Does stock liquidity enhance or impede dividend payout? Evidence from Australian market

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Abstract: Literature suggests several ways stock liquidity can either positively or negatively impacts on firm dividend. In this paper, I investigate the impact of stock liquidity on firm dividend payout policy in Australian market. The finding suggests that stock liquidity positively relates to firm level dividend payout. The result holds after controlling for different model estimations and different measures of stock liquidity. To control for verve causality issue, I rely on an external shock in Australian market, named broker anonymity, which results to significant increase in stock liquidity. The result suggests that an increase in stock liquidity around this shock leads to an increase in firm dividend, pointing out that liquidity does have causal effect on firm dividend. I further document that stock liquidity enhances firm dividend through reducing future cash-flow volatility and the effect of stock liquidity on firm dividend is weaker for firms report imputation tax credit.

Keywords: Dividend payout, Stock liquidity, Cash-flow volatility, and Imputation tax

JEL classification number: G14, G30, G35

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1. Introduction

The implication of Miller and Modigliani's (1961) trading frictionless assumption suggests that other things being equal, firms with more liquid shares pay fewer dividends. Using a sample of U.S. listed companies, Banerjee, Gatchev & Spindt (2007) find that firms with less liquid stock are likely to pay cash dividends, supporting the view that stock market liquidity and dividends are substitudes. In U.S. market, substitutional effect may dominate other effects of liquidity on dividend because the high level of market development with low trading cost, high transparency information environment, and adequate investors protection makes investors indifferent between earning from dividends and earning from selling stock.[1] Market liquidity literature suggests several other channels stock liquidity can enhance dividend payouts. These channels are more easily exposed in a market with low development level than U.S. In this paper, I test whether stock liquidity enhances dividend payout in Australian market?

There are strong reasons to suspect that market liquidity will positively affect dividend payout. Firstly, liquidity market can increase dividend by increasing firm performance. Positive value impact of liquidity is predicted in theoretical studies (Maug 1998), and empirical studies (Fang, Noe & Tice 2009; Huang et al. 2018). In addition, it is well established that firms with higher performance are more likely pay dividend and pay at a higher level (Fama & French 2001; Denis & Osobov 2008). Secondly, informational effect of liquidity may reduce information asymmetry between insiders and shareholders. This leads to the reduction in firm managers' incentives to keep earnings inside for their personal use or for the investments that provide private benefit. Jiang, Ma & Shi (2017) find evidence support for informational effect of stock liquidity on dividend in Chinese market. From those arguments, stock liquidity is expected to have positive effect on dividend payout in Australian market.

Stock liquidity may positively affect dividend through reducing cash-flow volatility. Survey evidence demonstrates that cash-flow uncertainty is an important factor that firm managers consider when forming payout policy (Lintner 1956; Brav et al. 2005). Chay and Suh (2009) find the evidence support for this argument in an international sample comprised six

[1] Previous studies provide some evidences suggest that U.S. institutional environment is strong enough that effects of the other factors are not significantly appeared. This leads to the difference in results of studies on the same issue in U.S. and non-U.S. contexts. For example, in search of agency problem and the value impact of cash holding, Harford (1999) and Opler et al. (1999) find no evidence in U.S. market, while Kalcheva & Lins (2007) find the negative value impact of cash holding when agency problem is high in a sample outside U.S.

countries. In addition, theoretical studies find that stock liquidity reduce stock return deviation (Merton 1987; Brunnermeier & Pedersen 2008). Empirically, Benston & Hagerman (1974), and Stoll (1978) document the positive relation between idiosyncratic risk and firm return variance, respectively, and bid-ask spread. Thus, reducing cash-flow uncertainty is one potential channel through which stock liquidity effects on dividend.

To investigate the relation between liquidity and dividend payout, I use a sample of non-financial and non-utility firms listed in Australian stock market. The finding shows that stock liquidity positively impact on dividend payout. Alternative measures of liquidity are used to eliminate the concern that the main result is driven by inaccurate liquidity measure. Furthermore, other factors previously documented that potentially have effect on dividends also include in the model specification. The result holds for alternative measures of liquidity and dividend, and controlling for a set of variables. The finding is robust for different models control for time trend effect, and firm fixed effect. To address the reverse causality concern, I examine the changes in dividend following an exogenous shock to liquidity. The shock was chosen was the switch to broker anonymity on the ASX in 2005. As Comerton-Forde & Tang (2009) show that the switch to broker anonymity has resulted in higher liquidity in the Australian stock market, and the change is unlikely directly affect firm dividend. Thus, broker anonymity serves very well as an external shock used in a change model. I find that an increase in liquidity around this liquidity shock tends to lead to an increase in firm dividend, pointing that liquidity does have causal effect on firm dividend.

To investigate the impact of liquidity to dividend thorough impact on cash-flow volatility, following Chay & Suh (2009), I use two measures (standard deviation of return and standard deviation of ROA) to proxy for cash-flow volatility. Standard deviation of return (SDRE) in year t is calculated as arithmetic standard deviation of daily return in a 3 year rolling window from year t to year t+2. Standard deviation of ROA (SDROA) in year t is calculated in 5 year rolling window from year t to year t+4. I find that stock liquidity enhances dividend payout through reducing cash-flow volatility. More specifically, one standard deviation increase in liquidity measure is associated with 1.9% (6.0%) decrease in cash-flow volatility measured by SDRE and SDROA, respectively.

After investigating the relation between liquidity and dividend and the channels through which the relation happens, I further study the moderating role of tax incentive on liquidity dividend relation. Australia runs two tax systems – imputation and traditional – contemporaneously. Under the Australian imputation tax system, Australian companies pay dividends on profits that are earned in Australia (franked dividends) and provide shareholders resident in Australia with a credit for the corporate tax paid that can be subsequently upset again their own personal tax liabilities. Employing the imputation tax system in Australia, I show that, within firms who pay franked dividend, the impact of stock liquidity on dividend is weaker.

