Deregulating the Open Market Stock Repurchase Restriction Around the World:

The Effects on Firm Value and Behaviors

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Abstract

We construct a unique collection of 38 countries' deregulation laws that remove the restrictions of the open market stock repurchase. We utilize the yearly variation across the international market on the restrictions to explore the causal impact of the open market stock repurchase on corporate behaviors. We find that allowing repurchasing firms' stocks on the secondary market decreases cash holding, capital expenditure, mergers and acquisitions and effective tax rate in developed markets, in developing markets and in general. However, the restriction removal has mixed effects on dividend payout policies and R&D expenditure. Overall, the deregulation increases firms' return on assets and Tobin's Q.

Keywords: Stock repurchase, firm value, firm behavior, cash holding, payout policy

JEL Codes: G32, G35, G38

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1. Introduction

The effects of stock repurchase on firm value and behaviors such as cash holding and payout policies have been widely discussed since open market repurchase weren't allowed (e.g. Dann 1981 on tender offer repurchases). Existing literature documents some causes and effects of firms' stock repurchase activities. Firm repurchasing their stocks can be incentivized by executive stock options (Fenn and Liang 2001), bonus (Cheng, Harford and Zhang 2015, Young and Yang 2011), or the pressure of meeting analyst EPS forecast (Almeida, Fos and Kronlund 2015). On the effects, firm repurchases can stabilize stock price (Hong, Wang and Yu 2008), decrease market liquidity due to the effect on spread (Brockman and Chung 2001, Ben-Rephael, Oded and Wohl 2014), or (temporarily) increase market liquidity (Cook, Krigman and Leach 2004, Chemmanur, Cheng and Zhang 2010).

Most works take open market stock repurchase as granted. In fact, many financial markets legally prohibited firms' stock repurchase on the open market before 1980 and they gradually removed this restriction since the 1980s. For example, the UK deregulated the open market repurchase in 1981 by passing the Companies Act; the US removed the restriction in 1982 under the SEC Rule 10b-18. This deregulation lasted internationally in the 1990s and 2000s. Poland removed the restriction by passing Amendments to Commercial Code in 1991, South Korea after Securities Act of January 1994, Russia after Federal Law on Joint Stock Companies in 1995, and Indonesia after the Company Law in 2007. These different years of deregulation provides a unique natural experiment to allow us explore the impacts of open market stock repurchase on the firm value and firm behaviors.

In this paper, we first present a unique collection of around 40 countries' deregulation laws that remove the restrictions of the open market stock repurchase since the 1980s. We carefully identify the years of deregulation throughout the information collection process. For example, Japan loosened the restriction gradually after passing two laws (Commercial Law (1994), Tax Law (1995)), and we treat 1995 as the "deregulation year". Although we are able to find deregulation laws in some other major markets, we exclude them in our analyses because of the data availability. We mainly reply on the Worldscope international firms' data that start from 1980. To effectively identify the difference between pre- and post-deregulation corporate behaviors, we have to exclude the US that passed the related law in 1981, Canada (1985), the UK (1981), Brazil (1980), Belgium (1984) and Chile (1981). Yet all results hold when including these countries' firms in our regressions.

We utilize the yearly variation across different countries on the restrictions to explore the causal impact of the open market stock repurchase on corporate behaviors. The empirical setting follows standard approach similar to Beck, Levine and Levkov (2010) and Chava, Oettl, Subramanian and Subramanian (2013) on the US banking deregulation methodology; the difference is that in the US banking deregulation setting each state passed the law in different years, in our setting each country passed the deregulation law in different years.

We investigate a set of outcome variables to understand the impact of allowing repurchasing firms' stocks on the secondary market. We first find that the deregulation increases firms' Tobin's Q after controlling the firm and year fixed effects and clustering by firm. The findings are statistically significant and economically meaningful in subsample analyses for developed and developing markets as well as in the full sample. We also analyze the dynamics of the firm value change as well. Employing a similar approach as in Beck, Levine and Levkov (2010), we find the gradual increase of firms' Tobin's Q. The firm value did not significantly change before the deregulation laws were passed, meaning that they were not much expected ex-ante and caused significant variation on investors' valuation. Tobin's Q largely increased in the first two years after the deregulation, with an adjustment in year three, and gradually increase in the next two years.

Then we explore the mechanism of this value increase. We find that firms' cash holding decreases after the restriction removal. Literature documents several ways of spending cash: paying dividend (Guay and Harford 2000), starting new mergers and acquisitions (Harford 1999) and expanding the current firm production scale (Lamont 1997). The existing hypothesis argues that stock repurchase and dividend payment are substitutes, but we find mixed results on dividend payments after deregulation. In the full sample, the deregulation causes significant decline in dividend/cash ratio, but this negative relation is only driven by the developing markets and the results are not statistically significant in the developed markets. We do find that the deregulation helps reduce the M&A activities in the full sample and subsamples. Post-deregulation capital expenditure also drops. Moreover, we find no significant overall impact on firm R&D, but we do find a significant decrease in effective tax rate in developed markets, in developing markets and in general, indicating that stock repurchase indeed assists avoidance. All these factors lead to an increase of firms' return on assets.

Our paper contributes to a number of literatures. First, we add additional evidence on the literature about complicated relations between stock repurchase and dividend payment. Dividend payment in the late 20th century started to be less popular in the public firms

compared to earlier years.[1] Fama and French (2001) find that the proportion of firms paying cash dividends falls from 67% in 1978 to 21% in 1999. Grullon and Michaely (2002) argue that it's because firms use share repurchases as a substitute for dividends. Skinner (2008) also reaches a similar conclusion. But Jagannathan, Stephens and Weisbach (2000) find that repurchases and dividends are used at different times and by different firms, therefore they are more like different strategies used by different firms rather than the substitute strategies chosen by the same firms.

Second, this paper also contributes to the growing literature on how firm behaviors are affected by regulatory enforcement. Tsoutsoura (2015) and Gan, Hernandez and Ma (2016) analyze the effect of minimum wage regulation. Albring, Banyi, Dhaliwal and Pereira (2015) analyze the effect of financial disclosure regulation. Starting from Jayaratne and Strahan (1996) and Kroszner and Strahan (1999), the US bank branching deregulations' cross-state-year variations have been used to investigate the impact on firm behaviors (e.g. Chava, Oettl, Subramanian and Subramanian 2013). Our paper looks at how a different type of laws affect firm behaviors internationally.

Third, our work contributes a new identification on the open market repurchase' impact on corporate governance, and confirms some prior studies' conclusions based on correlation analyses. For example, our results on decreased post-deregulation M&A activities evidence Billet and Xue (2007) who use two-stage estimation. We also contribute to a large literature of determinants of firm cash holding (Opler, Pinkowitz, Stulz, and Williamson 1999, Gao, Harford and Li 2013).

The rest of this paper is organized as follows. Section 2 explains the background and the open market stock repurchase laws in several major financial markets, with brief discussion on the other markets due to the space limit. Section 3 discusses the data sources. Section 4 details the empirical specification and presents the results. Section 5 concludes.

2. Open Market Share Repurchase Around the World

In this section, we document the regulations pertaining to open market share repurchases in different markets around the world. Specifically, we analyze the imperative

[1] This finding is disagreed by Grullon, Paye, Underwood and Weston (2007).

requirements of the board or shareholder meeting approval, restrictions (timing, price and volume) and governing law, when it was enacted and the overseeing authority.

We provide detail analysis of the following representative markets: Australia, France, Germany, India, China, Japan and Hong Kong. We also provide a brief summary of the regulations in other markets at the end of this section. Due to the data limitation, our study mainly focuses on those 44 markets. We will explain more about the data limitation in the next section.

2.1.1. Australia

Open market share repurchase in Australia was legalized in 1989 following a report by the Companies and Securities Law Review Committee (CSLRC). The onerous restrictions introduced by the CSLRC were relaxed in 1995 through the First Corporations Law Simplifications legislation, which increased the popularity of share repurchases. As per the bill, firms are regulated by the Australian Securities Exchange (ASX) and all firms must comply with the following restrictions:

1. Must obtain shareholders meeting approval for the repurchase to be approved.
2. Timing restriction: repurchase must be completed in a 12-month period.
3. Price restriction: repurchase price cannot be 5% higher than the average price over the last 5 days.
4. Volume restriction: repurchases are restricted to 10% of shares issued over a 12-month period.

As per the ASX regulations, all repurchase activities must be disclosed by 9:30 am the following trading day. The shares repurchased cannot be considered as treasury shares and therefore must be cancelled. At the end of the program, firms must disclose a 'final buyback' notice to the market. After this notice is filed, the open market share repurchase program has been completed.

2.1.2. France

In 1998, France implemented major reforms to the law surrounding open market share repurchases which made the activity much easier to execute. Prior to this, share buybacks were

not illegal but difficult to enact due to the onerous regulations. The reforms were instituted by the Commission des Operations de Bourse (COB), which is the securities trading regulatory body. The restrictions firm's face in open market share repurchases in France are the following:

1. Must obtain shareholder meeting approval as well as approval from the COB
2. Timing restriction: the repurchase must be completed within an 18-month time frame
3. Price restriction: the repurchase price cannot exceed the lowest or the highest market price on the day the repurchase was recorded.
4. Volume restriction: The number of shares repurchased cannot exceed 25% of the average daily trading volume over the prior 3 days.

