The Real Effects of Short Selling Constraints: Cross-Country Evidence from a set of Natural Experiments

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Abstract

We identify 13 countries that changed their regulation to allow short selling for the first time since 1990. We use this exogenous change in short selling constraints to study the effect of short selling constraints on stock prices and corporate investments. We find that prices drop, and corporate investment declines. These changes are most pronounced in developed countries. Our results suggest that short selling constraints have a causal effect on stock prices and firms' real corporate activities. Our paper is the first, to provide evidence of the effect of short selling constraints on prices and investment in an international context.

Keywords: *Short selling; Market efficiency; Equity mispricing; Corporate investment*

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1. Introduction

Can short selling constraints and mispricing in equity prices affect capital allocation? We take advantage of a new set of regulations introduced in several countries that lead to an exogenous change in short selling constraints and equity prices to shed light on this question. There are a number of papers devoted to this question.[1] However, investigating the consequences of mispricing on corporate investment has proved difficult. The problem is that it is hard to find a measure of mispricing that is unrelated to growth opportunities. For example, it is hard to determine to what extent investment is related to prices because of the price per se or because of the growth opportunities that are embedded in prices. Our set of new regulations enables us to isolate changes in prices from growth opportunities, and makes it possible to establish causality. One other advantage of our set up is that the regulation changes are distributed across a set of heterogeneous countries that are expected to react differently to the regulation change. We take advantage of this variation in country characteristics to further explore the relation between prices and investment.

We use as our source of identification, countries that adopted new regulation to enable short selling for the first time. There are 13 countries that adopted new regulation since 1990.[2] Current evidence suggests that short selling constraints cause prices to be overvalued on average,

[1] A non-comprehensive list includes: Morck, Shleifer and Vishny (1990), Barro (1990), and Blandhard, Rhee and Summers (1990).

[2] See Charoenrook and Daouk (2009) and Jain, Jain, McInish, and McKenzie (2013) for a list of countries that adopted new regulation allowing short sales. We contact countries' regulators and exchanges for details.

and by enabling short selling, investors will sell and/or short over-priced stocks, causing prices to fall. Miller (1977) theorizes that short-sale constraints cause stock prices to be overvalued, on average. Alleviating short selling constraints will result in a drop in stock prices, as prices will converge to fundamentals. There are a number of empirical studies on the relation between short selling, short selling constraints and stock prices. The majority of evidence indicates that short selling constraints cause stock prices to be overvalued (Jones and Lamont (2002), Ofek and Richardson (2003), Ofek, Richardson, and Whitelaw (2004), Cohen, Diether, and Malloy (2007), and Grullon, Michenaud and Weston (2014)).

The introduction of the new short selling rules across the various countries provides us with a good source of exogenous variation in stock prices. Countries are unlikely to pass regulation that is intended to cause prices to drop, or investment in real assets to decline. For that reason, we believe that the short selling regulation changes provide us with the needed identification to study the effect of changes in prices on corporate investment. In addition, we explore cross-sectional and cross-country variation in firm and country characteristics to provide further evidence of the link between prices, investment, types of investment and financing.

Consistent with the previous literature on short selling constraints, we find that prices drop with the introduction of the new short selling rule. In some countries short selling is enabled for a specific list of stocks, in the other countries short selling opens up for all stocks. We collect the list of stocks for the countries with a list. For the other countries, we contrast the top 25% of stocks in total assets with the remaining stocks in the sample.[3] This is based on the observation that the stock price reaction to the new regulation is stronger for large firms, and is consistent

[3] in the robustness section we show that our tests are not sensitive to this cut-off.

with the fact that large stocks have lower short selling constraints.[4] We conjecture that with the introduction of the new rule, investors start with shorting the stocks that are easier to short -- large stocks. We find that the new rule results in a price drop of about 1% in the whole sample. There is a wide variation in the stock market reaction to the new rule. The effect ranges from -20.8% in Turkey, to -5.7% in Sweden, and 8% in Chile.

Countries with different degrees of development may react differently to the new regulation. For example, emerging markets may not have the necessary institutions or market liquidity to effectively enable short selling. Our sample includes 7 countries from developed markets and 6 from emerging markets. We find that the price effect of the new rule is concentrated among developed markets. The price drops by 3.1% in developed markets, and increases by 0.6% in emerging markets (an amount that is statistically indistinguishable from zero). We explore this variation in price responses to the rule change to investigate the relation between short selling constraints, prices and investment. We expect that in countries where the new rule has a negligible effect on prices, the rule also has a negligible effect on corporate investment.

The idea that stock market inefficiencies affect investment decisions dates back to at least Keynes (1936, p. 151). Keynes writes "certain classes of investment are governed by the average expectation of those who deal on the Stock Exchange as revealed in the price of shares, rather than by the genuine expectations of the professional entrepreneur."

The effect of the new short selling rule on prices may have both positive and negative implications for firms' real activities. The positive implication is that the new short selling

[4] See D'Avolio (2002)

activity improves price efficiency, and to the extent that prices affect corporate investment, an improvement in price efficiency will also improve allocation efficiency in corporate investment. Managers are influenced by stock prices for various reasons: (1) Managers rely on the stock market as a source of information, which may or may not be correct about future fundamentals. (2) Managers cater to investors' desire for growth in order to benefit from an overvalued stock. These two channels imply that the lower and more efficient prices that result from the new rule lead to improved allocation efficiency. Specifically, corporate investment drops as managers and investors realize the market over-estimated firms' growth opportunities.

Managers rely on the information embedded in prices to decide on their investment policy (Dow and Gorton (1997) and Subrahmanyam and Titman (1999)). The rationale is as follows: Stock prices aggregate information from many different participants, and as a result, stock prices may contain some information that managers do not have. This information, in turn, can guide managers in making corporate decisions, such as the decision on corporate investments. Chen, Goldstein and Jiang (2007) provide evidence consistent with this channel. One implication of this argument is that if markets are mispriced, managers will be misguided when they rely on stock prices for their investment decisions. When prices fall as a result of enabling short sellers, managers realize that stock prices were over-estimating firms' growth opportunities and realign their investment policy. The end result is a drop in investment.

Another channel through which prices affect investment is catering. If there are periods during which the market misprices firms according to their level of investment, managers may be tempted to boost short-run share prices by catering to current sentiment. Managers may be tempted to waste resources in negative NPV projects when their stock price is overpriced and to

forgo positive investment opportunities when their stock price is undervalued. Polk and Sapienza (2003) provide evidence consistent with this channel. The drop in prices that results from enabling short sellers may provide information to investors that the market over-estimated the value of the firm's growth opportunities, and may reduce the effect of catering on growth.

The introduction of the new short selling rules, and resulting drop in prices could also have a negative effect on the real economy. (1) The stock market affects firm growth through its influence on the cost of issuing new equity. An equity-dependent firm with growth opportunities may not be able to issue new equity if prices fall, even if that fall in prices is warranted. (2) Short sellers may drag prices below fundamental values and drag down investment with it.

Consider an equity-dependent firm that does not have enough capital to invest in all projects it could profitably invest. If this firm, because of an irrational rise in its stock price, can get access to cheaper financing through the stock market, it would use the proceeds from the equity issue to invest. In this case, the marginal investment has a positive rather than a negative net present value, and is worth undertaking. Baker and Wurgler (2002), Baker, Stein, and Wurgler (2003), and Jensen (2005) provide evidence consistent with this channel. They find evidence that stock market mispricing does influence firms' investment through an equity issuance channel. This channel suggests that the introduction of the new short selling rule could have negative effects for the real economy, in that the drop in prices that result from the new short selling rule will cause equity-dependent firms to forgo positive NPV projects.

Goldstein and Guembel (2008) developed a theoretical model where they show that short selling may cause underinvestment through price manipulation. If managers base their decision to invest on stock prices, a drop in prices may cause a manager to forgo a positive NPV project.

This would cause firm value to drop. Short sellers could profit from this feedback effect by bidding down the stock price. Short sellers would profit because the lower stock price would cause a reduction in investment that would cause a further reduction in the stock price. Short sellers could therefore profit from price manipulation, and this price manipulation could have real investment consequences. Though there is anecdotal evidence that price manipulation occurs, and that the effect described in Goldstein and Guembel (2008) is a real concern, current evidence on short selling suggests that on average, short sellers do not engage in stock price manipulation,[5] and thus we don't think this would explain our average effects.