This paper offers some contributions to finance literature. Firstly, this study contributes to the literature on how stock liquidity affects dividend payouts. The pioneering work is Miller & Modigliani's (1961) paper. According to the traditional transaction cost view, stock liquidity negatively impacts on dividend payout. Support for this view, Banerjee, Gatchev & Spindt (2007) find that U.S. firms with less stock liquidity are more likely payout dividend. In contrast, I find stock liquidity increases dividend payouts by mitigating cash-flow uncertainty. To my knowledge, my study is the first to show this mechanism.

Secondly, this study contributes to the literature on dividends and cash-flow uncertainty. Lintner (1956), and Brav et al. (2005) suggest that cash-flow uncertainty is one of factors firm managers consider when they make dividend decision. Chay & Suh (2009) find that firms facing high cash-flow uncertainty will pay low dividend. I extend this strand of research and show that stock liquidity can reduce cash-flow uncertainty, and thus promote the dividend payout.

Lastly, my study extends the line of literature on the tax clientele effects on dividend policy (Chetty & Saez 2005; Holmen, Knopf & Peterson 2008; Korkeamaki, Liljeblom & Pasternack 2010). The prior researches show the relative importance of the imputation tax system in encouraging firm managers to increase dividend payout and reduces the effects of other factors such as profitability or earned/contributed mix (Balachandran et al. 2017). I am the first show the role of imputation tax in negatively moderating the positive relation between liquidity and dividend.

The remainder of this paper is organized as follows. Section 2 discusses the related literature and develops testable hypotheses. Section 3 describes our data, sample construction process, variable construction process and descriptive statistics. Section 4 provides empirical results. Section 5 concludes and summaries the paper.

2. Literature review and hypothesis development

Stock liquidity is generally defined as the ability to trade a significant quantity of a company's stock at a low cost in a short time (Holden, Jacobsen & Subrahmanyam 2014). Stock liquidity can affect either positively or negatively on dividend. The negative effect comes from the substitution between return gained from selling stock and dividend. When investors hold more liquid stock, they can sell their holding in the firm at low price and timely manner and may not expect the cash from dividend to satisfy their liquidity needs. Support for this argument, Banerjee, Gatchev & Spindt (2007) find that U.S. firms with less liquid stock are more likely to pay cash dividends. From signalling theory, managers know more about the firm's true worth than do its investors and use dividends to convey information to the market (Bhattacharya 1979; John & Williams 1985; Miller & Rock 1985). This theory suggests a positive information asymmetry and dividend policy. Information asymmetry, also, is reduced when the stock liquidity is higher (Kyle 1984; Easley et al. 1994). Thus, taking together these theories support for the view that stock liquidity negatively impact on dividend by reducing information asymmetry between insiders and shareholders. I establish my first hypothesis as follow:

H1: Stock liquidity negatively relates to firm dividend level in Australian market.

Opposite strand of literature on informational effect of liquidity suggests that by reducing information asymmetry between insiders and shareholders, liquidity encourages firms' managers to pay dividend. Liquidity can help informed party to disguise private information that is not reflected in the price (Kyle 1984), this leads to marginal value of information increases (Holmstrom & Tirole 1993). In this way, to earn more trading gains on more liquid stock, investors have to spend more time on gathering and analysing information. Because liquidity associates with greater external analyst attention, insiders have less incentive to keep cash for private benefit and have stronger promotion to distribute cash in form of dividend. Thus, liquidity positively relates to dividend payout. Support for this argument, Jiang, Ma & Shi (2017) find that Chinese firms with higher liquidity stock pay more dividend. At the other perspective, literature documents various channels through which liquidity enhances firms' performance that is a key factor decides firm payout policy (Fama & French 2001). Some studies show that liquidity improves firm valuation by lowering the cost of equity capital (Holmstrom & Tirole 2001; Baker & Stein 2004), encouraging efficient management compensation (Holmstrom & Tirole 1993), and simulating informed trading that allows managers to learn from (Subrahmanyam & Titman 2001).[2] Compiling all arguments, I propose that stock liquidity positively relates to dividend payout:

H2: Stock liquidity positively impacts on dividend payout in Australian market.

Stock liquidity can enhance firm payout by reducing the volatility of cash flow. On the one hand, cash-flow uncertainty is an important factor that firm managers consider when forming payout policy (Lintner 1956; Brav et al. 2005). Precautionary motive theory argues that firms with high cash-

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[2] I do not attempt to exhaust the related literature that provides both theoretical model and empirical evidence for the relation between stock liquidity and firm performance (either negative or positive). Fang, Noe & Tice (2009) provide a comprehensive review of this extensive literature.

flow uncertainty are likely to pay low dividend and keep earning inside in anticipation of funding shortfalls. Chay and Suh (2009) find the evidence support for this argument in an international sample comprised six countries. They further state that earning uncertainty effect is stronger than the other traditional factors (earned/contributed capital mix, agency conflict, and investment opportunities) documented in the previous literature.

On the other hand, stock liquidity reduces volatility of cash-flow uncertainty that proxied by return variance. Theoretically, inventory control models such as (Merton 1987; Brunnermeier & Pedersen 2008) predict that there should exist a negative relationship between idiosyncratic risk and liquidity. Empirically, Benston & Hagerman (1974) drawn a random sample of 314 over-the-counter stocks and find that idiosyncratic risk is positively related to bid-ask spread. Stoll (1978) documents the relationship between a firm return variance and the bid-ask spread on the Nasdaq. Taking all together, I expect that stock liquidity reduce cash-flow uncertainty in Australian firms. I propose a hypothesis predicts this channel as following:

H2.1: Higher stock liquidity leads to lower cash-flow uncertainty in Australian market.