Firms are also restricted from undergoing open market share repurchases 15 days preceding the disclosure of performance reports or significant information that can affect the market. Firms must also file monthly reports of buyback activity during the duration of the repurchase program. Furthermore, if insiders (directors and associates) have sold their shares to the company, the COB requires information on a monthly basis.

2.1.3. Germany

In 1998 The Corporations Control and Transparency Act legalized open market share repurchases in Germany, prior to this all share buyback programs were considered illegal. Firm's engaging in buyback programs must disclose this information to the market through the Deutsche Gesellschaft für Ad hoc-Publizität (DGAP), which is the central financial news agency which divulges all financial information to the public on the behest of firms listed in the German Stock Exchange. Firms that engage in buyback programs must abide by the following restrictions:

1. Must obtain shareholder meeting approval.
2. Timing restriction: the repurchase must be completed within an 18-month time frame.
3. Price restriction: the maximum and minimum price must be determined at the shareholder meeting.
4. Volume restriction: repurchased shares cannot exceed 10% of total outstanding equity.

The Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin) is the regulating authority. It is one of the largest financial supervisory authorities in Europe. BaFin requires

firms to comply with the following restrictions. All firms must disclose buyback programs through financial statements. If a firm exceeds the volume restriction, it must be disclosed to the BaFin.

2.1.4. India

In 1998 India legalized the buyback of securities through the Securities and Exchange Board of India regulations (SEBI). Through these provisions' firms are required to comply with the following restrictions:

1. Must obtain board approval in the form of a passage of a special resolution
2. Timing restriction: the repurchase program must be completed within a 12-month time frame
3. Price restriction: the maximum price must be determined in the special resolution in the board meeting. The price at which shares are repurchased must depend on market forces.
4. Volume restriction: the maximum number of shares repurchased in the open market is 15% of outstanding shares.

In addition to the aforementioned restrictions, firms must also announce the repurchase program to SEBI at least 7 days prior to announcing it to the market. Once the firm has announced to the market, it must file an official report to SEBI within 2 days. Every time a firm buys back an additional 5% of its shares from the market it must publish this information to the national newspaper.

2.1.5. China

China enacted the legalization of share buybacks in 2005 through the provisions of the "Company Law", "Securities Law" and "Provisional Regulations on Stock Issuance and Transaction Management". All share buyback programs are regulated by the China Securities Regulatory Commission (CSRC). The commission requires firms to comply with the following restrictions:

1. Must obtain board approval for the repurchase to be approved.

2. Timing restriction: repurchase should be done in a 3-month timeframe after authorization
3. Price restriction: The maximum price of the repurchase should not exceed 5% of the average trading price over the previous 30 days
4. There are no volume restrictions as per the laws.

In addition to the aforementioned restrictions, firms are required to list their stocks for at least one year and firms must also be clear of any illegal activity in the preceding year to the announcement of the share buyback program.

2.1.6. Japan

In Japan prior to 1994 open market share repurchases were illegal; however, post the reform of the Commercial Law, firms were permitted to buy back shares. Due to significant tax burdens, many firms did not engage in buyback programs until the reform of the tax law in 1995. Preexisting this reform, firms were required to consider share repurchases as dividends which compelled income tax obligations on all shareholders. The regulating agency is the Tokyo Stock Exchange (TSE), and it requires all firms to comply with the following restrictions:

1. Must obtain board approval for the repurchase to be approved. Prior to 1997, a shareholder meeting approval was required.
2. Timing restrictions: repurchase trading is prohibited for the last 30 minutes of a trading day and the last week of the fiscal year.
3. Price restriction: share buybacks cannot exceed the maximum price of the preceding day.
4. Volume restriction: firms cannot buyback over 25% of daily outstanding shares.

Firms are required to disclose detailed information about the buyback program. If buyback transactions are executed on any given day, firms are required to submit a report to the TSE at the end of the trading day. Furthermore, an insider (director and associates) must not trade their own shares during a share buyback program and any conflicts of interest must be disclosed to the market.

2.1.7. Hong Kong

In Hong Kong, open market share repurchases were legalized in 1991 through amendments to the Companies Ordinance. All firm's engaging in share buyback programs are regulated by the Hong Kong Stock Exchange (HKEX). The regulatory body requires for firms to comply with the following restrictions:

1. Must obtain approval at shareholder's meeting for share repurchases to be authorized
2. Timing restriction: The share buyback program must be completed in a 12-month time frame
3. Volume restriction: Can repurchase a total of 10% of shares outstanding annually or 25% of shares outstanding traded in the previous month.

In addition to these restrictions, firms are prohibited in engaging in share buybacks one month prior to the announcement of annual earnings. Firms must also comply to HKEX listing rules and the Securities and Finance Ordinance in addition to the Companies Ordinance. After the repurchase of shares, the details and information must be filed with the HKEX no later than 9:30 AM the following trading day. Firms are also prohibited from purchasing shares from an insider (director and associates) or when they are aware of price sensitive information.

2.1.8. Other Markets

We condense the laws and the restrictions related to the open market share repurchase in Table 1. Besides the above-mentioned 7 representative markets, Table 1 also includes other 37 developed and emerging markets, including the United States, the United Kingdom, Canada , South Korea, Taiwan, Malaysia, Russian Federation, Sweden, Vietnam, Singapore, South Africa, Thailand, Israel, Brazil, Poland, Italy, Indonesia, Denmark, Switzerland, Norway, Turkey, Netherlands, Greece, Spain, Belgium, Chile, New Zealand, Mexico, Bulgaria, Finland, Sri Lanka, Jordan, Egypt, Peru, Ireland, Kuwait, and Austria.

Table 1 reports the laws related to the open market share repurchase deregulation and the legalized year across the 44 sample markets. There are 6 markets deregulated open market share repurchases earlier than 1985, including United States, United Kingdom, Canada, Brazil, Belgium, and Chile. Following these "pioneer" markets, open market share repurchases in 19 markets were legalized in 1990s, including Japan, India, Australia, South Korea, France, Hong

Kong, Germany, Malaysia, Russian Federation, Singapore, Israel, Switzerland, Norway, New Zealand, Bulgaria, Finland, Egypt, Peru, and Ireland. There are also 19 markets choose to deregulate the open market share repurchase in the first decade of the 21st century, including China, Taiwan, Sweden, Vietnam, South Africa, Thailand, Poland, Italy, Indonesia, Denmark, Netherlands, Greece, Spain, Mexico, Sri Lanka, Jordan, Kuwait, and Austria.

Table A1 reports the restrictions related to open market share repurchase across the 44 sample markets. Regarding timing restrictions there are 11 markets where regulations stipulate for firms to complete their open market share repurchase program within a 12-month time frame. These markets include: Canada, India, Australia, Hong Kong, Malaysia, Russian Federation, Brazil, Spain, Belgium, Chile and New Zealand. There are 6 markets that require firms to complete their share buyback program in an 18-month time frame. These markets include: United Kingdom, France, Italy, Netherlands, Bulgaria and Ireland. There are 5 markets that require firms to complete their share repurchase program in less than a 12-month time frame, these markets include: China, South Korea, Taiwan, Israel and Indonesia. There are 4 markets that require firms to complete share buyback programs in greater than an 18-month time frame, the markets include: Sweden, Singapore, Peru and Austria.

With regards to price restrictions, there are 9 markets that require firms to repurchase their shares at a price not exceeding the most recent price before the purchase. These markets include: United States, Japan, Canada, Italy, Denmark, Greece, Israel, Sweden and Mexico. There are 6 markets that restrict firms from repurchasing shares at a price over 5% the average price. These markets include: United Kingdom, China, Australia, South Korea, Singapore and Ireland. In the aforementioned markets, the calculation of the average price varies; in the United Kingdom, Australia, South Korea and Singapore the average price is calculated over the last 5 trading days, whilst in China the average price is calculated over the last 30 trading days. There are 5 markets that require for the price of share buybacks to be determined and approved in either the shareholder or board meeting. These markets include: India, Germany, Netherlands, Chile and Austria. There are 3 markets that require firms to repurchase their shares at a price exceeding 5% of the average price. These markets include: Malaysia, Thailand and Turkey.

With regards to volume restrictions there are 22 markets that prohibit firms from purchasing over 10% of outstanding shares of any class of equity. These markets include: Australia, Taiwan, Italy, Hong Kong, Germany, Malaysia, Russian Federation, Sweden, Singapore, South Africa, Thailand, Brazil, France, Switzerland, Norway, Turkey, Netherlands,

Greece, Bulgaria, Finland, Peru and Ireland. There are 10 markets that permit firms from purchasing over 10% of outstanding shares of any class of equity. These markets include: United States, Japan, United Kingdom, India, South Korea, Vietnam, Israel, Indonesia, Belgium and Chile. It should be noted that the quantity of outstanding shares is calculated using different time frames, Table A1 elucidates these differences. There are 3 markets that prohibit firms repurchasing over 5% of outstanding shares of any class of equity. These markets include Austria, Spain and Canada.