We find that corporate investment, as measured by growth in total assets, drops. Corporate investment drops for both large and small firms, and this change is largest for large stocks, so that corporate investment in large stocks drops by 8% more relative to small stocks. Given our prior evidence that the new rule had the greatest effect on large stocks, this effect is consistent with our hypothesis that the drop in corporate investment is related to the exogenous drop in prices.

Regression analyses that control for time-varying variables, and the heterogeneity across firms, show that this effect is limited to firms in developed countries, and countries with declining stock prices that resulted from the introduction of the new rule. As argued above, the new rule had the strongest impact on stock prices in developed countries. In fact, we show that the new rule had a limited impact in emerging markets, likely due to the lack of infrastructure needed to support short selling. The fact that we find that the drop in investment is limited to

[5] Alexander and Peterson, 2008; Diether, Lee, and Werner, 2009; Boehmer and Wu, 2013; Chakrabarty, Moulton, and Shkilko, 2011; Shkilko, Van Ness and Van Ness, 2012;

countries that had the greatest stock market reaction to the rule change is consistent with our hypotheses that growth is linked to prices.

We decompose total asset growth into growth in the various asset components, such as growth in cash, current assets, property plant and equipment (PPE) and other assets, and find that, in developed countries, the source of the effect on total asset growth is current assets and PPE. Cash growth and other assets are unaffected by the regulation change. On the financing side, we find that the rule change has no effect on net equity issues, but rather on net debt issues. Net debt issues decline for both large and small stocks, though we find that debt issues decline by 1.7% more for large stocks than small stocks. This suggests that prices affect investment through means other than equity issuance. Prices have an effect on growth that is independent from equity issues. Further, prices have an effect on asset growth through actual investment in PPE and non-cash current assets, suggesting that firms are not simply investing the proceeds of their financing in cash and equivalents. The fact that this effect is stronger for larger, non-financially constrained firms suggests that the effect of prices on investment is not likely due to the ability of financially constrained firms to raise capital, and is likely due to the other two channels discussed above: the informational role of prices and catering.

Our results are robust to a number of tests. We find that the effect disappears if we use pseudo dates. If we change the regulation date to 3 years before or 3 years after the event, then asset growth no longer responds to this pseudo event. Further, we find that the effect is not sensitive to the size cut-off we use to define large stocks. If instead of using the top quartile of firms we use the top half of firms to define large stocks, our results remain qualitatively similar.

Our paper is related to Grullon, Michenaud and Weston (2014). They examine the effect of the repeal of the up-tick rule in the US on stock prices and corporate investment. Our paper is different in that we focus on countries that introduce for the first time a rule that enables short selling. This approach has several advantages. We examine a number of very sharp events across very heterogeneous countries that respond very differently to the new rule. This setting allows us to investigate the impact of short selling and price changes in different and multiple contexts, that are expected to have different effects on prices and corporate growth. While we find, like Grullon, Michenaud and Weston, that investment drops as a result of the drop in prices, our results are different in a number of ways. For example, we do not find a stronger effect for financially constrained firms, nor do we find a drop in equity issues. Quite the contrary: We document a stronger effect for large firms and a drop in debt holdings.

Evidence on the relation between equity prices and investment in the international context is scarce. McLean, Pontiff and Watanabe (2009) show that the well documented negative relation between net equity issues and future returns is weaker in countries with weaker institutions. This result suggests that managers have some difficulty taking advantage of miss-pricing in international markets, because they have a harder time issuing equity when equity is over-priced. If short selling impacts corporate growth through its effect on equity, then it is not necessarily the case that this effect also exists in international markets. Several papers document that prices are less informative in countries with weaker institutional development.[6] To the extent that managers know that prices are less informationally efficient in certain markets, managers may rely less on prices for investment decisions, in which case changes in prices could have a

[6] See DeFond, Hung and Trezevant (2007), Alford et al. (1993), Ali and Hwang (2000), Hung (2000), Ball et al. (2000, 2003) and Morck et. al. (2000).

significantly weaker or no association with investment. Our paper is the first, to the best of our knowledge, to provide evidence of the effect of short selling constraints and prices on corporate investment in an international context.

In section 2 we present the short selling regulations for these 13 countries, section 3 describes the sample and data, section 4 presents the results of the effects of short selling on stock prices, section 5 presents the results of the real effects of short selling constraints on corporate investment, section 6 conducts robustness tests, and section 7 concludes.

2. Cross-country changes in short selling restrictions

We obtain information on the legality and feasibility of short selling across a wide range of countries from Bris, Goestzmann, and Zhu (2007), Charoenrook and Daouk (2009), Jain, Jain, McInish, and McKenzie (2013), and Beber and Pagano (2013). These papers provide a comprehensive review of short selling regulations for countries around world. Where clarification or more information is necessary, we correspond directly with the stock exchanges and financial market regulators, and search the news media.

Charoenrook and Daouk (2009) observe that before 1990, 64 percent of developed countries allowed short sales, compared to 10 percent of emerging countries. These percentages have increased significantly since. Many developed and undeveloped countries have changed their regulation to allow for short selling, however, despite the regulatory change, short selling remains unfeasible or not practiced. For example, in Finland short selling was allowed in 1998, yet tax laws inhibit would be short sellers. Short selling continued to be unpracticed in New

Zealand as of January 2010. Jain et. al. (2013) document no security borrowing in New Zealand during the 2006–2010 period.

We identify 13 countries that changed regulations to make short selling feasible and practiced since 1990.[7] We choose to start in 1990 to ensure data availability. Table 1 presents a summary of information on the changes in short selling restrictions for these countries. Geographically, these 13 countries span three continents: Latin America, Asia, and Europe. These countries also span various degrees of economic development. We use the list of IMF advanced economies and the OECD membership to classify economies as developed and emerging. The developed economies included in our sample are: Hong Kong, Norway, Poland, Sweden, South Korea and Taiwan. The emerging economies are: Chile, China, India, Indonesia, Philippines, Thailand and Turkey.

Countries lift the ban on short selling at different dates. We observe that, for the most part, the earlier part of the sample includes developed economies, while the latter part of the sample includes mostly emerging economies. When the date of the rule change is different from the date short selling became feasible, we use the date short selling became feasible. For example, in Norway short selling was allowed in 1992, but it was only in 1999 that short selling rules and guidelines were instituted to make it feasible. We use the latter date as our event date.

The reach of the regulatory change varies across countries. Specifically, the proportion of listed stocks affected by the regulatory change varies. In some countries, mostly developed countries, the regulatory change affected all listed stocks. These countries are: Norway,

[7] We firstly identify 15 countries. Because of the low data availability for Fiji and Hungary, we drop them from our sample

Indonesia, Philippines, South Korea, Sweden, and Taiwan. For all other countries, the regulatory change affected only a sub-set of listed stocks.

We contact the countries' regulators and exchanges to get the list of stocks designated for short selling. Most of them replied with either the designated stock list of short selling or the details of the regulation changes in their countries.[8] Seven out of the 13 countries specified the designated lists of stocks for short selling. We use the designated lists for 5 countries and regions: China, Hong Kong, India, Poland, and Thailand. For Chile and Turkey, we are not able to match the list provided by the regulators to our dataset. We include them in the same category as countries that lifted the short selling ban to all firms.

Hong Kong and China, started by lifting the ban on short selling for a group of designated stocks and expanded the list of stocks eligible for short selling several times since. The Stock Exchange of Hong Kong revisited and expanded the list of stocks for short selling more than 100 times between Jan, 1994 and August, 2014[9]. Some of these revisions are a result of a change in criteria, such as the list revision in May, 1997, but most are automatic list revisions based on the rules' benchmarks for liquidity and market cap. In Hong Kong, we use the lists from 1994 and 1997 as our event dates. In China we use the 2 regulatory changes in March, 2010 and December, 2011. In certain countries, the list is composed of the stocks in a major

[8] We thank the exchanges and regulators who provided us with the information requested. We would like to thank the Stock Exchange of Hong Kong, Superintendency of Securities and Insurance (Chile), Chinese Securities Regulatory Commission, Capital Market Regulator in India, Indonesian Capital Market and Financial Institution Supervisory Agency, Oslo Bors (Norway), Philippine Stock Exchange, Warsaw Stock Exchange (Poland), Korea Securities Depository, Finansinspektionen (Sweden), The Stock Exchange of Thailand, and Istanbul Stock Exchange (Turkey).