In the presence of tax effect, the relationship between stock liquidity and firm dividend maybe do not persist. Literature documents the influence of tax incentive on firm dividend payment decision (Chetty & Saez 2005; Holmen, Knopf & Peterson 2008; Korkeamaki, Liljeblom & Pasternack 2010). In Australian tax system, Pattenden & Twite (2008) find that upon the introduction of dividend imputation, all dividend measures include dividend initiations, dividend payouts and dividend reinvestment plan increase. Balachandran et al. (2012) find that negative reaction to dividend reductions and reduction in franking credits. The result is contributable for the view that market incorporates the impact of the reduction in franking credit in prices at the date of announcement. Balachandran et al. (2017) argue that tax incentives are available in the imputation tax environment promote dividend payments to be shifted to earlier points in time and find that firms who are in imputation tax system are more likely pay dividend and pay a higher level than firms are in traditional tax system. All of those findings support for the tax clientele effects in dividend policy. Companies will pay dividend when imputation credit available, regardless of the other dividend determinants such as size of profits and earned/contributed mix (Balachandran et al. 2017), or stock liquidity as predicted in this paper. More specifically, I hypothesize that the positive relation between stock liquidity and dividend is weaker within imputation environment.

H2.2: Dividend effect of stock liquidity is weaker in imputation tax system.

3. Data sources, variables description and descriptive statistic

Data used in this study is retrieved from Datastream and Morningstar DatAnalysis in the period from 2000 – 2018. I start the sample from 2000 because prior to 2000, data on daily stock price is relatively poor. Data on stock prices (close price, intraday high price, intraday low price) to calculate Amihud's (2002) illiquidity measure and Corwin & Schultz (2012) high-low price ratio spread and other financial measures are retrieved from Datastream. Data on franking dividend are from Morningstar DatAnalysis database. I exclude all firms in financial and utility sectors because their dividend policy may be influenced by regulation instead of economic factors like stock liquidity. Furthermore, I winsorize all observations at 1st and 99th to eliminate effect of outliers and coding error. Because in specification model, I use some of lead, lagged variables, the final sample covers the period of 15 years from 2002 – 2016. The final sample consists of 7,419 firm year observations.

3.1 Variable definition

Dividend measures

To proxy for firm dividend, I rely on two measures. The first is *DVE*, cash dividend scaled by earning. Cash dividend is total cash common dividends paid on the company's common stock during the fiscal year. Earning is net income after preferred dividends. The second is *DVC*, cash dividend scaled by cash flow from operating activities. Cash flow from operating activities is net cash receipts and disbursements resulting from the operating activities and extraordinary items. For ease of interpretation, I delete firms with negative dividend-to-earnings ratio or negative dividend-to-cash flow ratio (the cases that dividend is paid event either earning or cash flow are negative).

Liquidity measures

My main analysis relies on Amihud's (2002) illiquidity ratio. Since microstructure has proposed a variety of liquidity measures, data availability allows me to calculate reliably Amihud's measure. In addition, based on previous studies, I am confident that Amihud's illiquidity measure unlikely biases the result. Hasbrouck (2009) and Goyenko, Holden & Trzcinka (2009) report that Amihud's (2002) illiquidity ratio performs well relative to other proxies in capturing high-frequency measures of transaction costs in the U.S. data. Furthermore, Lesmond (2005) documents a high correlation between this measure and the bid-ask spread in 23 emerging markets.

I compute Amihud's measure as following:

$$Amihud_{i,t} = \frac{1}{D_{i,t}} x \sum_{d=1}^{D} \left| \mathrm{Re}\, t_{i,t,d} \right| / Volume_{i,t,d} \quad (1)$$

Where $Ret_{i,t,d}$ and $Volume_{i,t,d}$ are, respectively, the daily stock return, and trading volume (in million) on day d for firm i in year t, and $D_{i,t}$ is the number of trading days in fiscal year t for firm i. Following Amihud (2002), I just include the firm years with number of nonzero return trading days per year above 200. Because the raw Amihud measure is highly skewed, flowing Edmans, Fang & Zur (2013), I take natural logarithm of one plus the measure in our analysis. Since a higher value of this measure corresponds to a lower level of liquidity, for ease of interpretation, I multiply it by -1. Therefore, my liquidity measure is $ALLIQ_{i,t}$= - ln(1+ $Amihud_{i,t}$).

My alternative measure for stock liquidity in robustness test are Corwin & Schultz (2012) high-low price ratio spread (*HL*) and percentage of zero daily returns Lesmond, Trzcinka & Ogden's (1999) measure. *HL* is calculated as flow:[3]

$$HL = \frac{2(e^{\alpha}-1)}{1+e^{\alpha}} (2) ,$$

Where:

$$\alpha = \frac{\sqrt{2\beta}-\sqrt{\beta}}{3-2\sqrt{2}} - \sqrt{\frac{\gamma}{3-2\sqrt{2}}}, \beta = \sum_{j=0}^{1}\left[\ln\left(\frac{H^{0}_{t+j}}{L^{0}_{t+j}}\right)\right]^{2}, \gamma = \left[\ln\left(\frac{H^{0}_{t,t+1}}{L^{0}_{t,t+1}}\right)\right]^{2},$$

Where $H^0_{t,t+1}$ ($L^0_{t,t+1}$) are high and low prices over days t and t+1.

To estimate high-low spread, following (Corwin & Schultz 2012), I exclude all years with number of nonzero return trading days lower than 200 days. I set all negative daily estimates to zero before taking the arithmetic mean over financial year to get yearly estimates and than multiply yearly estimate with 100. I also take the natural logarithm of one plus the raw measure and multiply the result by -1.

