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Gennaro BERNILE
Singapore Management University, gbernile@smu.edu.sg

George Korniotis
University of Miami

Alok Kumar
University of Miami

Qin WANG
University of Michigan - Dearborn

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Gennaro Bernile

Singapore Management University

George Korniotis

Alok Kumar

University of Miami

Qin Wang

University of Michigan at Dearborn

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Abstract – This study examines whether state-level economic conditions affect the liquidity of local firms. We find that liquidity levels of local stocks are higher (lower) when the local economy has performed well (poorly). This relation 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. Overall the evidence supports the notion that the geographical segmentation of U.S. capital markets generates predictable patterns in local liquidity.

Keywords: Geographical market segmentation, local business cycles, local liquidity, local bias.

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* Please address correspondence to George Korniotis, Department of Finance, University of Miami, School of Business Administration, Coral Gables, FL 33124, USA; Tel: 305-284-5728; Email: gkorniotis@miami.edu. Gennaro Bernile can be reached at gbernile@smu.edu.sg. Alok Kumar can be reached at akumar@miami.edu. Qin Wang can be reached at qinw@umich.edu. We thank an anonymous referee, Robert Battalio, Hank Bessembinder (the Editor), Tarun Chordia, Shane Corwin, Mathijs van Dijk (discussant), Allaudeen Hameed, Ralitsa Petkova, Alessio Sarretto, Paul Schultz, Johan Sulaeman, Annette Vissing-Jorgensen, Fernando Zapatero (discussant), and participants at the 1st ITAM Finance Conference and at the Warwick Business School Frontiers of Finance 2012 Conference for helpful comments and suggestions. We are responsible for all remaining errors and omissions.

Local Business Cycles and Local Liquidity

Abstract – This study examines whether state-level economic conditions affect the liquidity of local firms. We find that liquidity levels of local stocks are higher (lower) when the local economy has performed well (poorly). This relation 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. Overall the evidence supports the notion that the geographical segmentation of U.S. capital markets generates predictable patterns in local liquidity.

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1. Introduction

The financial crisis of 2008 has demonstrated that market-wide liquidity can strongly influence financial markets. In principle, such systematic liquidity shocks should depend upon the state of the real economy. Although previous studies find that national monetary policy variables predict aggregate liquidity, the evidence that real national economic factors affect capital market liquidity is relatively weak (e.g., Fujimoto (2003), Choi and Cook (2005), Chordia, Sarkar, and Subrahmanyam (2005), Sauer (2007)).

In this study, we examine whether the link between macroeconomic variables and liquidity is stronger at the state-level. Specifically, we posit that local economic conditions would affect the liquidity of local firms more than national macroeconomic variables. Our main hypothesis is that if a significant portion of the ownership and trading of stocks is local, and local economic conditions affect the risk aversion of local investors, then local economic conditions should affect local investors' willingness to trade. As a result, there would be a common factor in the liquidity of local firms that varies with the local economic conditions.

This conjecture is motivated by the recent evidence of segmentation of U.S. capital markets and the strong preference for local stocks by local investors. In particular, there is mounting evidence that U.S. capital markets are geographically segmented. Becker (2007) shows that U.S. bank loan markets are segmented. Korniotis (2008) and Korniotis and Kumar (2013) find that U.S. state-level heterogeneity in economic conditions explains the variation in the cross-section of stock returns.

Concurrently, other recent studies show that stock trading activity is localized. For example, Loughran and Schultz (2004) find that firms in areas affected by extreme weather experience lower trading volume. Loughran and Schultz (2005) find that firms in urban areas have higher liquidity than firms in rural areas. Shive (2012) shows that large power outages are associated with lower stock turnover for firms headquartered in the area. The joint evidence of localized trading and geography-induced market segmentation suggests that local economic conditions can affect local stock liquidity.

To formalize our empirical predictions, we rely on the theoretical framework of Vayanos and Wang (2012a; hereafter VW2012). Building on the empirical and theoretical literature on liquidity[1], VW2012 develop a model, which predicts that asset liquidity levels decrease when investors' risk aversion levels and asset return volatility levels are higher, and when there are fewer liquidity suppliers. The evidence of localized trading and the relation between local risk aversion and local economic conditions suggest that the liquidity primitives in VW2012 (i.e., risk aversion, asset return volatility, proportion of liquidity suppliers, and information asymmetry) should depend on local business cycles. Therefore, there should be a direct relation between current local economic indicators and the subsequent liquidity of local stocks.

