馬可夫機率矩陣分析工具，依照除息日至發放日間隔天數，區格五種狀態：不發放、除息日後 22 日內發放、23 至 28 日發放、29 至 36 日發放與超過 36 日發放。

然後，本研究再將發放事件分成四組發放規模，以分析股利政策之改變過程。研究發現，無論就統計顯著性或經濟顯著性，公司之股利政策呈現持續性與平滑性。因此，公司股利政策之持續性比傳統文獻討之內容更明顯。研究結果對股利政策持續性之原因具有啟發性解釋，本研究主張發放股利之行為已經成為一種規範。

關鍵詞：股利政策、發放日、馬可夫矩陣、經濟顯著性

Abstract

This article studies the stickiness and smoothness of dividend policy from a new perspective, through examining the dividend policy of Taiwanese firms over 2005-2012. The issues we investigate include: the propensity to paying dividends, the magnitude of dividends and the periods between the ex-dividend date and the payment date. We exploit the Markov migrating probability matrix to explore these issues. This study defines five states for the cash dividend-paying policy: paying none, paying within 22 days, paying between 23 and 28 days, paying between 29 and 36 days, and paying after more than 36 days, with respect to the various periods between the ex-dividend date and the payment date. After further dividing the sample of dividend payers into four groups according to the quartiles of dividend magnitude, we find firms reveal a high degree of stickiness and smoothness in terms of economic significance. Hence, the preponderance of smooth dividend policy is more prevalent than we thought of. This study sheds light on the reason why a dividends policy is sticky or smooth. We suggest that it has become a social norm to pay and receive dividends.

Keywords: dividend policy, payment date, migration matrix, economic significance

I. Introduction

Miller and Modigliani (1961) show that dividend policy is irrelevant in determining a firm's value when markets are perfect and investors are rational. They conclude that rational investors "always prefer more wealth to less and are indifferent as to whether a given increment to their wealth takes the form of cash payments or an increase in the market value of their holding of shares." (p. 445) However, both empirical evidence (e.g., Allen and Michaely, 2003) and survey evidence (Lintner, 1956; Brav, Graham, Harvey, and Michaely, 2005) suggest that dividend policy is anything but irrelevant to managers and markets. Rather, corporate dividend policies exhibit clear patterns.

The word "policy" implies some consistent pattern over time, and corporate dividends do not simply evolve in an arbitrary and random manner (Allen and Michaely, 2003). In particular, dividends are "smoothed" and not often decreased, and investors react positively to dividend increases and negatively to dividend decreases (e.g., Benartzi, Michaely, and Thaler, 1997). While these stylized facts are well established, the economic mechanism behind these facts—that is, how and why firms decide on a particular dividend policy—is not well understood in spite of an abundance of empirical evidence. Consequently, Berk and DeMarzo (2014, p. 609), one of the most popular college textbook on corporate finance, proclaim that "there is no clear reason why firms *should* smooth their dividends, nor convincing evidence that investors prefer this practice."

Baskin (1988) reviews the historical development of firms in the United Kingdom and the United States, and observes that pressure on behalf of investors turned dividend paying into a hard-to-evade **norm**. Frankfurter and Wood (1997) studies the corporate dividend history of the Western companies starting in the early 1600's. They conclude that dividend-payment patterns (or what is often referred to as "dividend policy") of firms are a cultural phenomenon, influenced by customs, beliefs, regulations, public opinion, perceptions and hysteria, general economic conditions and several other factors, all in perpetual change, impacting different firms differently. Accordingly, corporate dividend policy seems difficult to be modeled mathematically and uniformly for all firms at all times. They suggest to study more carefully dividend policies as a cultural phenomenon rather than expending efforts in mathematical model building.

In other words, investors' affection for dividends and the prominent stickiness of dividends raise the question of whether dividends have become a **social norm** (Frankfurter and Wood 1997; Ben-David 2010). The idea behind such a hypothesis is that dividends

might have had an initial use in, for example, mitigating information asymmetry and reducing agency problems. Over the course of time, however, dividend paying evolved into a custom that is difficult to question and hard to resist. According to the Oxford dictionary (2011), a norm is a "standard; pattern; type (as representative of a group when judging other examples)". The **social norm** is a behavioral regularity that is based on a socially shared belief of how one should, or how one should not, behave (Akerlof, 2007).Consequently, firms are reluctant to decrease dividends even after suffering losses and firms will increase dividends only when managers are confident over their future performance. The social norm of welcoming dividends results in the phenomena of sticky dividend policy.

The aforementioned argument is what Ben-David (2010) calls the **inertia-based explanation** for dividends. The term inertia means the property of matter by which it remains its state of rest or its velocity along a straight line so long as it is not acted upon by an external force (e.g. Oxford, 2011). Proving that a corporate policy is a social norm is generally difficult because this requires disproving any economic reasons for the policy at the same time. In particular, an empirical work that attempts to show that dividends are socially normative needs to control for other reasons for dividend payouts. However, we can enhance or refute the inertia feature of paying dividend from a different perspective. In particular, this paper will illustrate the inertia of dividend policy with respect to the relative magnitude of aggregate dividends and the period durations between the ex-dividend date and the payment date.

Culturally and traditionally, we get irreplaceable and great joy from receiving gifts at Christmas although receiving gifts is economically inefficient when comparing with receiving an equivalent amount of cash. Following the same logic, paying and receiving dividends becomes a social norm. This is why John D. Rockefeller (1839-1937)said: "Do you know the only thing that gives me pleasure? It's to see my dividends coming in." It is one of the most famous quotes by Rockefeller. He is an extremely wealthy and wise shareholder in spite of expressing such an economically irrational comment about dividends.

Paying dividends is something like giving Christmas gifts, which is a cultural and social norm. Accordingly, shareholders derive great pleasure from hearing the announcement of the distribution of dividends. However, they are not necessarily as appreciative of the ex-dividend date as they were at the announcement date, since the share price is typically reduced by a magnitude equal to the dividend amount. They have to wait for a period (weeks or months) until they receive the cash. Hereafter, we will refer to the

period duration between the ex-dividend date and the payment date as the waiting period. The greater reduction in the dividend payment announcement, the more severely disappointed the shareholders are. Similarly, the longer the waiting period, the more severely discounted the supposed joy of receiving dividends becomes.

Let us observe the features of some high-profile firms. DeAngelo, DeAngelo, and Skinner (2004, Table 9) compiled the 25 industrial firms that paid the largest dividends in 2000; Exxon Mobil paid the largest (US$6,122 million) and General Electric paid the second largest (US$5,647 million). Twelve years later, in 2012, Exxon Mobil is the second largest payer (US$10,092 million) and General Electric is the third largest payer (US$7,189 million), whereas AT&T is the largest payer with a magnitude of US$10,241 (Amenta, 28 March 2013). This case demonstrates a sticky phenomenon with respect to the relative magnitude of dividends among firms. Primary dividend payers tend to remain to be the primary payers even after 12 years. As to the waiting period, they also implement a consistent policy despite of the substantial advancement of technology over the past decade. For example, Exxon Mobil always decides on the waiting period to be 30 to 33 days. Although the waiting period of General Electric distributed from 32 to 69 days, they are mostly 39 days, especially in recent years.Obviously, the stability (Lintner, 1956) and the smoothing (Allen and Michaely, 2003) of both Exxon Mobil and GE's dividend policy seems to go beyond the realms of conventional thought on the matter.

The subject market of this research is Taiwan and the primary data source of this paper is Taiwan Economic Journal (TEJ). The sample period is from 2005 to 2012 and the sample firms are listed in three Taiwanese markets: Taiwan Stock Exchange (TWSE), and the Gretai Securities Exchange (traditionally called the Over-the-Counter market, OTC). TWSE is the most important market in Taiwan with aggregate market value of TW$24 trillion, which accounts for 88% of the three markets. Note that one US$ is around TW$ 30 and the exchange rate is very stable.

The remaining part of the paper is organized as follows. Section II gives a literature review. Section III describes our data and analyzes the payout policy of Taiwanese corporations. Section IV examines the smoothness and stickiness of dividend policy in terms of the relative magnitude and the waiting periods. In particular, we discuss these issues in terms of both economic significance and statistical significance. Section V concludes this paper.

II. Literature Review

In the survey of Lintner (1956), he notes that managers consider the amount of payout relative to the benchmark of the existing payout, rather than independent of this rate. Brav et al. (2005) conduct a comprehensive survey of executives in order to learn their view on the purpose of dividends. The results of the survey show no support for rational theories of signaling, agency, or the clientele hypothesis. Conversely, the results of the survey are consistent with a social explanation for dividends—managers reported that their firms distribute dividends due to inertia and because ending the payout would result in a negative market reaction (Baker,2009). Hence, inertia and conservatism about the ability to maintain the dividend rate in the future governs dividend decisions (Ben-David,2010).