3. Sample Construction and Data Sources

3.1. Firm-Year Level Financial Data

To construct our samples, we first download all observations from Thomson Reuters Worldscope (Fundamentals Annual) database from 1980 (the base year) to 2018. Worldscope provides detailed financial statement data and profiles data on public firms around the world. Over 75 markets are represented, including all markets in markets global indices (FTSE All World, Dow Jones Global, MSCI World, MSCI EMF, S&P Global, S&P/Citigroup). In total, Worldscope covers approximately 84,000 active and inactive firms in developed and emerging markets, representing approximately 95% of global market capitalization as it claims.

We filter the dataset by keeping the observations of firms[2]. We are left with 1,109,961 firm-year observations from 84,303 firms. Due to data limitation, we drop the markets with less than 200 active and inactive firms. After making this adjustment, we end up with a panel dataset that covers 46 markets: the United States, Japan, the United Kingdom, Canada, China, India, Australia, South Korea, Taiwan, France, Hong Kong, Germany, Malaysia, Russian Federation, Sweden, Vietnam, Singapore, South Africa, Thailand, Israel, Brazil, Poland, Italy, Indonesia, Denmark, Switzerland, Norway, Turkey, Netherlands, Greece, Spain, Pakistan, Belgium, Chile, New Zealand, Philippines, Mexico, Bulgaria, Finland, Sri Lanka, Jordan, Egypt, Peru, Ireland, Kuwait, and Austria.

[2] We drop the observations if their *Entity Type* (Worldscope item 06100) not equal to "C". *Entity Type* represents a code used to indicate that the Worldscope Identifier represents either an average, company, exchange rate, ADR, security or a stock index. Code "C" stands for "company".

3.2. Open Market Share Repurchase Deregulation

We hand-collect the year of open market share repurchase deregulation for the above-mentioned markets in our dataset. To the best of our effort, we are able to document the year of deregulation for 44 markets except for Pakistan and Philippines. Table 1 documents the laws related to the open market share repurchase deregulation and the year of removing the restrictions across these markets. Table A1 reports the rules related to open market share repurchase of the 44 markets.

Next, we exclude the US, the UK, Canada, Brazil, Belgium, and Chile, as they deregulated open market share repurchases earlier than 1985. The earliest annual information contained on Worldscope is for 1980, which means that we have far few observations before the deregulations in these six "pioneer" markets. As for other markets in our dataset, open market share repurchases were legalized after 1990, which make it possible to employ more observations to analyze the influence of the deregulation. After making these adjustments, we are left with 623,657 firm-year observations from 44,665 firms.

4. Empirical Specification and Results

In this section, we present our main results from the firm-year level analysis, in which each observation represents the characteristics of a firm. We use difference-in-differences method (DID) to investigate the influence of open market share repurchase deregulation on a) Tobin's Q; b) cash holding, capital expenditures, and R&D expense; c) M&A; d) dividend; e) cash ETR; f) RoA.

4.1. Empirical Specification of DID Regressions

We use the following empirical specification to study:

$$Y_{i,t} = \alpha + \beta * D_{i,t} + \chi_{i,t} + \Phi_i + \Phi_t + \epsilon_{i,t} \quad (1)$$

The dependent variable $Y_{i,t}$ is one of the financial measures of firm i in year t. $D_{i,t}$ indicates whether the firm i in the market that deregulated open market share repurchase in year t. This dummy variable equals one in the years after market deregulates and zero otherwise. We control for a number of firm-year level financial characteristics in χ_{it}, including the natural

logarithm of total assets, the natural logarithm of net sales, the natural logarithm of net income, and leverage. We include firm dummies and year dummies in all regressions, and the firm dummies also absorb the fixed effects of industry and market.

4.2. Empirical Results

In this subsection, our empirical results are presented in two major blocks. First, we show that there is a significant positive impact of share repurchase deregulation on firm performance. Second, we go into more detail on the resource allocation within the firm, showing that firms in deregulated markets have lower cash in hand, lower capital expenditure, lower M&A expense, pay less dividend, lower cash ETR and higher RoA. We also split our sample into two subsamples, containing firms in developed markets and firms in developing markets, separately. By doing so, we are able to analyze the difference between the influence of share repurchase deregulation in developed and developing markets.

According to the FTSE Criteria, the 38 markets in our sample are classified into developed markets and developing markets. The developed markets include Japan, Australia, South Korea, France, Hong Kong, Germany, Sweden, Singapore, Israel, Poland, Italy, Denmark, Switzerland, Norway, Netherlands, Spain, New Zealand, Finland, Ireland, and Austria. The developing markets include China, India, Taiwan, Malaysia, Russia, Vietnam, South Africa, Thailand, Indonesia, Turkey, Greece, Mexico, Bulgaria, Sri Lanka, Jordan, Egypt, Peru, and Kuwait.

4.2.1. Tobin's Q

Table 4 lists the DID regressions that link open market share repurchase deregulation and Tobin's Q. It shows that deregulation significantly enhances firm's Tobin's Q.

The sample is at firm-year level. The dependent variable is *Tobin's Q*. As described in Table 2, *Tobin's Q* is calculated as (*Total Assets* + *Market Value of Equity* - *Book Value of Equity*) / *Total Assets*. It is winsorized at the 1% and 99% levels. We control for *Total Asset (log)*, *Net Sales (log)*, *Net Income (log)*, and *Leverage*, together with the fixed effect of firm and year.

Column (1) use the sample of all firms in our sample as the baseline results. The estimated coefficient of *Deregulation* is positive and significant. This result suggests a positive impact of deregulation on firm performance. In terms of the economic magnitude of our estimates, *Tobin's Q* will be marginally higher by 0.178 if the firm in the market that deregulated open market share repurchase.

We next turn to Column (2), where we focus on the firms in developed markets. The independent variable, *Deregulation*, enters insignificantly in Column (2). Comparing with the results of Column (3), it is clear that the positive impact of deregulation is mainly driven by the firms in developing markets, since the positive impact of deregulation on Tobin's Q is significant for firms in developing markets. In terms of the economic magnitude of our estimates, *Tobin's Q* will be marginally higher by 0.117 if the firm in the developing market that deregulated open market share repurchase.

The results suggest that firms in the deregulated markets will have a significantly higher *Tobin's Q*, implying a positive impact of share repurchase deregulation on firms' performance. Besides, the positive impact is mainly driven by firms in developing markets.

4.2.2. Dynamics of Deregulation and the Firm Performance

We next examine the dynamics of the impact of the open market share repurchase deregulation on firm performance. We do this by including a series of dummy variables in the standard regression to trace out the year-by-year effects of repurchase deregulation on Tobin's Q:

$$Tobin's\ Q_{i,t} = \alpha + \beta_1 * D_{i,t}^{-5} + \beta_2 * D_{i,t}^{-4} + \cdots + \beta_{15} * D_{i,t}^{+10} + \chi_{i,t} + \Phi_i + \Phi_t + \epsilon_{i,t} \quad (2)$$

where the dependent variable is *Tobin's Q* of firm *i* in year *t*. The deregulation dummy variables, the "*D*'s," equal zero, except as follows: $D_{i,t}^{-j}$ equals one for markets in the *j*th year before deregulation, while $D_{i,t}^{+j}$ equals one for markets in the *j*th year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on Tobin's Q relative to the year of deregulation. The vectors Φ_i and Φ_t are vectors of firm and year dummy variables, respectively. At the end-points, $D_{i,t}^{-5}$ equals one for all years that are 5 or more years before deregulation, while $D_{i,t}^{+10}$ equals one for all years that are 10 or more years

after deregulation. Thus, there is a much greater variance for these end-points and the estimates may be measured with less precision. Figure 1 plots the results and the 95% confidence intervals, which are adjusted for firm-level clustering.

Figure 1 illustrates that the impact of deregulation on Tobin's Q materializes very quickly. As shown, the coefficients on the deregulation dummy variables are insignificantly different from zero for all years before deregulation, with no trends in Tobin's Q prior to deregulation. Next, note that Tobin's Q boosts immediately after deregulation, such that D^{+1} is positive and significant at the 5% level. Thus, the particular mechanisms and channels connecting deregulation with the firm performance must be fast acting.

4.2.3. Cash, CapEx and R&D Expense

Table 5 lists the DID regressions that link open market share repurchase deregulation and firm's cash holding, capital expenditures, and R&D expense. The dependent variables of interest are *Cash % Total Assets*, *Capital Expenditure % Total Assets*, and *R&D Expense % Total Assets*. As described in Table 2, *Cash % Total Assets* is the liquidity ratio (Worldscope item 08111) that obtained from Worldscope directly. *Capital Expenditure % Total Assets* is the asset utilization ratio (Worldscope item 08416) that obtained from Worldscope directly. *R&D Expense % Total Assets* is calculated as (*Research & Development Expense* / *Total Assets*) * 100.

Columns (1) - (3) use the sample of all firms in our sample as the baseline results. Estimated coefficients of *Deregulation* are negative and significant when the dependent variables are *Cash % Total Assets* and *Capital Expenditure % Total Assets*. These results suggest a negative impact of deregulation on firm's cash holding and capital expenditure. In terms of the economic magnitude of our estimates, *Cash % Total Assets* and *Capital Expenditure % Total Assets* will be marginally lower by 0.957 and 0.917 if the firm in the market that deregulated open market share repurchase, respectively. The independent variable, *Deregulation*, enters insignificantly in Column (3), suggests that the influence of deregulation in insignificantly for R&D expense.