To test this hypothesis, we use multiple measures of stock liquidity and construct quarterly state-level liquidity indices of all the firms headquartered in each state. We find that there is a strong relation between state-level economic conditions and subsequent state-level liquidity. Specifically, the liquidity of stocks headquartered in a state dries up (increases) following deteriorating (improving) local economic conditions. This finding is robust to the choice of estimation methods, estimation period, and control variables. Our control variables include U.S. macroeconomic indicators, lagged levels of liquidity of the local firms, the average market capitalization of local firms and the past, contemporaneous, and future stock returns of local firms. We also replicate our analysis using more disaggregated data from Metropolitan

[1] For example, see Stoll (1978), Amihud and Mendelson (1986), He and Wang (1995), Gromb and Vayanos (2002), Huang (2003), Chen, Lesmond, and Wei (2007), Edwards, Harris, and Piwowar (2007) and Bao, Pan, and Wang (2011). For a comprehensive review see Amihud, Mendelson and Pedersen (2005) and Vayanos and Wang (2012b).

Statistical Areas (MSA). Due to data restrictions, the MSA economic activity index is annual but it is still statistically and positively related to next-year MSA firm liquidity.

Additional tests show that the relation between local liquidity and economic conditions is weaker when firm localness is lower, i.e., among larger or S&P500 firms. Moreover, consistent with the evidence in Loughran and Schultz (2005), we find that the effect of local economic conditions on liquidity is stronger in rural states where liquidity is scarcer, and this link is yet stronger prior to the advent of decimalization in 2001.

Next, we examine whether the degree of local ownership and trading is a channel through which local economic conditions influence local liquidity. Since the local ownership and local trading intensity are known to be disproportionately high (e.g., Coval and Moskowitz (1999), Huberman (2001), Ivkovic and Weisbenner (2005), Bodnaruk (2009), Seasholes and Zhu (2010), and Becker, Cronqvist, and Fahlenbrach (2011)), the risk aversion of local investors should influence the liquidity of local stocks. Moreover, because local economic conditions affect local risk aversion (Korniotis and Kumar (2013)), the relation between local economic conditions and local liquidity should be stronger when local ownership and trading of local stocks are higher.

We also investigate whether tighter local funding constraints and greater opacity in local information environments amplify the effect of local economic conditions on local liquidity. This analysis is based on the theoretical models and empirical evidence that demonstrate that liquidity should be lower when investors face tighter funding constraints or more opaque information environments (e.g., Gromb and Vayanos (2002), Eisfeldt (2004), Anshuman and Viswanathan (2005), Taddei (2007), Garleanu and Pedersen (2007), Brunnermeier and Pedersen (2009), Hameed, Kang, and Viswanathan (2010)).

Our empirical evidence is consistent with the conjecture that local capital market conditions affect the local primitives of liquidity and thus the liquidity of local stocks, both directly and by amplifying the effect of local economic conditions on local liquidity. Specifically, we show that the effect of local economic conditions on local liquidity is stronger when local ownership and trading levels are higher, local funding constraints are more binding, and the local information environment is more opaque.

Overall, our empirical results provide evidence that macroeconomic conditions do affect liquidity. More importantly, the macroeconomic conditions that matter are the local ones. This finding is consistent with the evidence on the geographical segmentation in U.S. capital markets and with the evidence of localized trading. Moreover, our evidence complements the findings in Næs, Skjeltorp, and Ødegaard (2011) by showing that, in contrast to other existing studies, there is in fact a significant link between real economic factors and future liquidity levels.

The remainder of the paper is organized as follows. In Section 2, we develop our main hypotheses. In Section 3, we describe the data sources and variables used in our tests. We present the empirical evidence in Sections 4 to 6 and conclude in Section 7.

2. Related Literature and Testable Hypotheses

We organize our empirical analyses around two hypotheses, which we motivate using the Vayanos and Wang (2012a) model.

2.1 Local Economic Conditions and Local Liquidity

There are two types of risk-averse investors in the VW2012 model: liquidity demanders and suppliers. Liquidity demanders receive an endowment correlated with the returns of the risky assets. This correlation gives liquidity demanders an incentive to hedge endowment risk and, initiate trading. Under full information, the price impact of trades initiated by liquidity demanders (i.e., λ) is given by:

$$(1) \qquad \lambda = \frac{\alpha\sigma^2}{1-\pi},$$

where α is the investor risk aversion, σ^2 is the volatility of the risky asset, and $(1-\pi)$ is the fraction of liquidity suppliers.