Ben-David (2010) proposes that dividend-paying has become a social norm. The notion behind such a hypothesis is that paying dividends might have had an initial function, such as mitigating agency problem or signaling inside information. Over time, however, paying dividend evolved into a deeply entrenched custom. There must be many others in addition to Rockefeller, who derive special and irreplaceable joy from receiving dividend checks or from witnessing dividends flowing into his bank account. In other words, although paying dividends is economically unwise, the service of delivering dividends by a firm has evolved into a social norm which injects great pleasure into the lives of investors, much like it did for Rockefeller.

Akerlof (2007) proposes that the norm of decision makers can bridge the gap between New Classical economic theory and the conflicting empirical evidence. Lam, Zhang, and Lee (2013) implement this framework and show that the manager-subordinate relationship and the manager-environment relationship in a national culture are significantly and negatively related to the leverage ratio. Malmendier, Tate, and Yan (2011) find that the capital structure of a firm is related to the early-life and military experience of the CEOs. Deshmukh, Goel, and Howe (2013) find that firms managed by overconfident CEOs tend to pay out lower level of dividends than otherwise firms. Although these two papers do not contain the term “norm” in their paper, what they describe are actually the so called “microfoundations” of norms (Akerlof 2007, p. 30).

The existing literature on cash dividend-paying behavior mainly concerns with the trading behavior of the dividend-paying shares at the ex-dividend date.The stylized findings are that the price drops by less than the dividend amount and there exists abnormal trading volume at the ex-dividend date. These empirical results are prominent in both developed

markets and developing markets (Frank and Jagannathan, 1998; Jun, Alaganar, Partington, and Stevenson, 2008; Al-Yahyaee, Pham, and Walter, 2008). Yet, few studies discuss issues concerning with the payment date of cash dividends. In fact, the survey of the above works reveals nothing about the dividend payment date or about the period between the ex-dividend date and the payment date. To the best of our knowledge, only two paperspublishedin international journals ever discussed issues relating to dividend payment dates: Ogden (1994) and Yilmaz and Gulay (2006). The former examines the price and the trading volume of the dividend-paying shares around the payment date; while the latter discusses similar issue for the Turkish market. Both find that there existed abnormal return and abnormal volume around the payment date. Ogden (1994) infers that investors receiving the cash dividends are very likely to reinvest the same shares when receiving the dividends. Besides, Ogden (1994) finds that the average period the ex-dividend date and the payment date is 17.9 days and is typically two to five weeks. But Ogden (1994) does not further discuss this issue.

The study of Liu, Lu, and Chiu (2014) is the only published articles examining the waiting periods in Taiwan. This research shows that the waiting periods distributed between 6 and 155 days over 2002 to 2009 and they increased gradually between 2002 and 2006, but decreased afterwards. The changing is due to the Formosa Group's dominant proportion in aggregate dividends. The change of policy incurred a potential opportunity cost of $161 million of interest revenue to the Formosa. However, the annual mean and median of the waiting periods always stay at around 30 days. Lee, Yin, Liu, and Kuo (2014) argue that the decision of the duration between the ex-dividend and payment dates is based on a reference point from which an adaption is made to the market.

Lintner (1956) finds that dividends are sticky, tied to long-term sustainable earnings, and smoothed from year to year. Scholars have documented adequate evidence of dividend smoothing policy using Liniter's framework (Naceur, Goaied and Belanes, 2006;Leary and Michaely, 2011; Michaely and Roberts, 2012).They show that dividend smoothing firms tend to be large, profitable, and mature firms. The behavior of smoothing dividends is most common among firms that are not financially constrained, face low levels of asymmetric information, and are most susceptible to agency conflicts (Leary and Michaely 2011).

Quite different from the traditional approach, this paper develops new approaches examining the stickiness and smoothness of corporate dividend policy. We illustrate the inertia of dividend policy with respect to the relative magnitude of aggregate dividends and the waiting periods.We will show that the preponderance of smooth dividend policy is more

prevalent than we thought of.

III. Data Description and the Sticky Paying Frequency

This research examines the stickiness of dividend policy in three dimensions: the paying frequency, the magnitude of dividend amounts, and the waiting period between the ex-dividend date and the payment date. Based on our observation of Exxon Mobil and General Electric, we expect that the likelihood of a Taiwanese firm paying dividends during 2009-2012 is correlated with its frequency of doing so during 2005-2008. This arrangement is due to the occurrence of the 2008 global economic recession triggered by the U.S. subprime mortgage crisis.

We collectthe data of TWSE-listed firms and OTC-listed firms from the database of the Taiwan Economic Journal (TEJ), which provides the most prominent economic and financial database in Taiwan. We limit the sample period to 2005-2012. The first reason is that Taiwanese firms were prone to distribute stock dividends instead of paying cash dividends before 2004 (see e.g., Hu and Tseng, 2006). The second is that the aggregate cash dividends paid by Taiwanese firms strictly increased from 2005 to 2008, increasing from TW$494.957million to TW$865,862million, as demonstrated in the 4th row of Panel A of Table 1. The corresponding average amount of dividends increased from TW$1,016million in 2005 to TW$1,541million in 2008, as shown in the 4th row of Panel B of Table 1.

The aggregate dividends sharply dropped by 48.2% in 2009 due to the global recession in 2008, the so-called financial tsunami triggered by the American subprime mortgage crisis. The corresponding drop in the number of cash dividend payers is 19.8% (from 562 to 440). The corresponding average amount of dividends dropped from TW$1,541million to TW$1,019million, as shown in the 4th row of Panel B.Afterwards, both the number of payers and the payout value reverted back to their increasing trends. We intend to examine the possible changes in corporate dividend policy after 2008, especially on the persistence of dividend policy in both TWSE- and OTC-listed firms. The sample period over 2005-2012 grants us a balanced sample of years to examine the firms' behavior before and after 2008. The corresponding table for the OTC-listed firms is presented in the Appendix.

Table 1. Amount and periods of the dividend policy of TWSE-listed firms over 2005-2012.

Year	2005	2006	2007	2008	2009	2010	2011	2012
Panel A. Cash dividend paying propensity and aggregate dividends. (Aggregate dividends is in million TW$.)								
Sample size	721	714	717	730	713	745	753	762
No. of dividend payers	487	480	522	562	440	524	589	537
Proportion of payers	67.5%	67.2%	72.8%	77.0%	61.7%	70.3%	78.2%	70.5%
Aggregate dividends	$494,957	$569,521	$693,099	$865,862	$448,280	$650,533	$830,225	$664,664
growth rate of payers		-1.0%	0.4%	1.8%	-21.7%	19.1%	12.4%	-8.8%
growth rate of dividends		15.1%	21.7%	24.9%	-48.2%	45.1%	27.6%	-19.9%
Panel B. Distribution of the annual total dividends paid per firm (million TW$).								
min	$4.9	$6.1	$1.9	$4.1	$5.8	$4.7	$7.9	$8.2
Q1	$72	$78	$115	$106	$81	$119	$128	$120
median	$170	$210	$266	$279	$193	$253	$308	$305
mean	$1,016	$1,187	$1,328	$1,541	$1,019	$1,241	$1,412	$1,238
Q3	$504	$550	$667	$717	$507	$616	$738	$681
max	$46,504	$61,825	$77,489	$76,881	$76,876	$77,708	$77,730	$77,749
Stdev.	$4,179	$4,879	$5,171	$6,081	$4,529	$4,928	$5,405	$4,725
Skewness	8.27	8.35	9.19	8.12	12.43	9.87	8.66	10.59
Panel C. Distribution of the periods between the ex-dividend date and the payment date.								
min	8	8	10	8	8	8	8	8
Q1	27	26	26	25	24	23	22	22
mode	28	28	28	28	28	28	21	28
median	33	32	30	30	29	28	28	27
mean	33.97	32.96	32.59	33.47	30.82	29.78	29.27	28.34
Q3	41	39	39	39	37	36	36	34
max	72	78	70	**582***	99	69	74	62
Stdev.	10.62	9.52	9.78	**25.33**	9.47	9.13	9.36	8.73
Skewness	0.62	0.55	0.52	**18.20**	1.14	0.73	0.76	0.78

Note *. When the dividend policy of Enlight Corp. in 2008 is excluded, that year's max, stdev. and skewness become **86**, **10.21** and **0.68**, respectively. The corresponding table for the OTC is in the Appendix.

Panel C of Table 1 shows the statistics of the periods between the ex-dividend date and the payment date. When excluding the extreme case of Enlight Corp[1], the periods are distributed from 8 to 99 days. The annual means, medians, and modes are around 30 days. The first quartile is around 22 days and the third quartile is around 34 days. The positive coefficient of skewness (at least 0.52) suggests that some dividend-paying firms tend to delay the paying of cash relative to most other payers.

To enhance our understanding of the evolution of the cash dividend-paying propensity, Table 2 presents the migration matrix of the number of years that a firm paid dividends. For example, there are 122 firms never paying dividends during 2005-2008, and there are 62 firms paying dividends once during 2008-2008, etc. There are many striking features for both TWSE and OTC firms. First, firms that paid 0 during 2005-2008 are most likely to continue their prior pattern of paying 0 dividends over the succeeding four years. A TWSE (OTC)-listed firm that did not pay dividends during 2005-2008 had a probability of 0.59

[1]Enlight Corp (trading code 2438) went ex-dividend on 24 July 2008, and announced it would pay the cash on 24 October. However, it failed to keep the promise due to financial distress. It was paid on 26 February 2010 after the company liquated part of its real estates.