Franking dividend and cash-flow volatility measures

To capture firm dividend franking position, flowing Balachandran et al. (2017), I use franked dividend dummy *(FRANK)* which takes the value of unity if firm declares franked dividend in year t, and zero otherwise. To capture firm cash flow volatility, flowing Chay & Suh (2009), I use two proxies. First is return volatility *(SDRE)*, calculated by the average standard deviations of daily stock return in a 2 years rolling window from t to t+1. The rationale for using SDRE as a proxy for cash-flow uncertainty is that stock prices tend to fluctuate more when cash flows are unpredictable. Second measure is standard deviation of

[3] I thank Shane Corwin for making his code available on his website: https://www3.nd.edu/_scorwin/HILOW_Estimator_Sample_002.sas

return on asset (SDROA). SDROA is calculated as the standard deviation of yearly return on asset in a 5 years rolling window from t to t+4.

Control variables

It is well documented that large, profitable, and less leveraged firms with few investment opportunities are more likely to pay dividends (Fama & French 2001; Denis & Osobov 2008). Accordingly, I include these firm characteristics in our regression analyses. To control for firm size, I use natural logarithm of total asset as a measure of firm size (*SIZE*). My proxy for profitability is return on asset (*ROA*). I use sale growth (*SGR*) as a measure of growth opportunities. Firm investment *(INV)* calculated by total capital expenditured scaled by total asset is used to control for investment opportunities. Finally, I use total debt on asset ratio (*LEV*) to measure firm leverage. The detail of variable definition is in Appendix A.

3.4 Descriptive statistic

Summary statistics for the sample are reported in Table 1. I winsorize all of variables in our analysis at 1% and 99% of their empirical distributions to eleminate the effect of outliers.[4] Table 1 contains some features that make me confident about the consistancy of my sample with samples in previous studies. First, the mean liquidity (ALLIQ) is -0.290 is comparable with -0.218 which is reported by Ali, Liu & Su (2017) for Australian market, and -0.195 by Jiang, Ma & Shi (2017) for Chinese market.

[Inserted table 1 here]

Second, mainly firm years observations in my sample do not report dividend payout. The dividend measures (DVE, DVC) show that up to 50% of sample observation pay no dividends, and dividend level means are 0.175 and 0.128 for DVE and for DVC, respectively. Those numbers are comparable with previous study on dividend payout (Balachandran et al. 2017; Jiang, Ma & Shi 2017).

4. Empirical results

In this section, I report and interpret empirical results for my hypostheses tests. I start with H1 and H2 using dividend scaled by net income (DVE) and dividend scaled by cash flow (DVC) to proxy for dividend policy. I then present robustness check which includes alternative measure for liquidity, and changed model to establish causality relation. I, next,

[4] The result is unchanged when I do not winsorize.

test the cash-flow uncertainty reduction. Finally, I examine the moderating role of tax regime on the impact of liquidity on dividend.

4.1 Univariate evidences

In this section, I compare the dividends levels of two group of firms sorted by level of stock liquidity (ALLIQ). Firms are classified into high and low stock liquidity groups according to the median liquidity in each year. Observations with stock liquidity above the median are called the high stock liquidity group, while those below form the low stock liquidity group. The results are presented in Table 2.

[Insert table 2 here]

According to the relation between dividend-to-earning ratio (DVE) and liquidity, firms with high stock liquidity payout 30.4% of their earnings on everage, while firms with low liquidity stock payout 4.50%. The t-statistic for the difference in mean is (-40.11) indicating that the difference in mean is statistically different at 1% level. The result for the relation between liquidity and dividend to cash-flow ratio (DVE) is consistent, remained economically significant.

4.2 Multivariate evidences

In this section, I present the result about relation between dividend and liquidity by regression technique. To assess whether stock liquidity improves, harms, or has no effect on dividend policy, two measures of dividend payout (DVE and DVC) are regressed on the liquidity measure and several control variables. The baseline specification is defined as follows:

$$Dividend_{i,t} = \beta_1 + \beta_2 ALLIQ_{i,t-1} + \sum_{j=1}^{n} \alpha_j X^{J}{}_{i,t-1} + F_i + Y_t + \varepsilon_{i,t} \quad (3)$$

Where $Dividend_{i,t}$ is measured by DVE and DVC at the end of year t for firm i. $ALLIQ_{i,t-1}$ is the Amihud illiquidity measure of firm i in year t-1. $X_{i,t-1}$ denotes vector of control variables, F_i and Y_t are firm fixed effect and year fixed effect, respectively. Given that the two measures of dividend level (DVE and DVC) are truncated at zero and one, I estimate equation (3) by a two-sided Tobit model. The result is reported in Table 3.

[Insert Table 3 here]

In regression (1) and (2), I do not control for either aggregate time series trend or other obmited firm-factors by year and firm fixed effects. The dependent variables are dividend scaled by earning (*DVE*) and dividend scaled by cash-flow *(DVC)*. The result supports for Hypothesis 2, that stock liquidity positively impact on dividend payouts. The coefficient estimate on stock liquidity is positive and significant at 1% level (t value is 9.82 and 9.76 for DVE and DVC measures, respectively). The other control variables, provide consitent estimates with literature. For example, firms with higher investment opportunities proxied by investment level (INV), and firm sale growth (SGR) pay relatively lower dividend. Consistent with the prediction, Table 3 shows that the coefficients of INV and SGR are both negative and significant. On the other hand, firms which are larger, more profitable would pay higher dividend. The coefficents of *SIZE* and *ROA* are positive and significant support for this argument. Although the coefficient estimate on the leverage ratio could have either a positive or a negative sign a priori, it is positive for our sample.

The result hold after I control for time series by introducing year fixed effect in regression (3)-(4) and firms' other obmited factors by including both year fixed effected and firm fixed effected in regression (5)-(6). In all four columns, I find results consistent with those estimated earlier. In particular, the coefficient on stock liquidity is positive and significant. Overall, consistent with the results from univariate analysis, the result from multivariate analyses suggest that there is a positive relationship between stock liquidity and firm dividend.