The subsample analysis indicates that the negative impact of deregulation on cash holding is mainly driven by the firms in developing markets, since the *Deregulation* enters insignificantly in Column (4) and extreme negative in Column (7). As of capital expenditure,

the negative impact of deregulation is spread to firms in developed markets and firms in developing markets, as shown in Column (5) and Column (8). In terms of R&D expense, the results of Column (6) and Column (9) denote that there is a mixed influence of deregulation on R&D expense. The firms in developed markets invest less in R&D after the deregulation, whereas the firms in developing markets spend more on R&D when the open market share repurchase are legalized.

The results suggest that firms in the deregulated markets will have a significantly lower Cash and CapEx, implying a resource reallocation behavior within the firm after the share repurchase deregulation. Besides, the restriction removal has mixed effects on R&D expenditure.

4.2.4. Mergers and Acquisitions

Table 6 lists the DID regressions that link open market share repurchase deregulation and M&A activities. The dependent variable of interest is *Net Assets from Acquisitions % Total Assets*. As described in Table 2, *Net Assets from Acquisitions % Total Assets* is calculated as (*Net Assets from Acquisitions* / *Total Assets*) * 100), where *Net Assets from Acquisitions* (Worldscope item 04355) represent assets acquired through pooling of interests or mergers.

Column (1) uses the sample of all firms in our sample as the baseline results. Column (2) uses the sample contains the firms in developed markets. Column (3) uses the sample contains the firms in developing markets. The analysis indicates that the negative impact of deregulation on *Net Assets from Acquisitions % Total Assets*, for all firms in developed markets and in developing markets. In terms of the economic magnitude of our estimates, *Net Assets from Acquisitions % Total Assets* will be marginally lower by 0.110 if the firm in the market that deregulated open market share repurchase.

The results suggest that firms in the deregulated markets will have a significantly lower expense on M&A, implying a resource reallocation behavior within the firm after the share repurchase deregulation.

4.2.5. Dividend

Table 7 lists the DID regressions that link open market share repurchase deregulation and Dividend. The dependent variable of interest is *Dividend % Cash*. As described in Table 2, the ratio is calculated as *(Dividends / Cash)* * 100.

Column (1) uses the sample of all firms in our sample as the baseline results. Column (2) uses the sample contains the firms in developed markets. Column (3) uses the sample contains the firms in developing markets. The analysis indicates that the negative impact of deregulation on dividend payout, for all firms in developed markets and in developing markets. In terms of the economic magnitude of our estimates, *Dividend % Cash* will be marginally lower by 57.41 if the firm in the market that deregulated open market share repurchase.

We next turn to Columns (2) - (3), where we focus on the firms in developed and developing markets separately. The independent variable, *Deregulation*, enters insignificantly in Column (2). Comparing with the results of Column (3), it is clear that the negative impact of deregulation is mainly driven by the firms in developing markets, since the negative impact of deregulation on the dividend is even larger among the firms in developing markets. In terms of the economic magnitude of our estimates, *Dividend % Cash* will be marginally lower by 59.87 if the firm in the developing market that deregulated open market share repurchase.

The results suggest that firms in the deregulated markets pay less dividend, implying a resource reallocation behavior within the firm after the share repurchase deregulation.

4.2.6. Tax

Table 8 lists the DID regressions that link open market share repurchase deregulation and firm's cash ETR. The dependent variable, *Cash* ETR, is calculated as *Taxes Paid / (Pre-tax Income - Discontinued Operations - Extraordinary Items)*.

Column (1) uses the sample of all firms in our sample as the baseline results. Column (2) uses the sample contains the firms in developed markets. Column (3) uses the sample contains the firms in developing markets. In particular, China is excluded from this analysis since it has a special tax system. The analysis indicates that allowing repurchasing firms' stocks on the secondary market decreases effective tax rate in developed markets, in developing markets and in general. In terms of the economic magnitude of our estimates, *Cash ETR* will

be marginally higher by 1.494 and 2.608 if the firm in the developed markets and developing markets that deregulated open market share repurchase, respectively.

The results suggest that firms in the deregulated markets will have a significantly lower Cash ETR, implying a positive impact of the share repurchase deregulation on firm's tax avoidance.

4.2.7. RoA

Table 9 lists the DID regressions that link open market share repurchase deregulation and RoA. It shows that deregulation significantly enhances firm's RoA.

The dependent variable *RoA*, as described in Table 2, is the profitability ratio (Worldscope item 08326) that obtained from Worldscope directly. Column (1) uses the sample of all firms in our sample as the baseline results. Column (2) uses the sample contains the firms in developed markets. Column (3) uses the sample contains the firms in developing markets. The analysis indicates that allowing repurchasing firms' stocks on the secondary market enhances RoA of firms in developed markets, in developing markets and in general. In terms of the economic magnitude of our estimates, *RoA* will be marginally lower by 0.394 if the firm in the market that deregulated open market share repurchase.

The results suggest that firms in the deregulated markets will have a significantly higher *RoA*, implying a positive impact of share repurchase deregulation on firm performance.

5. Conclusion

In this paper, we construct a unique collection of 38 countries' deregulation laws that remove the restrictions of the open market stock repurchase. We utilize the yearly variation across the international market on the restrictions to explore the causal impact of the open market stock repurchase on corporate behaviors. We find that allowing repurchasing firms' stocks on the secondary market decreases cash holding, capital expenditure, mergers and acquisitions and effective tax rate in developed markets, in developing markets and in general. However, the restriction removal has mixed effects on dividend payout policies and R&D expenditure. Overall, the deregulation increases firms' return on assets and Tobin's Q.

References

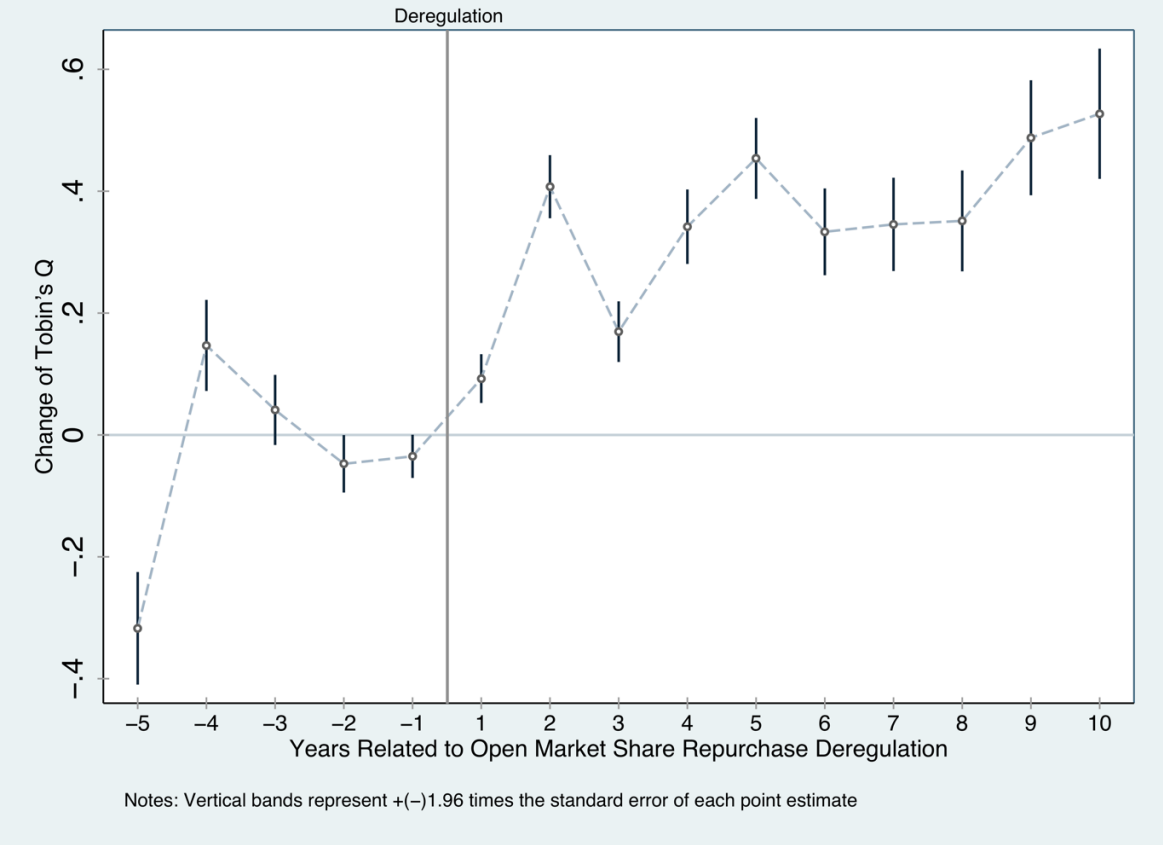
1. Almeida, H., Fos, V., & Kronlund, M. (2016). The Real Effects of Share Repurchases. *Journal of Financial Economics*, 119(1), 168-185.
2. Beck, T., Levine, R., & Levkov, A. (2010). Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States. *Journal of Finance*, 65(5), 1637-1667.
3. Ben-Rephael, A., Oded, J., & Wohl, A. (2014). Do Firms Buy Their Stock at Bargain Prices? Evidence from Actual Stock Repurchase Disclosures. *Review of Finance*, 18(4), 1299-1340.
4. Billett, M. T., & Xue, H. (2007). The Takeover Deterrent Effect of Open Market Share Repurchases. *Journal of Finance*, 62(4), 1827-1850.
5. Brockman, P., & Chung, D. Y. (2001). Managerial Timing and Corporate Liquidity: Evidence from Actual Share Repurchases. *Journal of Financial Economics*, 61(3), 417-448.
6. Chava, S., Oettl, A., Subramanian, A., & Subramanian, K. V. (2013). Banking Deregulation and Innovation. *Journal of Financial Economics*, 109(3), 759-774.
7. Chemmanur, T., Y. Cheng, and T. Zhang. 2010. Why do Firms Undertake Accelerated Share Repurchase Programs? Working Paper, Boston College.
8. Cheng, Y., Harford, J., & Zhang, T. T. (2015). Bonus-driven Repurchases. *Journal of Financial and Quantitative Analysis*, 50(3), 447-475.
9. Cook, D. O., Krigman, L., & Leach, J. C. (2003). On the Timing and Execution of Open Market Repurchases. *Review of Financial Studies*, 17(2), 463-498.
10. Dann, L., 1981. Common Stock Repurchases: An Analysis of Returns to Bondholders and Shareholders. *Journal of Financial Economics*, 9(2), 113–138.
11. Emilsson, M., & Larsson, S. (2000). Accounting for Own Shares - An analysis of a New Equity Instrument in Sweden (Unpublished master's dissertation). Göteborg University, Gothenburg, Sweden.
12. Fama, E. F., & French, K. R. (2001). Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?. *Journal of Financial Economics*, 60(1), 3-43.
13. Fenn, G. W., & Liang, N. (2001). Corporate Payout Policy and Managerial Stock Incentives. *Journal of Financial Economics*, 60(1), 45-72.
14. Firth, M., & Yeung, C. S. (2005). An Empirical Investigation of Share Buybacks in Hong Kong. *Journal of Emerging Market Finance*, 4(3), 207-225.
15. Gao, H., Harford, J., & Li, K. (2013). Determinants of Corporate Cash Policy: Insights from Private Firms. *Journal of Financial Economics*, 109(3), 623-639.
16. Ginglinger, E., & L'her, J. F. (2006). Ownership Structure and Open Market Stock Repurchases in France. *European Journal of Finance*, 12(1), 77-94.
17. Grullon, G., & Michaely, R. (2002). Dividends, Share Repurchases, and the Substitution Hypothesis. *Journal of Finance*, 57(4), 1649-1684.