(0.711) of sustaining the same policy during 2009-2012. Second, the propensity of paying dividends is increasing**.** A TWSE (OTC)-listed firm paying dividends more than once (twice) during 2005-2008 were very likely to pay for four consecutive years during 2009-2012 (with probability of at least 0.323). Firms paying dividends more than once during 2005-2008 were very likely to pay for four consecutive years during 2009-2012. On the other hand, an OTC-listed firm paying dividends once is very likely paying do dividends during 2009-2012 (with probability of 0.508). Third, the incidence of paying dividends by TWSE-listed firms is higher than that of OTC-listed firms. In particular, a TWSE (OTC)-listed firm paying four consecutive dividends during 2005-2008 has a probability of 0.733 (0.596) to pay four consecutive dividends during 2009-2012. These fact manifest the stickiness of dividend policy and also imply that TWSE-listed firms perform stickier dividend policy than OTC firms.

Table 2. Migration probabilities of shifting cash dividend-paying decisions by firms listed in either TWSE or OTC in 2009. The number represents a firm's probability to shift a dividend policy from emigration state *x* (number of years paying dividends) during 2005-2008 *T* to immigration state *y* during 2009-2012. The probability in each row is highlighted in bold type if it is the largest among immigration states, doubly underlined if it is the second.

Initial states 2005-08	TWSE						OTC					
	size	Next states, 2009-2012					size	Next states, 2009-2012				
		0	1	2	3	4		0	1	2	3	4
0	122	**0.59**	0.148	0.098	0.131	0.033	121	**0.711**	0.041	0.132	0.074	0.041
1	62	0.258	0.129	0.177	0.113	**0.323**	59	**0.508**	0.085	0.051	0.153	0.203
2	64	0.109	0.188	0.094	0.219	**0.391**	66	0.242	0.106	0.152	0.136	**0.364**
3	86	0.209	0.093	0.081	0.151	**0.465**	91	0.209	0.165	0.154	0.187	**0.286**
4	397	0.02	0.048	0.073	0.126	**0.733**	230	0.091	0.057	0.091	0.165	**0.596**

In the preceding section, we examine the stickiness of dividend policy in terms of paying frequency. The statistical significance of sticky paying frequency can be justified by highlighting the fact that a firm paying zero (four consecutive) dividends during 2005-2008 is most likely to pay zero (four consecutive) dividends during 2009-2012. The primary objective of this research is to explore the stickiness (smoothness) of both the relative dividend magnitude and the duration between the ex-dividend date and the payment date. Note that the conclusions of prior studies (Leary and Michaely, 2011; Michaely and Roberts, 2012; Naceur, Goaiced, and Belenes, 2006) are supported by our results as TWSE-listed firms are characterized by higher tendency of sticky dividend policy than OTC-listed firms.

III. Sticky and Smoothing Dividend Policy

This section investigates the stickiness of dividend policy in other two new dimensions: the

magnitude of dividend amounts, and the waiting periodbetween the ex-dividend date and the payment date. As this no study ever discusses the two issues, we shall proceed in a formal and rigorous way.

Let *Ai* and *Aj* denote the states of dividend amounts, while *Bm* and *Bn* denote the states of the waiting periods. The cardinal numbers of the domains for the aforementioned variables are both five. In particular, 0 (as well as*A0*and *B0*)stands for paying no dividend, *A1* (*B1*) stands for values between 0 and the 2nd quartile, *A2* (*B2*) for values between the 2nd quartile and the median, *A3* (*B3*) for values between the median and the 3rd quartile, and *A4* (*B4*) for values above the 3rd quartile. Define

$$p_A(Ai;\ Aj),\quad i,j \in \{0,1,2,3,4\} \tag{1}$$

as the migration (transition) probability of a dividend policy of state *Ai* in a specific year to another dividend policy of state *Aj*next period (next year or at the end of the time span). The thresholds for partitioning *A1* to *A4* for TWSE-listed firms are $112.3, $264.7 and $642.2 in units of a million Taiwan dollars, which are defined in a way that results in nearly one quarter of dividend payers in each state (Panel B of Table 1). The resultant migration probability matrices for TWSE-listed firms are presented in Table 3.

We partition the evolution of the dividend amount into three subperids: 2005-2008 (Panel A), 2009-2012 (Panel B), and 2008-2009 (Panel C). To calculate the migration probabilities, we first sum up the number of firms altering their dividend policy from state *Ai* in year *T*-1 to state *Aj*in year *T* across *T*=2006 to *T*=2008, resulting inN_{ij}. Next, we sum up the total number of firms in state *Ai* across all states of *j*, resulting in N_i. We then procure the transitional probability from state *Ai* to state *Aj* by dividing the latter number (N_i) into the former number (N_{ij}). The largest probability in each emigration state is highlighted in boldfaceand doubly underlined if it is the second. The numbers of Panel B and Panel C are similarly produced.

In this way, we can isolate the impact of the global recession in 2008. Panels A and B of Table 3 show that the diagonal probabilities are always the largest among all subsequent states along the same row. This is especially true for the initial states 0 and *A4*, with probabilities of at least 0.7 remaining in line with the status quo. Besides, the second largest probability always locates in the state adjacent to the initial state. We shall refer to the former feature as sticky dividend policy, and the latter as smooth dividend policy. Panel C of Table 3 reveals that a firm's tendency of remaining in status *A3* (also *A3* and *A4*) obviously reduces. However, a nonpayer has a larger probability of remaining not paying

dividends (at least 0.88) due to the global economic recessing of 2008.

Table 3. Migration probabilities of shifting dividend magnitude decisions. The number represents a firm's probability to shift a dividend policy from an initial state to another subsequent state next year. The probability in each row is highlighted in boldface if it is the largest among the initial states and doubly underlined if it is the second. The bottom row defines the thresholds of partitioning the states.

Panel A. Sample period over 2005-2008.												
	TWSE-listed firms						OTC-listed firms					
Initial states	Size	None	Paying with various magnitudes				Size	None	Paying with various magnitudes			
		0	*A1*	*A 2*	*A 3*	*A 4*		0	*A1*	*A 2*	*A 3*	*A 4*
0	633	**0.771**	0.103	0.063	0.044	0.019	590	**0.810**	0.086	0.051	0.031	0.022
A1	387	0.116	**0.599**	0.245	0.039	0	269	0.257	**0.398**	0.223	0.104	0.019
A2	385	0.068	0.106	**0.512**	0.288	0.026	252	0.111	0.183	**0.353**	0.278	0.075
A3	354	0.048	0.014	0.099	**0.63**	0.209	251	0.076	0.060	0.183	**0.442**	0.239
A4	351	0.034	0.003	0.009	0.08	**0.875**	229	0.061	0.017	0.022	0.100	**0.799**
Threshold (million TW$)		$112.3	$264.7	$642.2					$28.59	$61.06	$132.5	
Panel B. Sample period over 2009-2012.												
0	654	**0.705**	0.139	0.07	0.047	0.038	739	**0.793**	0.084	0.060	0.035	0.028
A1	397	0.144	**0.524**	0.272	0.05	0.01	268	0.205	**0.403**	0.269	0.101	0.022
A2	401	0.095	0.132	**0.441**	0.302	0.03	255	0.125	0.133	**0.388**	0.267	0.086
A3	368	0.057	0.03	0.144	**0.576**	0.193	248	0.060	0.056	0.149	**0.456**	0.278
A4	379	0.05	0.011	0.013	0.092	**0.834**	242	0.045	0.017	0.045	0.149	**0.744**
Panel C. From 2008 to 2009.												
0	165	**0.915**	0.061	0.018	0.006		199	**0.88**	0.08	0.025	0.015	
A1	121	0.405	**0.521**	0.066	0.008		71	0.423	**0.46**	0.085	0.028	
A2	122	0.254	0.361	**0.336**	0.049		84	0.345	**0.39**	0.214	0.048	
A3	144	0.139	0.16	**0.403**	0.292	0.007	89	0.18	0.157	**0.31**	**0.31**	0.034
A4	153	0.131	0.02	0.046	0.242	**0.562**	108	0.139	0.065	0.111	0.269	**0.42**

When comparing the migrating matrices of TWSE- and OTC-listed firms, a TWSE-listed non-payer's probability remaining in line with the status quo is always less than that of an OTC-listed firm. On the other hand, a TWSE-listed payer's tendency to remain in line with the status quo is always larger than that of an OTC counterpart.To examine the stickiness issue of dividend policy, we shall test the following hypotheses.