[9] For detailed information on the list revisions, refer to http://www.hkex.com.hk/eng/newsconsul/hkexnews.

index and some important sectors, such as India, Poland, Thailand, and Turkey.[10] For these countries, as well as the countries opening short selling to all stocks, we use the date short selling was first allowed, feasible and practiced.

For countries with a designated list, we focus on regulatory changes in the criteria used to select the stocks on the list, and ignore changes that are based on variations in firm characteristics, to avoid changes that are potentially endogenous. For example, we want to avoid firm-years where a firm becomes part of the list of stocks allowed to short because of a significant increase in market capitalization and liquidity after a Merger or Acquisition.

3. Sample and Data

We obtain accounting data and stock market returns from Thomson Reuters Datastream for the 13 countries that are part of our study for a period of 13 years surrounding the event period. The sample period spans from 1988 to 2014. We include all firms with data available on Datastream. We use Datastream's list of active and dead stocks. We define all variables in Appendix 1. We obtain the daily stock prices from the Datastream variable -- Total Return Index. We obtain data for all public firms that are available on Datastream 7 years surrounding the short selling regulation changes. First, we filter out holidays and non-trading days by deleting low frequency date series country by country. In each country, we look at how many stocks are actively traded on each date. If the number of stocks traded on any date are less than 5% of the total number of stocks usually traded in that country, we consider those dates holidays, and delete all stock return data on those days from our sample. Second, we delete all delisted stocks

[10] India only allows short selling for F&O segment stocks; In Turkey only ISE 100 stocks can be sold short; Thailand allow short selling for only SET 50 stocks; Poland only allows short selling for the stocks in WIG 20 index.

from the sample if the stocks give zero returns for consecutive days all the way to the most recent date in the sample, because Datastream does not delete delisted stocks. Third, we apply the criteria for calculating stock returns proposed in Ince and Porter (2006) to filter outliers in returns.[11] After applying all these filters, we winsorize the daily returns at 1 and 99 percentiles of the entire sample. We obtain accounting data from Datastream Worldscope (WS) dataset and Datastream main dataset. We winsorize all variables we use in our analysis at the 1st and 99th percentiles of the entire sample.

For countries with a designated short selling list, we compare firms in the designated list with those in a matched sample. For each treatment firm, we match it with another firm in the same country that is closest in total assets.[12] We match without replacement. For the countries that open short selling to all stocks and the two countries for which we do not have the list, we compare the largest firms to all other firms in the sample. Specifically, we define largest firms as those that are in the highest quartile of total assets one year before the regulatory change. This is based on the observation that the stock price reaction to the new regulation is stronger for large firms, and is consistent with the fact that large stocks have lower short selling constraints.[13] Our sample includes 1,162 firms in the treatment group and firms classified as large, and 3,059 firms in the control group and firms not classified as large.

Table 2 reports descriptive statistics of firm characteristics for all 13 countries in the year immediately before the short selling regulation change. Panel A reports descriptive statistics for countries that open up short selling for all stocks. The left columns report descriptive statistics

[11] If R_t (raw return on day t for individual stock) or R_{t-1} (raw return on day t-1 for individual stock) is greater than 300% and $(1 + R_t)(1 + R_{t-1}) - 1$ is less than 50%, we set R_t and R_{t-1} to missing.

[12] For robustness, we also match on alternative dimensions such as by country, three year average growth in total assets, and size. Results are qualitatively similar.

[13] See D'Avolio (2002)

for large firms, and the right columns report descriptive statistics for small firms. The last column contains t-statistics for the difference in means across the two groups of stocks. Firm size, asset growth, capital expenditures, debt issuance, leverage, and cash flow are larger for larger firms. Equity issuance and profitability are identical across both groups of stocks.

Panel B reports descriptive statistics for countries that open short selling for a list of stocks. The left columns report the descriptive statistics for treated firms, and the right columns report descriptive statistics for matched firms. The t-statistics for mean differences are reported in the last column. All variables have identical means across the two groups of stocks except for leverage, cash flow, and profitability. In panel B, the two groups of firms are more identical because we match treated firms to form a control group of identical firms.

4. The Effect of Short Selling on Stock Prices

In this section, we investigate the stock market reaction to the short selling regulation changes. There are two opposing forces that affect stock prices when short-selling prohibitions are lifted.

Miller (1977) predicts that stocks are likely to be overvalued when short selling is not allowed. When short selling is prohibited, and investors have heterogeneous beliefs, prices only reflect the valuation of the bullish investors and of the bearish investors who already own the stock. Stock prices do not reflect the information of the bearish investors who do not own the

stock, because these investors are prevented from trading. As a result, on average, stocks are overvalued, and stock prices decline when the short selling prohibitions are lifted.[14]

We follow the traditional event study techniques to estimate abnormal returns (ARs) and cumulative abnormal returns (CARs).[15] For each stock, we use a market model to estimate the coefficients $\hat{\alpha}_i$ and $\hat{\beta}_i$ for a pre-event window of -281 to -31 trading days, where day 0 is the day of the event. For this estimation, we require that there are at least 150 trading days of return data. We forecast returns using the market model and the coefficients estimated during the pre-event window.[16] We then estimate abnormal returns as the difference between actual returns and forecast returns. Cumulative abnormal returns are the sum of abnormal returns during a stated window.

In Figure 1, we plot cross-sectional means of CARs for the window -15 to 40 days. Panel A reports CARs for three groups of stocks: (1) The stocks of the largest firms headquartered in countries that lift short selling prohibition for all stocks. (2) The stocks for firms headquartered in countries that lift the short selling prohibition for a specified list of stocks. And all the other stocks in the sample, which we expect are less affected, or not affected, by the short selling rule change. The stocks in the first two groups drop by about 2% following the short selling regulation changes. The stocks we expect to be least affected by the regulation changes do not show a clear pattern, suggesting that the regulation change affects large stocks the most. We

[14] Several papers find that prices drop when short selling constraints drop: Jones and Lamont, 2002; Ofek and Richardson, 2003; Ofek, Richardson, and Whitelaw, 2004; Cohen, Diether, and Malloy, 2007; Chang, Cheng, and Yu, 2007; Chang, Luo, and Ren, 2014; and Grullon, Michenaud and Weston, 2014.

[15] See Brown and Warner (1985) for an assessment of event study methodologies for measuring share price impact of firm-specific events.

[16] We also estimate market adjusted CARs, and results are qualitatively the same.

show in a later section that this result does not depend on the cut-off we use to define large stocks.

Panel B plots mean CARs for stocks in emerging and developed economies. We include only large stocks and stocks that are part of the list of stocks allowed to sell short. CARs in both emerging and developed economies drop after the short selling prohibitions are lifted. However, starting from around 20 days after the regulation change, prices in emerging economies reverse, to end at a positive abnormal return 40 days after the event. In contrast, prices in developed economies drop by about 3%. This result suggests that rules enabling short selling are not as effective in emerging economies.

To complement the graphs, we report in Table 2 mean CARs and corresponding p-values from t-tests for different windows and different subsamples. Panel A reports results for all 13 countries in the sample. Stocks that are part of the short selling list and the largest stocks experience negative price movements in 9 of the 13 countries. The coutnries affected the most by the short selling are China, Norway, Poland, Sweden and Turkey. These countries experience negative and significant returns in most event windows. In addition, the stock prices in Hong Kong, Norway, Sweden and Turkey drop more than three percent around the regulation changes. With the exception of China and Turkey, all these are developed countries.