18. Guay, W., & Harford, J. (2000). The Cash-flow Permanence and Information Content of Dividend Increases Versus Repurchases. *Journal of Financial Economics*, 57(3), 385-415.
19. Harford, J. (1999). Corporate Cash Reserves and Acquisitions. *Journal of Finance*, 54(6), 1969-1997.
20. Hong, H., Wang, J., & Yu, J. (2008). Firms as Buyers of Last Resort. *Journal of Financial Economics*, 88(1), 119-145.
21. IBA Corporate and M&A Law Committee. (2014). Brazil: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
22. IBA Corporate and M&A Law Committee. (2014). Canada: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
23. IBA Corporate and M&A Law Committee. (2014). Chile: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
24. IBA Corporate and M&A Law Committee. (2014). Ireland: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
25. IBA Corporate and M&A Law Committee. (2014). Israel: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
26. IBA Corporate and M&A Law Committee. (2014). Italy: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
27. IBA Corporate and M&A Law Committee. (2014). Netherlands: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
28. IBA Corporate and M&A Law Committee. (2014). Peru: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
29. IBA Corporate and M&A Law Committee. (2014). Spain: Treasury Shares Guide. Retrieved from https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=3ab49ee4-2a6c-413f-92c6-4c604422011e
30. Indonesia - Buybacks of Shares by Public Companies. (2009). Retrieved from https://www.worldservicesgroup.com/publications.asp?action=article&artid=2729
31. Isa, M., Ghani, Z., & Lee, S. P. (2011). Market Reaction to Actual Share Repurchase in Malaysia. *Asian Journal of Business and Accounting*, 4(2), 27-46.

32. Jagannathan, M., Stephens, C. P., & Weisbach, M. S. (2000). Financial Flexibility and the Choice between Dividends and Stock Repurchases. *Journal of Financial Economics,* 57(3), 355-384.
33. Jung, S. C., Lee, Y. G., & Thornton Jr, J. H. (2005). An Empirical Comparison between Operations of Stabilization Funds and Stock Repurchases in Korea. *Pacific-Basin Finance Journal*, 13(3), 319-341.
34. Kim, J., Schremper, R., & Varaiya, N. (2004). Open Market Repurchase Regulations: Open Market Repurchase Regulations: A Cross-country Examination. *Corporate Finance Review*, 9(4), 29-38.
35. Lamont, O. (1997). Cash Flow and Investment: Evidence from Internal Capital Markets. *Journal of Finance*, 52(1), 83-109.
36. Market Profiles: Egypt. (2018). Retrieved from https://www.rbcits.com/en/gmi/global-custody/market-profiles/market.page?dcr=templatedata/globalcustody/marketprofiles/data/egypt
37. Naydenov, Y. (2014). Bulgaria Takeover Guide. Retrieved from https://www.ibanet.org/document/default.aspx?documentuid=fb126755-7760-4aca-9495-6a2fddad8073
38. Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The Determinants and Implications of Corporate Cash Holdings. *Journal of Financial Economics*, 52(1), 3-46.
39. Parliament of the Democratic Socialist Republic of Sri Lanka. (2007). Retrieved from http://www.parliament.lk/uploads/acts/gbills/english/3776.pdf
40. Pitts, A. (2015). Securities Finance. Getting the Deal through. Retrieved from http://www.weber.co.at/tl_files/dateien/downloads/sf2015-austria-christoph-moser.pdf
41. Rau, P. R., & Vermaelen, T. (2002). Regulation, Taxes, and Share Repurchases in the United Kingdom. *Journal of Business*, 75(2), 245-282.
42. Sabri, N. R. (2003). Using Treasury" Repurchase" Shares to Stabilize Stock Markets. International *Journal of Business*, 8(4), 425-450.
43. Securities and Exchange Board of India (Buy Back of Securities) Regulations. (1998). Retrieved from https://www.sebi.gov.in/acts/buybackreg.html
44. Seifert, U., & Stehle, R. (2005). Stock Performance Around Share Repurchase Announcements in Germany. Working Paper, Humboldt University of Berlin.
45. Skinner, D. J. (2008). The Evolving Relation between Earnings, Dividends, and Stock Repurchases. *Journal of Financial Economics*, 87(3), 582-609.
46. Tabtieng, N. (2013). Motivations for Share Repurchase Programs and the Effect of Share Prices on Managerial Decisions to End Share Repurchase Programs in Thailand. *International Journal of Business and Social Science*, 4(10), 257-266.
47. The Securities Law. (2002). Retrieved from https://www.exchange.jo/en/legislation/laws/securities-law
48. Van Holder, T., Van de Kerckhove, J., & Heyman, D. (2015). The Effect of Share Repurchases in Belgium and the Netherlands (Unpublished master's dissertation). University of Ghent, Gent, Belgium.

49. Wang, L. H., Lin, C. H., Fung, H. G., & Chen, H. M. (2013). An Analysis of Stock Repurchase in Taiwan. *International Review of Economics & Finance*, 27(3), 497-513.
50. Wrońska-Bukalska, E. (2014). Announced Reasons and Anticipated Results of Share Repurchase Programs-Case of Warsaw Stock Exchange Companies. *Acta Universitatis Lodziensis Folia Oeconomica*, 2(301), 237-247
51. Young, S., & Yang, J. (2011). Stock Repurchases and Executive Compensation Contract Design: The Role of Earnings Per Share Performance Conditions. *The Accounting Review*, 86(2), 703-733.

Figure 1. The Dynamic Impact of Deregulation on Tobin's Q



The figure plots the impact of open market share repurchase deregulation on Tobin's Q of firms. We consider a 15-year window, spanning from 5 years before deregulation until 10 years after deregulation. The vertical bands represent 95% confidence intervals, adjusted for firm-level clustering. Specifically, we report the estimated coefficients from the following regression:

$$Tobin's\ Q_{i,t} = \alpha + \beta_1 * D_{i,t}^{-5} + \beta_2 * D_{i,t}^{-4} + \cdots + \beta_{15} * D_{i,t}^{+10} + \chi_{i,t} + \Phi_i + \Phi_t + \epsilon_{i,t}$$

The D's equal zero, except as follows: D^{-j} equals one for markets in the jth year before deregulation, while D^{+j} equals one for markets in the jth year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on Tobin's Q relative to the year of deregulation. Φ_i and Φ_t are vectors of firm and year dummy variables that account for firm and year fixed effects, respectively. This figure plots the results and the 95% confidence intervals, which are adjusted for firm-level clustering.