H1. (**Stickiness in Dividend Amount**) For any state of dividend amount *i*, defined in (1), we shall have

$$p_A(Ai\ ;\ Ai) > p_A(Ai\ ;\ Aj) \qquad \text{for } j \neq i\ .$$

Through observing Table 3, Hypothesis 1 proves reliable in terms of economic significance for two reasons (McCloskey and Ziliak, 1996). First, the probability of maintaining the status quo is usually larger by a factor of two than immigrating to other states. Second, the state with the second largest probability (doubly underlined) is always adjacent to the diagonal of the transition matrix. For example, the left column of Table 3 shows that a TWSE-listed firm in initial state *A1* is going to stay in the same state with a probability 0.599, and is also likely to immigrate to state *A2* with a probability 0.245 during

2005-2008. The corresponding probabilities are 0.524 and 0.272, respectively during 2009-2012 (Panel B of Table 3). This fact also indicates that the sticky policy (sticky in prior state) is also called the smoothing policy (**smoothness**, smoothly transferring to adjacent state). On the other hand, this article differentiates between stickiness and smoothness. As to the concern of statistical significance, Panels A and B of Table 3 shows that all diagonal values are in bold type, i.e. the probabilities of remaining in line with the status quo are unanimously the largest in all rows of the initial states. This fact partly justifies the validity of Hypothesis 1, especially when excluding the impact of the 2008 global recession.

The above features correspond with the findings of Leary and Michaely (2011) and Michaely and Roberts (2012). That is, a firm which is either mature, or has a high dividend-yield, tends to be smoother in dividend policy. In particular, when simultaneously comparing the four matrices in Panels A and B of Table 3, the OTC-listed firms in the initial state *A1* during 2005-2008 are the only group to reveal a modest decreasing tendency. The probability of migrating to state 0 (0.257) is larger than that of migrating to state *A2* (0.223). This fact provides two implications: first, a TWSE-listed firm had a higher tendency to increase dividends than an OTC-listed firm; second, an OTC-listed firm had a greater tendency to increase dividends during 2009-2012 than during 2005-2008.

The same pattern emerges in each year-by-year migrating matrix (not explicitly shown here), that is except for the initial year of 2008, which is shown in Panel C. Of the five states, both TWSE- and OTC-listed firms have one state which fails to reveal sticky characteristics. They are initial state *A3* for the TWSE market and state *A2* for the OTC market. The smoothing feature also fails to be sustained in the OTC market since its probability of migrating to state 0 for an OTC-listed firm in state *A2* (0.345) is higher than that of remaining quo (0.214).

The most important finding revealed in Table 3 is that TWSE-listed firms present a stronger tendency of dividend stickiness and smoothness than the OTC-listed firms. This finding is intuitive appealing and distinguishes this research from both Leary and Michaely (2011) and Michaely and Roberts (2012).

In a similar way, define

$$p_B(Bm;\ Bn),\quad m,n \in \{0,1,2,3,4\} \tag{2}$$

as the migrating probability of a dividend policy with period of the initial state *Bm* to another subsequent state at the end of the time span. The exact range for the states of

expression (2) is: *B1* denotes 8-22 days, *B2* denotes 23-28 days, *B3* denotes 29-36 days and *B4* denotes periods larger than 36 days, whereas *B0* denotes 0 dividends. The resultant migrating matrices are presented in Table 4. When comparing the probabilities between Table 3 and Table 4. The most obvious feature is that the probabilities of migrating from state 0 to state 0 are exactly the same for both Tables, resulted from the definition. The second feature is that the probabilities of migrating from *B4* to *B4* (Panels A and B of Table 3) are smaller than those of migrating from *A4* to *A4* (Panels A and B of Table 4).

Its reasoning is linked to the investor's preference. It has been recognized that investors value stability (stickiness and smoothness) since the era of Lintner (1956). On the other hand, it is logical that investors appreciate early payment of dividends after the ex-dividend trading date. Hence, we would not witness much likelihood for a firm to persist in the state *B4*. On the other hand, the stickiest state of paying dividends occurs in state *B2*(with the waiting period locating between 23 to 28 days) among TWSE-listed firms during 2009-2012, with a probability of 0.616.

Table 4. Migration probabilities of shifting dividend payment period decisions. The number represents a firm's probability to shift a dividend policy from an initial state to another subsequent state next year. The probability in each initial state is highlighted in boldface if it is the largest among the initial states and doubly underlined if it is the second. The bottom row defines the range of the states.

Panel A. Sample period over 2005-2008.												
Market	TWSE-listed firms						OTC-listed firms					
Initial states	Size	None	Paying with various magnitudes				Size	None	Paying with various magnitudes			
		0	*B1*	*B2*	*B3*	*B4*		0	*B1*	*B2*	*B3*	*B4*
0	633	**0.771**	0.032	0.066	0.060	0.071	590	**0.810**	0.029	0.044	0.046	0.071
B1	188	0.053	**0.468**	0.314	0.096	0.069	149	0.121	**0.477**	0.215	0.107	0.081
B2	395	0.051	0.165	**0.501**	0.200	0.084	230	0.113	0.157	**0.361**	0.213	0.157
B3	372	0.086	0.081	0.223	**0.409**	0.202	273	0.125	0.070	0.187	**0.348**	0.271
B4	522	0.073	0.021	0.061	0.172	**0.672**	349	0.149	0.026	0.060	0.215	**0.550**
Threshold (days)			-22	23-28	29-36	37-			-22	23-28	29-36	37-
Panel B. Sample period over 2009-2012.												
0	654	**0.705**	0.055	0.089	0.064	0.087	739	**0.793**	0.060	0.060	0.041	0.047
B1	357	0.067	**0.616**	0.213	0.070	0.034	257	0.105	**0.510**	0.241	0.078	0.066
B2	450	0.080	0.216	**0.493**	0.149	0.062	262	0.111	0.252	**0.408**	0.168	0.061
B3	375	0.093	0.099	0.227	**0.392**	0.189	216	0.102	0.120	0.250	**0.366**	0.162
B4	363	0.110	0.088	0.124	0.201	**0.477**	278	0.126	0.101	0.147	0.194	**0.432**
Panel C. From 2008 to 2009.												
0	165	**0.915**	0	0.012	0.030	0.042	199	**0.88**	0.03	0.035	0.015	0.04
B1	91	0.209	**0.516**	0.176	0.077	0.022	61	0.213	**0.44**	0.197	0.033	0.115
B2	142	0.211	0.134	**0.444**	0.169	0.042	71	0.282	0.169	**0.35**	0.113	0.085
B3	135	0.193	0.037	0.215	**0.393**	0.163	82	0.28	0.061	0.171	**0.3**	0.183
B4	172	0.262	0.041	0.076	0.203	**0.419**	138	0.246	0.065	0.051	0.159	**0.48**

To test the stickiness issue of dividend policy, we shall test the following hypotheses.

H2. (**Stickiness in Waiting Periods**) For any state of dividend payment period *m*, defined in (2), we shall have

$$p_B(Bm;\ Bm) > p_B(Bm;\ Bn) \qquad for\ n \neq m.$$

A similar argument can be applied to the validity of Hypothesis 2 through observing Table 4. Table 4 shows that all diagonal values are in bold type, i.e. the probabilities of remaining in line with the status quo are unanimously the largest in all rows of the initial states. This fact justifies the validity of Hypothesis 2. We can find a subtle feature distinguishing Table 4 from Table 3 when observing the second largest probabilities (those doubly underlined). Aside from being most likely to remain in line with the status quo, Table 4 shows that on the row of *B2* the second largest probability (0.2) is migrating from *B2* to *B3* during 2005-2008, whereas it is migrating from *B2* to *B1* (with probability 0.216) during 2009-2012.

As to Panel C of Table 4, the second largest probabilities tend to be the state 0 in the emigrating states *B1*, *B2*, and *B4* for both TWSE and OTC-listed firms. The same phenomenon occurs in the emigrating state *B3* for OTC-listed firms. This is attributed to the global economic recession of 2008.

In summary, both the dividend magnitude decision and the payment period decision reveal substantially sticky (smoothing) pattern, although the former is coupled with a trend of mild increases and the latter with a trend of small decreases.

To further explore this smoothing issue, we incorporate expression (1) with (2) and define the joint transitional probability as:

$$p(Ai, Bm;\ Aj, Bn), \quad i,j \in \{0,1,2,3,4\} \text{ and } m,n \in \{0,1,2,3,4\}, \tag{3}$$

where *i*=0 if *m*=0 and vice versa, and *j*=0 if *n*=0 and vice versa, and both standing for state 0 of paying none. The consequent expanded migration matrix is presented in Table 5, which summarizes over 2005-2012.

Table 5. Migration probabilities of shifting dividend policy by TWSE firms over 2005-2012. The number represents a firm's probability to shift a dividend policy from an initial state in year *T* to another subsequent state year *T*+1. The probability is in boldface if it is largest among the row of numbers. The 2nd largest one is doubly underlined and the 3rd largest is singly underlined. The state variables are defined in Table 3 and Table 4.

Panel A. Migration matrix for TWSE-listed firms over 2005-2012.