4.3 Robustness tests

In previous section, I show that there is a positive relation between stock liquidity and dividend payout by demonstrating various models control for the potential factors impact on dividend. In this section, I present several robustness tests by utilizing alternative measure of stock liquidity as well as addressing potential endogeneity concerns.

4.3.1 Alternative measures of liquidity

One may concern about the relation between liquidity and dividend in the baseline result is driven by the choice of stock liquidity measure. To alleviate this concern, following Jiang, Ma & Shi (2017) I use alternative measures for liquidity: Corwin & Schultz's (2012) high-low impact spread estimator and Lesmond, Trzcinka & Ogden's (1999) percentage of zero daily return measure.[5]

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[5] These two measures are used widely in the studies focus on U.S market (Marshall et al. 2018) and emerging market (Bekaert, Harvey & Lundblad 2007).

[Insert table 4 here]

Because high value of those measures correspond to a low level of liquidity, I multiply each measure by -1 for ease of interpretation. The regression results are reported in Table 4. The coefficients of stock liquidity are positive and significant for all measures of dividend payout. This suggests that the main findings are not drived by the way I choose measure of liquidity.

4.3.2 Reverse causality

One may concern the primary result is subject to reverse causality. The rationale, for example, is that investors who prefer dividend may trade more actively on high dividend stocks that lead to high liquidity. To address this problem, I employ a change in liquidity caused by an exogenous shock of broker anonymity on the ASX in 2005. Prior to November 28, 2005, broker ID of each order were exposed to the broker community in a real time basic. However, from November 28, 2005, brokers are no longer able to observe other broker's ID. Comerton-Forde & Tang (2009) document that the switch to broker anonymity has resulted in higher liquidity in the Australian market. On the other hand, the change is very less likely to directly impact on firm dividend. Following Fang, Noe & Tice (2009), I regress the change in firm dividend surrounding anonymity shock on the change in liquidity from the 2 years prior to anonymity to 2 years after anonymity. The specification is shown in

$$\Delta Dividend_{i,[t-2,t+2]} = \beta_1 + \beta_2 \Delta ALLIQ_{i,[t-2,t+2]} + \sum_{j=1}^{n} \alpha_j \Delta X^{J}{}_{i,[t-2,t+2]} + F_i + \varepsilon_{i,[t-2,t+2]} \quad (4)$$

Where t is 2005 when the anonymity happened. I use 2 years before the shock and 2 years after the shock because it is generally believed that firms normally avoid changing dividend aggressively.[6] The long window surrounding the shock provides time for the change in liquidity to affect firm dividend. Furthermore, firm dividend policy may be effected by the ratification of the Kyoto protocol in 2007 as documented by Balachandran & Nguyen (2018), thus, I use 2 years before and 2 years after 2005 to avoid noisy effect caused by this event. I require that our sample firms are listed before 2003 and after 2007 to make sure that all firms experienced the shock.

[Insert table 5 here]

Positive coefficient of ΔALLIQ in Table.5 shows that the increase in liquidity according to the shock of anonymity causes the increase in dividend. The result makes us

[6] Lintner (1956) finds that a firm smooths its dividend over time.

confident that the relation between stock liquidity and dividend is not driven by the reverse causality issue.

4.4 Liquidity and cash flow volatility

Previous studies provide evidence that cash flow uncertainty is an important factor of dividend policy. Lintner (1956), and Brav et al. (2005) points out from survey data that managers view earnings stability as one of the important factors in dividend decisions. Chay & Suh (2009) provide empirical evidence by using data from firms in six countries support for the argument on the important impact of cash-flow uncertainty on firm dividend. On the other hand, stock liquidity is reported to reduce idiosyncratic risk (Merton 1987; Brunnermeier & Pedersen 2008), firm return variance (Stoll 1978). Taking two streams of argument together, I argue that stock liquidity can enhance dividend through reducing cash-flow volatility. Following Chay & Suh (2009), I use the variance of stock return (SDRE) and variance of return on asset (SDROA) to proxy for cash-flow uncertainty. More specifically, I calculate yearly stock return volatility for firm i in year t by taking arithmetic mean of standard deviation of daily return in year t and t+1. Similarly, I calculate yearly variance of return on asset by arithmetic mean of standard deviation of yearly standard deviation of ROA in 5 years from t and t+4. My specification to test the negative relation between liquidity and return volatility is as follow:

$$\text{Return\_volatility}_{\text{i,t}} = \beta_1 + \beta_2 ALLIQ_{i,t} + \sum_{j=1}^{n} \alpha^j X_{i,t}^J + F_i + Yt + \varepsilon_{i,t} \quad (5)$$

Where Return_volatility is proxied by two measures are average of standard deviation of daily stock in upcoming two years (SDRE) and standard deviation of return on asset (SDROA) in upcoming 5 years. Table 6 reports the OLS regression result where the cash-flow volatility measures (SDRE, SDROA) are regressed on the stock liquidity measure (ALLIQ). Following Chay & Suh (2009), I control for the firm growth (SGR), firm size (SIZE), profitability (ROA).

[Insert table 6 here]

In model (1) and (2), I use SDRE and SDROA, respectively to proxy for cash-low volatility and do not control for time and firm fixed effects. Both of those measures indicate that stock liquidity statistically and economically reduce cash-flow volatility. In the next 4 models, I incorporate year fixed effect (models (3), (4)) and firm and year fixed effect (model

(5), (6)). The results hold significant. Overall, the result in Table 6 support for Hypothesis 2.1 that is stock liquidity enhances dividend payout through reducing return volatility.