In Panel B, we report the means and p-value of CARs for large and small firms. CARs of large firms experience an economically and statistically significant drop of about 1%. This drop is consistent across all event windows. The remaining firms do not experience a consistent drop in returns. Returns are negative for the longest window (-15 to +40), but are positive for all other windows. This result suggests that the lifting of the short selling prohibition has a significant

effect for only the largest firms, and suggests that short selling constraints remain large for the smaller firms.

In Panel A we observed that the stock price reaction to the rule change is more pronounced in developed economies compared to emerging countries. Based on this observation, we divide the sample into emerging and developed economies and report results in Panel C. In developed economies, stock prices drop gradually as we increase the event windows, and prices drop by 3% for the longest event window. In emerging economies prices drop briefly but quickly rebound to end at an insignificantly positive abnormal return for the longest window. This finding suggests that the effects of lifting of short selling constraints are more pronounced in developed economies, and suggests that constraints remain large in emerging countries, even after the rule change.

Panel D reports results for countries that open short selling for a designated list of stocks, and large firms in countries that open short selling to all listed stocks. The price drop in countries with a list is not consistently significant in all event windows. The countries opening up short selling to all listed stocks experience a significant drop of about 2%. These results reflect the fact that that the countries that chose to remove the ban on short selling for a list of stocks are, for the most part, emerging countries.

To sum, in this section we document that stock prices drop after the regulation changes. The drop in prices is isolated among developed economies and large firms. The fact that prices drop confirms that the introduction of the new short selling regulations are a good source of variation in prices. Further, because regulators are unlikely to pass legislation that causes corporate growth to drop, the new regulation changes are exogenous to corporate growth. The

exogenous variation in prices that results from the new regulations, enable us to investigate the causal relation between prices and corporate growth. We turn to this question in the next section.

5. The Effect of Short Selling on Corporate Investment

In this section, we take advantage of the price drops that result from the new regulations introduced in several countries enabling short selling, to investigate the causal link between stock prices and corporate investment.

Figure 2 plots the changes in corporate investment, measured as the annual percentage change in total assets for large firms (the firms affected the most by short selling) minus that for small firms (the firms affected the least by short selling) for the 7 years around the short selling regulation changes. The entire sample experiences a drop in growth starting 1 year before the rule change. We observe that for developed countries and countries with low CARs, large firms grow faster than small firms before the introduction of the new rule. However, large firms also experience higher drops in growth after the rule change. We supplement Figure 2 with univariate results in Table 4.

Table 4 reports the univariate results for the changes in corporate investment around the short selling regulation changes. In this table we measure corporate investment using growth in total assets. Later we decompose growth in total assets into its various components and document similar results. We compare the average asset growth for the three years before the event to that three years after the event. We skip the event year. Panel A reports results for the whole sample. We find that the three year average asset growth for larger and treated firms before the regulation changes is 6.55% higher than non-treated (or small) firms. However, after

short selling regulation changes, treated (or large) firms' three year average growth is 1.34% lower than the non-treated (or small) firms. The difference in the differences is -7.89%, and is statistically significant at 1% level. The results from Panel A indicate that on average the short selling regulation changes induce a significant drop in investment.

Panel B reports univariate results sorted by economic development. This sort is motivated by the result we documented earlier, that stock prices react to the new short selling rule only in developed economies. Panel C reports results for countries with announcement CARs below and above country level median. Our prior is that investment drops only in markets where prices drop with the introduction of the new rule: Developed economies, and countries with below median CARs. We find that investment drops for all groups of countries. Below, we document in multivariate regressions that investment only drops in developed economies, and countries with low CARs. Panel D reports the results for the countries that open short selling to all stocks and those that open short selling for a list of stocks. We find that investment drops for both groups of stocks, though countries that open short selling to all stocks experience a larger drop. This result is consistent with the fact that countries that open short selling for a list of stocks are typically emerging economies.

Results, so far, show a drop in investment around the implementation of the new short selling rules. We documented in Table 2 that the main sample is different from the comparison sample along several dimensions. In the analysis below we control for these differences with multivariate regressions where we include several controls for firm characteristics and include firm fixed effects. We estimate panel regressions for 6 years surrounding the implementation of the new short selling rule, and skip the event year. The unit of the analysis is firm-year.

We measure the effects of the introduction of the new rule with a dummy variable (*Short* x *After*) equal to 1 if the firm is part of the large firms (or treatment firms) group and the new short selling rule is in effect. The dummy variable is set to zero otherwise. We also include an indicator variable for *After* to capture time variation in investment in all firms. The variable *After* is equal to 1 after the short selling rule is in effect and 0 otherwise. In addition we control for contemporaneous cash flows, lag of logged assets and past profitability. We also include firm fixed effects to capture any time-invariant heterogeneity across firms. We describe how we compute all variables we use in Appendix 1. Standard errors are robust to clustering at the firm level.

Table 5 reports the panel regression results for different subsamples, the dependent variable is asset growth. We report regressions for the entire sample, developed economies, emerging economies, countries with low CARs, and countries with high CARs. The average effect of the new regulation (variable *Short* x *After*) is a 1.86% drop in the entire sample, a 2.78% drop in developed economies and a 2.71% drop in countries with low CARs. These coefficients are all significant at the 5% level. Firms from countries with high CARs and emerging countries also have negative coefficients on the variables *Short* x *After*. However, the estimates are smaller in magnitude and are statistically indistinguishable from zero. The sign of the coefficients on the control variables are as expected: positive for cash flow and profitability, and negative for assets.

We hypothesize that investment drops as overvalued prices drop to fundamental levels with the implementation of the new short selling rules. We document in table 3 that prices drop only in developed economies. Our results in Table 5, that investment drops only in developed

economies and countries with low CARs is in line with results documented in table 3 and is consistent with our hypotheses, that the drop in investment is associated with the drop in prices.

Firms may respond to overvaluation by issuing cheap equity and keeping it in cash, as opposed to investing in negative NPV projects. This would be an optimal response to overvaluation, from the perspective of shareholder wealth maximization (Stein, 1996). However, it is also possible that firms invest sub-optimally when their stock is overvalued. Firms may do so because managers use prices as a source of information, which may or may not be correct about future fundamentals. Or, managers may invest sub-optimally because they cater to investors during periods when the market over-prices a firm with a high corporate investment, in order to boost short-term stock prices. The difference is that in the first case the manager has good intentions, and in the second the manager knows s/he is committing resources to negative NPV projects. The result is that in either case, the firm is overinvesting in PPE and non-cash current assets.

In table 6 we decompose asset growth into all of the major components in the left side of the balance sheet, as in Cooper, Gulen, and Schill (2008). We compute growth in cash, non-cash current assets, property, plant, and equipment (PPE), and other assets. We also compute equity issuance, and debt issuance. Panel A in Table 6 reports results for developed economies, and Panel B in Table 6 reports the results for countries with low CARs. We no longer include emerging markets and countries with low CARs in our analysis because we show in Tables 3 and 5 that these countries are not affected by the rule changes. We find that current assets and PPE drop by over 1%. Cash and other assets do now show any significant effect. Further, the drop in

investment is accompanied with a drop in debt issuance of about 3%. Equity issuance is not affected by the rule change.

In sum, the results in this section provide evidence that the stock prices have a causal impact on the corporate investment, and this causal effect is most pronounced in countries with greater price corrections. This result is consistent with Grullon, Michenaud, and Weston (2014). However, our findings are different from Grullon, Michenaud, and Weston in several respects. We find strong results for large firms as opposed to financially constrained firms. Also, the effect on corporate investment is financed through debt issuance as opposed to equity issuance. Our results are consistent with catering and the informational role of stock prices (Polk and Sapienza (2009), and Down and Gorton (1997) among others). Our results are not consistent with over-pricing helping finance equity dependent financially constrained firms (Baker, Stein, and Wurgler (2003), Baker and Wurgler (2002) and Jensen (2005)).

6. Robustness

In the tests above we define large firms as those in the top quartile of total assets. This cut-off was one we chose, but is not guided by theory. To ensure that our results are not sensitive to this cut-off, we change the cut-off to be the median of firm size one year before the regulation changes. We report results in Table 7. We report results for asset growth and debt issuance for the whole sample, developed economies and countries with low CARs. Our results are identical to those reported earlier. Asset growth and debt issuances decline with the rule changes, and results are consistent across all samples.