State	Size	0	*A1*				*A2*				*A3*				*A4*			
			B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0	1452	**0.758**	0.021	0.028	0.028	0.038	0.008	0.023	0.012	0.018	0.004	0.010	0.012	0.014	0.006	0.008	0.007	0.005
A1	*B1*	147	0.17	**0.293**	0.177	0.075	0.034	0.136	0.061	0.014	0.007	0.007	0.027					
	B2	238	0.13	0.143	**0.303**	0.118	0.046	0.038	0.113	0.042	0.017	0.004	0.021	0.017		0.004		0.004
	B3	220	0.173	0.064	0.141	**0.232**	0.109	0.018	0.068	0.073	0.073	0.014	0.005	0.018	0.009	.		0.005
	B4	300	0.19	0.017	0.033	0.103	**0.357**	0.013	0.037	0.053	0.157	0.007	0.003	0.007	0.02	0.003		
A2	*B1*	165	0.079	0.091	0.03	0.018	0.012	**0.309**	0.145	0.024	0.024	0.145	0.067	0.036	0.012	0	0.006		
	B2	278	0.09	0.014	0.09	0.022	0.011	0.083	**0.263**	0.094	0.032	0.076	0.133	0.043	0.018	0.011	0.014	0.004	0.004
	B3	203	0.123	0.01	0.03	0.079	0.025	0.064	0.118	**0.187**	0.099	0.02	0.064	0.108	0.049	0	0.005	0.015	0.005
	B4	262	0.122	0.011	0.027	0.027	0.111	0.011	0.05	0.076	**0.267**	0.015	0.023	0.061	0.172	0.004	0.004	0.004	0.015
A3	*B1*	166	0.03	0.03	0.006	0.006	0.006	0.133	0.024	0.012	0.012	**0.398**	0.151	0.036	0.012	0.102	0.03	0.006	0.006
	B2	238	0.084	0.004	0.021	0.004	0.021	0.05	0.088	0.029	0.021	0.088	**0.315**	0.071	0.038	0.059	0.063	0.034	0.008
	B3	218	0.064	0.005	0.014	0.014	0.009	0.014	0.037	0.078	0.041	0.037	0.156	**0.248**	0.124	0.014	0.023	0.073	0.05
	B4	244	0.078		0.008	0.008	0.025	0.016	0.016	0.033	0.074	0.025	0.037	0.143	**0.34**	0.016	0.02	0.033	0.127
A4	*B1*	158	0.063	0.013			0.006	0.013	0.006	0.013	0.006	0.114	0.013	0.006	0.013	**0.437**	0.209	0.07	0.019
	B2	233	0.043		0.004		0.004		0.013	0.004	0.004	0.013	0.086	0.026	0.009	0.15	**0.425**	0.185	0.034
	B3	241	0.066			0.004				0.008		0.004	0.037	0.025	0.029	0.066	0.195	**0.427**	0.137
	B4	251	0.06			0.008		0.004		0.004		0.004	0.008	0.02	0.06	0.048	0.072	0.175	**0.538**

For instance, the first row of the transition probability matrix in Panel A of Table 5 shows that there were 1,452 firm-years paying no dividends during one of the years 2005 to 2011. Then, 1,100 (0.758 in proportion) of the aforementioned 1,452firm-years persisted with a zero dividend policy over the following year. Moreover, there were 55 (0.038) of them paying dividends over the next year and locating at the subsequent state of *A1B4*, with dividend amount less than TW$112.3 million and the waiting period larger than 36 days. The preceding two ratios are the largest (in boldface) and the second largest probabilities (doubly underlined) on the row of the initial state 0 in Table 5. The third most likely state is *A1B2* with probability 0.028 (singly underlined). The state *A1B2* is characterized by dividend amounts less than TW$112.3 million and the waiting period is from 23 to 28 days.

For further exploring the stickiness and smoothness of dividend policy, we extend and join Hypoth**e**ses 1 and 2, leading to the following hypothesis:

H3. (**Stickiness in Dividend Policy**) For any pair of dividend amount state *Ai* and payment period *Bm*, we shall have

$$p(Ai, Bm;\ Ai, Bm) > p(Ai, Bm;\ Aj, Bn), \quad \text{for any } j \neq i \text{ or } n \neq m, \tag{4}$$

where *p*(*Ai, Bm; Aj, Bn*) is defined in expression (3).

Table 5 shows that all diagonal values are in bold type, i.e. the probabilities of remaining in line with the status quo are unanimously the largest in all rows of the initial states. This fact is equivalent to the validity of Hypothesis 3. To provide more supporting evidence for Hypothesis 3 in terms of economic significance (McCloskey and Ziliak, 1996),

we shall define **adjacent states** for the structure of function (3) and Table 5. For $1 \le i, j, m, n \le 4$, define the set of adjacent states of an initial state as follows.

$$\left.\begin{array}{lcl} \text{adj}(0) & = & \{A1B1, A1B2, A1B3, A1B4\} \\ \text{adj}(A1Bm) & = & \{0, A2Bm\} \cup \{A1Bn : n = m\text{-}1 \text{ or } n = m+1\} \\ \text{adj}(AiBm) & = & \{AjBn : j = i\text{-}1 \text{ or } j = i+1\} \cup \{AiBn : n = m\text{-}1 \text{ or } n = m+1\} \end{array}\right\} \quad (5)$$

Note that the elements within the sets of equations (5) are invalid whenever they are not within the range of $1 \le i, j, m, n \le 4$.

Next, we turn back to Table 5 and observe all the probabilities (doubly underlined) that are the second largest in each row representing the initial state. For example, the subsequent state with the second largest probability in the row of the initial state 0 is state *A1B4* with a probability of 0.038. After going through all the probabilities doubly underlined, we find that the only row with its thus underlined probability not adjacent to its initial state occurs at *A2B3,* where the probability of migrating to state 0 is 0.123. Note that the adjacent states of the initial state *A2P3* include *A2P2, A2P4, A1P3* and *A3P3*, not including state 0.

Hence, based on the sample of TWSE-listed firms over 2005-2012 (Table 5), it is most likely for a firm to remain in line with the status quo and the second most likely state to immigrate to is its adjacent state. As a matter of fact, when going further to scrutinize the two most likely states, only state *A2B3* does not belong to the adjacent states. Therefore, it is logical to recognize the validity of Hypothesis 3 in terms of economic significance (McCloskey and Ziliak, 1996).

On the other hand, since there are 17 states in the structure of function (3) and Table 5, we can establish a hypothesis testing both the stickiness and smoothness of dividend policy in terms of statistical significance. To that end, we have to present the following hypothesis.

> **H4**. (**Smoothness in Dividend Policy**) For any pair of dividend amount state *Ai* and payment period *Bm*, we shall have the largest two probabilities of $p(Ai, Bm; Aj, Bn), \text{where } 1 \le j, n \le 4,$ locate at its initial state and adj(*Ai*,*Bm*), defined in equations (5).

Accordingly, we claim that a firm's dividend policy is smooth if the most likely two subsequent states are located in its adjacent states. We turn our attention back to Table 5 and scrutinize the values doubly underlines in each row. The initial state *A2B3*(with 203 events) has probability 0.123 of migrating to state 0, larger than those of migrating to its adjacent states, and it is the only one failing to satisfy Hypothesis 4 with the criterion of requiring two most likely two states. Hence, we conclude that Hypothesis 4 sustains with a

significance level of 2.9% (=1/34) with the criterion of two states. In other words, Hypothesis 4 is true with a likelihood of 97.1%.

In summary, it is logical for us to conclude that the smooth dividend policy is true with respect to the sample of TWSE-listed firms over 2005-2012. Accordingly, Hypothesis 3 is true in terms of economic significance.To further examine the robustness of the above argument, we partition the sample of Table 5 into three group, just as what we have done in Table 3 and Table 4. Accordingly, we produce Panel A of Table 6 for 2005-2008, Panel B of Table 6 for 2009-2012, and Panel C of Table 6 for 2008-2009.

Table 6 (Panel A). Migration probabilities of shifting dividend policy by TWSE firms over 2005-2008.Whenever the conditional probability is 0, it is space.