This relation implies that liquidity would be low when risk aversion is high, asset volatility is high, and the proportion of liquidity suppliers is low. We conjecture that the three model primitives, i.e., α, σ^2, and $(1 - \pi)$, would vary with the local business cycle due to geographical segmentation of U.S. financial markets and localized trading. Therefore, our first main hypothesis posits that:

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

Existing empirical evidence provides the motivation for this conjecture. First, Korniotis and Kumar (2013) demonstrate that the local investors' risk aversion increases when local economic conditions deteriorate. Prior studies also show that stock ownership and trading are disproportionately concentrated around firm headquarters (e.g., Coval and Moskowitz (1999, 2001), Loughran and Schultz (2004, 2005) and Shive (2012)). Thus, we conjecture that worsening local economic conditions would result in higher risk aversion α and, according to the VW2012 model, higher illiquidity (λ) among local stocks.

Second, prior studies show that there is an inverse relation between equity market volatility and the business cycle (e.g., Schwert (1989a), (1989b); Mele (2008)). Recent evidence in Bernile, Kumar, and Sulaeman (2013) also demonstrates that there is a significant local component in stock returns. This evidence suggests that local economic conditions would have a negative effect on local asset volatility and in turn the liquidity of local assets.

Last, local economic conditions may affect local investors' propensity to act as liquidity suppliers or demanders. Deteriorating local economic conditions can limit local investors' ability to supply liquidity because either their income/wealth is negatively affected by local recessions or they want to reduce their exposure to local risk. Thus, deteriorating local conditions would decrease the proportion of liquidity suppliers, $(1-\pi)$, and increase illiquidity (λ) of local assets.

2.2 Local Capital Markets and Amplification Mechanisms

Local capital market conditions can affect the link between local economic conditions and local liquidity. Existing studies suggest three sets of factors that can generate state-level variation in firm liquidity: (i) local institutional ownership and trading of local stocks, (ii) local funding constraints, and (iii) opaqueness of local information environments.

In VW2012, the risk aversion (α) of investors trading an asset determines asset illiquidity (λ). Given that the risk aversion of local investors is more sensitive to local conditions (e.g., Korniotis and Kumar (2013)), we expect high local stock ownership and/or trading imbalances between local and non-local investors would strengthen the relation between local economic conditions and local liquidity.

Another important determinant of λ is the proportion of investors trading the stock that act as liquidity suppliers. Theory suggests that market liquidity drops after large negative market-wide shocks because the collateral values of financial intermediaries 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)). We expect that local funding constraints would limit local investors' ability to provide liquidity. Therefore, higher local funding constraints would reduce the liquidity of local stocks directly. Further, those constraints would amplify the effects of local economic variables through their impact on other primitives of the model (i.e., risk aversion and asset volatility).

VW2012 also analyze the case of asymmetrically informed investors. They show that the presence of privately informed liquidity demanders increases illiquidity, both directly and by amplifying the impact of other primitives of the model, i.e., α, σ^2, and $(1-\pi)$. We cannot observe the precision of local private information signals. Instead, we rely on the notion that a more opaque local information environment would exacerbate information asymmetries between local and nonlocal investors. In turn, we posit that higher opacity of the local environment would reduce stock liquidity directly and amplify the indirect effects of local economic variables.[2]

Based on the discussion above, our second hypothesis posits that:

H2: *The relation between local economic conditions and local liquidity is amplified when (i) the shareholder base is more local, (ii) there are larger differences in trading of local stocks by local and non-local investors, (iii) local funding constraints are more binding, and (iv) the local information environment is more opaque.*

3. Data and Variables

We use data from multiple sources to test our two main hypotheses. In this section, we describe the main data sources and variables used in our empirical analysis.

3.1 State-Level Liquidity

The liquidity level of local stocks is the central variable of interest in our tests. In our main tests, we use two established measures of stock liquidity: (i) Amihud's (2002) illiquidity

[2] This conjecture is also supported by other theories, which show that firm opacity can result in pro-cyclical liquidity (e.g., Eisfeldt (2004), Taddei (2007)).

measure and (ii) relative spreads.[3] The Amihud (2002) illiquidity measure is based on Kyle's (1985) lambda. This variable captures the daily price impact of the order flow and is defined as the ratio of the absolute value of the daily stock return to its dollar volume. The relative spread measure is the ratio of the daily closing bid-ask spread divided by the midpoint of the daily closing bid-ask spread. All liquidity measures are calculated using data on common stocks (share code of 10 or 11) from the Center for Research in Security Prices (CRSP).

