Local Business Cycles and Local Liquidity*

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July 1, 2012

Abstract – This paper shows that the geographical location of a firm affects its liquidity. We find that there is an economically significant local component in firm liquidity that is induced by local economic conditions. The future firm liquidity is higher (lower) when the local economy performs well (poorly) and this effect is more pronounced among larger firms. Further, the impact of local economic conditions on local firm liquidity is stronger when local financing constraints are more binding, the local information environment is more opaque, and local institutional ownership levels and trading intensity are higher. This geographical variation in local liquidity generates predictable patterns in local stock returns. Local stock prices decline and future returns are higher when expected local liquidity is lower. A trading strategy based on the geographical variation in firm-level liquidity generates an annual risk-adjusted performance of over six percent.

Keywords: Market segmentation, U.S. state business cycle, liquidity, local bias, capital constraints, institutional investors, return predictability.

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Abstract

This paper shows that the geographical location of a firm affects its liquidity. We find that there is an economically significant local component in firm liquidity that is induced by local economic conditions. The future firm liquidity is higher (lower) when the local economy performs well (poorly) and this effect is more pronounced among larger firms. Further, the impact of local economic conditions on local firm liquidity is stronger when local financing constraints are more binding, the local information environment is more opaque, and local institutional ownership levels and trading intensity are higher. This geographical variation in local liquidity generates predictable patterns in local stock returns. Local stock prices decline and future returns are higher when expected local liquidity is lower. A trading strategy based on the geographical variation in firm-level liquidity generates an annual risk-adjusted performance of over six percent.

1. Introduction

An emerging literature in finance suggests that the U.S. financial markets may be segmented. For example, Becker (2007) shows that U.S. bank loan markets are segmented since local loan supply and the level of local economic activity depend on the level of local deposits. Consistent with the idea of geographical segmentation, Korniotis (2008) shows that heterogeneity in economic conditions across the U.S. states can explain the variation in the cross-section of expected returns. Similarly, Gomez, Priestley, and Zapatero (2011) show that the risk premium varies across the nine U.S. Census divisions due to differences in investors' relative wealth concerns. Most recently, Korniotis and Kumar (2012) show that a strong investor preference for holding local stocks and incomplete risk sharing across U.S. states generate geographical segmentation in equity markets. Consequently, state-level stock returns vary with the local business cycle, where future stock returns are higher (lower) when the local economy is contracting (expanding).

In this paper, we extend this literature on geography-induced economic segmentation and investigate whether the geographical location of a firm affects its liquidity. Our main conjecture is that local macroeconomic variables would influence the liquidity of local firms. In particular, local firm liquidity would be lower when the local economy performs poorly and local liquidity would improve as the local economic environment improves.

This conjecture is motivated by the recent evidence in Korniotis and Kumar (2012), who demonstrate that the local economic conditions rather than the aggregate U.S. macroeconomic climate is more salient to local investors. The second key motivation for our analysis is the previous finding that portfolio allocations and trading activities of retail and institutional investors are tilted toward local stocks (e.g., Coval and Moskowitz (1999, 2001)).

Beyond these two broad strands of finance literature, our conjecture is motivated by recent studies in liquidity. This literature finds that firm-level liquidity exhibits a significant market-wide component and suspects that changes in macroeconomic conditions are likely to induce this commonality in liquidity.[1] Although this is an intuitive conjecture and country-level studies find a link between aggregate liquidity and monetary policy (e.g., Chordia, Sarkar, and Subrahmanyam (2005), Sauer (2007)), the empirical evidence that liquidity varies systematically with real aggregate economic factors is weak (e.g., Fujimoto (2003), Choi and Cook (2005)).

A key innovation in our study is to recognize that state-level economic conditions may be a significant source of commonality in firm-level liquidity. That is, we shift the focus from the aggregate country-level to the state-level and identify local macroeconomic conditions as novel determinants of the common variation in liquidity across firms. Just as state-level macroeconomic variables are stronger predictors of local stock returns than aggregate U.S.-level macroeconomic indicators, state-level macroeconomic variables may be more appropriate predictors of firm liquidity.

The idea that the geographical location of a firm could affect its liquidity is not entirely new and has been examined in Loughran and Schultz (2005). Their study, however, focuses on liquidity differences between firms in rural and urban regions that arise from differences in familiarity and access to information. They do not examine the impact of local economic conditions on firm liquidity and the potential asset pricing implications of this relation, which are the main focus of our study.

Our main conjecture is based on the key implicit assumption that commonality in firm-level liquidity is at least partly local. Therefore, before proceeding with our core analysis, we

[1] For example, see Chordia, Roll, and Subrahmanyam (2000), Huberman and Halka (2001), Hasbrouck and Seppi (2001), Brockman and Chung (2002), Korajczyk and Sadka (2008), Brockman, Chung, and Pérignon (2009).

assess the validity of this assumption. Specifically, we augment the main tests in Chordia, Roll, and Subrahmanyam (2000) and add a local liquidity factor to their baseline specification. Consistent with our key implicit assumption, we find that liquidity has an economically sizeable and statistically significant local component, which is stronger than the industry-induced component in liquidity. This local liquidity component is incremental over commonalities in liquidity induced by market-wide and industry factors documented in earlier studies.

Encouraged by this important evidence, we test our key prediction that local economic conditions affect the liquidity of local stocks and also assess whether this relation depends on local capital market conditions. Consistent with our key conjecture, using multiple measures of liquidity, we show that the liquidity of local firms dries up (increases) following a deterioration (improvement) in local economic conditions. Further, consistent with studies that find that liquidity commonality is stronger for larger firms (e.g., Chordia, Roll, and Subrahmanyam (2000); Kamara, Lou, and Sadka (2008)), we show that the relation between local economic conditions and subsequent liquidity is more pronounced among larger firms.

Next, we identify the channels through which local business cycles may affect local liquidity. We rely on recent studies to determine this set of potential channels. Specifically, Korniotis and Kumar (2012) document a strong state-level component in holdings and trading of local stocks. They find that more than 15% of trading in a typical firm can be attributed to state-based institutional investors and trades of local investors are more strongly correlated (i.e., herding tendencies are stronger) than trades of institutions located far from each other. The mean within-region trading correlation is 0.141, which is more than three times higher than the mean across-region trading correlation of 0.046.

Further, Chordia, Roll, and Subrahmanyam (2000) and Kamara, Lou, and Sadka (2008) posit that commonality in the composition of the institutional investor base or similarities in their trading strategies would be an important channel through which liquidity commonality across firms arises. Other recent liquidity studies suggest that investors' funding constraints and firms' information environment should influence liquidity (e.g., Eisfeldt (2004), Taddei (2007), Brunnermeier and Pedersen (2009), Hameed, Kang, and Viswanathan (2010)).

A natural implication of the arguments in these earlier studies is that the relation between liquidity and local economic conditions is likely to be stronger in states where local ownership and local trading levels are relatively higher. Further, local economic conditions should influence local liquidity more strongly when local financing constraints are more binding and the local information environment is more opaque. Consistent with these conjectures, we find that local economic conditions affect local liquidity more strongly when (i) local financing constraints are more binding, (ii) the local information environment is more opaque, (iii) local ownership levels are higher, and (iv) the trading intensity of local investors is relatively high.

In the last part of the paper, we study whether geographical variation in expected local liquidity generates predictable patterns in local stock returns. The local component in liquidity may affect prices of local stocks because the local macroeconomic variables affect the liquidity of local firms in a systematic manner and make them riskier. Alternatively, local macroeconomic variables may generate mispricing among local stocks through the impact of local trading. In either instance, local stock prices would be lower when expected local liquidity is lower and, consequently, average future returns would be higher.

To test this asset pricing conjecture, we use the liquidity predictability regression estimates to construct Long−Short portfolios. The Long portfolio includes firms located in states predicted to have the lowest common liquidity and the Short portfolio includes firms located in states predicted to have the highest common liquidity. We find that this Long−Short trading strategy based on the geographical variation in expected firm-level liquidity generates an annual risk-adjusted performance of over six percent.

These results make several important contributions to the finance literature. In particular, these findings improve our understanding of the sources of commonality in liquidity. Previous liquidity studies provide strong evidence of commonality in liquidity but the mechanisms that induce such commonality have been harder to identify. Our paper not only identifies a new geography-based component in liquidity but also identifies its main determinants.

Specifically, we show that geographical heterogeneity in macroeconomic conditions generates geographical patterns in firm liquidity, i.e., a significant component of firm-level liquidity can be traced to local economic factors. Examining why local economic factors affect local firm liquidity, we find that local funding constraints, opacity of local information environment, and commonalities in local institutional ownership and trading are important channels through which local economic conditions influence the liquidity of local firms.

Beyond these contributions to the liquidity literature, we show that the impact of local macroeconomic variables on local liquidity generates predictable patterns in stock returns. This evidence indicates that either market participants do not react optimally to changes in local economic environment or the existing asset pricing models are unable to account for the time-varying local liquidity risks induced by local economic conditions. Overall, the asset pricing results improve our understanding of the role of geography in the price formation process.

The rest of the paper is organized as follows. In Section 2, we discuss the related literature and develop our main hypotheses. In Section 3, we describe the data sources. We present the main empirical results in Section 4 and discuss the robustness of these results in Section 5. We conclude in Section 6.

2. Related Literature and Testable Hypotheses

We study the relation between local liquidity and local macroeconomic conditions by organizing our empirical analysis around four hypotheses, which are developed in this section. The primary motivation for our study comes from the recent literature in liquidity commonality. Several studies document significant evidence of commonality in liquidity across equity securities (see footnote 1). In addition, Chordia Roll, and Subrahmanyam (2000) suggest that because firms have common investor base and those investors may use common trading strategies, changes in aggregate economic conditions may induce correlated trading patterns and have a common effect on firm liquidity.

Although this is an intuitive conjecture, unfortunately, except for some monetary policy variables, prior studies find little or no support for the posited relation between aggregate liquidity and macroeconomic factors (e.g., Fujimoto (2003), Choi and Cook (2005), Chordia, Sarkar, and Subrahmanyam (2005), Sauer (2007)). Our main innovation is to recognize that a significant source of commonality in firm-level liquidity may be local. This idea is motivated by a growing finance literature, which finds that the U.S. financial markets may be segmented.

In particular, Becker (2007) shows U.S. bank loan markets are highly segmented. Korniotis (2008) shows that differences in economic conditions across the U.S. states can explain variation in the cross-section of expected returns. Similarly, Gomez, Priestley, and Zapatero (2011) show that the risk premium varies across the nine U.S. Census divisions due to geographical variation in relative wealth concerns of investors. Most recently, Korniotis and Kumar (2012) demonstrate that the local economic environment rather than aggregate U.S. macroeconomic climate is more salient to local investors and, thus, more relevant for local stock returns. Based on these observations, our main hypothesis posits that:

H1: *There is a positive relation between local macroeconomic conditions and subsequent liquidity of local stocks.*

Earlier studies also show that the degree of liquidity commonality varies systematically across securities. In particular, Chordia Roll, and Subrahmanyam (2000) find that liquidity commonality increases with firm size, as large firm spreads are more sensitive to market-wide changes in spreads. They suggest that this evidence may be due to a greater prevalence of institutional herd trading among larger stocks.

Kamara, Lou, and Sadka (2008) build upon these findings and analyze the evolution of systematic liquidity in the cross-section of US stocks from 1963 through 2005. They find that liquidity commonality has increased for large firms and declined for small firms. They conjecture that this finding may be due to changes in the US equity investor base. Consistent with this conjecture, they show that differences in the level of institutional ownership (especially ownership of investment companies and investment advisors) across stock-size groups can explain the differences in systematic liquidity across those groups.

Motivated by the findings in these two recent studies, our second hypothesis posits:

H2: *The impact of local macroeconomic environment on local liquidity increases with firm size.*

Next, we focus on the mechanisms through which local commonalities in liquidity may arise. We consider three broad sets of factors, which may generate state-level variation in firm liquidity: (i) local institutional ownership and trading, (ii) local funding constraints, and (iii) information environments of local firms.

The choice of the first potential channel is motivated by the evidence in Korniotis and Kumar (2012), who show that holdings and trading levels of both retail and institutional investors are substantially higher for local firms and exhibit substantial cross-state variation. More than 15% of trading in a typical firm can be attributed to state-based institutional investors, which is considerably higher than the expected trading levels of 6-8%. In addition, the trades of local investors are more strongly correlated (i.e., herding tendencies are stronger) than trades of institutions located far from each other. The mean state-level trading correlation among institutions located within the same Census region is 0.141, which is more than three times higher than the mean across-region trading correlation of 0.046. Given this prior evidence of concentrated local trading and strong local trading correlations, the relation between local economic conditions and local liquidity is likely to vary with the degree of local stock ownership and trading.

Next, we conjecture that financial constraints should affect the relation between real economic conditions and liquidity. Existing theories suggest that market liquidity drops after large negative market-wide shocks because financial intermediaries' collateral values decrease and funding constraints become more binding, forcing asset holders to liquidate (e.g., Kyle and Xiong (2001), Gromb and Vayanos (2002), Anshuman and Viswanathan (2005), Brunnermeier and Pedersen (2009)). Hameed, Kang and Viswanathan (2007) find that commonality in liquidity increases during periods of market decline, and that liquidity commonality is positively related to market volatility. Along similar lines, we expect local funding constraints to amplify the relation between liquidity and local economic conditions.

Our last channel is motivated by the observation that higher levels of adverse selection negatively affect liquidity and this relation is magnified when the information environment of a firm is more opaque. Recent theories suggest this would result in pro-cyclical systematic liquidity. Eisfeldt (2004), for instance, models a dynamic economy in which high productivity leads to higher investment in risky assets and hence more rebalancing trades. This mechanism mitigates (exacerbates) adverse selection and improves (deteriorates) liquidity of risky asset markets in good (bad) economic times. Taddei (2007) derives a similar prediction for the relation between liquidity and economic fluctuations when firms endogenously choose capital structure to finance investment opportunities where they have private information. These arguments suggest that greater opacity of the local information environment would amplify the relation between liquidity and local economic conditions.

Overall, motivated by the evidence from these previous studies, our third hypothesis posits that:

> **H3:** *The effect of local economic conditions on local liquidity is amplified when (i) local financing constraints are more binding, (ii) the local information environment is more opaque, (iii) the shareholder base is more local, and (iv) stock trading is relatively more localized.*

In the last part of the paper, we study the potential asset pricing implications of geographical variation in expected liquidity that is induced by local business cycles. The local component of liquidity could affect the prices of local stocks in two distinct ways. The first possibility is that local macroeconomic variables affect the liquidity of local firms in a systematic manner and make them riskier, commanding a higher risk premium. Alternatively, local macroeconomic variables may generate mispricing among local stocks through the impact of local trading. In either instance, local stock prices would be lower when expected local liquidity is lower and, consequently, expected returns would be higher. Specifically, our key asset pricing hypothesis posits that:

> **H4:** *When local economic conditions are poor, local liquidity falls, depressing local stock prices and leading to higher average future returns.*

To test the asset pricing hypothesis, similar to Korniotis and Kumar (2012), we form Long−Short trading strategies, where the Long portfolio includes firms located in states predicted to have the lowest common liquidity and the Short portfolio includes firms located in states predicted to have the highest common liquidity. If the impact of local macroeconomic variables on the liquidity of local firms is economically significant, these trading strategies would earn significant risk-adjusted returns.