4.5 Stock liquidity, dividend and tax

In this section, I test my fourth hypothesis which is whether tax environment negatively moderates the relation between stock liquidity and dividend. In the presence of imputation tax credits, tax incentive promotes firm's managers paying more dividends and the effect of tax incentive is stronger than other factors such as profitability and earned/contributed capital mix (Balachandran et al. 2017). I expect that tax incentive negatively moderates the relation between liquidity and dividend. To test this proposition, we use the following model

$$\text{Dividend}_{\text{i,t}} = \beta_1 + \beta_2 ALLIQ_{i,t-1} + \beta_3 ALLIQ_{i,t-1} xFRANK_{i,t-1} + \beta_4 FRANK_{i,t-1} \sum_{j=1}^{n} \alpha^j X_{i,t}^J + F_i + Yt + \varepsilon_{i,t} \quad (6)$$

Where Dividend, ALLIQ are defined as in model 1, FRANK is a dummy variable takes value of one if firm report franking dividend and zero otherwise. Table 7 reports the regression result of model (6).

[Insert table 7 here]

β_3 is the coefficient of interest. I do not control for time variance and the difference across firms in model (1) and (2). Although using different model, the result confirms the finding in Balachandran et al. (2017). The coefficients of FRANK are positive and significant suggest that firms are in imputation tax environment pay higher dividend than who are in traditional tax system. β_3 in those two models are negative and significant indicates that the effect of stock liquidity on dividend is weaker with firms report franking dividend supporting for tax clientele effect. The result is hold after we control for year fixed effect in model (3), (4) and firm fixed effect in model (5) and (6). Overall, the finding in this section supports for the H.2.1, tax incentive negatively moderates the relation between liquidity and dividend.

5. Conclusion

Previous studies on stock liquidity and dividend document the contrasting result. Stock liquidity negatively impacts on dividend in case of a highly developed market with well-established corporate governance and regulation named U.S. and positively impact on dividend in case of a far behind established market, named China. The contrasting results are, perhaps, explained by the different in the level of market development (la Porta et al. 2000).

A study on the dividend impact of liquidity in a neutral context to avoid the impact of extreme market development level would be expected to provide valuable insight. In this paper, I examine whether firm stock liquidity affects its dividend payout in Australian market. I, furthermore, test the cash-flow uncertainty reduction channel, through which stock liquidity impact on dividend and the negatively moderating impact of imputation tax environment on stock liquidity, firm dividend relation.

The finding reveals a strong positive relationship between stock liquidity and its' dividend level. The positive relationship is robust for various model estimations and is not biased by reverse causality problem. In addition, I find that stock liquidity enhances dividend through reducing cash-flow volatility. Specifically, I find that firm with higher stock liquidity exhibits lower level of cash-flow uncertainty proxied by the variance of stock return and the variance of return on asset. Furthermore, I find that within firms report tax credit, the relation between stock liquidity and dividend is weaker. This finding supports for the tax clientele effect.

Those findings in this paper extend our understanding about the relation between stock liquidity and firm dividend. Traditional trading cost suggests the negative relation between liquidity and dividend when investors who hold more liquid stock can make homemade dividend by selling an appropriate holding position (Miller & Modigliani 1961). Banerjee, Gatchev & Spindt (2007) find evidence supports for this proposition in a sample of U.S. firms. However, stock liquidity can positively impact on dividend by reducing cash-flow uncertainty. The finding in this paper supports for this argument. This paper also contributes to the tax clientele effect of dividend by showing that stock liquidity and dividend payout relation is weakened in imputation tax environment.

Appendix A. Description of variables

Acronym	Variable name	Definition/ Calculation	Data Sources
DVE	Cash dividend scaled for Net income	Cash dividend is total cash common dividends paid during the fiscal year. Net income is the net income after preferred dividends	Datastream
DVC	Cash dividend scaled for Cash flow from operating activities.	Cash flow from operating activities is net cash receipts and disbursements resulting from the operating activities and extraordinary items.	Datastream
ALLIQ	Amihud Illiquidity measure	Log of the average of daily Amihud's (2002) measure (calculated as the absolute value of stock return divided by dollar trading volume on a given day scaled by total trading days in the year) in a given year.	Datastream
HL	High – Low price spread proxy	High – Low price spread calculated follow (Corwin & Schultz 2012).	Datastream
ZR	Lesmond (2005) illiquidity measures	Number of trading days with zero daily returns and positive trading volume divided by the number of annual trading days over the firm's fiscal year.	Datastream
SDRE	Return volatility	Evarage standard deviation of daily average return over a 2-year roling window covering year t to t+1.	Datastream
SDROA	Return on asset volatility	Average standard deviation of yearly ROA (pre-tax earnings over total assets) over a five-year roling	Datastream

		window covering year t to t+4.	
FRANK	Firm franking status	Dummy variable takes the value of one if firm reports franking dividend in year t	Morningstar direct
INV	Investment	Ratio of capital expenditure to book value of assets in year t.	Datastream
LEV	Leverage	Long-term debt plus short-term debt scaled by the book value of total assets t.	Datastream
ROA	Profitability	Net income divided by total value of book asset t.	Datastream
SGR	Sales growth	Sales growth in year t.	Datastream
AT	Lagged book value of total asset	Book value of total asset in year t	Datastream
PPE	Tangibility asset	Book value of Tangible asset	

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Table 1: Summary statistics

This table reports the statistics of the main variables used in the paper. The sample includes all Australian firms covered in Datastream from 2000 – 2017. Firms in financial industry and utility industry (i.e., SIC codes between 6000 and 6999 or between 4900 and 4999). All observations are winsorized at 5% and 95% of their impirical distributions. Appendix A provides a detailed definition of those variables.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	N	mean	sd	p25	p50	p75
DVE	7,328	0.175	0.306	0.000	0.000	0.304
DVC	7,321	0.128	0.235	0.000	0.000	0.176
ALLIQ	7,419	-0.290	0.382	-0.443	-0.115	-0.010
SIZE	7,329	11.007	2.034	9.419	10.651	12.326
INV	7,254	0.093	0.111	0.012	0.045	0.138
LEV	6,977	0.105	0.139	0.000	0.014	0.200
PPE	7,285	0.372	0.305	0.060	0.329	0.650
ROA	7,328	-0.183	0.385	-0.278	-0.056	0.062
SGR	6,168	0.564	1.676	-0.193	0.090	0.501
SDRE	7,419	0.049	0.024	0.028	0.047	0.063
FRANK	7,419	0.267	0.443	0.000	0.000	1.000

Table 2. Univariate analysis

This table reports univariate tests on the difference in dividend payout between firms with high stock liquidity and those with low stock liquidity. Firms are classified into high and low stock liquidity according to the median liquidity in each year.

