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journal homepage: [www.elsevier.com/locate/jfec](http://www.elsevier.com/locate/jfec)Stock repurchases and liquidity<sup>☆</sup>Alexander Hillert<sup>a</sup>, Ernst Maug<sup>a,\*</sup>, Stefan Obernberger<sup>b</sup><sup>a</sup> University of Mannheim, L9 1-2, 68131 Mannheim, Germany<sup>b</sup> Erasmus University Rotterdam, Burgemeester Oudlaan 50, 3000DR Rotterdam, The Netherlands

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## ABSTRACT

We analyze the impact of share repurchases on liquidity based on a new comprehensive data set of realized share repurchases in the US, which covers 50,204 repurchase months between 2004 and 2010. Using instrumental variable analysis, we show that repurchases unequivocally improve liquidity and suggest that endogenous controls have confounded results in earlier studies. Liquidity also influences how firms execute repurchase programs. Repurchases provide liquidity when other investors sell the firm's stock or in times of crisis. No evidence exists that firms reduce liquidity when they trade on private information.

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## 1. Introduction

This paper investigates how firms affect the liquidity of the market for their own stock when they repurchase shares and which strategies firms adopt when they

execute buyback programs. Beginning with [Barclay and Smith \(1988\)](#), a large literature seeks to understand whether firms provide or demand liquidity when they repurchase shares. From the point of view of market microstructure, firms are simply another category of traders when they conduct open market repurchases. The literature has identified several dimensions in which traders could differ and that affect their demand for or supply of liquidity: traders' time horizon (patience, willingness to pay for immediacy), their informational advantage relative to other traders, and their size. Most of the prior literature on repurchases and liquidity builds on the theoretical framework of [Barclay and Smith \(1988\)](#), who emphasize information as the main dimension and ask whether firms act like informed investors and increase the adverse-selection component of the spread or whether they enter the market as liquidity traders. By contrast, we build on more recent research on limit order markets (e.g., [Foucault, Kadan, and Kandel, 2005](#); [Kaniel and Liu, 2006](#)) and

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\* Corresponding author. Tel.: +49 621 181 1952.

E-mail address: [maug@uni-mannheim.de](mailto:maug@uni-mannheim.de) (E. Maug).

emphasize investors' time horizon, i.e., their willingness to pay for immediacy. The overall conclusion from our results is that firms should be regarded as large and patient investors when they buy back their own stock.

Research on the question of whether share repurchases increase or reduce liquidity has not converged. Several authors have analyzed the impact of repurchases on stock liquidity and found that repurchases reduce liquidity in France and Hong Kong, while their impact is positive in Canada, Italy, Sweden, and Switzerland.<sup>1</sup> The evidence for the US is ambiguous. The earlier literature on US data analyzes repurchase announcements as data on realized share repurchases have become available only recently and are difficult to collect.<sup>2</sup> Apart from data availability, the diversity of results can be attributable to methodological differences across studies as well as trading environments, which vary across markets and have changed over time, with most exchanges now adopting electronic limit-order trading.

In this paper, we provide a fresh look at this topic. We collect a much larger and more accurate data set than has been available in previous studies for the US and develop instruments for repurchases and for liquidity to disentangle the causal connections between these two variables. Our theoretical point of departure is the theory of modern limit order markets, because it seems the most appropriate framework for analyzing US stock markets during our sample period.<sup>3</sup> Following [Foucault, Kadan, and Kandel \(2005\)](#), we conceive of limit order markets as markets for immediacy, in which traders can either demand immediacy, e.g. through placing market orders, or supply immediacy through placing limit orders (see also [Grossman and Miller, 1988](#)). The critical characteristic of traders in these markets thus is their time horizon or patience, which can be affected by liquidity needs, private information, and risk aversion. We therefore test whether firms act as patient investors by providing liquidity and investigate which firm characteristics affect their patience and their supply of liquidity.

<sup>1</sup> See [Brockman and Chung \(2001\)](#) for Hong Kong, [De Cesari, Espenlaub, and Khurshed \(2011\)](#) for Italy, [Ginglinger and Hamon \(2007\)](#) for France, [Chung, Isakov, and Perignon \(2007\)](#) for Switzerland, [McNally and Smith \(2011\)](#) for Canada, and [Rasbrant and Ridder \(2013\)](#) for Sweden.