We test whether the results we get from our regressions could have been a result of chance. We change the date of the event to 3 years before it actually occurs to create a "pseudo event" date. We also create a "pseudo-event" date 3 years after the date of the actual event. The reason we choose three years before and after for our "pseudo-event" dates is that we collected data for 13 years surrounding the event. These "pseudo-event" dates allow us to use the data we have, and at the same time exclude the event from our analysis.

Table 8 reports the results for the placebo tests. We expect that the coefficients on *Short* x *After* are non-negative. A significantly negative coefficient would suggest that our results are obtained because of some force other than the events of interest. We present results for the entire sample, developed economies and countries with low CARs. We investigate effects of these "pseudo-event" dates on asset growth and debt issuance. We find that the coefficient designed to capture the effect of the "pseudo-event" on growth is insignificant in all instances, and the sign of the coefficient varies between positive and negative.

7. Summary and Conclusions

In this paper we investigate the effect, of investors' ability to sell short, on stock prices and corporate investment. We use for identification a set of countries that introduce new regulation to allow short selling for the first time. We identify 13 countries that introduce new short selling regulation since 1990. We hypothesize that prohibiting short selling will cause prices to be overvalued, and after the introduction the new rule allowing short selling, stock prices will fall to their fundamental values. To the extent that prices affect corporate investment,

and allocation efficiency, the drop in prices to their fundamental values will cause investment to drop, and thereby improve allocation efficiency.

Our results are in line with our hypotheses. We find that stock prices drop with the introduction of the new rule. The drop in prices is limited to developed countries. Prices do not drop in emerging countries. This result suggests that short selling rules have limited influence in emerging markets. Corporate investment, as measured by growth in total assets, also drops with the new short selling rule, and as with prices, the drop is limited to developed countries. We decompose asset growth into growth in cash, inventory, property, plant and equipment and other, and find that the growth in assets can be attributed to growth in inventory and property, plant and equipment. On the financing side, we show that the investment is financed with debt.

Our results suggest that short selling constraints and prices have a causal effect on corporate investment. The effect we document cannot be explained by equity dependent financially constrained firms' inability to raise new equity after the introduction of the new rule. The effect we document prevails in large firms, and is due to a decline in debt financing. We believe that the channels most likely to explain our results are as follows: (1) Managers cater to investors' desire for growth in order to benefit from an overvalued stock. (2) Managers rely on the stock market as a source of information.

Our results suggest that the introduction of the new short selling rules improve the allocation efficiency of corporate investment. Short selling causes prices to fall to a level closer to fundamentals, and a more informationally efficient price results in greater allocation efficiency. This is because an informationally efficient market is not influenced by catering, and managers are able to obtain better information from prices. To the best of our knowledge, this is

the first paper to document the effect of short selling constraints, and prices on corporate investment in an international context.

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Appendix 1. The Definitions of Variables

Variables	Definition	Datastream Code
Total Assets	Firm level total assets (in Thousand USD)	WC02999
After	Dummy variable equal to 1 if the fiscal year is after the short selling regulation change in each country and equal to 0 if the fiscal year is before the short selling regulation change in each country	
AR	Abnormal returns using market model	
Asset Growth	Total Assets divided by lagged year Total Assets minus one x 100	
CAI	Capital adjustment index, calculated as the cumulative product of the inverse of the individual-period capital adjustment factor and is analogous to the Total Factor of Pontiff and Woodgate (2008)	CAI
CAPX	Capital expenditures scaled by total assets x 100	WC08416
CAR	Cumulative abnormal returns	
Cash	Cash and short term investment	WC02001
Cash Flow	Cash flow per share	WC05501
Common Equity	Common equity / common shareholders' investment in a company	WC03501
Current Assets	Current assets - cash and short term investments	WC02201
Debt Issuance	Change in total debt (=Long Term Debt + Short Term Debt) scaled by Total Assets x 100	
Depreciation	Depreciation, depletion, and amortization	WC01151
Equity Issuance	We first calculate adjusted shares by using shares outstanding scaled by CAI, and then take the difference between the natural log of the adjusted shares of current month and the natural log of the adjusted shares for 12 months ago.	WC03995
Leverage	Long Term Debt plus Short Term Debt scaled by the sum of Long Term Debt, Short Term Debt, and Total Shareholders' Equity x 100	
Long Term Debt	Firm level long term debt	WC03251
Operating Income	Operating income (in Thousand USD)	WC01250
Other Assets	Total Assets - Cash - Current Assets - PPE	
PPE	Property, plant, and equipment net	WC02501
Profitability	Ratio of operating income before depreciation and amortization to total assets x 100.	
Short	Dummy variable equal to 1 if the firm is in the short selling designated list or from the largest firms in certain countries and otherwise equal to 0	
Short Term Debt	Firm level short term debt short term debt & current portion of long term debt	WC03051
Total Shareholders' Equity	The sum of Preferred Stock and Common Shareholders' Equity	

Table 1: Short Selling Regulation Changes around the World

This table lists 13 countries around the world in which the short selling was completely prohibited. This table provides a timeline of the regulation changes of short selling for these countries, and the number of stocks allowed to be shorted due to the short selling regulatory changes since 1990. In addition, we report the number of short selling eligible firms included in our sample and the country category in terms of economic development. The institutional details provide the source information of the regulatory changes.

Countries	The date of regulatory change	Number of designated stocks	Number of short selling eligible firms in our sample	OECD Countries or IMF Advanced Economies	Institutional Details
Chile	10/1/1999	23	23	No	The list and date information are provided by Superintendency of Securities and Insurance.
China	3/31/2010	278	225	No	On 3/31/2010, the first 90 stocks are released from the ban on short selling; In 12/5/2011, 188 additional stocks are added to the designated list by CSRC (Chinese Securities Regulatory Commission)
Hong Kong	5/1/1997	129	92	Yes	The historical detailed designated list information is provided by Stock Exchange of Hong Kong (SEHK).
India	4/21/2008	220	203	No	SEBI (Capital Market Regulator in India) permitted Short selling vide Circular - MRD/DoP/SE/Dep/Cir- 14 /2007 on December 20, 2007. The securities traded in the F&O segment are eligible for short selling.

Table 1, cont'd

Countries	The date of regulatory change	Number of designated stocks	Number of short selling eligible firms in our sample	OECD Countries or IMF Advanced Economies	Institutional Details
Indonesia	6/30/2008	All stocks affected	141	No	The Regulation on short selling transactions in Indonesia first set out in Bapepam-LK (Indonesian Capital Market and Financial Institution Supervisory Agency) regulation V.D.6 concerning on Financing Transaction by the Exchange Company for the customer and short selling transaction by the exchange company (Appendix Bapepam Decree No. Kep-258/BL / 2008 dated June 30, 2008).
Norway	9/1999	All stocks affected	67	Yes	Here we follow the information provided by Charoenrook and Daouk (2009) and Jain, Jain, McInish, and McKenzie (2013). This detailed information is confirmed by contacting Oslo Bors.
Philippines	1998	All stocks affected	27	No	The information is obtained from the Philippine Stock Exchange, and the exchange didn't assign a specific short selling designated list.
Poland	7/1/2010	141	38	Yes	The information is obtained from Warsaw Stock Exchange. The most important regulatory change occurred in July, 2010. All shares participating in the WIG20 index were eligible for short selling.
South Korea	9/1/1996	All stocks affected	67	Yes	The information is obtained by contacting Korea Securities Depository.
Sweden	8/1/1991	All stocks affected	65	Yes	The information is obtained by contacting Finansinspektionen in Sweden. Although short selling was not ban for non-financial stocks but it was very difficult to short sale a stock before 1991. The law on short selling was changed August 1, 1991 so that all market participants could perform short sales.