Variables	High liquidity firms		Low liquidity firms		Test of different (t value)
	Mean	Std	Mean	Std	
DVE	0.304	0.351	0.045	0.174	-40.11***
DVC	0.221	0.272	0.034	0.138	-37.15***
Obs	3,682		3,646		

Table 3. Baseline regression

This table reports the two-sized Tobit regressions in which the dividend ratio is regressed on the stock liquidity and a set of firm characteristics. Appendix A provides a detailed description of the variables. The t-statistics are reported in parentheses. *, **, *** denote the significant level at 10%, 5%, 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	DVE	DVC	DVE	DVC	DVE	DVC
ALLIQ	0.443***	0.381***	0.443***	0.381***	0.427***	0.353***
	(9.82)	(9.76)	(9.53)	(10.24)	(6.43)	(5.84)
INV	-0.886***	-1.053***	-0.886***	-1.053***	-0.857***	-1.016***
	(-9.08)	(-12.24)	(-11.26)	(-15.73)	(-4.99)	(-7.42)
LEV	0.407***	0.237***	0.407***	0.237***	0.401***	0.227***
	(9.01)	(6.10)	(13.09)	(6.75)	(5.24)	(3.55)
SIZE	0.085***	0.066***	0.085***	0.066***	0.087***	0.068***
	(20.10)	(18.13)	(19.17)	(15.55)	(13.27)	(11.30)
ROA	2.659***	2.357***	2.659***	2.357***	2.651***	2.345***
	(33.24)	(33.66)	(13.23)	(14.29)	(14.33)	(14.06)
SGR	-0.055***	-0.041***	-0.055***	-0.041***	-0.055***	-0.041***
	(-9.10)	(-8.02)	(-5.45)	(-4.78)	(-6.03)	(-5.19)
PPE	-0.341***	-0.215***	-0.341***	-0.215***	-0.349***	-0.224***
	(-12.54)	(-9.30)	(-12.25)	(-7.10)	(-7.33)	(-5.09)
_cons	-0.904***	-0.710***	-0.904***	-0.710***	-0.824***	-0.705***
	(-16.16)	(-14.77)	(-13.13)	(-11.20)	(-8.43)	(-8.06)
Firm FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Pseudo R2	0.6731	0.7309	0.6731	0.7309	0.6784	0.7382
N	6,236	6,236	6,236	6,236	6,236	6,236

Table 4. Alternative liquidity measures

This table reports two-sized Tobit regression result the dividend ratios are regressed on the stock liquidity and a set of firm characteristics. In panel A, stock liquidity is measured by the percentage of zero daily returns (Lesmond, Trzcinka & Ogden's (1999) measure), and in panel B, stock liquidity measure is Corwin & Schultz's (2012) high-low spread estimator. Variables definitions are provided in Appendix. The t-statistics reported in parentheses. *, **, *** denote significance at 10%, 5%, and 1% levels, respectively.

	Panel A: Percentage of zero daily returns		Panel B: High-low impact spread estimator	
	(1)	(2)	(3)	(4)
	DVE	DVC	DVE	DVC
Liquidity	0.333**	0.205*	0.613***	0.466***
	(2.31)	(1.94)	(9.26)	(9.47)
INV	-0.956***	-0.921***	-0.805***	-0.823***
	(-4.62)	(-6.46)	(-4.02)	(-6.00)
LEV	0.357***	0.176***	0.253***	0.098
	(3.70)	(2.62)	(2.73)	(1.57)
SIZE	0.131***	0.097***	0.122***	0.087***
	(12.22)	(11.59)	(13.50)	(13.02)
PPE	-0.386***	-0.321***	-0.325***	-0.275***
	(-6.05)	(-6.67)	(-5.48)	(-6.06)
ROA	3.347***	2.695***	3.045***	2.467***
	(21.77)	(21.54)	(20.38)	(20.63)
SGR	-0.050***	-0.039***	-0.039***	-0.030***
	(-4.45)	(-5.47)	(-3.66)	(-4.68)
_cons	-1.361***	-1.042***	-1.001***	-0.732***
	(-8.98)	(-8.88)	(-8.06)	(-7.79)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R2	0.657	0.7674	0.6955	0.8139
N	6,915	6,907	6,915	6,907