3. Data Sources and Summary Statistics

3.1 State-Level Liquidity Measures

We use various common measures of liquidity in our empirical analysis: (i) Amihud (2002) illiquidity measure; (ii) relative spreads; (iii) Corwin-Schultz (2012) spreads; (iv) Lesmond, Ogden, and Trzcinka (1999) (LOT) measure; and (v) stock turnover. Goyenko and Ukhov (2009) and Goyenko, Holden, and Trzcinka (2009) find that "low-frequency" liquidity measures do well in capturing the spread cost and price impact estimated using intraday data. In particular, the Amihud (2002) illiquidity measure is based on Kyle's (1985) lambda and calculated as the ratio of the absolute value of daily stock return to its daily dollar volume. It measures the daily price impact of the order flow.

Among the other liquidity measures, relative spread is the ratio of the daily closing bid-ask spread divided by the midpoint of the daily closing bid-ask spread. The Corwin-Schultz spread, developed from daily high and low prices, is the daily spread estimated for each stock based on equations (14) and (18) in Corwin and Schultz (2012). Negative daily spread estimates are set to zero. The LOT measure is the ratio of the number of zero daily returns to the total number of daily returns within a quarter for each firm. This variable reflects the notion that "harder-to-trade" (i.e., less liquid) stocks are more likely to have zero-volume and, thus, zero return days. Last, turnover is the ratio of quarterly trading volume to the number of shares outstanding at the beginning of the quarter for each firm.

Atkins and Dyl (1997) show that trading volume on the NASDAQ is overstated due to trades between dealers. Therefore, we divide trading volume on NASDAQ-listed stocks by two when calculating the Amihud (2002) and turnover measures. For the Amihud (2002) illiquidity measure, relative spread, Corwin-Schultz spread, and LOT measures, higher values imply lower liquidity. For turnover, higher values imply higher liquidity. All the liquidity measures are calculated using data from the Center for Research in Security Prices (CRSP).

Hasbrouck (2009) shows that Amihud (2002) illiquidity measure is most highly correlated with benchmark price impact measures based on intraday data. The correlation is 0.82. Thus, we focus the discussion of our tests on this particular measure, although all our inferences are qualitatively similar when we use any of the other four liquidity measures to conduct our empirical analysis.

We conduct our main tests using state-quarter observations. To obtain an estimate of the Amihud (2002), relative spread, and Corwin and Schultz (2012) spread measures in state *j* and quarter *q*, we use the following log-average index:

$$State\ Liq\ (j,q) = Log\left(\sum_{i=1}^{N} \omega_{i,q-1}^{j}\left(\frac{\sum_{d=1}^{Q} Liq_{i,d,q}^{j}}{Q}\right)\right).$$

To estimate the LOT and turnover measures in state *j* and quarter *q*, we use the following log-average index:

$$State\ Liq\ (j,q) = Log\left(\sum_{i=1}^{N} \omega_{i,q-1}^{j} Liq_{i,q}^{j}\right).$$

In both instances, $Liq_{i,d,q}^{j}$ is the daily liquidity estimate for stock *i* headquartered in state *j* on day *d* in quarter *q*; Q is the total number of trading days for stock *i* in quarter *q*; $Liq_{i,q}^{j}$ is the quarterly liquidity estimate for stock *i* headquartered in state *j* in quarter *q*; $\omega_{i,q-1}^{j}$ is stock *i*'s market capitalization scaled by the aggregate market capitalization of all firms located in the same state at the end of quarter $q-1$; *N* is the number of stocks headquartered in state *j*; and *Log* indicates the natural logarithm function. Due to the non-normality of state-quarter liquidity measures, we use the natural logarithm of these measures in all empirical tests.

3.2 Measures of Local Economic Activity

We use various macroeconomic data in our analysis. Specifically, following Korniotis and Kumar (2012), we focus on three measures of macroeconomic activity: the relative unemployment rate (US Rel Un, State Rel Un), the labor income growth rate (US Inc Gr, State Inc Gr), and the housing collateral ratio (US hy, State hy). The choice of these economic indicators is motivated by previous studies (e.g., Boyd, Hu, and Jagannathan (2005), Jagannathan and Wang (1996), Campbell (1996), Lustig and van Nieuwerburgh (2005, 2010)), which suggest that unemployment, income growth, and the housing collateral ratio capture macroeconomic information that is relevant for asset returns. In some of our tests, we combine these three measures and define an economic activity index (US Econ Act, State Econ Act).

Using unemployment rates data from the Bureau of Labor Statistics (BLS), we measure the relative unemployment rate as the current unemployment rate divided by the moving average unemployment rate over the previous 16 quarters. We use labor income data from the Bureau of Economic Analysis (BEA) to measure quarterly labor income growth. Last, we follow Lustig and van Nieuwerburgh (2005) method to measure state-level housing collateral ratios and we download the U.S. hy directly from Stijn van Nieuwerburgh's website.

Each variable is standardized to have zero (sample) mean and standard deviation equal to one. The U.S. and state-level economic activity indices are computed by adding the corresponding standardized values of income growth and hy, and subtracting the standardized value of relative unemployment, and dividing the result by three.

Following earlier studies on U.S.-level liquidity (e.g., Chordia, Sarkar, and Subrahmanyam (2005), Sauer (2007)), we also control for national monetary policy and credit conditions using the term spread (ten-year government bond yield minus one-year government bond yield) and default spread (Baa-rated corporate bond yield minus ten-year government bond yield). The two spreads measures are based on quarterly data obtained from the Board of Governors of the Federal Reserve System web site.

In some of our tests, we examine the predictability of local stock returns and form various trading strategies. For this analysis, we follow Korniotis and Kumar (2012) and use the macroeconomic variables from quarter $t - 2$ because these measures are reported with a lag.[2] Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t - 1$ because they are reported without any lag.

We use the macroeconomic series for the 1980 to 2008 time period. The choice of the sample period is dictated by various data constraints. State-level macroeconomic data are available from 1975 onward but state-level data before 1980 are very noisy since they are based on various approximations. Further, the housing collateral series is unavailable after 2008.

3.3 Measures of Local Funding Constraints, Opacity, Ownership and Trading

We use data from several sources to identify the channels through which local macroeconomic variables affect the liquidity of local firms. We retrieve price and shares outstanding data from the CRSP database to compute each firm equity market capitalization at the

[2] For robustness, we use state macroeconomic variables from quarter $t - 1$ and find very similar results. See the evidence in Section 5.2.

beginning of every quarter. Then, we rank firms into size terciles and form three separate portfolios of firms for each state, i.e., small, medium, and large.

We classify states based on four indicator variables: (i) funding constraint indicator; (ii) state opacity indicator; (iii) indicator for high local institutional ownership; and (iv) indicator for high local stock trading differentials between local institutions and non-local ones. These state-quarter indicators are set equal to one when, in the relevant quarter, the state is subject to funding constraints, the information environment of firms headquartered in the state is more opaque, local institutions hold larger fractions of local stocks, and local stock trading absolute differentials between local institutions and non-local ones are large, respectively.

We follow Hameed, Kang, and Viswanathan (2010) to construct the state funding constraint indicator. First, we retrieve data from the CRSP database to compute the state-level value-weighted daily portfolio returns of NYSE-listed investment banks and securities brokers and dealers (i.e., SIC = 6211) headquartered in each state. Then, we obtain daily excess returns of the state investment banking portfolios defined as the residuals from one-factor market model regressions. Finally, we compute the arithmetic mean of daily excess returns within each state-quarter. The state funding constraint indicator is set to one when the mean daily excess return for the state-quarter is negative, i.e., the state is considered capital constrained in that quarter, and zero otherwise.

To construct the state opacity dummy, we follow an approach that is similar to Anderson, Duru, and Reeb (2009). We begin by sorting stocks each quarter into deciles independently by dollar volume, analyst following, and analyst forecast error. Decile 1 contains least opaque firms (high volume, high analyst following, and low forecast error), while decile 10 contains most opaque firms (low volume, low analyst following, and high forecast error). Each firm-quarter, the independent rankings across the three characteristics are summed and divided by 30 to provide a firm opacity index ranging from 0.1 to 1.0.

The state opacity index is the value-weighted mean opacity index of firms headquartered in the state. The state opacity dummy is set to one, if the value of the state opacity index for the state-quarter is above the sample median, and zero, otherwise. We use the state opacity dummy measured in quarter $t - 1$ in the baseline empirical tests to avoid any contemporaneous correlations between the state opacity dummy and the state liquidity measures.

Among the individual components of the state opacity measure, dollar volume is the daily dollar volume aggregated within the quarter using data from the CRSP database. Analyst following is the number of analysts following the firm within the quarter. Analyst forecast error is the absolute difference between the mean analysts' earnings forecast and the actual firm earnings within the quarter divided by the firm's stock price. Both the analyst following and analyst forecast error variables use data from the Institutional Brokers' Estimate System (I/B/E/S) database.

We create a dummy variable that captures the degree of local institutional ownership each quarter. We measure the local institutional ownership each firm-quarter as the aggregate percentage ownership of 13(f) filers reporting a business address located in the same state where the firm is headquartered. State local institutional ownership is defined as the value-weighted mean of local firms' local institutional ownership. The data on the 13(f) institutional holdings are from Thomson Reuters, while 13(f) filers' business address locations are obtained using a web crawling application from WRDS (SEC Analytics Suite). The state-quarter local ownership indicator is set to one if local institutional holdings for the state-quarter are above the sample median, and zero, otherwise.

Finally, using the same 13(f) data as above and CRSP prices, we create a dummy variable that reflects extreme trading in local stocks by local institutions relative to non-local ones. Each quarter, we measure the change in the dollar value of local stock holdings due to changes in the number of shares held by local (non-local) institutions, i.e., using constant market prices measured at the beginning of the quarter. Then, we compute the percentage change in holdings by dividing the change in the dollar value of local (non-local) investors' local stock holdings by the aggregate value of institutional holdings at the beginning of the quarter. Next, we compute the difference between the percentage local and percentage non-local local stock holding changes. Finally, we rank the resulting state-quarter measure of relative trading into quintiles and create a dummy that takes on a value of one for the top and bottom state-quarter quintiles, i.e., in state-quarters where local institutions buying or selling of local stocks is high relative to non-local institutions.

3.4 Other Data Sources

For our asset pricing tests, we obtain the monthly time series of the RMRF, SMB, HML, UMD, STR, and LTR factors from Kenneth French's data library available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french. The liquidity factor (LIQ) is from the data library of Lubos Pastor available at http://faculty.chicagobooth.edu/lubos.pastor/research. The three industry factors are calculated using the Pastor and Stambaugh (2002) method and are designed to capture industry momentum (Grinblatt and Moskowitz (1999), Hong, Torous, and Valkanov (2007)). Specifically, we estimate two time-series regressions for each of the 48 industry portfolios. In these regressions, the dependent variable is either the current or the lagged return of the industry portfolio. The independent variables include the three Fama and French (1992, 1993) factors, and the momentum factor (Jegadeesh and Titman (1993), Carhart (1997)).

The industry factors are defined as the first three principal components of the residuals from these 96 regressions.

3.5 Summary Statistics and Correlations

Table 1 presents the summary statistics for the sample of state-quarter observations. From the table, we observe that the average of the state Amihud measure is −15.813 and is close to its median value of −15.843. The state relative spread has a mean of −4.664 and a median of −4.338. This evidence shows that the distribution of the natural logarithm of the state liquidity measures is roughly symmetric. The liquidity measures are also quite persistent, especially the relative spread with an autocorrelation coefficient of 90 basis points. Therefore, in our regression estimation, the standard errors for the coefficient estimates account for serial autocorrelation.

Table 2 reports unconditional correlations between all the variables used in the main analysis, including the liquidity measures and the lagged local and U.S. macroeconomic variables. The liquidity proxies are measured in quarter t, all real economic variables are measured in quarter t–2, and term spread and default spread are measured in quarter t–1. The table reports Pearson (Spearman-rank) correlations above (below) the main diagonal.

As expected, the State Amihud and State Relative Spread measures are positively correlated, and the correlation estimates are large in magnitude (above 0.65) as well as statistically significant at the 1% level. The lagged state economic activity index is negatively correlated with current levels of both the State Amihud and State Relative Spread measures. This evidence implies that better local economic conditions are associated with higher liquidity (i.e., less illiquidity) of local stocks in the subsequent quarter.

Examining the individual components of the state economic activity index, we find that, as predicted, both state income growth and state hy are negatively correlated with the two liquidity measures. The correlation between state relative unemployment and the liquidity measures is negative, which is contrary to our expectation. However, these correlations are weaker and often insignificant. Similarly, the lagged U.S. economic activity index is significantly, negatively correlated with both liquidity measures. But, consistent with our basic conjecture, the correlations between the liquidity measures and the local economic variables are notably stronger.

We also find that liquidity varies significantly across U.S. states. Figure 1 plots the time-series of the state-level means of the quarterly Amihud liquidity measure for the 1980 to 2008 sample period. The figure shows that local stocks in the state of Wyoming (WY) are the least liquid, on average, followed by Montana (MT). In contrast, Connecticut (CT), District of Columbia (DC), Delaware (DE), and New York (NY) are among the states with the most liquid local stocks, on average.

4. Main Empirical Results

4.1 Local Component in Liquidity

We begin our empirical analysis by showing that there exists an economically significant local component in firm liquidity that is orthogonal to market- and industry-wide liquidity factors. To test this conjecture, we augment equation (2) in Chordia, Roll, and Subrahmanyam (2000) using our equal-weighted local liquidity factor and examine whether local liquidity betas are significantly positive when we account for market- and industry-wide liquidity factors. In particular, we use the following augmented model:

$$DL_{j,t} = \alpha_j + \beta_{j,Local} DL_{Local,t} + \beta_{j,M} DL_{M,t} + \beta_{j,I} DL_{I,t} + \varepsilon_{j,t}, \tag{7}$$

where $DL_{j,t}$ is the percentage change (D) from trading day t-1 to t in the liquidity variable L for stock j on day t, $DL_{Local,t}$ is the concurrent change in a state-specific average liquidity variable,

$DL_{M,t}$ is the concurrent change in a market-specific average liquidity variable, $DL_{I,t}$ is the concurrent change in an industry-specific average liquidity variable.