Table 1. Selected Open Market Share Repurchase Deregulation

Market	Year	Law	Referring Literature
United States	1982	SEC Rule 10b-18	Cook, D. O., Krigman, L., & Leach, J. C. (2003) Kim, J., Schremper, R., & Varaiya, N. (2004)
Japan	1995	Commercial Law (1994), Tax Reform Act (1995)	Sabri, N. R. (2003) Kim, J., Schremper, R., & Varaiya, N. (2004)
United Kingdom	1981	The Companies Act 1981	Rau, P. R., & Vermaelen, T. (2002) Kim, J., Schremper, R., & Varaiya, N. (2004)
Canada	1985	Canada Business Corporations Act	IBA Corporate and M&A Law Committee. (2014) Justice Laws. (2018)
China	2005	Administration of Repurchase of Public Shares by Listed Companies Procedures (Trial Implementation)	Administration of Repurchase of Public Shares by Listed Companies Procedures (Trial Implementation). (2005)
India	1998	SEBI's Buy Back of Securities Regulation	SEBI's Buy Back of Securities Regulation. (1998) Jena, S. K., Mishra, C. S., & Rajib, P. (2016)
Australia	1995	First Corporations Law Simplification Bill	Sabri, N. R. (2003) Akyol, A. C., & Foo, C. C. (2013)
South Korea	1994	Securities Act	Jung, S. C., Lee, Y. G., & Thornton Jr, J. H. (2005)
Taiwan	2000	Securities and Exchange Act	Wang, L. H., Lin, C. H., Fung, H. G., & Chen, H. M. (2013)
France	1998	The 1998 Law Reform	Kim, J., Schremper, R., & Varaiya, N. (2004) Ginglinger, E., & L'her, J. F. (2006)
Hong Kong	1991	Companies (Amendment) Ordinance	Kim, J., Schremper, R., & Varaiya, N. (2004) Firth, M., & Yeung, C. S. (2005)
Germany	1998	Aktiengesetz	Kim, J., Schremper, R., & Varaiya, N. (2004) Seifert, U., & Stehle, R. (2005)
Malaysia	1997	Malaysian Companies Act	Isa, M., Ghani, Z., & Lee, S. P. (2011) Isa, M., & Lee, S. P. (2014)
Russia	1995	Federal Law on Joint Stock Companies (LJSC)	An Overview of the Glass Lewis Approach to Proxy Advice: Russia. (2017)

Table 2. Sample Construction and Variable Definition

This table presents how we construct the sample and the definitions of the dependent, independent, and control variables.

	Sample Construction
Firm-Year Level Sample	Each firm-year observation contains the firm characteristics and the financial indicators of a firm in a given year. To construct our samples, we first download all observations from Thomson Reuters Worldscope (Fundamentals Annual) database from 1980 (the base year) to 2018. We filter the dataset by keeping the observations of companies. We first drop the economies with less than 200 active and inactive companies. Next, we exclude Pakistan and Philippines since we cannot find the law related to share repurchase. We also exclude United States, United Kingdom, Canada, Brazil, Belgium, and Chile, as they deregulated open market share repurchases earlier than 1985. After making this adjustment, we end up with a panel dataset that covers 38 economies: Japan, China, India, Australia, Korea (South), Taiwan, France, Hong Kong, Germany, Malaysia, Russian Federation, Sweden, Vietnam, Singapore, South Africa, Thailand, Israel, Poland, Italy, Indonesia, Denmark, Switzerland, Norway, Turkey, Netherlands, Greece, Spain, Pakistan, New Zealand, Philippines, Mexico, Bulgaria, Finland, Sri Lanka, Jordan, Egypt, Peru, Ireland, Kuwait, and Austria. We are left with 623,657 observations from 44,665 companies.
	Dependent Variables
Tobin's Q	Tobin's Q is calculated as [Total Assets (Worldscope item 07230) plus Market Value of Equity (Worldscope item 07210) minus Book Value of Equity (Worldscope item 07220)] divided by Total Assets (Worldscope item 07230). Obtained from Thomson Reuters Worldscope. Winsorized at level 1% and 99% levels.
RoA	Profitability Ratio. Obtained from Thomson Reuters Worldscope directly (Worldscope item 08326). Winsorized at level 1% and 99% levels.
Cash	The ratio of cash to total assets (in percentage). Calculated as (Cash & Equivalents / Current Assets-Total) * 100. Obtained from Thomson Reuters Worldscope directly (Worldscope item 08111). Winsorized at level 1% and 99% levels.
CapEx	The ratio of capital expenditure to total assets (in percentage). Calculated as (Capital Expenditures / Last Year's Total Assets) * 100. Obtained from Thomson Reuters Worldscope directly (Worldscope item 08416). Winsorized at level 1% and 99% levels.
R&D	The ratio of R&D expense to total assets (in percentage). Calculated as (Research & Development Expense / Total Assets) * 100. Research & Development Expense (Worldscope item 01201) represents all direct and indirect costs related to the creation and development of new processes, techniques, applications and products with commercial possibilities. Obtained from Thomson Reuters Worldscope. Winsorized at level 1% and 99% levels.
Net Assets from Acquisitions	The ratio of net assets from acquisitions to total assets (in percentage). Calculated as (Net Assets from Acquisitions / Total Assets) * 100. Net Assets from Acquisitions (Worldscope item 04355) represent assets acquired through pooling of interests or mergers. Obtained from Thomson Reuters Worldscope. Winsorized at level 1% and 99% levels.
Cash ETR	Annual Cash ETR, calculated as Taxes Paid (Worldscope item 01451) divided by [Pre-tax Income (Worldscope item 01401) less Discontinued Operations (Worldscope item 04054) & Extraordinary Items (Worldscope item 04225)]. It is set to missing if the denominator is negative. Obtained from Thomson Reuters Worldscope. Winsorized at level 1% and 99% levels.
Dividend / Net Income Ratio	The ratio of dividend to net income (in percentage). Calculated as (Dividends / Net Income - Bottom Line) * 100. Obtained from Thomson Reuters Worldscope. Winsorized at level 1% and 99% levels.
Dividend / Cash Ratio	The ratio of dividend to cash (in percentage). Calculated as (Dividends / Cash) * 100. Obtained from Thomson Reuters Worldscope. Winsorized at level 1% and 99% levels.
	Independent Variable
Deregulation	This dummy variable equals one in the years after market deregulates and zero otherwise.
	Control Variables

Total Assets (log)	Natural logarithm of Total Assets (Worldscope item 07230). Total Assets represent the total assets of the company converted to U.S. dollars using the fiscal year end exchange rate. Obtained from Thomson Reuters Worldscope.
Net Sales (log)	Natural logarithm of Net Sales or Revenues (Worldscope item 07240). Net Sales represents the net sales or revenues of the company converted to U.S. dollars using the fiscal year end exchange rate. Obtained from Thomson Reuters Worldscope.
Net Income (log)	Natural logarithm of Net Income (Worldscope item 07250). Net Income represents the net income of the company converted to U.S. dollars using the fiscal year end exchange rate. Obtained from Thomson Reuters Worldscope.
Leverage	Leverage Ratio (Worldscope item 08236). Calculated by Total Debt % Total Assets. Obtained from Thomson Reuters Worldscope.

Table 3. Summary Statistics

	All Markets				Developed Markets				Developing Markets			
	Obs	Mean	Std. Dev	Median	Obs	Mean	Std. Dev	Median	Obs	Mean	Std. Dev	Median
Dependent Variables												
Tobin's Q	518841	1.76	3.36	1.12	319187	1.71	3.36	1.1	199654	1.86	3.36	1.18
RoA	543907	0.49	28.46	3.73	327473	-1.8	31.67	3.03	216434	3.95	22.33	5.03
Cash % Total Assets	522007	31.63	25.91	24.98	306017	34.47	26.53	27.65	215990	27.62	24.47	20.92
Capital Expenditure % Total Assets	491880	6.38	10.62	3.04	289014	6.07	10.47	2.93	202866	6.82	10.82	3.21
R&D Expense % Total Assets	184983	3.34	8.93	1.04	115377	3.97	10.52	1.17	69606	2.3	5.18	0.84
Net Assets from Acquisitions % Total Assets	368995	0.66	2.98	0	206588	0.84	3.35	0	162407	0.44	2.39	0
Dividend % Net Income	75089	7.98	27.2	0.45	30556	8.29	27.99	0.52	44533	7.77	26.65	0.41
Dividend % Cash	71088	43.64	223.74	0.97	29201	41.82	224.61	0.89	41887	44.91	223.13	1.03
Cash ETR	502855	27.82	26.22	24.52	293100	31.3	27.87	28.92	209755	22.97	22.85	20.25
Independent Variables												
Deregulation	638039	0.83	0.38	1	377769	0.81	0.39	1	260270	0.86	0.35	1
Control Variables												
Total Assets (log)	597829	18.87	2.35	18.8	356672	19.11	2.43	19.05	241157	18.51	2.17	18.47
Net Sales (log)	597168	18.02	3.38	18.42	355676	18.27	3.54	18.78	241492	17.65	3.1	17.97
Net Income (log)	455252	15.8	2.25	15.83	261991	16.04	2.18	16	193261	15.47	2.3	15.6
Leverage	580700	24.18	26.33	19.25	347489	23.39	25.4	18.38	233211	25.36	27.63	20.54

Table 4. Share Repurchase Deregulation and Firm Value

The table presents the impact of open market share repurchase deregulation on firm value. The sample is at firm-year level. Each observation contains a firm's characteristics. Column (1) uses the sample of all firms. Column (2) uses the sample only containing the firms in developed markets. Column (3) uses the sample only containing the firms in developing markets. The dependent variable of interest is *Tobin's Q*. As described in Table 2, *Tobin's Q* is calculated as (*Total Assets* + *Market Value of Equity* - *Book Value of Equity*) / *Total Assets*. The independent variable of interest is *Deregulation*, which equals one in the years after the markets deregulate and zero otherwise. We control for *Total Asset (log), Net Sales (log), Net Income (log),* and *Leverage*. The dependent variable is winsorized at the 1% and 99% levels. In each regression, we also control for the firm fixed effect and year fixed effect. Robust t-statistics are in parentheses, which are adjusted for firm-level clustering. ***, ** and * denotes 1%, 5% and 10% statistical significance.