Table 1, cont'd

Countries	The date of regulatory change	Number of designated stocks	Number of short selling eligible firms in our sample	OECD Countries or IMF Advanced Economies	Institutional Details
Thailand	1/1/2001	50	50	No	On January 3, 2001, the new regulation specified that the stocks in SET 50 were allowed to be sold short. The historical SET 50 lists are provided by the Stock Exchanges of Thailand.
Turkey	4/3/1995	100	15	No	On April 3, 1995, Short selling allowed for stocks on ISE National 100.
Taiwan	7/1/2003	All stocks affected	150	Yes	TWSE launched a centralized Stock Borrowing and Lending (SBL) system in June 2003 to meet the needs of qualified institutional investors while TWSE serves as an intermediary. The detailed information can be found in http://www.tse.com.tw/en/trading/SBL.

Table 2: Firm Characteristics before the Short Selling Regulation Changes

This table reports summary statistics of firm characteristics for 13 countries in the year immediately before the short selling regulation changes. Panel A reports the summary statistics for both large and small firms in the countries that open short selling to all stocks and Chile and Turkey. Panel B reports the summary statistics for both short selling eligible firms and their controlled pairs in the countries that specify the stocks eligible for short selling. The t-stats for mean test also reported. All variables are winsorized at 1% and 99% level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels. All variables have defined in Appendix 1.

Panel A: Countries that Open Short Selling to All Stocks

	Large Firms				Small Firms				Test for Differences
Variable	N	Mean	Median	SD	N	Mean	Median	SD	Mean (t-stats)
Total Assets ($1,000,000)	614	6.900	2.650	10.70	2,552	0.267	0.086	0.547	21.05***
CAPX	559	7.827	4.685	8.322	2,252	6.937	4.006	7.666	2.41**
Asset Growth	581	24.397	16.264	27.767	2,296	18.00	11.52	27.54	4.99***
Equity Issuance	461	-0.002	0.000	0.127	1,650	-0.004	0.000	0.122	0.33
Debt Issuance	562	11.975	7.832	19.722	2,208	7.110	2.107	20.11	5.14***
Leverage	596	43.808	41.477	27.909	2,469	40.06	36.01	30.68	2.71***
Cash Flow	464	9.455	7.740	8.714	2,233	8.213	7.348	9.590	2.57***
Profitability	610	5.442	3.609	9.337	2,522	5.082	4.848	12.18	0.68

Panel B: Countries that specify Stocks Eligible for Short Selling

	Treated				Non-Treated				Test for Differences
Variable	N	Mean	Median	SD	N	Mean	Median	SD	Mean (t-stats)
Total Assets ($1,000,000)	548	1.720	0.790	2.200	507	1.300	0.519	1.910	1.34
CAPX	510	9.289	6.281	9.03	458	9.065	5.462	9.362	0.37
Asset Growth	516	27.19	18.73	31.21	466	23.88	15.31	33.30	1.60
Equity Issuance	492	-0.023	0.000	0.183	385	-0.008	0.000	0.132	-1.36
Debt Issuance	485	8.401	2.403	20.63	440	8.651	3.139	20.17	-0.12
Leverage	516	36.04	34.38	27.10	487	39.86	38.04	29.25	-2.22**
Cash Flow	510	11.89	9.976	9.545	457	10.29	8.763	10.08	2.53**
Profitability	527	8.173	6.845	9.827	497	6.65	5.42	13.11	2.11**

Table 3: Cumulative Abnormal Returns around Short Selling Regulation Changes

This table reports the cumulative abnormal returns calculated based on the market model regression around short selling regulation changes for 13 countries in our sample. For each country, the effective date for the stock that is allowed to be short is recorded as day 0. For estimating the market model, the estimation window is [-281,-31] trading days, with a minimum length of 150 trading days for each observed stock. The mean of cumulative abnormal returns is reported for each observed period window [-10, -1], [-10, 10], [-10, 20], [-10, 30], and [-10, 40]. The means of cumulative abnormal returns are reported in the first row, and the one-tailed p-value are reported in the second row. Panel A reports the cumulative abnormal returns and one tailed p-value for all 13 countries in the sample; Panel B reports the cumulative abnormal returns and one tailed p-value for developed and emerging countries; Panel C reports the cumulative abnormal returns and one tailed p-value for both short selling eligible stocks and large stocks when the countries that have no short selling list; Panel D the cumulative abnormal returns and one tailed p-value for both large (and the stocks specified in the short selling lists) firms and small firms. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Countries	[-10,-1]	[-10,10]	[-10,20]	[-10,30]	[-10,40]	Countries	[-10,-1]	[-10,10]	[-10,20]	[-10,30]	[-10,40]
Panel A: All Countries											
Chile	0.015	-0.001	0.021	0.034	0.080**	*Poland*	-0.032***	-0.036***	-0.029***	-0.031***	-0.020*
	0.26	0.96	0.37	0.27	0.05		0.00	0.00	0.00	0.00	0.06
China	-0.008***	-0.022***	-0.024***	-0.017*	-0.008	*South Korea*	0.027	-0.016	-0.036*	-0.008	-0.006
	0.01	0.00	0.00	0.06	0.39		0.09	0.43	0.09	0.80	0.87
Hong Kong	0.042***	0.029	0.030	-0.010	-0.037	*Sweden*	-0.005	-0.016**	-0.038***	-0.041***	-0.057**
	0.00	0.12	0.17	0.72	0.24		0.44	0.04	0.00	0.01	0.02
India	0.004	0.003	0.009	0.014	0.017	*Taiwan*	-0.004	-0.008	-0.017*	-0.019	-0.026
	0.53	0.64	0.36	0.25	0.23		0.48	0.48	0.10	0.18	0.11
Indonesia	-0.004	0.002	-0.002	0.001	-0.008	*Thailand*	0.007	0.012	0.022	0.004	0.032
	0.54	0.88	0.90	0.95	0.72		0.50	0.60	0.56	0.92	0.48
Norway	-0.003	-0.011	-0.022	-0.035*	-0.048**	*Turkey*	-0.017	-0.057	-0.094	-0.138	-0.208*
	0.70	0.28	0.19	0.10	0.04		0.69	0.33	0.33	0.18	0.06
Philippines	-0.020	-0.053*	-0.061	0.051	0.058						
	0.20	0.08	0.11	0.18	0.21						

Table 3, cont'd

Panel B: Large firms VS. Small firms										
Large Firms	-0.002	-0.010***	-0.011***	-0.011**	-0.011*	*Small Firms*	0.004**	0.000	0.002	0.005	-0.010**
	0.29	0.00	0.01	0.03	0.07		0.05	0.98	0.57	0.17	0.02
Panel C: Emerging VS. Developed Economies										
Developed	-0.002	-0.010**	-0.014**	-0.024***	-0.031***	*Emerging*	-0.002	-0.010**	-0.009	0.000	0.006
	0.51	0.05	0.02	0.00	0.00		0.40	0.02	0.14	0.97	0.43
Panel D: Countries with a specified list VS. Countries with no specified list										
With List	-0.002	-0.010**	-0.007	-0.010	-0.006	*Without List*	-0.002	-0.011**	-0.019***	-0.013	-0.018*
	0.44	0.02	0.22	0.12	0.39		0.46	0.05	0.01	0.13	0.07

Table 4: Change in corporate investment around regulation changes

This table reports the mean percentage change of corporate investment, proxied by asset growth, for firms from both short selling treated group (the largest firms for the countries that don't specify the stocks eligible for short selling) and non-treated group (the small firms for the countries that don't specify the stocks eligible for short selling) for 3 years before and after the short selling regulation change. Panel A reports the changes for both developed sample and emerging economies sample; Panel B reports the changes for the countries with and without short selling list; Panel C reports the changes for the countries with high and low cumulative abnormal returns around the regulation changes, respectively. DID (the Difference in Difference) measures the change in the mean after the regulation changes (versus before the changes) for firms in the treated group relative to firms in the non-treated group. DID estimates are based on an OLS regression where investment is regressed on a dummy for firms in the Short, a dummy variable equal to 1 after the regulation changes and the interaction term of these two variables. ***, **, and * indicate the significance level less than 1%, 5%, and 10% respectively.