The set of additional independent variables includes the first lag and lead of the state-level liquidity measure, the market liquidity, the industry liquidity, plus the contemporaneous, leading, and lagged market return, and the contemporaneous change in the individual stock squared return. As discussed in Chordia, Roll, and Subrahmanyam (2000), the leading and lagging variables are designed to capture any lagged adjustment in commonality while the market return is intended to remove any spurious dependence induced by an association between returns and spread measures.

We report the estimation results using the Amihud liquidity measure in Panel A of Table 3, while the estimates obtained using the relative spread are reported in Panel B of Table 3. Consistent with the evidence in Chordia, Roll, and Subrahmanyam (2000), we find that market- and industry-wide liquidity beta estimates are significant. But from our perspective, importantly, we find that state liquidity is a distinct and a new source of liquidity, which is independent of the other two sources of liquidity.

For example, as shown in specification (2) of Panel A of Table 3, after controlling for market- and industry-wide liquidities as well as other variables, the coefficient estimates of the concurrent, lagged, and leading daily change in state liquidity variables are 0.247, 0.266, 0.261, respectively. The aggregate effect of concurrent, lagged and leading change in state liquidity on stock liquidity is 0.327, which is significant at the 1% level. The results are robust to using daily proportional change in relative spread (see Panel B).

In economic terms, a one standard deviation shift in the market, industry, and local liquidity factors is associated with a shift of 0.800, 0.519, and 0.574 in the Amihud illiquidity measure, respectively.[3] This evidence indicates that the market factor has the strongest effect on firm liquidity, but the impact of local liquidity factor is comparable and somewhat stronger than the effect of the industry factor. Overall, our evidence indicates that state liquidity is a new source of commonality in liquidity, which is independent from the effects of market- and industry-wide liquidity.

4.2 Liquidity Panel Predictability Regressions: Baseline Estimates

In this section, we test the first hypothesis. Specifically, we estimate panel regressions that pool on both the time-series and cross-sectional dimensions, where current state liquidity is the dependent variable and all economic activity measures are lagged as described earlier. State fixed effects are included in all regressions, but their coefficients are suppressed to conserve space. The liquidity regression estimates are presented in Table 4. In Panel A, we use the Amihud's illiquidity measure while, in Panel B, the dependent variable is the relative spread measure.

Consistent with our main conjecture (H1), we find that lagged state income growth and state housing collateral (hy) are negatively related to current state liquidity, regardless of whether we control for the level of overall U.S. economic activity. The statistical significance of state relative unemployment variable is weaker, consistent with the unconditional correlations. Specifically, lagged state relative unemployment is positively correlated with the current State Amihud measure when we control for other U.S. macroeconomic variables. However, the coefficient estimate is positive but statistically insignificant when State Relative Spread is the dependent variable.

When we examine the joint effects of all local macroeconomic variables, we find that the lagged state economic activity index is significantly negatively related to current state liquidity,

[3] The standard deviations of the market, industry, and liquidity factors are 0.871, 0.933, and 1.756, respectively.

which is consistent with Hypothesis 1. The economic magnitudes of the estimated relations are also highly significant. For example, a one standard deviation increase in the local economic activity index (= 0.602) implies an increase of 0.602 × 0.701 = 0.422 in the Amihud illiquidity measure, which is equivalent to 28.69% of the dependent variable's standard deviation. The economic significance of the panel regression estimates is even higher when relative spread is the dependent variable.

The inferences drawn from the baseline estimates are robust to changing the model specification, estimation technique, or the liquidity measure. Most notably, in column (6) of Table 4, we include time fixed effects in the model specification in addition to state fixed effects, and drop all the U.S.-level variables. This specification is arguably very conservative as it accounts for all unobserved state-level constant factors as well as national time-varying factors. Consistent with the baseline results, the state-level economic activity index continues to have a statistically significant, negative coefficient estimate.

We also obtain similar results when we estimate cross-sectional Fama-Macbeth regressions (see Section 5.1. and Table A.1), or use alternative measures of state liquidity based on the Corwin and Schultz (2012) spread, the LOT measure, or stock turnover (see Section 5.6 and Table A.7). Overall, consistent with the unconditional correlations and our main conjecture (H1), the baseline liquidity regression estimates in Table 4 show that better (worse) local economic conditions are followed by higher (lower) local stock liquidity.

4.3 Comparing the Economic Significance of Local versus National Factors

The baseline regression estimates in Table 4 show that local economic conditions are significantly correlated with subsequent quarter liquidity of local stocks. The estimated regressions also show that local factors explain substantially more variation in local liquidity and have a larger economic impact than national factors.[4]

Specifically, when we use the state Amihud measure (see model (1) in Panel A), local economic condition alone explain about 17.8 percent of the within-panel variation in local liquidity. Including national macroeconomic and money supply variables to the model specification increases the within-panel variation adjusted R^2 by only 5 percent to 22.8 percent (see model (4) in Panel A). This relatively small increase in fit measure is perhaps not surprising, given that national macroeconomic or money supply variables alone yield within-panel variation adjusted R^2 of about 6 percent (see models (2) and (3) in Panel A).

The comparison across the fit measures yields similar inference when we use relative spread to measure liquidity (see Panel B). Specifically, local macroeconomic variables alone explain about 41.5 percent of the within-panel variation in state relative spread (see model (1) in Panel B). The within-panel variation adjusted R^2 rises only by about 10 percent when we add the national macroeconomic and money supply factors to the model specification (see model (4) in Panel B).

Local macroeconomic variables also induce more sizeable economic effects on local liquidity than U.S. macroeconomic variables. For example, when state income growth increases by one standard deviation, state liquidity improves considerably: the state Amihud measure decreases by 0.219 (Panel A, model (4)) and the state relative spread measure decreases by 0.359 (Panel B, column (4)). In contrast, the impact of a one standard deviation change in U.S. income growth on local liquidity is considerably lower: a 0.135 decrease in the state Amihud measure (Panel A, model (4)) and a 0.056 decrease in state relative spread (Panel B, model (4)).

[4] We are grateful to Annette Vissing-Jorgensen for suggesting this discussion.

Overall, consistent with our main conjecture, we find that local macroeconomic factors explain more variation in state liquidity than the U.S. aggregates. In addition, our results demonstrate that the economic impact of changes in local conditions on local liquidity is substantially larger than that of the U.S. business cycle.

4.4 Local Stock Liquidity Predictability and Firm Size

In the next set of tests, we assess our second hypothesis (H2) by examining whether the relation between local economic conditions and stock liquidity varies with firm size. Within each state-quarter, we sort stocks into size terciles based on the firm most recent (i.e., beginning of the current quarter) market capitalization of equity. Then, for each state-quarter-size tercile, we repeat the tests presented Table 4. The panel regression estimates for each size tercile are reported in Table 5, together with *p*-values from tests of no differences in the coefficient estimates across the size terciles.

We find that the coefficient estimates of lagged state economic activity index decrease monotonically across firm size terciles and these differences are statistically significant at conventional levels. Two of the three components of the state economic activity index (lagged state income growth and state hy) display similar patterns. The estimates of state relative unemployment instead display no clear pattern.

When we combine the local macroeconomic variables into an index, we find that the coefficient estimates of the state economic activity index exhibit a monotonically decreasing pattern. It is significantly positive or weakly negative for smaller firms but strongly negative and highly significant, both economically and statistically, for medium and large size firm terciles.[5]

[5] The state economic activity index has a positive coefficient estimate in Panel A, where the dependent variable is the Amihud measure. This evidence suggests that the liquidity for smaller firms increase when the local economic

These size-based subsample estimates indicate that the liquidity of large stocks is most affected by local economic conditions, which is consistent with our second hypothesis (H2). This finding is consistent with the evidence of stronger liquidity commonality among larger stocks in previous liquidity studies and suggests that local liquidity commonality can explain this phenomenon, at least in part.

4.5 Local Stock Liquidity and Local Capital Market Conditions

In this section we test our third hypothesis (H3) and assess more directly the potential channels through which local macroeconomic conditions affect subsequent liquidity of local stocks. For this analysis, we expand the baseline model specifications to include interaction terms between the local economic indicators and characteristics of the local capital market environment.

Specifically, as described earlier, we classify state-quarters based on whether local investors face tighter funding constraints, the information environment of local firms is more opaque, local institutions hold larger fractions of local firms, or institutional trading in local firms is more local. These state-quarter indicators are set equal to one in the relevant quarter, respectively, when (i) the state is subject to funding constraints, (ii) the information environment of firms headquartered in the state is more opaque, (iii) local institutions hold larger fractions of local stocks, and (iv) local institutions buying or selling of local stocks is high relative to non-local institutions. We add interactions of these state-quarter indicators and economic activity indexes to our base model to determine whether the documented relation between past local economic conditions and local stock liquidity depends on local capital market conditions.

The results of these tests are reported in Table 6. In the single-interaction-term specifications, we find that each interaction term is statistically significant with the sign predicted

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conditions are poor. This finding may appear puzzling but it is not a robust finding as the coefficient estimate has a significantly negative sign in Panel B where the dependent variable is the Relative Spread measure.

by our third hypothesis (H3). In particular, in models (1a) and (1b), the coefficient estimates of the "State Econ Act × State Fund Const Dummy" interaction term are negative. Consistent with the notion that binding capital constraints induce commonality in liquidity during economic downturns, the effect of local economic conditions on local stock liquidity is predominant in states-quarters characterized by tighter funding constraints.

In columns (2a) and (2b), the coefficient estimates of the "State Econ Act × State Opac Dummy" interaction term are negative, indicating that the impact of state economic conditions on local stock liquidity is stronger in states characterized by more opaque information environments. This finding is consistent with the notion that the liquidity of stocks depends more heavily on local investors in more opaque local information environments, where adverse selection is likely to be a more severe concern.

In columns (3a) and (3b), the coefficients estimates of the "State Econ Act × Local IO Dummy" interaction term are negative. Thus, the predicted relation between the state economic conditions and local stock liquidity is indeed stronger where local institutions hold larger stakes in local companies. This is consistent with the idea that a common local investor base determines the systematic impact of state-level macroeconomic conditions on local stock liquidity.

In columns (4a) and (4b), the coefficients estimates of the "State Econ Act × Rel Local Trading Dummy" interaction term are negative, suggesting that the relation between state economic conditions and local stock liquidity is stronger where trading in local stocks is more heavily local. This evidence is consistent with our conjecture that correlated trading of local investor affects the systematic impact of state-level macroeconomic conditions on local stock liquidity.

In the full model specifications (columns (5a) and (5b)), we find that the coefficient estimates of three of the four interaction terms become only marginally statistically significant, although all estimates retain the predicted sign. The full specification results, however, should be interpreted with caution given the severe reduction in sample size due to the availability of the funding constraint data before 1993 and limited presence of NYSE-listed broker-dealers across various states. In models (6a) and (6b), we drop the funding constraint indicator from the specification. This more parsimonious specification estimated for the larger sample again provides strong support for our third hypothesis (H3).

Next, we re-examine whether the effect of local macroeconomic conditions on liquidity varies by firm size, after conditioning on local capital market conditions. The specification of these tests is similar to those in Tables 5 and 6. In particular, for each size tercile, Table 7 reports panel regression coefficient estimates for the three-interaction specification of model (6) in Table 6, which excludes the funding constraint indicator to increase sample size. The table also reports *p*-values from tests of no differences in the coefficient estimates across size terciles.

In both Panels A and B, the main interaction terms have larger negative coefficient estimates for the medium and large size firm groups and the differences across subsamples are highly statistically significant. In contrast, the interaction variables defined using the U.S.-level economic indicators do not exhibit a similar pattern. This evidence is consistent with the results in Tables 5 and 6, and indicates that local liquidity predictability is stronger for larger firms and so are the effects of the local information environment opaqueness and the degree of local institutional ownership and trading.

Collectively, the evidence from the expanded liquidity regression specifications shows that the relation between local economic conditions and subsequent local stock liquidity critically depends upon the existing conditions of local capital markets. These results provide strong support to our third hypothesis (H3).

4.6 Performance of Trading Strategies Based on Predicted Local Liquidity

In this section, we test our fourth hypothesis, which focuses on the asset pricing implications of the geographical variation in liquidity. Similar to Korniotis and Kumar (2012), we use the liquidity predictability regressions to develop trading strategies and examine their risk-adjusted performance.

To form the trading portfolios, we use the state rankings implied by the recursive estimates with no look-ahead bias from model (4) in Table 4 and obtain quarterly state rankings. Then, we form four portfolios: (i) a value-weighted "Long" portfolio of stocks located in the three U.S. states with the lowest predicted liquidity at the beginning of the relevant quarter; (ii) a value-weighted "Short" portfolio of stocks located in the three U.S. states with the highest predicted liquidity at the beginning of the relevant quarter; (iii) a "Long−Short" portfolio, which captures the difference in returns of the Long and Short portfolios, and (iv) a "Others" portfolio, which includes all stocks that are neither in the Long nor the Short portfolios.

We evaluate the performance of these portfolios using monthly returns. Because all portfolios are formed at the beginning of each quarter when new data on state- and U.S.-level economic activity become available, the portfolio composition does not change every month. For each portfolio, we compute the raw, market-adjusted, and characteristic-adjusted returns of Daniel, Grinblatt, Titman, and Wermers (1997) method. We use three years for our pre-estimation period. Therefore, the trading periods are from 1983 to 2008 for portfolios formed based on the State Amihud measure and from 1993 to 2008 for portfolios formed based on State Relative Spread measure. We use a shorter period of the latter measure because most stocks only have data on closing bid and ask spreads since 1990 in CRSP.

We report the portfolio performance estimates in Table 8. We find that only the Long portfolio generates significantly positive mean monthly raw, market-adjusted, and characteristic-adjusted returns. The Short portfolio has positive mean raw returns but insignificantly negative risk adjusted returns. More importantly, the Long−Short portfolio generates positive and significant mean monthly raw, market-adjusted, as well as characteristic-adjusted returns. The positive risk-adjusted performance of the liquidity based trading strategy supports our fourth hypothesis (H4) and indicates that local macroeconomic variables affect local stock prices through their impact on the liquidity of local firms.[6]

4.7 Local Business Cycles and Performance of Trading Strategies

It is possible that the performance of the liquidity-based trading strategy is driven only by periods when the local economy is in a recession as liquidity may deteriorate dramatically during those periods. To assess this possibility, we test the performance of the liquidity-based trading strategy conditional on the local business cycle.