State		Size	0	*A1*				*A2*				*A3*				*A4*			
				B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0		633	**0.771**	0.014	0.022	0.03	0.036	0.009	0.028	0.011	0.014	0.003	0.011	0.011	0.019	0.005	0.005	0.008	0.002
A1	*B1*	44	0.068	**0.295**	0.273	0.045	0.045	0.091	0.091	0.023	0.023		0.045						
	B2	102	0.078	0.137	**0.314**	0.176	0.078	0.029	0.088	0.049	0.01	0.01	0.02	0.01					
	B3	98	0.133	0.061	0.194	**0.224**	0.122	0.02	0.051	0.061	0.092	0.02		0.01	0.01				
	B4	143	0.147	0	0.014	0.070	**0.420**	0.007	0.028	0.07	0.21		0.007		0.028				
A2	*B1*	45	0.067	0.067	0.044			**0.311**	0.178	0.067	0.067	0.044	0.044	0.067	0.022		0.022		
	B2	117	0.068	0.009	0.051	0.009	0.009	0.077	**0.291**	0.103	0.017	0.077	0.188	0.051	0.026		0.017	0.009	
	B3	93	0.075	0	0.032	0.075	0.011	0.043	0.14	**0.269**	0.097	0.032	0.054	0.086	0.054			0.022	0.011
	B4	130	0.062	0.008	0	0.008	0.108	0.015	0.046	0.092	**0.315**	0.008	0.015	0.069	0.231			0.008	0.015
A3	*B1*	47	0.021					0.085	0.021	0.021	0.043	0.277	**0.340**	0.021	0.043	0.106	0.021		
	B2	92	0.043			0.011	0.022	0.011	0.076		0.022	0.109	**0.348**	0.087	0.065	0.065	0.076	0.054	0.011
	B3	87	0.08			0.011	0.011	0.011		0.034	0.011	0.023	0.161	**0.276**	0.161	0.023	0.023	0.115	0.057
	B4	128	0.039					0.008	0.008	0.008	0.07	0.008	0.039	0.141	**0.445**	0.016	0.016	0.047	0.156
A4	*B1*	52	0.058							0.038		0.077		0.019	0.019	**0.5**	0.192	0.077	0.019
	B2	84	0				0.012		0.012	0			0.048	0.024	0.012	0.131	**0.476**	0.226	0.06
	B3	94	0.053									0.011	0.032	0.011	0.043	0.074	0.202	**0.447**	0.128
	B4	121	0.033									0.008	0.008	0.017	0.017	0.008	0.066	0.165	**0.678**

Table 6 (Panel A) shows that only state *A3B1* does not satisfy equation (4). For a firm of state *A3B1*, its probability of remaining status quo is 0.277, less than the probability of migrating to its *adjacent*state *A3B2* (with probability 0.34). Hence, we can conclude that Hypothesis 3 sustains with a significance level of 5.88% (1/17). As to Hypothesis 4, Table 6 (Panel A) reveals that the largest two probabilities of each emigration state (row) are the initial state or its adjacent state. Thus, we conclude that both dividend stickiness (Hypothesis 3) and dividend smoothness (Hypothesis 4) sustain based on the sample over 2005 to 2008.

Next, we observe Table 6 (Panel B) for the sample period over 2009 to 2012. We apply the same procedure to examine the sample of TWSE-listed firms over 2009-2012. It is easy to find that Hypothesis 3 is valid at a statistical significance of 5.9% (=1/17), since only the initial state *A2P3* does not satisfy equation (4). The most likely subsequent state of the

initial state *A2B3* is *A3B3* (with a probability 0.165) instead of persisting in the initial state (with a probability 0.129). Moreover, Hypothesis 4 is fully satisfied in terms of the most likely two states.

Table 6 (Panel B). Migration probabilities of shifting dividend policy by TWSE firms over 2009-2012.Whenever the conditional probability is 0, it is space.

State	Size	0	*A1*				*A2*				*A3*				*A4*			
			B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0	654	**0.705**	0.032	0.04	0.028	0.04	0.009	0.024	0.012	0.024	0.006	0.011	0.017	0.014	0.008	0.014	0.008	0.009
A1	*B1*	85	0.153	**0.318**	0.129	0.082	0.024	0.188	0.059	0.012		0.012	0.024					
	B2	110	0.118	0.145	**0.3**	0.073	0.018	0.045	0.155	0.045	0.027		0.027	0.027			0.009		0.009
	B3	97	0.155	0.082	0.082	**0.216**	0.113	0.021	0.103	0.093	0.062	0.01	0.01	0.031	0.01				0.01
	B4	105	0.152	0.038	0.067	0.114	**0.295**	0.019	0.057	0.048	0.152	0.01		0.019	0.019		0.01		
A2	*B1*	94	0.074	0.085	0.021	0.021	0.021	**0.287**	0.128	0.011	0.011	0.202	0.096	0.032	0.011				
	B2	126	0.071	0.008	0.079	0.024	0.016	0.095	**0.262**	0.087	0.056	0.087	0.111	0.04	0.016	0.024	0.016		0.008
	B3	85	0.129	0.024	0.012	0.047	0.024	0.094	0.118	0.129	0.071	0.012	0.094	**0.165**	0.059		0.012	0.012	
	B4	96	0.115	0.021	0.052	0.021	0.052	0.01	0.063	0.063	**0.26**	0.031	0.042	0.073	0.156	0.01	0.01		0.021
A3	*B1*	96	0.01	0.021	0.01		0.01	0.115	0.01	0.01		**0.479**	0.094	0.052		0.125	0.042	0.01	0.01
	B2	101	0.079		0.01			0.079	0.069	0.02	0.02	0.099	**0.327**	0.069	0.03	0.079	0.079	0.03	0.01
	B3	94	0.032		0.021	0.011	0.011	0.011	0.053	0.053	0.032	0.064	0.181	**0.277**	0.096	0.011	0.032	0.064	0.053
	B4	77	0.117			0.013	0.013	0.026	0.013		0.052	0.052	0.039	0.169	**0.273**	0.026	0.039	0.026	0.143
A4	*B1*	82	0.037	0.012			0.012	0.024	0.012		0.012	0.11				**0.476**	0.232	0.049	0.024
	B2	113	0.053		0.009				0.009			0.009	0.106	0.027	0.009	0.195	**0.407**	0.15	0.027
	B3	99	0.061										0.03	0.01	0.02	0.071	0.162	**0.455**	0.192
	B4	85	0.047			0.012								0.012	0.024	0.118	0.094	0.247	**0.447**

Finally, we turn our focus to the sample year of 2008, Table 6(Panel C). Ten of the 17 (59%) initial states (*A1B1*, *A1B2*…etc.) do not satisfy equation (4) and the stickiness hypothesis obviously fails to sustain. In addition, six of the 34 (17.6%) most likely states (*A2P2*, *A2P3*,…etc.) do not locate at the adjacent states when testing Hypothesis 4 in terms of the most likely two states. In conclusion, both the sticky and smooth dividend policy were interrupted following the 2008 global financial recession triggered by the U.S. subprime mortgage crisis.

In the above analysis, we witness convincing evidence supporting both the sticky dividend policy of Hypothesis 3 and the smoothing dividend policy of Hypothesis 4, except when testing the single year sample of 2008. Furthermore, the evidence is significant both in terms of statistical significance and economic significance. As an auxiliary reference, we proceed with exactly the same methods uses when testing the sample of OTC-listed firms. Table 7 presents the migration probability matrix for OTC-listed firms over 2005-2012. Table 8(Panel A) is for 2005-2008, Panel B is for 2009-2012, and Panel C is for the single-year change from 2008 to 2009. An overview of Table 7 immediately manifests that OTC-listed firms are less sticky and less smoothing in dividend policy than TWSE-listed firms.

Table 6 (Panel C). Migration probabilities of shifting dividend policy by TWSE firms over 2008-2009.Whenever the conditional probability is 0, it is space.

State	Size	0	A1				A2				A3				A4			
			B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0	165	**0.915**	0.000	0.006	0.018	0.036			0.012	0.006		0.006						
A1 *B1*	18	**0.500**	0.167	0.167	0.111	0.056												
A1 *B2*	26	**0.385**	0.154	0.269	0.077	0.038	0.038	0.038										
A1 *B3*	25	**0.400**	0.000	0.160	0.320	0.040	0.000	0.000	0.040	0.040								
A1 *B4*	52	**0.385**	0.019	0.019	0.173	0.308	0.019	0.019	0.019	0.019	0.019							
A2 *B1*	26	0.115	0.154	0.038	0.038	0.000	**0.385**	0.154			0.115							
A2 *B2*	35	0.229	0.057	**0.257**	0.057		0.057	0.171	0.086		0.029	0.029	0.029					
A2 *B3*	25	**0.280**		0.080	0.200	0.080	0.040	0.040	0.080	0.200								
A2 *B4*	36	**0.361**	0.000	0.056	0.111	0.278	0.000	0.028	0.056	0.111								
A3 *B1*	23	0.130	0.130				**0.304**	0.087			**0.304**							
A3 *B2*	45	0.178		0.089		0.067	0.067	0.156	0.111	0.022	0.022	**0.222**	0.044					
A3 *B3*	37	0.108		0.027	0.027	0.000	0.027	0.081	**0.243**	0.135	0.000	0.081	0.108	0.108				
A3 *B4*	39	0.128			0.026	0.128	0.026	0.051		0.128	0.026	0.026	0.103	0.128				
A4 *B1*	24	0.167	0.042								**0.208**				0.167	0.167	0.125	
A4 *B2*	36	0.111						0.028			0.056	0.111	0.028		0.056	**0.361**	0.194	
A4 *B3*	48	0.104										0.063	0.083	0.021	0.042	0.250	**0.333**	0.042
A4 *B4*	45	0.156			0.022								0.044	0.244	0.022	0.044	0.067	**0.333**

Table 7. Migration probabilities of shifting dividend policy by OTC firms over 2005-2012. The constructing procedure are exactly the same as that described in Table 5.