<sup>2</sup> [Barclay and Smith \(1988\)](#) look at repurchase announcements and find a negative impact for the US, whereas [Miller and McConnell \(1995\)](#) find no effect. [Wiggins \(1994\)](#) and [Franz, Rao, and Tripathy \(1995\)](#) examine announcements of open market repurchases, and [Nayar, Singh, and Zebedee \(2008\)](#) analyze fixed price tender offers and dutch auctions. The last three studies find a positive relation between repurchases and liquidity. [Cook, Krigman, and Leach \(2004\)](#) provide univariate analyses of a small, hand-collected sample of realized open market share repurchases and find a positive effect. [Ben-Rephael, Oded, and Wohl \(2014\)](#) study recently disclosed, realized open market repurchases. The authors find ambiguous results and conclude from indirect evidence that "repurchasing firms consume liquidity rather than provide it" (p. 1301).

<sup>3</sup> See, e.g., [Jain \(2005\)](#) for a discussion of market mechanisms. He classifies US markets as hybrid markets, in which traders can interact directly through the limit-order book or through dealers. The results of [Comerton-Forde, Hendershott, Jones, Moulton, and Seasholes \(2010\)](#) (see their Internet Appendix), and [Hasbrouck and Sofianos \(1993\)](#) suggest that the specialist participation rate is only about 8–15%. Hence, it seems appropriate to treat these hybrid markets as limit order markets.

To test our hypotheses, we collect monthly data on all repurchase programs and stock repurchases from all US companies from 2004 to 2010 from Securities and Exchange Commission (SEC) forms 10-Q and 10-K and compute three different liquidity measures. Our data set covers 6,537 repurchase programs with an average (median) size of 6.59% (5.27%) of the firm's market capitalization. We collect data on 6,150 firms, of which 2,930 firms conduct at least one repurchase during our sample period. Our data set is significantly larger and also more accurate than the ones used in previous research.<sup>4</sup> In addition, we collect information on program characteristics, which allows us to condition on them and develop new instruments.

Our methodology departs from previous research in three important ways. First, we avoid contemporaneous control variables. Second, we use firm fixed effects and time fixed effects to control for cross-sectional characteristics and macroeconomic factors. Hence, no part of our identification comes from cross-sectional differences between firms. While simple, these two steps together already account for most qualitative differences between our results and those in the literature, as well as for differences between previous contributions themselves. Third, we recognize that liquidity and repurchases are simultaneously determined and, therefore, introduce instruments for both directions in this relation. Our analysis focuses on repurchases under previously announced repurchase programs, and our data allow us to use two characteristics of these programs as instruments for realized repurchases, namely, the size and the time that has elapsed since the inception of the program.<sup>5</sup> The time since program initiation increases each month by one month and the size of the program is fixed at the beginning, when the program is announced. Thereby, we ensure that predicted repurchases are not related to the dynamic development of liquidity during the execution of the program.

We use three instruments for liquidity. The first instrument is the median monthly trading volume of all firms that never undertake a repurchase. This instrument measures a factor of liquidity that is common to all firms and cannot be influenced by the execution strategy of any particular firm's stock repurchase program. Alternatively, we use lagged trading volume in some specifications. The third instrument is the absolute difference between the

<sup>4</sup> Previous work on realized repurchases ([Dittmar, 2000](#); [Stephens and Weisbach, 1998](#)) is mainly based on a measure constructed from Compustat purchases of common stock. [Banyi, Dyl, and Kahle \(2008\)](#) show that this measure, which is available only on a quarterly basis, "deviates from the actual number of shares repurchased by more than 30% in about 16% of the cases" (p. 460). The only exception is [Cook, Krigman, and Leach \(2004\)](#), who analyze the daily open market repurchases of 64 firms that voluntarily disclosed their repurchase programs.

<sup>5</sup> Given our setup, we need instruments for actual repurchases under previously announced programs. The only other paper that uses instruments for repurchases is [Bonaimé, Hankins, and Harford \(2014\)](#), who use state-by-state transitions in regulation, which removed a preference for dividends for some institutional investors. These transitions took place before our sample period and are not suitable to instrument for actual repurchases.

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