We conduct this analysis as follows. First, in each quarter t, we sort states into terciles of state economic activity. Tercile 1 contains states with the smallest values of the state economic index at quarter t, i.e., *contracting states*. Tercile 3 contains states with the largest values of state economic index in quarter t, i.e., *expanding states*. Then, within each tercile, we use the recursive liquidity prediction model from model (4) in Table 6 to rank state-portfolios based on their predicted liquidity. Table 9 reports mean monthly raw, market-adjusted, and characteristic-adjusted returns of liquidity-based state-portfolios, separately for contracting and expanding states. As in the previous table, we require a three-year window for the pre-estimation period. Thus, the evaluation periods are from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Relative Spread measure.

[6] Korniotis and Kumar (2012) define geography-based trading strategies to examine if local economic variables predict local returns. In unreported results, we find our liquidity based strategy is not a repackaging of the evidence in Korniotis and Kumar (2012). The correlation between the characteristic-adjusted returns from the two strategies is very low (0.10) and statistically insignificant, indicating that the two predictability phenomena are distinct.

The evidence shows that, when we use the State Amihud illiquidity measure, the Long−Short portfolio generates positive and significant mean monthly returns during both local expansions and local contractions. The Long-Short average monthly returns following contraction quarters, however, are larger than those following expansions. Moreover, when we use the State Relative Spread measure of liqudity, the Long−Short portfolio generates positive and significant returns only during local contractions. Overall, the evidence indeed suggests that local recessions have a larger effect on the performance of local liquidity-based trading strategies.

4.8 Performance of Trading Strategies Using Factor Models

Next, to better account for risk, we evaluate the economic significance of liquidity-based trading strategies using various factor models. We consider several unconditional factor models as well as two conditional factor modes. The unconditional factor models contain some combination of the market factor (RMRF), the size factor (SMB), the value factor (HML), the momentum factor (UMD), three industry factors (IND1, IND2, and IND3), short-term reversal factor (STR), long-term reversal factor (LTR), and the liquidity (LIQ) factor. The conditional models include the three Fama-French factors (RMRF, SMB, and HML), the momentum factor (UMD), and the interactions of these factors with either the Lettau and Ludvigson (2001a, b) lagged cay residual or the NBER recession indicator. As before, the evaluation period is from 1983 to 2008 for the State Amihud iliiquidity measure and from 1993 to 2008 for the State Relative Spread measure.

The estimation results from the unconditional models are reported in Table 10 and, to conserve space, we report the results from the conditional models in Appendix Table A9. We find that, for all factor models, the Long portfolio has positive and significant alpha estimates, the Short portfolio has negative and significant alpha estimates, and the Long−Short portfolio has positive and significant alpha estimates. For example, the CAPM monthly alpha for the

Long−Short portfolio is about 80 basis points and the monthly alpha estimate for the expanded factor models is about 60 basis points. Even when we consider conditional factor models that include both the interaction terms with the cay residual and the NBER recession indicator, the monthly alpha estimates remain high, at least 50 basis points, and statistically significant – Appendix Table A.9.

Overall, the alpha estimates from various factor models indicate that the impact of local business cycles on local liquidity is economically significant. This evidence is consistent with our main asset pricing hypothesis (H4), which posits that poor local economic conditions will lead to higher future average returns.

5. Supplemental Evidence and Robustness Checks

In this section, we report evidence from additional tests that examine the robustness of our main results. For brevity, the results from all these tests are provided in Appendix tables.

5.1 Fama-MacBeth Estimation and Sub-Period Results

First, we re-examine the relation between local economic conditions and liquidity using the Fama and MacBeth (1973) predictive regressions. Specifically, we estimate state-level cross-sectional regressions each quarter over the sample period. In the regression, the current state-level stock liquidity is regressed either on the lagged state income growth, lagged state relative unemployment, and lagged state hy, or on the lagged state economic activity index. We then report the time-series coefficient averages and their respective Newey-West (1987) corrected t-statistics. These results are in Appendix Table A.1. These estimates are qualitatively similar to the baseline results reported in Table 4 and support our first main hypothesis.

Next, we report the Fama-MacBeth regression estimates for different sub-periods to test if the relation between local economic conditions and local stock liquidity is persistent. We split our full sample period into six sub-periods and re-estimate the Fama-MacBeth regressions. For each sub-period, Appendix Table A.2 reports the time-series coefficient averages of quarterly Fama and MacBeth (1973) regressions, together with Newey-West (1987) corrected *t*-statistics. The sub-period estimates indicate that the relation between local liquidity and local economic conditions is consistently in the same direction and statistically significant.

5.2 Panel Regression Estimates Using Alternative Lag Length

Appendix Table A.3 replicates the baseline results reported in Table 4 using one-lag realizations of both the state and U.S.-level economic activity variables instead of the two-lag realizations used in the baseline specifications. We find that our main results and inferences remain virtually identical when we use the shorter lag for the economic activity measures, which is not very surprising given the persistence in local economic conditions. Interestingly, however, all estimated models consistently have somewhat higher adjusted-R^2, suggesting that more recent variation in economic conditions is a better predictor of local stock liquidity.

5.3 Panel Regression Estimates Excluding Large States and One-Firm States

Appendix Table A.4 replicates the baseline results reported in Table 4 after excluding large states (California, New York, and Texas) and one-firm states (Arkansas, the home of Walmart, and, Washington, the home of Microsoft) from the sample. We find that, even after we exclude these five states, local economic conditions are a strong predictor of subsequent local stock liquidity.

5.4 Panel Regression Estimates Using Industry-Adjusted Local Stock Liquidity

Given the known geographical clustering of industries, one potential concern with our results is that the evidence of commonality in local liquidity is merely another manifestation of the previously documented commonality in industry-level liquidity, first documented in Chordia, Roll, and Subrahmanyam (2000). Table A.5 replicates the baseline results reported in Table 4 using industry-quarter mean-adjusted Amihud and relative spread measures to construct the aggregate state-level liquidity measures.

The results are in line with those reported in Table 4, although the adjusted R^2 values and the economic magnitudes implied by the coefficient estimates are smaller than the baseline results. For example, a one standard deviation change in the local activity index is now associated with a change in the Amihud (relative spreads) illiquidity measure that is equivalent to about 10% (35%) of the measure's standard deviation, rather than 30% (50%) as in the baseline model. Thus, the local and industry liquidity phenomena are *partly* related, which is consistent with the motivation for these tests. However, it is important to highlight that the relation between local economic conditions and local liquidity is not *merely* a "dominant local industry" effect.

5.5 Regional Analysis

Our analysis so far is based on state-level liquidity measures and state-level economic activity estimates. If local liquidity commonality is truly a state-level phenomenon, aggregating states into regions should weaken the results. We use the four divisions of U.S. Census Bureau as regions and average the state liquidity and state economic conditions across the states within each region. We then regress the current regional liquidity on the lagged regional macroeconomic variables with or without U.S. macroeconomic control variables. Appendix Table A.6 reports these results. The evidence shows that lagged regional macroeconomic variables do not predict current regional liquidity at conventional significance levels, regardless of whether we control for U.S. macroeconomic factors or not. Similarly, the regional economic activity index does not predict regional liquidity.

5.6 Panel Regression Estimates Using Alternative Liquidity Measures

Table A.7 replicates the baseline results reported in Table 4 using alternative measures of state liquidity. They are the spread measure of Corwin and Schultz (2012), the Lesmond, Ogden, and Trzcinka (LOT) (1999) measure, and the turnover of local stocks. Unlike the other liquidity measures used in this paper, higher state turnover is associated with higher liquidity. The results from these tests are largely and robustly consistent with our baseline results, indicating that local economic conditions are strong predictors of the liquidity of local firms.

5.7 Lagged Local Capital Market Conditions and Local Liquidity Predictability

Table A.8 replicates the baseline results reported in Table 6, where we measure all state-level capital market conditions indicators with a one-quarter lag, as opposed to doing so for only the state opacity indicator. Our goal is to ensure that the significance of the interaction terms is not driven by omitted contemporaneous common shocks. The evidence in Table A.8 is very similar to the results reported in Table 6. This evidence provides further support to the notion that the opacity of the local information environment and the prevalence of local institutional ownership and trading jointly determine whether and to what extent local economic conditions induce liquidity commonality among local stocks.

5.8 Performance Estimates Using Alternative Factor Models

In the last test, we examine the robustness of our trading strategy performance estimates. Table A.9 reports conditional factor model estimates, where the factor models include interactions of factor returns with both cay and a NBER recession dummy indicator. The alpha estimates from these augmented models remain positive and significant, both economically and statistically. This finding indicates that the Long−Short portfolio alphas do not reflect portfolios' time-varying exposures to the underlying risk factors.

6. Summary and Conclusion

Understanding the determinants of commonality of liquidity across firms and over time is important because it has direct implications for investors' ability to diversify volatility and liquidity shocks. In this paper, we show that the geographical location of a firm affects its liquidity. Specifically, there is an economically significant local component in firm liquidity that is induced by local economic conditions. The firm liquidity is higher (lower) when the local economy performs well (poorly) and the magnitude of this effect increases with firm size. Further, the impact of local economic conditions on local firm liquidity is stronger when local financing constraints are more binding, the local information environment is more opaque, and local institutional hold larger stakes of or trade more heavily in stocks of local firms.

This geographical variation in local liquidity generates systematic patterns in local stock returns. Current local stock prices decline and future average returns are higher when expected local liquidity is lower. A trading strategy based on the geographical variation in firm-level liquidity generates an annual risk-adjusted performance of over six percent. Taken together, these results significantly improve our understanding of the sources of commonality in liquidity and support our broad conjecture that geographical heterogeneity in macroeconomic conditions generates geographical patterns in firm liquidity.

In future work, it may be useful to examine other asset pricing implications of geographical variation in firm liquidity. For example, one natural implication of our findings is that local macroeconomic variables generate commonality in local liquidity that is priced. It would also be useful to study whether the geographical variation in firm liquidity is associated with a geographical variation in firm-level volatility. It is likely that local macroeconomic variables affect the liquidity as well as the volatility of local firms. In this scenario, the pricing of firm-level volatility and the time-series patterns in volatility may also vary geographically across the U.S. states.

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Table 1
Summary Statistics

This table reports summary statistics for the sample of state-quarter observations. The sample period is from 1980 to 2008. The state portfolio Amihud liquidity measure is the natural logarithm of the value-weighted state portfolio Amihud liquidity measure of firms headquartered in a state. The Amihud liquidity measure is the daily ratio of the absolute stock return to its dollar volume, averaged within each quarter for each firm. The state portfolio relative spread is the natural logarithm of the value-weighted state portfolio relative spread of firms headquartered in a state. The relative spread is the difference between daily closing ask and bid prices divided by the midpoint of the bid-ask spread, averaged within each quarter for each firm. The data for the liquidity measures are from the Center for Research in Security Prices (CRSP) database. The liquidity predictors include the relative unemployment rate for the U.S. and individual states (US Rel Un, State Rel Un), the U.S. and state labor income growth rates (US Inc Gr, State Inc Gr), the U.S. and state housing collateral ratio (US hy, State hy), a U.S. and state index of economic activity, the term spread (10-year government bond yield minus one-year government bond yield), and default spread (Baa-rated corporate bond yield minus ten-year government bond yield). The relative unemployment rate is the ratio of current unemployment rate to the moving average of the unemployment rates from the previous 16 quarters. The unemployment rates are from the Bureau of Labor Statistics (BLS). The labor income data are from the Bureau of Economic Analysis (BEA). The state housing collateral ratio is computed using the Lustig and van Nieuwerburgh (2005) method. The U.S. hy is downloaded from Stijn van Nieuwerburgh's web site. For the U.S. and state economic activity indexes, we add the standardized values of income growth and hy, subtract the standardized value of relative unemployment, and divide this sum by 3, for the U.S. and individual states, respectively. The two spreads use quarterly data obtained from the Board of Governors of the Federal Reserve System web site. All U.S. and state macroeconomic variables, except the two indexes, are standardized by subtracting their sample means and divided by their sample standard deviations, respectively. The state funding constraint dummy is computed as follows. We first compute value-weighted daily returns of state portfolios of investment banks and securities brokers and dealers headquartered in a state and listed on NYSE with a standard industrial classification (SIC) code of 6211. Then, we define the daily excess returns of the state investment banking portfolio as the residuals from a one-factor market model regression, and then take the arithmetic mean of daily excess returns within each state-quarter. The state funding constraint dummy is 1 if the arithmetic mean of daily excess returns for the state-quarter is negative (capital constrained) and 0 (unconstrained) otherwise. We construct the state opacity dummy as follows. Each quarter, we sort stocks into deciles by dollar volume, analyst following, and analyst forecast error, respectively. Decile 1 contains the least opaque firms each assigned a value of 1 and decile 10 contains the most opaque firms each assigned a value of 10. Dollar volume is the daily dollar volume aggregated within the quarter. Analyst following is the number of analysts following the firm within the quarter. Analyst forecast error is the absolute difference between the mean analysts' earnings forecast and the actual firm earnings within the quarter divided by the firm's stock price. For each firm-quarter, the three rankings are summed and scaled by 30 to provide a firm opacity index ranging from 0.1 to 1.0. The state opacity index is the value-weighted quarterly opacity index of firms headquartered in a state. The state opacity dummy is 1 if the value of the state opacity index for the state-quarter is above the sample median and 0 otherwise. The local institutional ownership is measured using the 13(f) institutional holdings data from Thomson Reuters. The local IO dummy is 1 if the local IO for the state-quarter is above the sample median and 0 otherwise. The local minus non-local institutional trading differential dummy is 1 if the difference between changes in value of local and non-local IO for the state-quarter is in the top or bottom quintile and 0 otherwise.