Table 5. Controlling for reverse causality

Table 5 reports the two-sized Tobit regression result of model $\Delta \text{Dividend}_{\text{t},[\text{t}-2,\text{t}+2]} = \beta_1 + \beta_2 \Delta Alliq_{t,[t-2,t+2]} + \sum_{j=1}^{n} \beta \alpha^j X_{i,[t-2,t+2]}^J + F_i + \varepsilon_{i,[t-2,t+2]}$. Δ denotes the change in each variable from 2 years before the shock and 2 years after the shock. The t-tests statistics are reported in parentheses. *, **, *** indicate the significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
	ΔDVE	ΔDVC	ΔDVE	ΔDVC
ΔALLIQ	0.820**	0.496**	0.820***	0.496***
	(2.59)	(2.39)	(3.38)	(3.35)
ΔINV	-0.420	-0.034	-0.420	-0.034
	(-0.60)	(-0.08)	(-0.69)	(-0.09)
ΔLEV	-0.561	-0.239	-0.561	-0.239
	(-0.96)	(-0.69)	(-1.08)	(-0.70)
ΔSIZE	0.110	-0.023	0.110*	-0.023
	(1.36)	(-0.47)	(1.65)	(-0.53)
ΔPPE	-0.652*	0.121	-0.652*	0.121
	(-1.82)	(0.54)	(-1.91)	(0.69)
ΔROA	-0.380	-0.063	-0.380*	-0.063
	(-1.32)	(-0.36)	(-1.71)	(-0.51)
ΔSGR	-0.006	0.001	-0.006	0.001
	(-0.23)	(0.06)	(-0.32)	(0.10)
Pseudo R2	0.1123	0.0845	0.1123	0.0845
Firm FE	No	No	Yes	Yes
N	173	173	173	173

Table 6: Stock liquidity and return volatility

This table reports OLS regression result that stock return standard deviation is regressed on the stock liquidity and a set of firms characteristic. Variables definitions are provided in Appendix. The t-statistics reported in parentheses. *, **, *** denote significance at 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	SDRE	SDROA	SDRE	SDROA	SDRE	SDROA
ALLIQ	-0.019***	-0.060***	-0.019***	-0.069***	-0.019***	-0.069**
	(-29.62)	(-2.65)	(-30.20)	(-3.01)	(-17.95)	(-2.01)
INV	0.001	0.305***	-0.004**	0.194***	-0.004	0.194
	(0.44)	(4.14)	(-2.01)	(2.67)	(-1.18)	(1.57)
LEV	-0.001	0.009	0.001	0.095*	0.001	0.095
	(-0.63)	(0.16)	(0.71)	(1.77)	(0.42)	(1.21)
size	-0.005***	-0.054***	-0.005***	-0.050***	-0.005***	-0.050***
	(-36.74)	(-10.96)	(-36.25)	(-10.02)	(-22.70)	(-7.50)
PPE	0.014***	0.089***	0.015***	0.078***	0.015***	0.078*
	(19.04)	(3.38)	(20.63)	(3.05)	(11.14)	(1.84)
ROA	-0.012***	-0.392***	-0.013***	-0.419***	-0.013***	-0.419***
	(-18.18)	(-16.72)	(-19.62)	(-18.11)	(-11.72)	(-13.07)
SGR	0.001***	0.008*	0.001***	0.005	0.001***	0.005
	(5.98)	(1.87)	(5.00)	(1.21)	(4.59)	(1.09)
_cons	0.091***	0.807***	0.090***	0.761***	0.090***	0.761***
	(55.21)	(13.74)	(54.69)	(12.78)	(32.68)	(9.39)
Firm FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
ar2	0.6198	0.1776	0.650	0.218	0.650	0.218
N	6,112	6,047	6,112	6,047	6,112	6,047

Table 7: Stock liquidity and dividend in imputation tax system

This table reports two-sized Tobit regression result of the model $\text{Dividend}_{\text{i,t}} = \beta_1 + \beta_2 ALLIQ_{i,t-1} + \beta_3 ALLIQ_{i,t-1} xFRANK_{i,t-1} + \beta_4 FRANK_{i,t-1} \sum_{j=1}^{n} \alpha^j X_{i,t}^J + F_i + Yt + \varepsilon_{i,t}$. Where Dividend and ALLIQ are defined as in model (1), FRANK is a dummy variable that takes value of one if firm reports franking dividend and zero otherwise. Variable definitions are provided in Appendix A. The t-statistics are reported in parentheses. *, **, *** denote significance level at 1%, 5%, and 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	DVE	DVC	DVE	DVC	DVE	DVC
ALLIQ	0.397***	0.314***	0.380***	0.292***	0.380***	0.292***
	(6.27)	(6.65)	(6.03)	(6.21)	(3.54)	(3.26)
ALLIQxFRANK	-0.572***	-0.324***	-0.628***	-0.381***	-0.628***	-0.381***
	(-5.31)	(-4.08)	(-5.82)	(-4.82)	(-3.85)	(-3.07)
FRANK	0.465***	0.309***	0.454***	0.300***	0.454***	0.300***
	(23.10)	(20.91)	(22.67)	(20.53)	(10.09)	(8.85)
INV	-1.000***	-1.026***	-0.916***	-0.973***	-0.916***	-0.973***
	(-8.04)	(-10.77)	(-7.34)	(-10.24)	(-4.19)	(-5.93)
LEV	0.271***	0.117***	0.267***	0.105**	0.267***	0.105
	(4.63)	(2.69)	(4.53)	(2.42)	(2.77)	(1.41)
SIZE	0.071***	0.044***	0.074***	0.048***	0.074***	0.048***
	(12.68)	(10.60)	(12.93)	(11.42)	(7.70)	(5.99)
PPE	-0.217***	-0.206***	-0.242***	-0.225***	-0.242***	-0.225***
	(-5.95)	(-7.60)	(-6.58)	(-8.27)	(-3.36)	(-3.95)
ROA	1.978***	1.740***	2.010***	1.746***	2.010***	1.746***
	(20.18)	(23.43)	(20.37)	(23.56)	(8.33)	(8.79)
SGR	-0.053***	-0.037***	-0.052***	-0.039***	-0.052***	-0.039***
	(-6.09)	(-5.88)	(-5.96)	(-6.08)	(-3.91)	(-3.84)
_cons	-0.930***	-0.538***	-0.782***	-0.452***	-0.782***	-0.452***
	(-13.00)	(-10.22)	(-8.92)	(-7.07)	(-5.87)	(-4.15)
Firm FE	No	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Pseudo R2	0.6538	0.792	0.6617	0.8029	0.6617	0.8029
N	5,354	5,352	5,354	5,352	5,354	5,352