Given that state-level economic conditions can only be measured on a quarterly basis, we conduct our tests using state-quarter observations. To estimate Amihud (2002) illiquidity and relative spread in state *j* and quarter q, we use the following log-average index:

$$State\ Liq\ (j,q) = Log\left(\sum_{i=1}^{N} \omega_{i,q-1}^{j} \left(\sum_{d=1}^{Q} Liq_{i,d,q}^{j} / Q\right)\right). \tag{2}$$

Here, $Liq_{i,d,q}^{j}$ 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*; $\omega_{i,q-1}^{j}$ 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 Local Economic Activity

We use several macroeconomic variables in our analysis. Specifically, following Korniotis and Kumar (2013), we focus on 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

[3] The robustness tests contained in the internet Appendix use three other alternative measures of liquidity: Corwin and Schultz (2012) spreads, Lesmond, Ogden, and Trzcinka (1999) (LOT) measure, and stock turnover. See Internet Appendix Tables A3 and A7.

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 show that unemployment, income growth, and the housing collateral ratio capture relevant macroeconomic information.

In our tests, we use an economic activity index (US Econ Act, State Econ Act) by combining the three macroeconomic variables.[4] To construct the indices, we first standardize each macroeconomic variable to have zero sample mean and standard deviation equal to one. Then, we add the standardized values of income growth and hy, subtract the standardized value of relative unemployment, and divide the result by three to obtain the corresponding U.S. or state-level index. The Appendix provides further details on the data sources and method used to construct these state-quarter variables.

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). These variables are based on quarterly data obtained from the Federal Reserve Board.

Due to data constraints, our sample covers the 1980 to 2008 time period. State-level macroeconomic data are available from 1975 onward, but they are very noisy prior to 1980 due to various approximations. Further, the housing collateral series is unavailable after 2008.

3.3 Local Funding Constraints, Opacity, Ownership, and Trading

We use data from multiple sources to identify the channels through which local macroeconomic variables affect local stock liquidity. Specifically, we construct four state-quarter

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[4] The robustness analysis contained in the internet Appendix replicates our tests using the separate indicators that we use to construct the economic activity indices. See Internet Appendix Table A1.

indicator variables that capture: (i) funding constraints; (ii) state opacity; (iii) local institutional ownership; and (iv) local stock trading differentials between local and non-local institutions. These indicators are respectively 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.

Specifically, we follow Hameed, Kang, and Viswanathan (2010) to construct the state funding constraint indicator, which is based on the portfolio returns of NYSE-listed investment banks and securities brokers and dealers (i.e., SIC = 6211) headquartered in the state. We follow Anderson, Duru, and Reeb (2009) to construct the opacity dummy, which is based on dollar volume, analyst following, and analyst forecast error.[5] We also create a dummy variable that captures the degree of local institutional ownership each quarter based on the aggregate percentage ownership of 13(f) filers reporting a business address in the same state where the firm is headquartered. Finally, using the 13(f) data and stock prices from CRSP, we create a dummy variable that reflects the level of "trading" in local stocks by local institutions relative to non-local institutions. The Appendix provides further details on the data sources and the method used to construct each of these four state-quarter indicator variables.

3.4 Summary Statistics and Correlations

Table 1 presents the summary statistics for the sample of state-quarter observations. The average 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

[5] 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.

liquidity measures are also quite persistent and, therefore, the standard errors of the coefficient estimates in our regression analysis are adjusted for serial autocorrelation.

Table 2 reports the correlations among all the variables used in the main analysis, including the liquidity measures and the lagged local and U.S. macroeconomic variables. 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. More importantly, the lagged state economic activity index is negatively correlated with current levels of both the State Amihud and State Relative Spread measures. This preliminary evidence supports our main conjecture that better local economic conditions are associated with higher liquidity (i.e., less illiquidity) of local stocks in the subsequent quarter.

4. Local Economic Conditions and Local Liquidity

In this section we present our main results for the relation between local liquidity and local economic conditions. We also report evidence from a variety of robustness tests based on different estimation methods, different subsamples, and different liquidity measures.

4.1 Baseline Liquidity Regression Estimates

We begin our empirical analysis by testing our first hypothesis. We use two different estimation methods to investigate the relation between local (i.e., state-level) economic conditions and the subsequent stock liquidity of local firms. The first approach pools data along both time and cross-sectional dimensions. In these regressions, the current state liquidity is the dependent variable and all economic activity measures are lagged as described earlier. All pooled regression specifications include state fixed effects, but we suppress their coefficient estimates to conserve space. In addition to the panel estimation method, we estimate the relation between local economic conditions and local liquidity using the Fama and MacBeth (1973) method.