Variable	Short Name	Mean	SD	5^{th} Pctl	25^{th} Pctl	Median	75^{th} Pctl	95^{th} Pctl	Auto-Correl.
(1) Log State Portfolio Amihud Liquidity Measure	State Amihud	-15.813	1.471	-18.122	-16.805	-15.843	-14.929	-13.279	0.628
(2) Log State Portfolio Relative Spread	State Rel Spread	-4.664	1.169	-6.958	-5.259	-4.338	-3.871	-3.163	0.900
(3) State Income Growth	State Inc Gr	0.000	1.000	-0.639	-0.537	-0.309	0.137	1.589	0.071
(4) State Relative Unemployment	State Rel Unemp	0.000	1.000	-1.246	-0.717	-0.227	0.549	1.932	0.613
(5) State Housing Collateral Ratio	State hy	0.000	1.000	-1.729	-0.551	-0.068	0.576	1.636	0.393
(6) State Economic Activity Index	State Econ Act	0.000	0.602	-0.872	-0.342	-0.044	0.298	0.958	0.443
(7) U.S. Income Growth	US Inc Gr	0.000	1.000	-1.572	-0.858	-0.056	0.756	1.835	0.672
(8) U.S. Relative Unemployment	US Rel Unemp	0.000	1.000	-1.126	-0.838	-0.394	0.699	2.019	0.857
(9) U.S. Housing Collateral Ratio	US hy	0.000	1.000	-1.434	-0.750	-0.163	0.777	1.865	0.982
(10) US Economic Activity Index	US Econ Act	0.000	0.583	-1.028	-0.448	0.075	0.459	0.856	0.826
(11) Ten-Year - One-Year Gov Bond	Term Spread	0.000	1.000	-1.366	-0.759	-0.044	0.680	1.631	0.861
(12) Baa Corp Bond - One-Year Gov Bond	Default Spread	0.000	1.000	-1.068	-0.719	-0.234	0.466	1.746	0.695
(13) State Funding Constraint Dummy	State Fund Const	0.536	0.499	0.000	0.000	1.000	1.000	1.000	0.021
(14) State Opacity Dummy	State Opac	0.499	0.500	0.000	0.000	0.000	1.000	1.000	0.700
(15) Local Institutional Ownership Dummy	Local IO	0.500	0.500	0.000	0.000	0.500	1.000	1.000	0.741
(16) Local minus Non-Local Trading Dummy	Rel Local Trading	0.397	0.489	0.000	0.000	0.000	1.000	1.000	0.055

Table 2
Correlation Matrix for Key Variables

The table reports pairwise Pearson (upper diagonal) and Spearman (rank) (lower diagonal) correlations for the main variables used in the empirical analysis. Both State Amihud and State Rel Spread are measured in quarter t, while all real macroeconomic variables are measured in quarter $t - 2$. Other U.S.-level macroeconomic variables (i.e., term spread and default spread) are measured in quarter $t - 1$. The sample period is from 1980 to 2008. ***, **, and * denote correlation coefficients that are significantly different from zero at the 1%, 5%, and 10% levels, respectively. See Table 1 for variable definitions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) State Amihud		0.662***	-0.241***	-0.004	-0.291***	-0.292***	-0.005	-0.038***	-0.158***	-0.074***	0.132***	-0.083***
(2) State Rel Spread	0.671***		-0.246***	-0.092***	-0.567***	-0.415***	0.073***	-0.133***	-0.479***	-0.197***	0.063***	-0.142***
(3) State Inc Gr	-0.319***	-0.308***		-0.143***	0.096***	0.682***	0.082***	-0.124***	0.066***	0.157***	-0.100***	-0.051***
(4) State Rel Unemp	-0.027**	-0.147***	-0.162***		0.089***	-0.576***	-0.184***	0.763***	-0.011	-0.553***	0.305***	0.365***
(5) State hy	-0.292***	-0.519***	0.124***	0.142***		0.558***	-0.073***	0.044***	0.357***	0.142***	-0.099***	0.065***
(6) State Econ Act	-0.267***	-0.340***	0.556***	-0.588***	0.535***		0.105***	-0.461***	0.240***	0.467***	-0.277***	-0.192***
(7) US Inc Gr	-0.013	0.008	0.081***	-0.163***	-0.045***	0.133***		-0.218***	-0.244***	0.566***	0.178***	0.025*
(8) US Rel Unemp	-0.054***	-0.199***	-0.101***	0.757***	0.104***	-0.462***	-0.214***		-0.009	-0.708***	0.450***	0.496***
(9) US hy	-0.114***	-0.246***	0.030**	0.037***	0.222***	0.132***	-0.222***	0.059***		0.449***	0.016	-0.012
(10) US Econ Act	-0.073***	-0.085***	0.151***	-0.528***	0.083***	0.477***	0.548***	-0.664***	0.427***		-0.146***	-0.278***
(11) Term Spread	0.153***	0.050***	-0.119***	0.355***	-0.104***	-0.316***	0.146***	0.469***	0.064***	-0.228***		0.318***
(12) Default Spread	-0.103***	-0.151***	-0.084***	0.335***	0.068***	-0.200***	0.053***	0.413***	0.077***	-0.218***	0.335***	

Table 3
Local, Market, and Industry Commonality in Liquidity

This table replicates Table 5 (Market and industry commonality in liquidity) in Chordia, Roll, and Subrahmanyam (2000), while adding the local liquidity factor in their model specification. The sample period is from 1992 to 2008. Daily proportional changes in a stock's liquidity measure are regressed on proportional changes in the equal-weighted liquidity measures for all sample stocks headquartered within the same state (the 'Local'), all sample stocks (the 'Market'), and all sample stocks in the same industry (the 'Industry'). Amihud liquidity is the daily ratio of the absolute stock return to its dollar volume. Relative spread is the difference between daily closing ask and bid prices divided by the midpoint of the bid-ask spread. A proportional change on day t across successive trading days is defined as the change in the variable from day t – 1 to t, divided by day t – 1 value. Industry classification follows Roll (1992) and Chalmers and Kadlec (1998). Local, Market, and Industry liquidity factors exclude the stock in question. We report cross-sectional averages of time series slope coefficients with t-statistics in parentheses. 'Concurrent', 'Lag', and 'Lead' refer, respectively, to the same, previous, and next trading day of local, market, and industry liquidity. 'Sum' = Concurrent + Lag + Lead coefficients. The '*p*-value' is a sign test of the null hypothesis, H0: Sum Median = 0. 'Adj. R^2 Mean' is the mean cross-sectional adjusted R^2. 'Adj. R^2 Median' is the median cross-sectional adjusted R^2. Independent variables in specification (1) include the concurrent, lagged and leading local liquidity, the concurrent, lagged and leading market liquidity, the lead, lag and concurrent equal-weighted market return and the proportional daily change in individual firm squared return. Independent variables in specification (2) include all those in specification (1) plus the concurrent, lagged and leading industry liquidity. For brevity, the coefficient estimates for the lead, lag and concurrent equal-weighted market return and the proportional daily change in individual firm squared return are not reported. The data for the liquidity measures and other variables are from the Center for Research in Security Prices (CRSP) database.

	(1)		(2)		
	Local	Market	Local	Market	Industry
Panel A: Daily Proportional Change in Amihud Illiquidity					
Concurrent	0.293	0.813	0.247	0.870	0.448
	(4.20)	(6.19)	(3.16)	(6.32)	(4.08)
Lag	0.249	0.747	0.266	0.676	0.281
	(3.60)	(6.16)	(3.61)	(4.96)	(2.99)
Lead	0.242	0.693	0.261	0.545	0.543
	(4.04)	(6.09)	(4.16)	(4.31)	(5.20)
Sum	0.331	0.994	0.327	0.919	0.556
	(6.06)	(8.91)	(5.73)	(7.53)	(6.18)
Median	0.040	0.239	0.038	0.276	0.048
p-value	0.00	0.00	0.00	0.00	0.00
Adj. R^2 Mean	0.038			0.037	
Adj. R^2 Median	0.017			0.018	
Panel B: Daily Proportional Change in Rel Spread					
Concurrent	0.215	0.462	0.186	0.989	0.230
	(3.15)	(3.65)	(2.71)	(6.81)	(1.99)
Lag	0.065	0.248	0.061	0.608	0.445
	(1.00)	(2.57)	(0.90)	(4.56)	(3.97)
Lead	0.166	0.235	0.147	0.554	0.511
	(2.45)	(2.24)	(2.21)	(4.07)	(4.38)
Sum	0.207	0.426	0.182	0.979	0.566
	(3.67)	(4.90)	(3.16)	(8.80)	(5.82)
Median	0.024	0.169	0.002	0.689	0.330
p-value	0.02	0.00	0.04	0.00	0.00
Adj. R^2 Mean	0.008			0.009	
Adj. R^2 Median	0.001			0.002	

Table 4
Local Stock Liquidity Predictability: Panel Regression Estimates

The table reports one-quarter ahead panel predictive regression estimates. The dependent variables are the quarterly state liquidity measures. The independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. State fixed effects are included in all regressions, with corresponding coefficient estimates suppressed to conserve space. Both State Amihud and State Rel Spread are measured in quarter t, while all real macroeconomic predictors are measured in quarter $t - 2$. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t - 1$. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel variation adjusted R^2. The sample period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 1 for variable definitions.

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: State Amihud Illiquidity						
State Inc Gr	-0.272			-0.219		
	(-5.10)			(-4.60)		
State Rel Unemp	-0.000			0.121		
	(-0.01)			(2.62)		
State hy	-0.438			-0.367		
	(-8.27)			(-6.53)		
State Econ Act					-0.701	-0.156
					(-7.94)	(-3.20)
US Inc Gr		-0.111		-0.135		
		(-4.26)		(-5.71)		
US Rel Unemp		-0.074		-0.239		
		(-4.09)		(-4.78)		
US hy		-0.266		-0.128		
		(-6.99)		(-2.64)		
US Econ Act					0.043	
					(0.57)	
Term Spread			0.226	0.235	0.124	
			(6.20)	(6.12)	(3.60)	
Default Spread			-0.224	-0.125	-0.271	
			(-7.20)	(-3.91)	(-7.83)	
N	5,747	5,747	5,747	5,747	5,747	5,747
Adj R^2	0.178	0.057	0.050	0.228	0.142	0.510
Panel B: State Rel Spread						
State Inc Gr	-0.398			-0.359		
	(-4.50)			(-4.23)		
State Rel Unemp	-0.094			0.052		
	(-2.97)			(0.98)		
State hy	-0.656			-0.488		
	(-19.19)			(-14.00)		
State Econ Act					-1.055	-0.300
					(-12.40)	(-2.17)
US Inc Gr		-0.135		-0.056		
		(-13.77)		(-3.94)		
US Rel Unemp		-0.169		-0.277		
		(-14.88)		(-4.85)		
US hy		-0.573		-0.335		
		(-47.55)		(-8.88)		
US Econ Act					-0.100	
					(-1.34)	
Term Spread			0.176	0.155	-0.142	
			(14.81)	(5.06)	(-6.52)	
Default Spread			-0.258	-0.099	-0.258	
			(-17.48)	(-4.38)	(-11.60)	
N	5,090	5,090	5,090	5,090	5,090	5,090
Adj R^2	0.415	0.279	0.037	0.512	0.245	0.910
Year-Quarter Fixed Effects	No	No	No	No	No	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5

Local Stock Liquidity Predictability Regression Estimates: Firm Size Based Subsamples

The table reports one-quarter ahead panel predictive regression estimates by size groups. To define the size subsamples, we use the most recent market capitalization (size) of each stock. Then, we sort stocks into terciles by size and calculate value-weighted state liquidity measures within each tercile. The dependent variable is the quarterly state liquidity measure for the relevant size group. The independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. State fixed effects are included in all regressions. Both the State Amihud and State Rel Spread are measured in quarter *t*, while all real macroeconomic predictors are measured in quarter $t - 2$. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t – 1$. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel variation adjusted R^2. The *p*-values for the test of difference in coefficients between each pair of size groups are in square brackets. The sample period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 1 for variable definitions.

Independent Variable	Small		Medium		Large		Medium-Small	Large-Small	Large-Medium
				Panel A: State Amihud Illiquidity					
State Inc Gr	0.128		-0.134		-0.620		[0.00]	[0.00]	[0.00]
	(1.62)		(-3.59)		(-4.02)				
State Rel Unemp	0.119		0.136		0.088		[0.57]	[0.63]	[0.96]
	(1.73)		(2.37)		(1.39)				
State hy	-0.102		-0.270		-0.708		[0.00]	[0.00]	[0.00]
	(-1.93)		(-4.49)		(-9.72)				
State Econ Act		0.234		-0.339		-1.447	[0.00]	[0.00]	[0.00]
		(2.57)		(-3.15)		(-12.27)			
US Inc Gr	Yes		Yes		Yes				
US Rel Unemp	Yes		Yes		Yes				
US hy	Yes		Yes		Yes				
US Econ Act		Yes		Yes		Yes			
Term Spread	Yes	Yes	Yes	Yes	Yes	Yes			
Default Spread	Yes	Yes	Yes	Yes	Yes	Yes			
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes			
N	5,103	5,103	5,617	5,617	5,676	5,676			
Adj R^2	0.061	0.056	0.089	0.070	0.354	0.260			
				Panel B: State Rel Spread					
State Inc Gr	-0.084		-0.194		-0.348		[0.00]	[0.00]	[0.05]
	(-4.32)		(-4.98)		(-4.22)				
State Rel Unemp	0.036		0.057		0.072		[0.65]	[0.01]	[0.04]
	(0.81)		(1.30)		(1.31)				
State hy	-0.206		-0.323		-0.505		[0.00]	[0.00]	[0.00]
	(-9.16)		(-12.35)		(-13.64)				
State Econ Act		-0.312		-0.631		-1.057	[0.00]	[0.00]	[0.00]
		(-6.80)		(-11.25)		(-12.75)			
US Inc Gr	Yes		Yes		Yes				
US Rel Unemp	Yes		Yes		Yes				
US hy	Yes		Yes		Yes				
US Econ Act		Yes		Yes		Yes			
Term Spread	Yes	Yes	Yes	Yes	Yes	Yes			
Default Spread	Yes	Yes	Yes	Yes	Yes	Yes			
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes			
N	4,449	4,449	4,863	4,863	4,922	4,922			
Adj R^2	0.252	0.206	0.480	0.291	0.521	0.268			

Table 6

Local Stock Liquidity Predictability Variation and Local Capital Market Conditions

The table reports one-quarter ahead panel predictive regression estimates for expanded specifications. The dependent variables are the quarterly state liquidity measures. The independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. The additional independent variables include the State Fund Const Dummy, the State Opac Dummy, the Local Excess IO Dummy, and Rel Local Trading Dummy interacted with the State Econ Act and US Econ Act indices, respectively. State Fixed Effects and lagged Terms and Default Spreads are included in all specifications, with the corresponding estimates suppressed to conserve space. Both State Amihud and State Rel Spread are measured in quarter *t*, while all real macroeconomic predictors are measured in quarter $t - 2$. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t - 1$. State Fund Const Dummy, Local Excess IO Dummy, and Rel Local Trading Dummy are measured in quarter *t*, while the State Opac Dummy is measured in quarter $t - 1$. Robust *t*-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel variation adjusted R^2. The sample period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 1 for variable definitions.