Panel A. Migration matrix for OTC-listed firms over 2005-2012.

State	Size	0	A1				A2				A3				A4			
			B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0	1527	**0.811**	0.017	0.018	0.02	0.029	0.012	0.01	0.014	0.016	0.01	0.013	0.004	0.004	0.005	0.009	0.002	0.006
A1 *B1*	106	**0.217**	0.189	0.151	0.038	0.019	0.113	0.075	0.038	0.019	0.075	0.019	0.009	0.019		0.009	0.009	
A1 *B2*	130	**0.238**	0.092	0.138	0.092	0.054	0.054	0.115	0.038	0.046	0.031	0.062	0.015	0.008		0.008		0.008
A1 *B3*	135	**0.267**	0.03	0.119	0.148	0.111	0.037	0.044	0.081	0.089		0.015	0.044	0.007				0.007
A1 *B4*	237	0.27	0.013	0.025	0.093	**0.3**	0.017	0.025	0.051	0.097	0.013	0.008	0.013	0.051	0.004		0.013	0.008
A2 *B1*	107	0.159	0.084	0.047	0.009	0.047	**0.224**	0.084	0.019	0.009	0.093	0.084	0.028	0.028	0.056	0.028		
A2 *B2*	146	0.151	0.021	0.082	0.048	0.014	0.062	**0.199**	0.062	0.048	0.041	0.123	0.055	0.034	0.014	0.034		0.014
A2 *B3*	146	**0.13**	0.014	0.075	0.068	0.055	0.041	0.103	0.103	0.103	0.034	0.034	0.116	0.062	0.014	0.034	0.014	
A2 *B4*	192	**0.161**	0.005	0.031	0.047	0.115	0.031	0.068	0.089	0.151	0.026	0.036	0.042	0.125	0.01	0.01	0.01	0.042
A3 *B1*	124	0.089	0.032	0.008		0.008	0.048	0.016	0.008	0.04	**0.315**	0.089	0.048	0.024	0.145	0.081	0.04	0.008
A3 *B2*	142	0.077	0.035	0.049		0.014	0.049	0.063	0.049	0.035	0.099	**0.141**	0.099	0.049	0.077	0.07	0.07	0.021
A3 *B3*	149	0.087	0.007	0.007	0.02	0.027	0.02	0.06	0.094	0.04	0.02	0.101	**0.201**	0.128	0.04	0.04	0.06	0.047
A3 *B4*	173	0.087	0.006		0.017	0.058	0.006	0.023	0.046	0.139	0.04	0.04	0.116	**0.214**	0.006	0.017	0.058	0.127
A4 *B1*	130	0.054	0.008	0		0.008	0.023	0.008	0.008	0.008	0.062	0.046	0.038	0.015	**0.469**	0.169	0.031	0.054
A4 *B2*	145	0.076	0.007	0.007	0.014	.	0.021	0.021		0.014	0.062	0.069	0.021	0.007	0.145	**0.338**	0.152	0.048
A4 *B3*	141	0.078			0.007	0.021		0.007	0.007	0.021	0.014	0.028	0.071	0.021	0.078	0.163	**0.355**	0.128
A4 *B4*	163	0.067				0.031	0.012	0.006	0.018	0.018	0.018	0.018	0.018	0.098	0.037	0.055	0.172	**0.429**

We first observe Table 7 and test Hypothesis 3. Five of the 17 initial states (*A1B1*, *A1B2*, *A1B2*, *A1B3*, *A2B3* and *A2B4*) fail to satisfy equation (4) of the stickiness Hypothesis; hence it is not supported in terms of statistical significance. Neither is it supported in terms of economic significance, since the smoothness Hypothesis does not sustain, as described below.

Hypothesis 4 does not sustain as the initial states *A2B1*, *A2B2*, *A2B3* and *A2B4* all have state 0 (which is not their adjacent state) as the most likely or the second most likely

subsequent state. Consequently, Hypothesis 4 is valid with a mild significance level of 11.8%.

Next, we turn to Table 8 (Panel A) and observe the most likely two states on each row. Four of the 17 initial states do not support Hypothesis 3, which are states *A1B1*, *A1B3*, *A2B3* and *A2B4*. Six of the 34 probabilities do not support the Hypothesis 4, which are *A1B1*, *A1B3*, *A2B1*, *A2B3*, *A3B1* and *A3B2*. Hence, both Hypotheses only attain mild support from the OTC-listed firms over 2005-2012.

Table 8 (Panel A). Migration matrix for OTC-listed firms over 2005-2008.

State		size	0	A1				A2				A3				A4			
				B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0		590	**0.81**	0.014	0.017	0.024	0.032	0.008	0.007	0.014	0.022	0.003	0.012	0.008	0.007	0.003	0.008		0.01
A1	*B1*	37	**0.27**	0.027	0.189	0.081	0.054	0.081	0.027	0.054	0	0.135	0.027		0.027			0.027	
	B2	58	0.138	0.103	**0.155**	0.121	0.086	0.069	0.121	0.052	0.069		0.052				0.017		0.017
	B3	69	**0.304**		0.087	0.087	0.13	0.014	0.058	0.101	0.116		0.029	0.043	0.014				0.014
	B4	105	0.286		0.019	0.105	**0.314**	0.01	0.019	0.038	0.086	0.01	0.01	0.019	0.076			0.01	
A2	*B1*	33	0.152	0.061	0.03		0.091	**0.182**	0.121		0.03	0.121	0.091	0.03	0.03	0.03	0.03		
	B2	67	0.119	0.045	0.03	0.06	0.015	0.03	**0.179**	0.075	0.09	0.03	0.164	0.06	0.045	0.015	0.045		
	B3	69	0.072		0.072	0.043	0.072	0.072	0.13	0.116	0.072		0.029	**0.188**	0.087	0.014	0.029		
	B4	83	0.12		0.024	0.06	0.12	0.024	0.06	0.084	0.145	0.012	0.024	0.024	**0.181**	0.012	0.012	0.024	0.072
A3	*B1*	35	0.029		0.029		0.029	0.086	0.057	0.029		**0.314**	0.086	0.114		0.114	0.029	0.057	0.029
	B2	56	**0.125**	0.054	0.018		0.018	0.036	0.036	0.071	0.036	0.054	**0.125**	0.089	0.089	0.018	0.071	**0.125**	0.036
	B3	78	0.051			0.013	0.026	0.013	0.064	0.09	0.051	0.013	0.064	**0.256**	0.167	0.038	0.026	0.051	0.077
	B4	82	0.085			0.012	0.049		0.012	0.037	0.11	0.024	0.012	0.134	**0.244**		0.012	0.085	0.183
A4	*B1*	44	0.045					0.023				0.045	0.023	0.023		**0.636**	0.136	0.023	0.045
	B2	49	0.061		0.02				0.02		0.02	0.041	0.041	0.02		0.143	**0.347**	0.184	0.102
	B3	57	0.07			0.018	0.018				0.035	0.035	0.018	0.035		0.088	0.14	**0.351**	0.193
	B4	79	0.063				0.013							0.013	0.101	0.013	0.038	0.228	**0.532**

In contrast to the sample of OTC-listed firms over 2005-2008, both Hypotheses 3 and 4 attain mild support over 2009-2012. Table 8 (Panel B) shows that only two of the diagonal probabilities (*A1B2* and *A2B3*) fail to be the largest among the values of the corresponding row. This leads to a significance level of 11.7% for supporting the Stickiness Hypothesis. In addition, there are four states not supporting Hypothesis 4, which are *A2B1*, *A2B2*, *A2B3* and *A3B2*. It also results in a significance level of 11.7% for supporting the Smoothness Hypothesis.

Table 8 (Panel B). (OTC firms over 2009-2012). Migration matrix for OTC-listed firms over 2009-2012.