Countries		Non-Short.	Short	Diff.	T-stats	DID	T-stats
Panel A: All Countries							
Entire Sample	Before	18.90	25.45	6.551**	10.24		
	After	13.19	11.85	-1.343**	-2.46	-7.89***	-9.14
Panel B: Emerging VS. Developed Economies							
Developed	Before	17.09	19.21	2.114**	2.45		
	After	12.31	7.458	-4.849***	-6.81	-6.96***	-6.01
Emerging	Before	21.22	30.87	9.650**	10.25		
	After	15.43	17.19	1.758**	2.04	-7.89***	-6.15
Panel C: The Countries with Low CAR VS. The Countries with High CAR							
Low CAR	Before	18.15	20.89	2.747***	2.73		
	After	14.13	9.44	-4.690***	-5.53	-7.44***	-5.88
High CAR	Before	19.52	28.56	9.039***	10.78		
	After	11.71	14.32	2.61***	3.74	-6.43***	-5.64
Panel D: Countries with a specified list VS. Countries with no specified list							
With List	Before	25.10	29.84	4.736***	3.85		
	After	11.52	12.78	1.261	1.54	-3.48***	-7.06
Without List	Before	17.12	21.49	4.365***	5.66		
	After	13.51	10.86	-2.654***	-3.44	-7.02*	-1.82

Table 5: Multivariate Results -The Changes in Corporate Investment around Regulation Changes

This table reports the results of OLS regressions with firm-fixed effects with dependent variable as asset growth for different subsamples in the sample. The first to the fifth columns report the results for the entire sample, the sample including all developed economies, the sample including all emerging economies, the sample including all countries and regions with low cumulative abnormal returns around regulation changes, and the sample including all countries and regions with high cumulative abnormal returns around regulation, respectively. T-statistics are displayed within parentheses under each coefficient. Standard errors adjust for heteroskedasticity and within correlation clustered by firm. All variables are defined in Appendix 1. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

	Entire Sample	Developed	Emerging	Low CAR	High CAR
After	-2.117***	0.921	-4.600***	-3.046***	-0.322
	(-3.86)	(1.34)	(-5.37)	(-4.65)	(-0.34)
Short×After	-1.858**	-2.779**	-1.875	-2.711**	-1.320
	(-2.06)	(-2.19)	(-1.40)	(-2.04)	(-1.07)
Cash flow	1.484***	1.342***	1.580***	1.494***	1.459***
	(31.79)	(24.81)	(18.71)	(25.70)	(18.93)
Log(Assets (-1))	-10.376***	-20.918***	-5.391***	-9.776***	-11.965***
	(-12.52)	(-22.12)	(-7.09)	(-8.67)	(-10.99)
Profitability(-1)	0.254***	0.393***	0.110	0.279***	0.215**
	(4.90)	(6.14)	(1.25)	(4.26)	(2.52)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	20,090	12,389	7,701	10,754	9,336
adj. R-sq	0.451	0.451	0.485	0.491	0.398

Table 6: Asset Growth Decompositions and Corporate Financing

This table reports the results of OLS regressions with firm-fixed effects with dependent variables as asset growth decompositions (that include cash, current assets, property, plant & equipment, and other assets), equity issuance, and debt issuance for different subsamples in the sample. Panel A reports the results for the developed economies, and Panel B reports the results for the countries and regions with low country level cumulative abnormal returns around regulation changes. T-statistics are displayed within parentheses under each coefficient. Standard errors adjust for heteroskedasticity and within correlation clustered by firm. All variables are defined in Appendix 1. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

Panel A: Asset Growth Decompositions and Corporate Financing in Developed Economies

	Cash	*Cur. Assets*	*PPE*	*OtherAssets*	*Equity Iss.*	*Debt Iss.*
After	0.570***	0.805**	-0.242	-0.497***	0.038***	0.992*
	(2.69)	(2.31)	(-0.95)	(-3.11)	(9.88)	(1.68)
Short×After	0.257	-1.388**	-1.002**	-0.266	-0.005	-3.000***
	(0.66)	(-2.24)	(-1.96)	(-0.75)	(-0.70)	(-2.76)
Cash flow	0.266***	0.545***	0.186***	0.145***	0.000	0.021
	(12.82)	(18.65)	(9.89)	(10.38)	(1.22)	(0.46)
Log(Assets (-1))	-3.784***	-7.522***	-4.172***	-2.021***	-0.035***	-8.191***
	(-12.28)	(-16.69)	(-12.56)	(-8.54)	(-5.26)	(-8.16)
Profitability(-1)	-0.019	0.069**	0.253***	0.081***	-0.003***	0.240***
	(-0.79)	(1.98)	(11.39)	(5.31)	(-6.46)	(3.36)
Leverage (-1)					0.001***	-0.296***
					(3.98)	(-6.04)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	12,237	11,491	12,382	11,488	9,566	12,090
adj. R-sq	0.135	0.308	0.254	0.122	0.245	0.137

Table 6, cont'd
Panel B: Asset Growth Decompositions and Corporate Financing in the Countries with Low CAR

	Cash	*Cur. Assets*	*PPE*	*OtherAssets*	*Equity Iss.*	*Debt Iss.*
After	-0.343	0.027	-1.249***	-0.791***	0.033***	-0.021
	(-1.52)	(0.08)	(-4.89)	(-4.88)	(8.16)	(-0.04)
Short×After	0.477	-1.227*	-0.894*	-0.735*	-0.009	-2.924**
	(1.10)	(-1.86)	(-1.76)	(-1.87)	(-1.19)	(-2.52)
Cash flow	0.303***	0.602***	0.210***	0.147***	0.001	0.086*
	(13.47)	(19.24)	(10.67)	(9.98)	(1.43)	(1.94)
Log(Assets (-1))	-1.664***	-3.471***	-1.860***	-1.124***	-0.013***	-3.788***
	(-5.17)	(-7.91)	(-6.43)	(-6.01)	(-2.94)	(-5.29)
Profitability(-1)	-0.019	-0.002	0.224***	0.066***	-0.004***	0.223***
	(-0.74)	(-0.06)	(9.71)	(4.16)	(-7.17)	(3.17)
Leverage (-1)					0.001***	-0.286***
					(3.65)	(-5.15)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	10,603	10,012	10,747	10,009	8,465	10,443
adj. R-sq	0.144	0.363	0.317	0.112	0.255	0.187

Table 7: Robustness- Different Cut-off for Largest Firms

This table reports the results of OLS regressions with firm-fixed effects with dependent variables as asset growth and debt issuance for different subsamples when we define the largest firms as the firms of which the total assets immediately before the short selling regulation change are greater than the median firm level total assets in each country. Columns 1 and 2 report the results for the entire sample; columns 3 and 4 report the results for the developed economies; the last 2 columns report the results for the countries with the low cumulative abnormal returns (CARs) around the regulation changes. T-statistics are displayed within parentheses under each coefficient. Standard errors adjust for heteroskedasticity and within correlation clustered by firm. All variables are defined in Appendix 1. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