	Panel A: State Amihud Illiquidity						Panel B: State Rel Spread					
	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)
State Econ Act	-0.031	0.068	-0.028	-0.025	0.094	0.260	0.288	0.282	0.256	0.207	0.264	0.561
	(-0.17)	(0.67)	(-0.27)	(-0.27)	(0.60)	(2.24)	(0.97)	(2.4)	(1.5)	(1.42)	(1.51)	(3.60)
US Econ Act	-0.352	-0.041	-0.45	-0.284	-0.311	-0.278	-0.805	0.072	-0.86	-0.567	-0.103	-0.185
	(-2.91)	(-0.55)	(-4.48)	(-5.77)	(-1.85)	(-2.35)	(-5.60)	(0.61)	(-9.43)	(-15.2)	(-0.45)	(-1.39)
State Fund Const Dummy	0.145				0.043		0.375				0.132	
	-2.14				(0.70)		(3.69)				(2.22)	
State Opac Dummy		-0.299			-0.594	-0.164		-1.042			-1.509	-0.878
		(-1.84)			(-3.55)	(-1.10)		(-6.28)			(-8.05)	(-5.81)
Local IO Dummy			0.417		0.073	0.476			0.778		0.084	0.505
			(3.44)		(0.50)	(4.42)			(5.00)		(0.74)	(5.03)
Rel Local Trading Dummy				-0.053	0.057	-0.063				-0.023	0.069	0.021
				(-1.08)	(1.49)	(-1.32)				(-0.38)	(1.85)	(0.59)
State Econ Act*State Fund Const	-0.442				-0.179		-0.768				-0.174	
	(-8.30)				(-2.88)		(-4.74)				(-2.11)	
State Econ Act*State Opac		-0.762			-0.204	-0.678		-0.941			-0.172	-0.822
		(-4.16)			(-1.87)	(-3.82)		(-4.16)			(-1.27)	(-3.69)
State Econ Act*Local IO			-0.521		-0.230	-0.495			-0.994		-0.466	-0.707
			(-4.95)		(-1.76)	(-3.35)			(-6.11)		(-1.83)	(-3.21)
State Econ Act* Rel Local Trading				-0.565	-0.171	-0.331				-0.946	-0.204	-0.460
				(-5.17)	(-1.87)	(-4.08)				(-5.83)	(-4.05)	(-5.86)
US Econ Act*State Fund Const	0.404				0.194		0.777				0.275	
	(3.15)				(1.68)		(4.76)				(2.76)	
US Econ Act*State Opac		-0.275			-0.041	-0.149		-0.612			-0.622	-0.483
		(-1.97)			(-0.25)	(-1.10)		(-3.39)			(-3.88)	(-2.83)
US Econ Act*Local IO			0.605		0.264	0.358			1.039		0.340	0.440
			(4.4)		(1.65)	(2.77)			(6.76)		(1.44)	(3.18)
US Econ Act*Rel Local Trading				0.246	0.184	0.164				0.448	0.143	0.194
				(3.42)	(1.82)	(2.53)				(4.88)	(1.35)	(3.03)
Term & Default Spreads	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,053	4,502	5,747	5,703	949	4,502	1,025	4,472	5,090	5,090	949	4,472
Adj R^2	0.131	0.189	0.118	0.092	0.298	0.228	0.172	0.454	0.234	0.134	0.658	0.514

Table 7
Local Stock Liquidity Predictability Variation across Firm Size and State Types

The table reports panel regression estimates by size subsamples, using model (6) in Table 6. To define size subsample, we use the most recent market capitalization (size) of each stock. Then, we sort stocks into terciles by size and calculate value-weighted state liquidity measures within each tercile. The fit measure is the within-panel variation adjusted R^2. Robust *t*-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. All specifications include State Fixed Effects and lagged Terms and Default Spreads.

Independent Variable	Small	Medium	Large	M-S	L-S	L-M
			Panel A: State Amihud Illiquidity			
State Econ Act	-0.164	-0.001	0.756	[0.52]	[0.52]	[0.22]
	(-1.50)	(-0.00)	(3.74)			
US Econ Act	-0.347	-0.257	0.043	[0.95]	[0.00]	[0.00]
	(-1.94)	(-1.43)	(0.21)			
State Opac Dummy	0.114	-0.156	-0.622	[0.02]	[0.00]	[0.00]
	(0.82)	(-1.06)	(-3.15)			
Local IO Dummy	0.195	0.086	0.788	[0.56]	[0.00]	[0.00]
	(1.27)	(0.56)	(4.54)			
Rel Local Trading Dummy	-0.096	-0.114	-0.042	[0.88]	[0.80]	[0.94]
	(-1.85)	(-2.00)	(-0.65)			
State Econ Act*State Opac	-0.144	-0.406	-1.237	[0.01]	[0.00]	[0.00]
	(-1.31)	(-2.24)	(-4.27)			
State Econ Act*Local IO	-0.001	-0.355	-0.883	[0.02]	[0.00]	[0.01]
	(-0.01)	(-2.44)	(-3.51)			
State Econ Act*Rel Local Trading	-0.050	-0.223	-0.760	[0.25]	[0.00]	[0.00]
	(-0.55)	(-2.25)	(-5.86)			
US Econ Act*State Opac	0.272	0.002	-0.546	[0.16]	[0.00]	[0.00]
	(1.67)	(0.01)	(-2.14)			
US Econ Act*Local IO	0.134	0.426	0.563	[0.46]	[0.41]	[0.16]
	(0.69)	(2.31)	(2.68)			
US Econ Act*Rel Local Trading	-0.280	0.183	0.434	[0.12]	[0.28]	[0.01]
	(-3.45)	(1.77)	(3.64)			
N	4,177	4,481	4,487			
Adj R^2	0.055	0.096	0.396			
			Panel B: State Rel Spread			
State Econ Act	0.129	0.310	0.565	[0.93]	[0.93]	[0.84]
	(1.53)	(2.94)	(3.43)			
US Econ Act	-0.175	-0.226	-0.255	[0.00]	[0.00]	[0.14]
	(-1.91)	(-2.14)	(-1.78)			
State Opac Dummy	-0.381	-0.561	-0.902	[0.00]	[0.00]	[0.00]
	(-4.16)	(-6.67)	(-5.89)			
Local IO Dummy	0.259	0.257	0.506	[0.05]	[0.00]	[0.00]
	(3.40)	(3.32)	(4.83)			
Rel Local Trading Dummy	0.001	-0.002	0.026	[0.93]	[0.74]	[0.69]
	(0.03)	(-0.07)	(0.65)			
State Econ Act*State Opac	-0.246	-0.505	-0.827	[0.00]	[0.00]	[0.01]
	(-2.84)	(-3.48)	(-3.61)			
State Econ Act*Local IO	-0.229	-0.429	-0.704	[0.02]	[0.00]	[0.26]
	(-3.01)	(-3.40)	(-3.10)			
State Econ Act*Rel Local Trading	-0.174	-0.316	-0.497	[0.00]	[0.00]	[0.02]
	(-3.14)	(-6.02)	(-5.45)			
US Econ Act*State Opac	-0.133	-0.393	-0.491	[0.00]	[0.00]	[0.00]
	(-1.77)	(-3.03)	(-2.79)			
US Econ Act*Local IO	0.181	0.326	0.457	[0.11]	[0.24]	[0.96]
	(2.04)	(3.05)	(3.10)			
US Econ Act*Rel Local Trading	-0.051	0.150	0.228	[0.12]	[0.01]	[0.33]
	(-1.08)	(2.33)	(3.48)			
N	4,050	4,381	4,407			
Adj R^2	0.260	0.462	0.506			

Table 8
Performance of Liquidity Based Trading Strategies

The table reports mean monthly returns of trading strategies based on the liquidity prediction from model (6) in Table 6. We report mean returns of four portfolios: (i) “Long” portfolio, which is a value-weighted portfolio of stocks located in the three U.S. states with the lowest predicted liquidity, (ii) “Short” portfolio, which is a value-weighted portfolio of stocks located in the three U.S. states with the highest predicted liquidity, (iii) “Long Short” portfolio, which is the difference in returns of Long and Short portfolios, and (iv) “Others” portfolio, which includes stocks located in states that are not in the Long or the Short portfolios. We use the predicted state liquidity from model (6) in Table 6 to obtain the state rankings. We report mean monthly raw, market-adjusted, and characteristic-adjusted returns for each portfolio. The characteristic-adjusted returns are computed using the Daniel, Grinblatt, Titman, and Wermers (1997) method. The *t*-statistics are reported in parentheses. The sample period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure.

Portfolio	Raw Return	Market Adj Return	Char Adj Return
Panel A: State Amihud Illiquidity			
Long (Low Predicted Liquidity)	1.306	0.448	0.282
	(4.26)	(2.44)	(1.95)
Other	0.898	0.040	-0.015
	(3.64)	(0.78)	(-0.61)
Short (High Predicted Liquidity)	0.706	-0.152	-0.114
	(2.52)	(-1.10)	(-1.13)
Long-Short	0.646	0.646	0.448
	(2.72)	(2.72)	(2.60)
Panel B: State Rel Spread			
Long (Low Predicted Liquidity)	1.077	0.438	0.393
	(2.73)	(1.82)	(2.17)
Other	0.632	-0.007	-0.061
	(2.17)	(-0.08)	(-1.36)
Short (High Predicted Liquidity)	0.656	0.017	0.021
	(1.84)	(0.15)	(0.24)
Long-Short	0.531	0.531	0.494
	(2.21)	(2.21)	(2.79)

Table 9

Performance of Liquidity Based Trading Strategy Conditional on Local Business Cycles

The table reports mean monthly returns of trading strategies based on state-level economic activity and predicted liquidity. First, in each quarter t, we sort states into terciles of state economic activity. Tercile 1 (3) contains states with the smallest (largest) values of the state economic index in quarter t, *contracting states* (*expanding states*). Then, for each tercile, we use the predicted liquidity from model (6) in Table 6 to rank states. We report the returns of four portfolios: (i) "Long" portfolio, which is a value-weighted portfolio of t of stocks located in the three U.S. states with the lowest predicted liquidity, (ii) "Short" portfolio, which is a value-weighted portfolio of stocks located in the three U.S. states with the highest predicted liquidity, (iii) "Long Short" portfolio, which is the difference in returns of Long and Short portfolios, and (iv) "Others" portfolio, which includes stocks that are neither in the Long nor the Short portfolios. We report mean raw, market-adjusted, and characteristic-adjusted monthly returns for each portfolio. The characteristic-adjusted returns are computed using the Daniel, Grinblatt, Titman, and Wermers (1997) method. The *t*-statistics are reported in parentheses. The sample period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure.

State Economic Activity	Portfolio	Raw Return	Market Adj Return	Char Adj Return
	Panel A: State Amihud Illiquidity			
Contraction	Long (Low Pred Liq)	1.331	0.474	0.273
		(4.34)	(2.51)	(1.83)
	Other	0.881	0.023	-0.007
		(3.46)	(0.79)	(-0.57)
	Short (High Pred Liq)	0.503	-0.354	-0.291
		(1.64)	(-1.93)	(-1.88)
	Long-Short	0.828	0.828	0.564
		(3.23)	(3.23)	(2.58)
Expansion	Long (Low Pred Liq)	1.182	0.213	0.193
		(4.28)	(1.58)	(1.61)
	Other	1.029	0.060	0.002
		(4.28)	(1.15)	(0.08)
	Short (High Pred Liq)	0.610	-0.359	-0.232
		(2.20)	(-2.67)	(-2.31)
	Long-Short	0.573	0.573	0.425
		(2.93)	(2.93)	(2.66)
	Panel B: State Rel Spread Liquidity			
Contraction	Long (Low Pred Liq)	1.272	0.549	0.492
		(2.87)	(1.69)	(1.88)
	Other	0.754	0.031	0.011
		(2.43)	(0.78)	(0.77)
	Short (High Pred Liq)	0.592	-0.131	-0.166
		(1.69)	(-0.78)	(-1.36)
	Long-Short	0.681	0.681	0.658
		(1.91)	(1.91)	(2.41)
Expansion	Long (Low Pred Liq)	0.604	-0.015	0.017
		(1.80)	(-0.06)	(0.08)
	Other	0.679	0.059	-0.026
		(2.33)	(0.75)	(-0.76)
	Short (High Pred Liq)	0.509	-0.111	-0.030
		(1.43)	(-0.84)	(-0.27)
	Long-Short	0.095	0.095	0.047
		(0.33)	(0.33)	(0.20)

Table 10

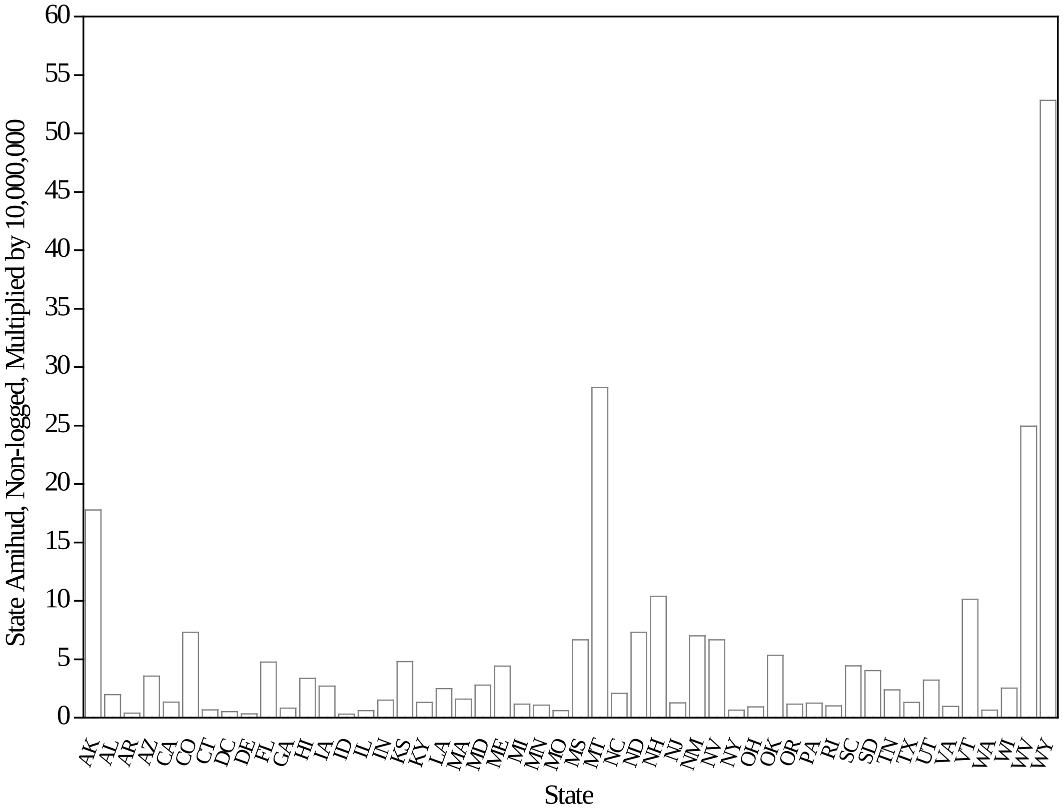
Performance of Liquidity Based Trading Strategies: Factor Model Estimates

The table reports regression estimates of various factor models. The factor models contain some combination of the following factors: the market factor (RMRF), the size factor (SMB), the value factor (HML), the momentum factor (UMD), three industry factors (IND1, IND2, and IND3), two reversal factors (short-term reversal (STR), long-term reversal (LTR)), and the liquidity (LIQ) factor. For each factor model, we report the estimates of the factor exposures. The *t*-statistics are reported in parentheses. The sample period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure.