	(1)	(2)	(3)
	All Markets	Developed Markets	Developing Markets
		Tobin's Q	
Deregulation	0.178***	-0.00774	0.117***
	(7.07)	(-0.30)	(3.25)
Total Assets (log)	-0.754***	-0.649***	-0.969***
	(-19.25)	(-13.82)	(-13.92)
Net Sales (log)	-0.00354	0.00696	-0.0239
	(-0.27)	(0.43)	(-1.15)
Net Income (log)	0.215***	0.179***	0.278***
	(25.98)	(17.80)	(19.00)
Leverage	0.00905***	0.0100***	0.00845***
	(6.27)	(5.56)	(3.69)
Firm Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Cluster at Firm Level	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Observations	383,251	229,256	153,995
R-squared	0.560	0.550	0.571

Table 5. Share Repurchase Deregulation, Cash, CapEx and R&D Expense

The table presents the impact of open market share repurchase deregulation on firm's cash holding, capital expenditure, and R&D expense. The sample is at firm-year level. Each observation contains a firm's characteristics. Columns (1) - (3) use the sample of all firms. Columns (4) - (6) use the sample only containing the firms in developed markets. Columns (7) - (9) use the sample only containing the firms in developing markets. The dependent variables of interest are *Cash*, *CapEx*, and *R&D*. As described in Table 2, *Cash* is the ratio of cash to total assets (in percentage), which is calculated as (*Cash & Equivalents* / *Current Assets-Total*) * 100. *CapEx* is the ratio of capital expenditure to total assets (in percentage), which is calculated as (*Capital Expenditures* / *Last Year's Total Assets*) * 100. *R&D* is the ratio of R&D expense to total assets (in percentage), which is calculated as (*Research & Development Expense* / *Total Assets*) * 100. The independent variable of interest is *Deregulation*, which equals one in the years after the markets deregulate and zero otherwise. We control for *Total Asset (log), Net Sales (log), Net Income (log)*, and *Leverage*. The dependent variables are winsorized at the 1% and 99% levels. In each regression, we also control for the firm fixed effect and year fixed effect. Robust t-statistics are in parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All Markets			Developed Markets			Developing Markets		
	Cash	Capital Expenditure	R&D Expense	Cash	Capital Expenditure	R&D Expense	Cash	Capital Expenditure	R&D Expense
Deregulation	-0.957***	-0.917***	0.0585	0.381	-0.706***	-0.160*	-4.310***	-0.467***	0.184***
	(-4.65)	(-8.79)	(1.20)	(1.33)	(-4.98)	(-1.72)	(-13.61)	(-2.84)	(3.09)
Total Assets (log)	2.030***	-0.0904	-1.072***	2.663***	-0.0784	-1.254***	1.074***	0.110	-0.886***
	(14.93)	(-1.26)	(-11.70)	(13.14)	(-0.81)	(-8.32)	(5.77)	(1.02)	(-13.42)
Net Sales (log)	-2.602***	-0.262***	0.502***	-2.874***	-0.157**	0.517***	-2.386***	-0.388***	0.469***
	(-25.45)	(-5.73)	(10.92)	(-18.18)	(-2.51)	(7.57)	(-17.81)	(-5.82)	(8.27)
Net Income (log)	1.206***	0.506***	-0.0251	1.035***	0.269***	-0.00808	1.526***	0.747***	-0.0478***
	(30.65)	(23.19)	(-1.60)	(20.51)	(10.56)	(-0.36)	(25.38)	(20.18)	(-2.67)
Leverage	-0.163***	0.0295***	0.00227	-0.155***	0.0236***	0.00579	-0.174***	0.0351***	-0.00282**
	(-34.80)	(12.24)	(0.45)	(-23.14)	(7.30)	(0.71)	(-26.69)	(9.76)	(-2.22)
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Firm Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	385,613	366,575	140,893	217,560	207,614	84,326	168,053	158,961	56,567
R-squared	0.717	0.431	0.829	0.735	0.451	0.823	0.697	0.412	0.839

Table 6. Share Repurchase Deregulation and M&A

The table presents the impact of open market share repurchase deregulation on M&A. The sample is at firm-year level. Each observation contains a firm's characteristics. Column (1) uses the sample of all. Column (2) uses the sample only containing the firms in developed markets. Column (3) uses the sample only containing the firms in developing markets. The dependent variable of interest is *Net Assets from Acquisitions*. As described in Table 2, *Net Assets from Acquisitions is* the ratio of net assets from acquisitions to total assets (in percentage), which is calculated as *(Net Assets from Acquisitions / Total Assets) * 100*. The independent variable of interest is *Deregulation*, which equals one in the years after the markets deregulate and zero otherwise. We control for *Total Asset (log), Net Sales (log), Net Income (log),* and *Leverage*. The dependent variable is winsorized at the 1% and 99% levels. In each regression, we also control for the firm fixed effect and year fixed effect. Robust t-statistics are in parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance.

	(1)	(2)	(3)
	All Markets	Developed Markets	Developing Markets
	Net Assets from Acquisitions		
Deregulation	-0.110***	-0.197***	0.00320
	(-2.96)	(-2.86)	(0.07)
Total Assets (log)	0.392***	0.422***	0.350***
	(18.28)	(13.09)	(12.91)
Net Sales (log)	-0.0866***	-0.0958***	-0.0734***
	(-8.06)	(-6.46)	(-4.79)
Net Income (log)	0.0468***	0.0533***	0.0351***
	(6.68)	(4.96)	(4.08)
Leverage	0.0113***	0.0204***	0.00247***
	(13.47)	(14.08)	(3.02)
Firm Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Cluster at Firm Level	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Observations	273,706	148,021	125,685
R-squared	0.284	0.299	0.249

Table 7. Share Repurchase Deregulation and Dividend

The table presents the impact of open market share repurchase deregulation on firm's dividend policy. The sample is at firm-year level. Each observation contains a firm's characteristics. Columns (1) - (2) use the sample of all firms. Columns (3) - (4) use the sample only containing the firms in developed markets. Columns (5) - (6) use the sample only containing the firms in developing markets. The dependent variables of interest are *Dividend / Net Income Ratio* and *Dividend / Cash Ratio*. As described in Table 2, *Dividend / Net Income Ratio* is the ratio of dividend to net income (in percentage), which is calculated as (*Dividends* / *Net Income - Bottom Line*) * 100. *Dividend / Cash Ratio* is the ratio of dividend to cash (in percentage), which is calculated as (*Dividends* / *Cash*) * 100. The independent variable of interest is *Deregulation*, which equals one in the years after the markets deregulate and zero otherwise. We control for *Total Asset (log), Net Sales (log), Net Income (log),* and *Leverage.* The dependent variables are winsorized at the 1% and 99% levels. In each regression, we also control for the firm fixed effect and year fixed effect. Robust t-statistics are in parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance.

	(1)	(2)	(3)	(4)	(5)	(6)
	All Markets		Developed Markets		Developing Markets	
	Dividend / Net Income Ratio	Dividend / Cash Ratio	Dividend / Net Income Ratio	Dividend / Cash Ratio	Dividend / Net Income Ratio	Dividend / Cash Ratio
Deregulation	0.356	-57.41***	-7.828	-28.66	0.918	-59.87***
	(0.26)	(-3.29)	(-1.27)	(-0.53)	(0.65)	(-3.31)
Total Assets (log)	7.324***	-6.177	7.396***	-22.28***	7.315***	-0.368
	(14.07)	(-1.40)	(7.50)	(-3.05)	(12.05)	(-0.07)
Net Sales (log)	-0.806***	-11.25***	-1.100*	7.513	-0.736**	-18.55***
	(-2.64)	(-2.77)	(-1.84)	(1.35)	(-2.09)	(-3.82)
Net Income (log)	-11.45***	6.553***	-12.16***	6.578***	-11.04***	7.141***
	(-38.44)	(5.05)	(-26.19)	(2.84)	(-28.54)	(4.52)
Leverage	-0.0973***	-0.0875	-0.115***	0.0410	-0.0875***	-0.137
	(-5.86)	(-0.60)	(-3.38)	(0.15)	(-4.69)	(-0.81)
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at Firm Level	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59,206	56,233	23,758	22,737	35,448	33,496
R-squared	0.631	0.561	0.627	0.556	0.635	0.567

Table 8. Share Repurchase Deregulation and Cash ETR

The table presents the impact of open market share repurchase deregulation on firm's cash ETR. The sample is at firm-year level. Each observation contains a firm's characteristics. China is excluded from this analysis since it has a special tax system. Column (1) uses the sample of all firms. Column (2) uses the sample only containing the firms in developed markets. Column (3) uses the sample only containing the firms in developing markets. The dependent variable of interest is *Cash ETR*. As described in Table 2, *Cash ETR* is calculated as *Taxes Paid* / (*Pre-tax Income - Discontinued Operations - Extraordinary Items*). It is set to missing if the denominator is negative. The independent variable of interest is *Deregulation*, which equals one in the years after the markets deregulate and zero otherwise. We control for *Total Asset (log), Net Sales (log), Net Income (log),* and *Leverage*. The dependent variable is winsorized at the 1% and 99% levels. In each regression, we also control for the firm fixed effect and year fixed effect. Robust t-statistics are in parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance.