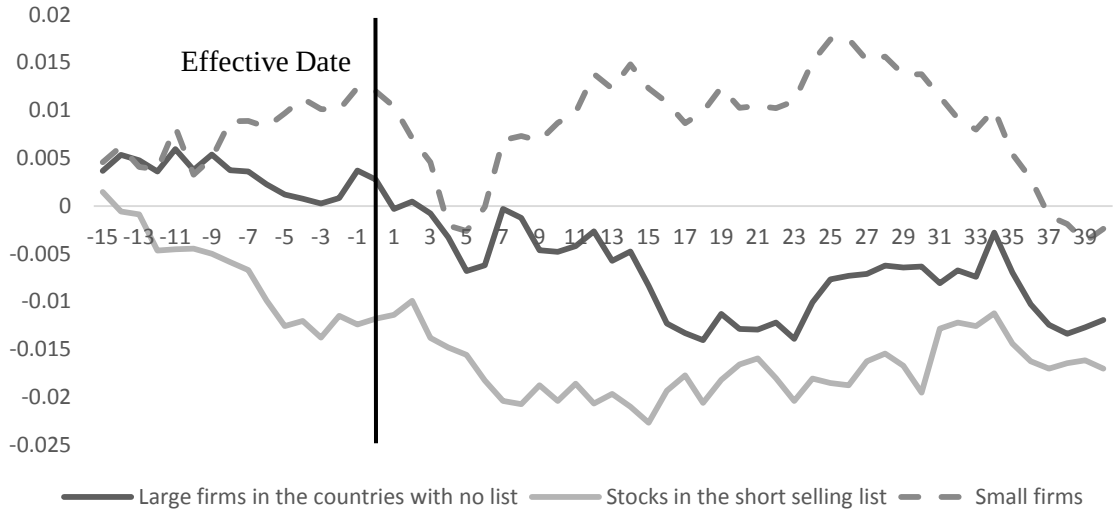
	Entire Sample		Developed Economies		Low CAR	
	Asset Gowth	Debt Iss.	Asset Gowth	Debt Iss.	Asset Gowth	Debt Iss.
After	-1.061	-0.369	1.844**	2.149***	-2.624***	1.501*
	(-1.55)	(-0.67)	(2.00)	(2.61)	(-2.96)	(1.80)
Short×After	-2.895***	-2.318***	-2.749**	-3.226***	-1.837*	-3.808***
	(-3.57)	(-3.37)	(-2.49)	(-3.23)	(-1.67)	(-3.70)
Cash flow	1.486***	0.101***	1.344***	0.024	1.496***	0.090**
	(31.78)	(2.72)	(24.82)	(0.53)	(25.68)	(2.01)
Log(Assets (-1))	-10.42***	-4.104***	-20.95***	-8.226***	-9.803***	-3.823***
	(-12.63)	(-8.67)	(-22.15)	(-8.20)	(-8.69)	(-5.33)
Profitability(-1)	0.257***	0.454***	0.400***	0.247***	0.285***	0.230***
	(4.95)	(9.83)	(6.26)	(3.46)	(4.36)	(3.28)
Leverage (-1)		-0.014		-0.296***		-0.286***
		(-1.13)		(-6.03)		(-5.15)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	20,090	19,463	12,389	12,090	10,754	10,443
adj. R-sq	0.452	0.086	0.451	0.138	0.491	0.188

Table 8: Placebo Tests

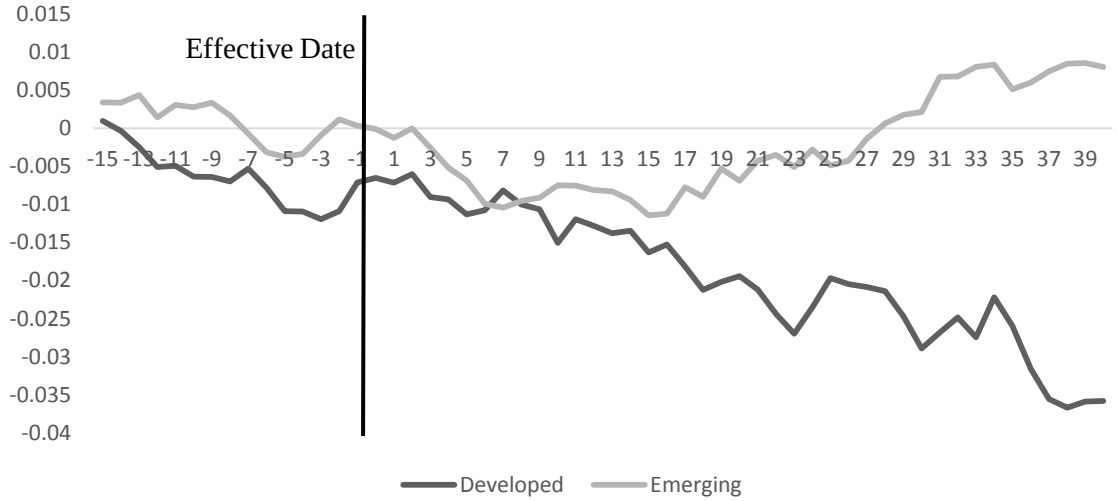
This table reports Placebo tests results when we define the event year as "Pseudo Event" year. Panel A reports the placebo tests results when we use the third year before the regulation change as the "Pseudo Event" year for all countries. Panel B reports the placebo tests results when we use the third year after the regulation change as the "Pseudo Event" year for all countries. Columns 1 and 2 report the results for the entire sample; columns 3 and 4 report the results for the developed economies; the last 2 columns report the results for the countries with the low cumulative abnormal returns (CARs) around the regulation changes. T-statistics are displayed within parentheses under each coefficient. Standard errors adjust for heteroskedasticity and within correlation clustered by firm. All variables are defined in Appendix 1. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively.

	Entire Sample		Developed Economies		Low CAR	
	Asset Gowth	Debt Iss.	Asset Gowth	Debt Iss.	Asset Gowth	Debt Iss.
Panel A: Event Year=-3						
Short×After	1.256	1.171	0.530	-0.940	-0.748	-0.775
	(1.31)	(1.46)	(0.44)	(-0.90)	(-0.57)	(-0.70)
with Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: Event Year=+3						
Short×After	1.281	0.953	1.630	1.914	1.772	2.334
	(0.97)	(0.86)	(0.76)	(1.03)	(0.85)	(1.18)
with Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Figures



Panel A: Cumulative Abnormal Returns for the Countries with Lists versus No Lists



Panel B: Cumulative Abnormal Returns for Emerging and Developed Economies

Figure 1: Cumulative Abnormal Returns around Short Selling Regulation Changes

This figure illustrates cumulative abnormal returns calculated based on the market model regression around short selling regulation changes for 13 countries in our sample. For each country, the short selling effective date is recorded as day 0. In order to estimate the market model, the estimation window is [-281,-31] trading days, with a minimum length of 150 trading days for each observed stock. Panel A reports the cumulative abnormal returns for large firms in the countries with no specified short selling lists, the stocks in the countries which specified a list, and all other firms (which are smaller firms) in all 13 countries, respectively. Panel B reports the cumulative abnormal returns for both short selling eligible stocks and largest stocks when the countries they are listed have no short selling list for both emerging and developed countries.

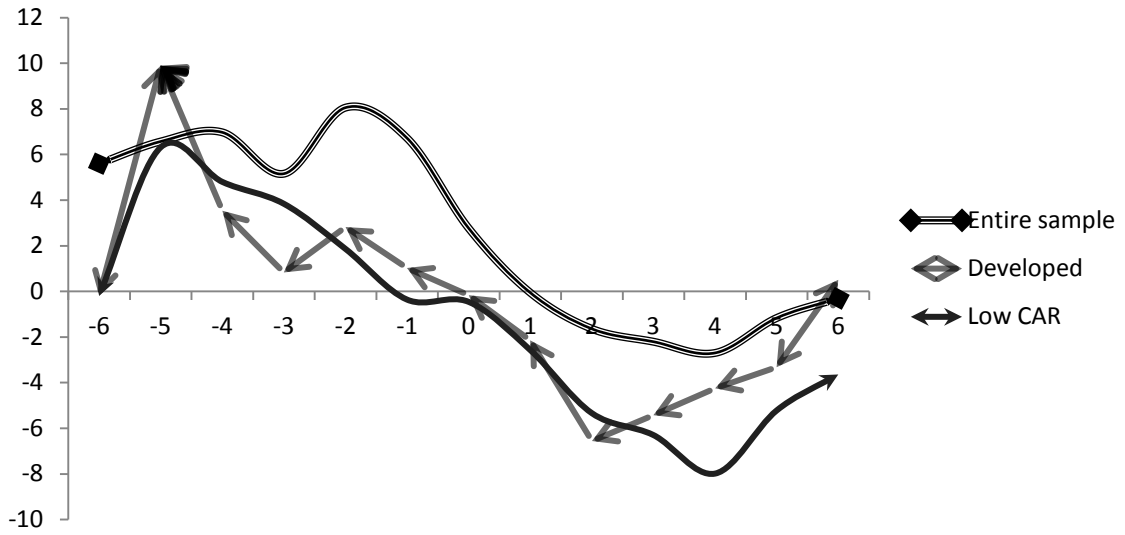


Figure 2: The Changes in Corporate Investment around Short Selling Regulation Changes
This figure illustrates the difference between treated firms and non-treated firms in yearly changes of corporate investments, measured by asset growth, around short selling regulation changes (6 years before and after the regulation changes). The changes are illustrated for the entire sample, developed economies, and the countries with low CARs.