	Long			Short			Long-Short		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Panel A: State Amihud Illiquidity								
Alpha	*0.870*	*0.737*	*0.706*	*-0.373*	*-0.302*	*-0.290*	*0.842*	*0.638*	*0.595*
	(5.18)	*(4.18)*	*(3.97)*	*(-2.83)*	*(-2.17)*	*(-2.06)*	*(3.83)*	*(2.75)*	*(2.54)*
RMRF	98.523	103.248	102.716	96.879	94.254	94.451	1.422	8.606	7.868
	(26.42)	(23.65)	(23.43)	(33.18)	(27.34)	(27.22)	(0.29)	(1.50)	(1.36)
SMB		17.269	16.973		7.085	7.195		10.746	10.336
		(2.76)	(2.71)		(1.43)	(1.45)		(1.30)	(1.25)
HML		23.956	22.380		0.764	1.350		22.968	20.783
		(3.40)	(3.13)		(0.14)	(0.24)		(2.48)	(2.20)
UMD		7.462	7.457		-6.399	-6.398		13.700	13.693
		(1.70)	(1.70)		(-1.84)	(-1.84)		(2.37)	(2.37)
IND1		-2.721	-2.527		-0.956	-1.029		-1.861	-1.592
		(-0.75)	(-0.70)		(-0.34)	(-0.36)		(-0.39)	(-0.33)
IND2		1.711	2.111		2.049	1.900		-0.352	0.203
		(0.51)	(0.63)		(0.77)	(0.71)		(-0.08)	(0.05)
IND3		0.632	0.381		4.585	4.678		-4.101	-4.449
		(0.19)	(0.11)		(1.71)	(1.74)		(-0.92)	(-1.00)
STR		-0.002	-0.002		0.031	0.031		-0.031	-0.031
		(-0.05)	(-0.03)		(0.74)	(0.74)		(-0.45)	(-0.44)
LTR		-0.207	-0.192		-0.039	-0.044		-0.157	-0.136
		(-2.61)	(-2.39)		(-0.62)	(-0.70)		(-1.51)	(-1.29)
LIQ			5.905			-2.195			8.186
			(1.20)			(-0.56)			(1.27)
N	309	309	309	309	309	309	309	309	309
Adj R^2	0.709	0.7175	0.7180	0.7937	0.7962	0.7957	0.7937	0.0117	0.0138
	Long			Short			Long-Short		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Panel B: State Rel Spread								
Alpha	*1.144*	*0.966*	*0.906*	*-0.166*	*-0.171*	*-0.146*	*1.003*	*0.827*	*0.739*
	(5.61)	*(4.47)*	*(4.11)*	*(-1.70)*	*(-1.60)*	*(-1.34)*	*(4.75)*	*(3.70)*	*(3.26)*
N	192	192	192	192	192	192	192	192	192
Adj R^2	0.6952	0.7039	0.7051	0.9215	0.9192	0.9193	0.0109	0.0416	0.0554

Figure 1
Average State Amihud Liquidity Measure

This figure plots the state average Amihud liquidity measure, which is the time-series average of the non-logged state-quarter Amihud liquidity measure over the sample period of 1980 to 2008, multiplied by 10^7. See Table 2 for variable definitions.



APPENDIX TABLES

Table A1
Fama-MacBeth Regression Estimates

This table reports time-series coefficient averages and Newey-West (1987) corrected t-statistics in parentheses for quarter-by-quarter cross-sectional regressions from 1980 through 2008. The dependent variable is one of the quarterly state liquidity measures. The independent variables include a constant, State Inc Gr, State Rel Unemp, State hy, and State Econ Act. Both the State Amihud and State Rel Spread are measured in quarter t, while all real macroeconomic predictors are measured in quarter $t-2$. See Table 2 for variable definitions.

Independent Variable	(1)	(2)	(3)	(4)	(5)
Panel A: State Amihud Illiquidity					
State Inc Gr	-0.445			-0.401	
	(-18.69)			(-14.90)	
State Rel Unemp		0.184		0.118	
		(5.46)		(3.69)	
State hy			-0.030	-0.081	
			(-0.90)	(-2.98)	
State Econ Act					-0.543
					(-14.06)
Avg N	49	49	49	49	49
Adj R^2	0.046	0.009	0.014	0.052	0.052
Panel B: State Rel Spread					
State Inc Gr	-0.138			-0.121	
	(-14.47)			(-12.14)	
State Rel Unemp		0.022		0.000	
		(1.39)		(0.01)	
State hy			-0.071	-0.081	
			(-4.42)	(-5.14)	
State Econ Act					-0.206
					(-15.59)
Avg N	48	48	48	48	48
Adj R^2	0.059	0.011	0.028	0.084	0.084

Table A2

Fama-MacBeth Regression Estimates For Sub-Periods

This table reports time-series coefficient averages and Newey-West (1987) corrected t-statistics in parentheses for quarter-by-quarter cross-sectional regressions for six sub-periods from 1980 through 2008. The dependent variable is one of the quarterly state liquidity measures. The independent variables include a constant, State Inc Gr, State Rel Unemp, State hy, and State Econ Act. Both the State Amihud and State Rel Spread are measured in quarter t, while all real macroeconomic predictors are measured in quarter $t-2$. See Table 2 for variable definitions.

		Dependent Variable			
Time Period	Independent Variable	State Amihud Illiquidity		State Rel Spread	
1980:Q1 to 1984:Q4	State Inc Gr	-0.624		-0.079	
		(-15.52)		(-3.60)	
	State Rel Unemp	0.169		0.081	
		(2.96)		(2.91)	
	State hy	0.098		-0.067	
		(1.14)		(-0.66)	
	State Econ Act		-0.948		-0.282
			(-9.32)		(-6.16)
1985:Q1 to 1989:Q4	State Inc Gr	-0.304		-0.013	
		(-12.45)		(-1.21)	
	State Rel Unemp	0.436		0.111	
		(6.89)		(3.85)	
	State hy	-0.204		-0.138	
		(-1.78)		(-2.73)	
	State Econ Act		-1.159		-0.168
			(-19.91)		(-4.61)
1990:Q1 to 1994:Q4	State Inc Gr	-0.402		-0.182	
		(-7.17)		(-5.58)	
	State Rel Unemp	-0.084		0.027	
		(-1.64)		(0.99)	
	State hy	-0.268		-0.152	
		(-5.92)		(-5.11)	
	State Econ Act		-0.349		-0.250
			(-5.32)		(-7.68)
1995:Q1 to 1999:Q4	State Inc Gr	-0.290		-0.192	
		(-17.36)		(-15.71)	
	State Rel Unemp	0.102		0.048	
		(0.94)		(1.68)	
	State hy	0.109		0.021	
		(6.74)		(1.72)	
	State Econ Act		-0.155		-0.174
			(-3.15)		(-6.85)
2000:Q1 to 2004:Q4	State Inc Gr	-0.158		-0.129	
		(-5.82)		(-7.62)	
	State Rel Unemp	-0.127		-0.144	
		(-1.46)		(-4.94)	
	State hy	-0.132		-0.079	
		(-2.61)		(-3.59)	
	State Econ Act		-0.329		-0.175
			(-8.64)		(-5.47)
2005:Q1 to 2008:Q4	State Inc Gr	-0.126		-0.106	
		(-8.84)		(-15.87)	
	State Rel Unemp	0.289		-0.097	
		(3.86)		(-4.07)	
	State hy	-0.104		-0.056	
		(-2.19)		(-6.60)	
	State Econ Act		-0.403		-0.235
			(-8.30)		(-17.82)

Table A3
Liquidity Panel Regression Estimates Using Alternative Lag Length

The table reports the results from one-quarter ahead panel predictive regressions. The dependent variables are the quarterly state liquidity measures, and the independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. State fixed effects are included in all regressions but their coefficient estimates are suppressed to conserve space. Both the State Amihud and State Rel Spread are measured in quarter *t*, while all predictors are measures in quarter *t* – 1. Robust t-statistics are reported in parentheses below the coefficient estimates and they account for heteroscedasticity and serial autocorrelation. The fit measure is the within-variation adjusted r-squared. The evaluation period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 2 for variable definitions.

	Panel A: State Amihud Illiquidity			Panel B: State Rel Spread		
Independent Variable	(1)	(2)	(3)	(1)	(2)	(3)
State Inc Gr	-0.303	-0.249		-0.418	-0.388	
	(-5.45)	(-4.87)		(-4.47)	(-4.21)	
State Rel Unemp	-0.002	0.098		-0.075	0.052	
	(-0.06)	(-2.03)		(-2.38)	(-0.97)	
State hy	-0.439	-0.357		-0.658	-0.488	
	(-8.25)	(-6.26)		(-19.31)	(-14.19)	
State Econ Act			-0.699			-1.104
			(-7.98)			(-12.93)
US Inc Gr		-0.159			-0.055	
		(-7.05)			(-3.67)	
US Rel Unemp		-0.186			-0.222	
		(-3.54)			(-4.00)	
US hy		-0.164			-0.346	
		(-3.53)			(-9.31)	
US Econ Act			-0.07			-0.146
			(-0.97)			(-2.00)
Term Spread		0.235	0.150		0.113	-0.119
		(-6.05)	(-4.48)		(-4.09)	(-5.40)
Default Spread		-0.144	-0.324		-0.092	-0.318
		(-4.51)	(-8.69)		(-3.76)	(-12.34)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	5,747	5,747	5,747	5,090	5,090	5,090
Adj R^2	0.187	0.242	0.161	0.423	0.52	0.275

Table A4

Panel Regression Estimates Excluding Large States and One-firm States

The table reports the results from one-quarter ahead panel predictive liquidity regressions, excluding the states of Arkansas, California, New York, Texas, and Washington. The dependent variables are the quarterly state liquidity measures, and the independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. State fixed effects are included in all regressions but their coefficient estimates are suppressed to conserve space. Both the State Amihud and State Rel Spread are measured in quarter *t*, while all real macroeconomic predictors are measured in quarter $t-2$. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t - 1$. Robust *t*-statistics, accounting for heteroscedasticity and serial autocorrelation, are reported in parentheses below the coefficient estimates. The fit measure is the within-variation adjusted r-squared. The evaluation period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 2 for variable definitions.

	Panel A: State Amihud Illiquidity			Panel B: State Rel Spread		
Independent Variable	(1)	(2)	(3)	(1)	(2)	(3)
State Inc Gr	-0.489	-0.402		-0.885	-0.849	
	(-3.41)	(-3.12)		(-4.24)	(-4.48)	
State Rel Unemp	-0.018	0.097		-0.124	0.013	
	(-0.54)	(1.95)		(-3.60)	(0.23)	
State hy	-0.420	-0.351		-0.617	-0.446	
	(-7.08)	(-5.51)		(-16.49)	(-11.47)	
State Econ Act			-0.710			-1.114
			(-6.26)			(-11.60)
US Inc Gr		-0.124			-0.038	
		(-4.63)			(-2.37)	
US Rel Unemp		-0.230			-0.243	
		(-4.20)			(-4.05)	
US hy		-0.132			-0.347	
		(-2.54)			(-9.41)	
US Econ Act			0.037			-0.115
			(0.42)			(-1.38)
Term Spread		0.228	0.124		0.120	-0.137
		(5.60)	(3.41)		(3.35)	(-5.95)
Default Spread		-0.116	-0.261		-0.106	-0.260
		(-3.41)	(-6.91)		(-4.69)	(-10.73)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	5,167	5,167	5,167	4,572	4,572	4,572
Adj R^2	0.170	0.216	0.125	0.432	0.538	0.236

Table A5

Panel Regression Estimates using Industry-Adjusted Local Stock Liquidity

The table reports one-quarter ahead panel predictive liquidity regressions. The dependent variables are the industry-adjusted quarterly state liquidity measures. Industry-adjusted quarterly state liquidity measures are the value-weighted state portfolio means of the industry-adjusted liquidity measures of firms headquartered in the state during the quarter, where industry-adjusted liquidity measure of firms is the natural logarithm of the quarterly stock liquidity minus the mean of the natural logarithm of stock liquidity within the same 2-digit SIC code for the quarter. State fixed effects are included in all regressions. Both the State Amihud and State Rel Spread are measured in quarter *t*, while all real macroeconomic predictors are measured in quarter $t - 2$. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t - 1$. Robust *t*-statistics, accounting for heteroscedasticity and serial autocorrelation, are reported in parentheses below the coefficient estimates. The fit measure is the within-variation adjusted r-squared. The evaluation period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 2 for variable definitions.

Panel A: Summary Statistics

	Mean	SD	Median
Ind-Adj State Amihud	-3.583	2.036	-3.767
Ind-Adj State Rel Spread	-0.873	0.555	-0.898

Panel B: Panel Estimates

	Ind-Adj State Amihud		Ind-Adj State Rel Spread	
	(1)	(2)	(1)	(2)
State Inc Gr	-0.244		-0.152	
	(-3.26)		(-4.80)	
State Rel Unemp	-0.095		-0.006	
	(-1.39)		(-0.23)	
State hy	-0.113		-0.115	
	(-2.08)		(-6.17)	
State Econ Act		-0.303		-0.292
		(-2.77)		(-9.09)
US Inc Gr	-0.087		0.032	
	(-3.13)		(3.30)	
US Rel Unemp	0.494		0.010	
	(6.96)		(0.29)	
US hy	0.098		0.011	
	(2.06)		(0.67)	
US Econ Act		-0.400		0.087
		(-5.53)		(2.71)
Term Spread	-0.542	-0.439	-0.086	-0.094
	(-15.48)	(-14.57)	(-3.84)	(-5.65)
Default Spread	-0.012	0.075	0.042	0.029
	(-0.40)	(2.01)	(2.52)	(1.66)
State Fixed Effects	Yes	Yes	Yes	Yes
N	5,746	5,746	5,083	5,083
Adj R^2	0.214	0.155	0.118	0.083

Table A6
Regional Analysis

This table reports the results of one-quarter ahead panel predictive regressions using regional U.S. data. The regions are the four divisions of U.S. Census Bureau. The dependent variables are the quarterly regional liquidity measures. The regional economic conditions are the averages of state-level economic conditions within the region. The independent variables include regional economic conditions, and U.S. macroeconomic conditions. Region fixed effects are included in all regressions. Both Region Amihud and Region Rel Spread are measured in quarter t, while all real macroeconomic predictors are measured in quarter $t-2$. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter $t-1$. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-variation adjusted r-squared. The evaluation period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 2 for variable definitions.