	(1)	(2)	(3)
	All Markets	Developed Markets	Developing Markets
		Cash ETR	
Deregulation	-0.617***	-1.494***	-2.608***
	(-3.02)	(-5.58)	(-7.59)
Total Assets (log)	7.033***	7.484***	5.699***
	(51.18)	(39.70)	(29.08)
Net Sales (log)	1.217***	1.225***	1.125***
	(14.20)	(9.54)	(10.52)
Net Income (log)	-7.859***	-7.974***	-7.483***
	(-79.64)	(-56.57)	(-61.78)
Leverage	-0.0502***	-0.0446***	-0.0559***
	(-10.86)	(-7.35)	(-8.05)
Firm Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Cluster at Firm Level	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Observations	360,178	232,400	127,778
R-squared	0.539	0.541	0.477

Table 9. Share Repurchase Deregulation and Firm Profitability

The table presents the impact of open market share repurchase deregulation on firm profitability. The sample is at firm-year level. Each observation contains a firm's characteristics. Column (1) uses the sample of all firms. Column (2) uses the sample only containing the firms in developed markets. Column (3) uses the sample only containing the firms in developing markets. The dependent variable of interest is *RoA*. As described in Table 2, *RoA* is the *Profitability Ratio* (Worldscope item 08326) that obtained from Worldscope directly. The independent variable of interest is *Deregulation*, which equals one in the years after the markets deregulate and zero otherwise. We control for *Total Asset (log), Net Sales (log), Net Income (log),* and *Leverage*. The dependent variable is winsorized at the 1% and 99% levels. In each regression, we also control for the firm fixed effect and year fixed effect. Robust t-statistics are in parentheses. ***, ** and * denotes 1%, 5% and 10% statistical significance.

	(1)	(2)	(3)
	All Markets	Developed Markets	Developing Markets
		RoA	
Deregulation	0.394***	0.386***	0.568***
	(9.14)	(6.64)	(7.47)
Total Assets (log)	-3.959***	-3.641***	-4.388***
	(-84.42)	(-56.98)	(-67.81)
Net Sales (log)	0.0870***	0.0493	0.102***
	(3.80)	(1.62)	(3.00)
Net Income (log)	3.209***	2.894***	3.667***
	(68.06)	(44.27)	(69.23)
Leverage	0.0127***	0.00853***	0.0183***
	(9.92)	(4.98)	(10.20)
Firm Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Cluster at Firm Level	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Observations	404,984	237,169	167,815
R-squared	0.737	0.730	0.741

Table A1. Open Market Share Repurchase Deregulation: Restrictions

Market	Approval	Authority	Timing Restriction	Price Restriction	Volume Restriction
United States	Board	SEC (Securities and Exchange Commission)	Repurchase trading is prohibited for the last 30 minutes of a trading day	No higher than most recent price	25% of daily volume (of the previous 4 weeks)
Japan	Shareholder meeting (94-97), Board (97-)	TSE (Tokyo Stock Exchange)	Repurchase trading is prohibited for the last 30 minutes of a trading day and the last week of a fiscal year	No higher than last day price	25% of daily volume (of the previous month)
United Kingdom	Shareholder meeting	FSA (Financial Supervisory Authority)	Repurchase should be done in an 18-month period after authorization	No higher than 5 % above the average price (of the previous trading 5 days)	15% of daily volume (within a period of 12 months)
Canada	Shareholder meeting	TSX (Toronto Stock Exchange)	Repurchase should be done in a 12-month period after authorization	No higher than most recent price	5 % of total shares
China	Shareholder meeting	CSRC (China Securities Regulatory Commission)	Repurchase should be done in a 3-month period after authorization	No higher than 5 % above the average price (of the previous trading 30 days)	No restriction according to law
India	Board	SEBI (Securities and Exchange Board of India)	Repurchase should be done in a 12-month period after authorization	According to the market price	15 % of total shares
Australia	Shareholder meeting	ASX (Australian Securities Exchange)	Repurchase should be done in a 12-month period after authorization	No higher than 5 % above the average price (of the previous trading 5 days)	10 % of total shares
South Korea	Board	KRX (Korea Exchange)	Repurchase should be done in a 3-month period after authorization	No higher than 5 % above the average price (of the previous trading 5 days)	25% of average daily volume
Taiwan	Board	FSC (Financial Supervisory Commission, Taiwan)	Repurchase should be done in a 2-month period after authorization		10 % of total shares
France	Shareholder meeting	COB (Commission des Operations de Bourse)	Repurchase should be done in an 18-month period after authorization	No higher than daily high, no less than daily low	10 % of total shares (within the maximum period of 18 months), 25 % of daily volume (of the previous 3 days)
Hong Kong	Shareholder meeting	HKEX (Hong Kong Exchanges)	Repurchase should be done in a 12-month period after authorization		10 % of total shares, 25 % of monthly volume
Germany	Shareholder meeting	BaFin (Financial Supervisory Authority)	Repurchase should be done in an 18-month period after authorization	The minimum and maximum repurchase price must also be specified before authorization	10 % of total shares
Malaysia	Shareholder meeting	MYX (Malaysian Stock Exchange)	Repurchase should be done in a 12-month period after authorization	No higher than 15 % above the average price (of the previous trading 5 days)	10 % of total shares
Russia	Shareholder meeting	MOEX (Moscow Exchange)	Repurchase should be done in a 12-month period after authorization	Repurchased shares must be reissued at a price no lower than their market value within one year of their repurchase.	10 % of total shares
Sweden	Shareholder meeting	Finansinspektionen (Swedish Financial Supervisory Authority)	Acquired shares must be held at least 3 months after purchase and must be sold or	Must be purchased at market price	10 % of total shares

			annulled within three years		
Vietnam		HOSE (Ho Chi Minh Stock Exchange)		No restriction according to law	Maximally 30% of common shares, or maximally 100% of other kinds of shares
Singapore	Shareholder meeting	SGX (Singapore Exchange)		No higher than 5 % above the average price (of the previous trading 5 days)	10 % of total shares
South Africa	Board	JSE (Johannesburg Stock Exchange)			10 % of total shares
Thailand	Shareholder meeting	SET (Stock Exchange of Thailand)		No higher than 15 % above the average price (of the previous trading 5 days)	10 % of total shares
Israel	Board	ISA (Israeli Securities Authority)	Repurchase should be done in a 6-month period after authorization	According to the market price	25% of average daily volume
Brazil	Board	CVM (Securities and Exchange Commission of Brazil)	Repurchase should be done in a 12-month period after authorization	No restriction according to law	10 % of total shares
Poland	Board	WSE (Warsaw Stock Exchange)			
Italy	Shareholder meeting	CONSOB (Commissione Nazionale per le Società e la Borsa)	Repurchase should be done in an 18-month period after authorization	No higher than most recent price	10 % of total shares, 25% of daily volume (of the previous month)
Indonesia		IDX (Indonesia Stock Exchange)	Repurchase should be done in a 3-month period after authorization		20 % of total shares
Denmark				No higher than most recent price	
Switzerland	Board	SFBC (Swiss Federal Banking Commission)	No restriction according to law	No restriction according to law	10 % of total shares
Norway					10 % of total shares
Turkey				Maximum and minimum price limits calculated with 10% margin on the determined price in the valuation report.	10 % of total shares
Netherlands	Shareholder meeting	AFM (Netherlands Authority for the Financial Markets)	Repurchase should be done in an 18-month period after authorization		10 % of total shares
Greece	Shareholder meeting	ATHEX (Athens Stock Exchange)		No higher than most recent price	10 % of total shares, 25% of average daily volum
Spain	Board	BME (Bolsa de Madrid)	Repurchase should be done in a 12-month period after authorization		5 % of total shares
Belgium	Board	BSE (Brussels Stock Exchange)	Repurchase should be done in a 12-month period after authorization		20 % of total shares
Chile	Shareholder meeting		Repurchase should be done in a 12-month period after authorization		25% of average daily volume
New Zealand	Board		Repurchase should be done in a 12-month period after authorization		

Mexico	Shareholder meeting			Must be purchased at market price	
Bulgaria	Board		Repurchase should be done in an 18-month period after authorization		10 % of total shares
Finland	Board		Repurchase should be done in an 18-month period after authorization		10 % of total shares
Sri Lanka					
Jordan					
Egypt		EGX (Egyptian Exchange)			
Peru	Board	SMV (Superintendence of Securities Market)	Repurchase should be done in a 24-month period after authorization		10 % of total shares
Ireland	Board	ISE (Irish Stock Exchange)	Repurchase should be done in an 18-month period after authorization	No higher than 5 % above the average price (of the previous trading 5 days)	10 % of total shares
Kuwait		CMA (Capital Markets Authority)			
Austria	Board	VSE (Vienna Stock Exchange)	Repurchase should be done in a 30-month period after authorization	No lower than most recent price	5 % of total shares