State	size	0	*A1*				*A2*				*A3*				*A4*			
			B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0	739	**0.793**	0.019	0.019	0.019	0.027	0.016	0.014	0.016	0.014	0.016	0.015	0.001	0.003	0.008	0.012	0.004	0.004
A1	58	0.207	**0.241**	0.103	0.017		0.155	0.103	0.034	0.034	0.034	0.017	0.017	0.017		0.017		
	60	**0.217**	0.1	0.133	0.083	0.033	0.05	0.133	0.033	0.033	0.05	0.083	0.033	0.017				
	52	**0.192**	0.058	0.135	**0.192**	0.115	0.077	0.038	0.077	0.058			0.058					
	98	0.204	0.031	0.041	0.092	**0.245**	0.031	0.031	0.071	0.122	0.02	0.01	0.01	0.041	0.01		0.02	0.02
A2	60	0.133	0.083	0.05	0.017	0.017	**0.25**	0.067	0.033		0.067	0.1	0.033	0.033	0.083	0.033		
	61	0.148		0.066	0.033		0.098	**0.23**	0.049	0.016	0.066	0.115	0.066	0.033	0.016	0.033		0.033
	58	0.121	0.017	0.069	0.069	0.017	0.017	0.103	0.103	**0.155**	0.086	0.034	0.069	0.034	0.017	0.052	0.034	
	76	0.105		0.026	0.026	0.053	0.053	0.105	0.092	**0.171**	0.053	0.066	0.079	0.118	0.013	0.013		0.026
A3	76	0.053	0.039				0.026			0.053	**0.342**	0.079	0.026	0.039	0.184	0.118	0.039	
	65	0.031	0.015	0.062		0.015	0.046	0.062	0.015	0.015	0.123	**0.185**	0.123		0.154	0.092	0.046	0.015
	51	0.059					0.02	0.059	0.118	0.02	0.039	0.157	**0.176**	0.098	0.059	0.078	0.098	0.02
	56	0.107	0.018		0.018	0.054	0.018	0.036	0.036	0.107	0.036	0.089	0.107	**0.196**	0	0.036	0.036	0.107
A4	63	0.048						0.016		0.016	0.063	0.048	0.048	0.016	**0.444**	0.222	0.048	0.032
	76	0.066	0.013		0.013		0.026	0.026			0.079	0.053	0.026	0.013	0.158	**0.355**	0.145	0.026
	55	0.036				0.018			0.018	0.018		0.036	0.055		0.091	0.236	**0.4**	0.091
	48	0.021				0.021	0.021	0.021	0.021		0.021	0.042	0.021	0.063	0.083	0.104	0.146	**0.417**

In light of the above evidence, it is not surprising to find that the failure of the OTC sample to support Hypotheses 3 and 4 (Panel A of Table 6) is primarily held accountable to the year of 2008. Table 8 (Panel C) reveals a heterogeneous pattern, which is hardly linked to the notion of a sticky or smoothing dividend policy. However, on the rows of states *A4*, there still exist a pattern of stickiness and smoothness. This fact is supportive of the findings of Leary and Michaely (2011) that dividend-smoothing firms are characterized as being mature and large, with shares yielding high dividends.

Table 8 (Panel C). Migration matrix for OTC-listed firms from 2008 to 2009.

State	Size	0	*A1*				*A2*				*A3*				*A4*			
			B1	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*	*B1*	*B2*	*B3*	*B4*
0	198	**0.879**	0.02	0.02	0.01	0.03	0.005	0.005	0.005	0.01	0.005	0.01						
A1	11	0.091	**0.455**	0.273				0.091			0.091							
	12	**0.833**		0.083							0.083							
	14	**0.357**	0.071	0.214	0.286					0.071								
	34	**0.412**			0.059	**0.412**		0.029	0.029	0.059								
A2	14	**0.286**	0.143	0.071		0.071	0.214	0.071			0.143							
	18	0.278		**0.333**	0.056	0.056	0.056	0.167	0.056									
	19	**0.368**	0.053	0.105	0.158	0.105			0.053	0.053		0.053		0.053				
	33	**0.394**	0.03	0.061	0.061	0.242			0.091	0.121								
A3	13	**0.462**	0.077				0.077			0.077	0.154	0.154						
	21	0.095	0.048	0.095			0.095	**0.143**	0.095	0.095	**0.143**	0.048	0.048	0.095				
	20	**0.3**	0.05	0.05	0.1	0.1	0.05	0.05	0.05	0.05		0.1	0.05	0.05				
	35	0.057			0.029	0.086		0.029	0.086	**0.257**	0.086	0.029	0.086	0.171	0.029	.	0.029	0.029
A4	23	0.087	0.043			0.043	0.087	0	0.043		0.087	0.087	0.043	0.043	**0.217**	0.087		0.13
	20	0.15			0.05	0	0.05			0.05	0.05	0.2			0.1	**0.25**	0.1	
	29	0.172				0.034		0.034				0.034	0.172	0.103	0.034	0.069	**0.276**	0.069
	36	0.139				0.083	0.028	0	0.056	0.083	0.056	0.028	0.028	0.139	0.028	0.028	0.083	**0.222**

V. Conclusion

Recently, researchers documented that firms subject to information asymmetry smooth less and that firms subject to agency conflicts smooth more in dividend policy (Leary and

Michaely, 2011; Michaely and Roberts, 2012). This paper provides a new aspect on smoothing dividend policy since dividend-paying firms obviously adopt a sticky and smoothing policy in determining the waiting period between the ex-dividend date and the payment date. This smoothing feature is prevalent in both TWSE- and OTC-listed firms, as well as across different magnitudes of dividend amounts. However, searching out a theory (information asymmetry, agency problem or any other) to justify this phenomenon is likely to prove unfruitful. An easy and intuitive approach to rationalize this behavior is through the behavioral theory of finance.

Based on the norm theory of financial policy (Frankfurter and Wood, 1997;Akerlof, 2007; Ben-David 2010), investors' affection for dividends and the prominent stickiness of dividends have become a social norm. The social norm is a behavioral regularity that is based on a socially shared belief of how one should, or how one should not, behave (Akerlof, 2007).Culturally and traditionally, we get irreplaceable and great joy from receiving gifts at Christmas although receiving gifts is economically inefficient when comparing with receiving an equivalent amount of cash. Following the same logic, paying dividends and receiving dividends seem become a social norm. This is why John D. Rockefeller (1839-1937)said: "Do you know the only thing that gives me pleasure? It's to see my dividends coming in."

Paying dividends is something like giving Christmas gifts, which is a cultural and social norm. Accordingly, shareholders derive great pleasure from hearing the announcement of the distribution of dividends. The greater reduction in the dividend payment announcement, the more severely disappointed the shareholders are. Similarly, the longer the waiting period, the more severely discounted the supposed joy of receiving dividends becomes. The influence of the social makes dividend-paying behavior even more smooth and sticky than we thought of. This paper shows that the stickiness and smoothness of dividend policy are also preponderant in the relative magnitude of dividends and in the waiting periods.

Appendix

Table A1 presents the counterpart of Table 1 for OTC-listed firms. We first compare Panel A of Table A1 with that of Table 1. Over the sample period, the proportion of OTC payers is always less than that of TWSE by at least 7%, the aggregate dividends of OTC payers is less than 9% of that of the TWSE. Next, we compare the dividends in the firm level. The

median of total dividends per OTC-listed firm is less than 25.2% of that of the TWSE-listed payers, whereas the mean is less than 13.1% of that of the TWSE-listed payers. These evidences manifest the higher tendency of TWSE-listed firms relative to the OTC-listed firms. As to the waiting periods, they do not show much discrepancy. The first quartile, median, mean, and the third quartile are all comparable between the TWSE and OTC-listed firms.

Table A1. Amount and periods of the dividend policy of OTC-listed firms over 2005-2012.

Year	2005	2006	2007	2008	2009	2010	2011	2012
Panel A. Cash dividend paying propensity and aggregate dividends. (Aggregate dividends is in million TW$.)								
Sample size	532	533	553	567	574	590	618	633
No. of dividend payers	331	319	355	358	301	330	386	399
Proportion of payers	62.2%	59.8%	64.2%	63.1%	52.4%	55.9%	62.5%	63.0%
Aggregate dividends	$33,664	$33,834	$61,601	$50,012	$29,333	$38,988	$60,709	$54,805
growth rate of payers		0.2%	3.8%	2.5%	-15.9%	9.6%	17.0%	3.4%
growth rate of dividends		0.5%	82.1%	-18.8%	-16.9%	32.9%	55.7%	-9.7%
Panel B. Distribution of the annual total dividends paid per firm (million TW$).								
min	$0.5	$1.7	$1.3	$1.6	$1.8	$1.8	$3.4	$0.9
Q1	$23.0	$24.1	$29.2	$31.0	$21.6	$31.0	$33.7	$34.0
median	$38.9	$48.5	$58.3	$62.5	$48.5	$60.4	$70.1	$68.7
mean	$101.7	$106.1	$173.5	$139.7	$97.5	$118.1	$157.3	$137.4
Q3	$81.0	$101.0	$139.1	$144.5	$89.3	$120.1	$166.7	$147.3
max	$4,167.2	$3,042.4	$10,322.8	$2,890.8	$1,592.9	$2,027.3	$2,868.2	$3,239.3
Stdev.	$351.6	$237.8	$680.0	$256.6	$169.2	$189.5	$292.4	$247.8
Skewness	10.11	8.68	12.10	5.88	4.48	4.96	5.57	6.83
Panel C. Distribution of the periods between the ex-dividend date and the payment date.								
min	8	13	14	11	10	10	11	11
Q1	25	26	25	26	24	23	22	22
mode	28	28	36	28	22	22	22	22
median	31	31	32	33	30	28	28	27
mean	33.40	33.34	33.95	33.67	32.35	30.29	29.57	28.10
Q3	39	39	41	42	40	37	36	33
max	69	155	111	78	125	98	61	58
Stdev.	10.78	12.21	11.36	10.47	12.27	10.04	9.55	8.57
Skewness	0.62	3.85	1.45	0.44	2.54	1.57	0.73	0.90

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