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Region Amihud Illiquidity						
Region Inc Gr	-0.150		-0.166		-0.170	
	(-0.18)		(-0.19)		(-0.23)	
Region Rel Unemp	0.150		0.173		0.151	
	(0.52)		(0.69)		(1.05)	
Region hy	-0.009		0.030		0.043	
	(-0.04)		(0.31)		(0.75)	
Region Econ Act		-0.311		-0.297		-0.235
		(-0.39)		(-0.39)		(-0.41)
US Inc Gr			Yes		Yes	
US Rel Unemp			Yes		Yes	
US hy			Yes		Yes	
US Econ Act				Yes		Yes
Term Spread					Yes	Yes
Default Spread					Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	456	456	456	456	456	456
Adj R^2	0.004	0.004	0.060	0.026	0.244	0.220
Panel B: Region Rel Spread						
Region Inc Gr	0.481		0.441		0.421	
	(0.39)		(0.39)		(0.37)	
Region Rel Unemp	0.006		0.069		0.064	
	(0.01)		(0.31)		(0.32)	
Region hy	-0.040		0.091		0.086	
	(-0.08)		(0.71)		(0.67)	
Region Econ Act		0.128		0.175		0.192
		(0.11)		(0.17)		(0.20)
US Inc Gr			Yes		Yes	
US Rel Unemp			Yes		Yes	
US hy			Yes		Yes	
US Econ Act				Yes		Yes
Term Spread					Yes	Yes
Default Spread					Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	420	420	420	420	420	420
Adj R^2	-0.003	-0.002	0.266	0.036	0.304	0.092

Table A7

Panel and Fama-MacBeth Regressions Using Alternative Liquidity Measures

The table reports the results from one-quarter ahead panel predictive regressions, Panel A, and Fama-MacBeth mean coefficient estimates, Panel B, using alternative state liquidity measures as dependent variables. The state portfolio Corwin-Schultz spread (2012) is the natural logarithm of the value-weighted state portfolio Corwin-Schultz spread of firms headquartered in the state, where Corwin-Schultz spread is the quarterly average of daily high-low spread estimates for each stock based on equations (14) and (18) in Corwin and Schultz (2012). Negative daily spread estimates are set to zero. The state portfolio LOT (1999) is the natural logarithm of the value-weighted state portfolio LOT of firms headquartered in the state, where LOT is the ratio of the number of zero daily returns to the total number of daily returns within a quarter for each firm. The state portfolio turnover is the natural logarithm of the value-weighted state portfolio turnover of firms headquartered in the state, where turnover is the ratio of quarterly trading volume divided by the number of shares outstanding at the beginning of the quarter for each firm. The data for computing the Corwin-Schultz spread, LOT, and turnover firm-measures are from the CRSP database. The independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. State fixed effects are included in all regressions and their coefficients are suppressed to conserve space. Both the state Corwin-Schultz spread, state LOT and state turnover are measured in quarter *t*, while all real macroeconomic predictors are measured in quarter $t-2$. Other U.S. -level predictors (i.e., term spread and default spread) are measured in quarter $t-1$. In Panel A, t-statistics reported in parentheses are corrected for heteroskedasticity and serial correlation; in Panel B, t-statistics are adjusted applying Newey-West (1987) correction. In Panel B, the fit measure is the within-variation adjusted r-squared. The sample period is from 1980 to 2008. See Table 2 for variable definitions.

Panel A: Summary Statistics

Variable	Mean	SD	5%ile	25%ile	Median	75%ile	95%ile
State Corwin-Schultz Spread	-4.836	0.433	-5.358	-5.134	-4.915	-4.641	-3.953
State LOT	-2.702	1.257	-4.952	-3.746	-2.231	-1.766	-1.25
State Turnover	-1.701	0.723	-2.853	-2.108	-1.724	-1.229	-0.552

Panel B: Panel Estimates						
	State Corwin-Schultz Spread		State LOT		State Turnover	
Independent Variable	(1)	(2)	(1)	(2)	(1)	(2)
State Inc Gr	-0.006		-0.464		0.225	
	(-0.55)		(-3.76)		(3.73)	
State Rel Unemp	0.016		0.036		0	
	(2.58)		(0.81)		(-0.02)	
State hy	-0.020		-0.491		0.223	
	(-4.37)		(-11.95)		(7.75)	
State Econ Act		-0.037		-1.034		0.499
		(-4.42)		(-12.12)		(9.20)
US Inc Gr	0.009		-0.193		0.049	
	(2.07)		(-12.79)		(4.52)	
US Rel Unemp	-0.047		0.068		-0.162	
	(-6.52)		(1.73)		(-7.05)	
US hy	-0.080		-0.225		0.067	
	(-17.97)		(-5.70)		(3.35)	
US Econ Act		3.048		-0.293		0.174
		(9.92)		(-6.61)		(5.66)
Term Spread	-0.011	-0.044	-0.087	-0.149	0.11	0.098
	(-2.34)	(-9.82)	(-5.17)	(-9.27)	(9.23)	(9.02)
Default Spread	0.094	0.074	-0.39	-0.518	0.148	0.164
	(17.90)	(14.65)	(-18.23)	(-20.62)	(11.15)	(10.24)
N	5,693	5,789	5,786	5,786	5,747	5,747
Adj R^2	0.129	0.047	0.418	0.327	0.32	0.275

Panel C: Fama-MacBeth Estimates						
	State Corwin-Schultz Spread		State LOT		State Turnover	
Independent Variable	(1)	(2)	(1)	(2)	(1)	(2)
State Inc Gr	-0.151		-0.228		0.148	
	(-12.05)		(-15.29)		(16.86)	
State Rel Unemp	0.035		0.024		-0.006	
	(2.57)		(1.75)		(-0.42)	
State hy	-0.019		-0.006		-0.012	
	(-1.99)		(-0.58)		(-0.77)	
State Econ Act		-0.177		-0.209		0.176
		(-7.78)		(-11.17)		(11.20)
Avg Nobs	50	50	50	50	49	49
Avg Adj R^2	0.069	0.069	0.124	0.124	0.055	0.055

Table A8

Liquidity Predictability Variation and Local Capital Market Conditions: Robustness

This table reports the results from expanded one-quarter ahead panel predictive liquidity regressions. The dependent variables are the quarterly state liquidity measures. The independent variables are State Inc Gr, State Rel Unemp, State hy, State Econ Act, US Inc Gr, US Rel Unemp, US hy, US Econ Act, Term Spread, and Default Spread. The additional independent variables include the State Fund Const Dummy, the State Opac Dummy, the Local Excess IO Dummy, and the Rel Local Trading Dummy interacted with the State Econ Act and US Econ Act indices, respectively. State fixed effects are included in all regressions but the fixed effects coefficient estimates are suppressed to conserve space. Both the State Amihud and State Rel Spread are measured in quarter *t*, while all real macroeconomic predictors are measured in quarter *t* – 2. Other U.S.-level predictors (i.e., term spread and default spread) are measured in quarter *t* – 1. The State Fund Const Dummy, State Opac Dummy, Local IO Dummy, and Rel Local Trading Dummy are measured in quarter *t* – 1. Robust *t*-statistics, accounting for heteroscedasticity and serial autocorrelation, are reported in parentheses below the coefficient estimates. The fit measure is the within-variation adjusted r-squared. The evaluation period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure. See Table 2 for variable definitions.

	Panel A: State Amihud Illiquidity						Panel B: State Rel Spread					
	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)
State Econ Act	-0.028	0.068	-0.023	-0.015	0.087	0.262	0.302	0.282	0.256	0.213	0.245	0.552
	(-0.15)	(0.67)	(-0.22)	(-0.15)	(0.55)	(2.25)	(0.98)	(2.40)	(1.49)	(1.45)	(1.37)	(3.61)
US Econ Act	-0.331	-0.041	-0.451	-0.291	-0.289	-0.292	-0.802	0.072	-0.854	-0.556	-0.096	-0.186
	(-3.00)	(-0.55)	(-4.51)	(-5.38)	(-2.01)	(-2.41)	(-6.06)	(0.61)	(-9.52)	(-13.4)	(-0.39)	(-1.40)
State Fund Const Dummy	0.187				0.115		0.360				0.104	
	(2.59)				(2.00)		(3.47)				(2.12)	
State Opac Dummy		-0.299			-0.592	-0.173		-1.042			-1.506	-0.887
		(-1.84)			(-3.43)	(-1.15)		(-6.28)			(-7.57)	(-5.83)
Local IO Dummy			0.396		0.126	0.435			0.765		0.125	0.484
			(3.15)		(0.78)	(3.76)			(4.82)		(0.91)	(4.61)
Rel Local Trading Dummy				-0.047	0.098	-0.042				-0.013	0.071	0.012
				(-0.91)	(3.38)	(-0.84)				(-0.20)	(1.71)	(0.30)
State Econ Act*State Fund Const	-0.417				-0.155		-0.769				-0.165	
	(-6.52)				(-2.18)		(-4.63)				(-2.02)	
State Econ Act*State Opac		-0.762			-0.205	-0.665		-0.941			-0.179	-0.814
		(-4.16)			(-1.68)	(-3.73)		(-4.16)			(-1.22)	(-3.57)
State Econ Act*Local IO			-0.528		-0.256	-0.498			-0.992		-0.470	-0.706
			(-4.90)		(-1.85)	(-3.49)			(-6.09)		(-1.80)	(-3.30)
State Econ Act* Rel Local Trading				-0.600	-0.140	-0.343				-0.954	-0.133	-0.424
				(-5.10)	(-1.87)	(-3.78)				(-6.24)	(-2.12)	(-4.36)
US Econ Act*State Fund Const	0.328				0.136		0.768				0.265	
	(3.16)				(1.52)		(4.14)				(2.00)	
US Econ Act*State Opac		-0.275			-0.036	-0.159		-0.612			-0.612	-0.489
		(-1.97)			(-0.22)	(-1.19)		(-3.39)			(-3.54)	(-2.90)
US Econ Act*Local IO			0.603		0.247	0.362			1.030		0.356	0.435
			(4.43)		(1.55)	(2.76)			(6.71)		(1.52)	(3.16)
US Econ Act*Rel Local Trading				0.290	0.169	0.222				0.432	0.097	0.210
				(3.44)	(2.36)	(2.65)				(4.29)	(1.34)	(2.80)
Term & Default Spreads	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,071	4,502	5,703	5,659	967	4,502	1,043	4,472	5,090	5,090	967	4,472
Adj R^2	0.124	0.189	0.117	0.095	0.298	0.225	0.174	0.454	0.232	0.134	0.652	0.510

Table A9
Conditional Factor Model Estimates

The table reports estimation results from various factor models. The factor models contain some combination of the following factors: the market factor (RMRF), the size factor (SMB), the value factor (HML), the momentum factor (UMD), and the interactions of these factors with either the lagged value of the Lettau and Ludvigson (2001a, b) cay residual or the NBER recession indicator, respectively. For each factor model, we report the estimates of the factor exposures. The *t*-statistics of the factor exposures are reported in parentheses below the coefficient estimates. The evaluation period is from 1983 to 2008 for the State Amihud measure and from 1993 to 2008 for the State Rel Spread measure.

	Long			Short			Long-Short		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: State Amihud Illiquidity									
Alpha	*0.743*	*0.588*	*0.581*	*-0.292*	*-0.359*	*-0.338*	*0.639*	*0.537*	*0.512*
	(4.43)	*(3.18)*	*(3.35)*	*(-2.11)*	*(-2.44)*	*(-2.28)*	*(2.96)*	*(2.20)*	*(2.25)*
RMRF	104.944	102.820	106.157	93.968	95.274	93.617	10.673	7.618	12.707
	(26.17)	(21.85)	(23.97)	(28.47)	(25.46)	(24.77)	(2.07)	(1.23)	(2.19)
SMB	0.637	3.304	-8.055	13.267	9.501	15.763	-11.479	-5.273	-22.626
	(0.11)	(0.56)	(-1.27)	(2.68)	(2.03)	(2.91)	(-1.48)	(-0.68)	(-2.72)
HML	13.021	14.710	15.933	-0.288	8.936	6.837	13.330	6.168	9.500
	(2.05)	(2.04)	(2.32)	(-0.06)	(1.56)	(1.17)	(1.63)	(0.65)	(1.06)
UMD	1.244	6.008	-0.768	-4.049	-6.250	-2.721	5.170	12.108	1.791
	(0.29)	(1.23)	(-0.16)	(-1.14)	(-1.61)	(-0.66)	(0.93)	(1.88)	(0.29)
RMRFcay	57.545	22.435	17.568	-202.744	9.554	-187.013	251.021	11.448	206.255
	(0.21)	(1.90)	(0.06)	(-0.89)	(1.02)	(-0.80)	(0.70)	(0.73)	(0.57)
SMBcay	-504.021	42.033	-766.394	354.773	-6.755	351.432	-828.997	50.165	-1081.674
	(-1.71)	(2.34)	(-2.63)	(1.46)	(-0.47)	(1.42)	(-2.18)	(2.12)	(-2.84)
HMLcay	-916.925	-3.250	-861.616	80.599	-47.766	-1.906	-1002.317	43.647	-848.654
	(-2.34)	(-0.21)	(-2.24)	(0.25)	(-3.83)	(-0.01)	(-1.99)	(2.11)	(-1.68)
UMDcay	-685.214	30.061	-685.797	326.686	12.056	246.817	-1020.192	17.838	-942.414
	(-2.71)	(2.44)	(-2.81)	(1.57)	(1.23)	(1.18)	(-3.14)	(1.10)	(-2.95)
cay	-39.706	1.195	-43.497	15.333	0.486	12.779	-57.117	0.771	-58.561
	(-3.98)	(2.12)	(-4.51)	(1.86)	(1.09)	(1.55)	(-4.45)	(1.04)	(-4.63)
RMRFREC			22.167			11.338			9.382
			(1.98)			(1.19)			(0.64)
SMBREC			43.290			-9.251			53.045
			(2.51)			(-0.63)			(2.34)
HMLREC			-23.497			-39.852			14.969
			(-1.56)			(-3.10)			(0.76)
UMDREC			36.425			8.935			27.360
			(3.16)			(0.91)			(1.81)
REC			1.306			0.427			0.959
			(2.47)			(0.95)			(1.39)
N	309	306	306	309	306	306	309	306	306
Adj R^2	0.7477	0.7355	0.7741	0.8022	0.8054	0.8086	0.1594	0.0482	0.1972

	Long			Short			Long-Short		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Panel B: State Rel Spread									
Alpha	*0.838*	*0.910*	*0.789*	*-0.145*	*-0.194*	*-0.150*	*0.680*	*0.793*	*0.633*
	(3.84)	*(3.99)*	*(3.40)*	*(-1.37)*	*(-1.78)*	*(-1.33)*	*(2.98)*	*(3.48)*	*(2.67)*
N	192	192	192	192	192	192	192	192	192
Adj R^2	0.7267	0.7102	0.7395	0.9290	0.9261	0.9319	0.0932	0.1251	0.1785