Table 3 presents the regression estimates that use the state Amihud illiquidity or the state relative spread measure as the dependent variable. Columns (1) through (5) report the panel regression estimates and column (6) reports the Fama-MacBeth regression estimates.[6] Consistent with our first main conjecture (H1), we find that the lagged state economic activity is significantly negatively related to current state illiquidity. When we control for state fixed effects alone, as shown in column (1), the coefficient estimate of the state economic activity index is -0.677 (*t*-statistic = −10.31). This is very similar to its estimate in column (4) where we control for U.S. economic activity and monetary policy variables (estimate = −0.699, *t*-statistic = −7.98).

The economic magnitude of the coefficient estimates is significant. For example, a one standard deviation increase in the local economic activity index (= 0.602) implies an average increase of 0.421 (= 0.602 × 0.699) in the Amihud illiquidity measure, which is equivalent to 28.61% of the dependent variable's standard deviation. The economic significance of the panel regression estimates is even higher when the state relative spread is the dependent variable.

The evidence also shows that local factors explain substantially more variation in and have a larger impact on local liquidity than national factors.[7] The estimates for the state Amihud illiquidity (relative spread) model in column (1) indicate that local economic conditions alone explain 10.4 (20.6) percent of the within-panel variation in local liquidity. Adding national macroeconomic and money supply variables to the specification increases the within-panel adjusted-R^2 by only 5.7 (6.9) percent in column (4).

[6] To conserve space, Table 3 only reports the estimates based on the US and state economic activity indices. For completeness, Table A1 in the Appendix reports coefficient estimates for the models using the individual components of the economic activity indices (i.e., income growth, relative unemployment, housing collateral), which are similar to the baseline results.

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

Further, the economic magnitude of the effect of local economic conditions on local liquidity is larger than that of U.S. conditions. When the state economic activity index decreases by one standard deviation (= 0.602), the state Amihud illiquidity increases by 0.41 (0.602 × 0.677) and the state relative spread increases by 0.60 (0.602 × 0.979). By contrast, the impact of a one standard deviation decrease in the U.S. economic activity index (= 0.583) is only 0.16 (0.583 × 0.270) for the state Amihud illiquidity and 0.27 (0.583 × 0.466) for the state relative spread.

Overall, consistent with the correlation estimates and our main hypothesis (H1), the baseline liquidity regression estimates in Table 3 show that better (worse) local economic conditions are followed by higher (lower) local stock liquidity.

4.2 Different Estimation Methods

The inferences from the baseline results are robust to changing the model specification or estimation technique. Most notably, in column (5) of Table 3, we include time fixed effects in the model specification in addition to state fixed effects, and drop all U.S.-level variables. This specification is 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 has a statistically significant, negative coefficient estimate. Specifically, the coefficient estimate of the state economic activity index is −0.153 (*t*-statistic = −2.30) for the state Amihud illiquidity model and −0.057 (*t*-statistic = −1.80) for the state relative spread model.

We obtain similar results when we estimate cross-sectional Fama-MacBeth quarterly regressions, reported in column (6) of Table 3. Because U.S. national factors are constant in each quarterly cross-section, the only explanatory variable in the Fama-MacBeth regressions is the state economic activity index. The table reports the time-series mean cross-sectional coefficients and their Newey-West (1987) corrected *t*-statistics. We find that the coefficient estimate of the index is negative and statistically significant for both the state Amihud illiquidity (estimate = −0.534, *t*-statistic = −13.95) and relative spread (estimate = −0.217, *t*-statistic = −16.13).

4.3 Subperiods, Alternative Liquidity Measures, and Subsample of States

The results from additional tests further indicate that our baseline results are robust. To conserve space, we briefly discuss these results here and report them in the Internet Appendix. First, to assess whether the relation between local economic conditions and local stock liquidity is robust over time, we divide our sample into six sub-periods. We find that the relation between local liquidity and local economic conditions goes in the same direction and is statistically significant at the 1% confidence level in each sub-period (see Internet Appendix Table A2).

Second, we examine whether our key results are affected by the choice of liquidity measure. The results from these tests are reported in Internet Appendix Table A3. We find that our inferences hold when we use alternative measures such as the Corwin and Schultz (2012) spread measure, the Lesmond, Ogden, and Trzcinka (LOT) (1999) measure, and the turnover of local stocks. We also repeat our tests using industry-adjusted liquidity measures to ensure that the geographical clustering of industries does not drive our main results due to the known commonality in industry-level liquidity (e.g., Chordia, Roll, and Subrahmanyam (2000)). The results from these tests are reported in Internet Appendix Table A4.

Third, we examine whether the clustering of firms and investors across U.S. states affects our results. To this end, we repeat our baseline tests after excluding large states (California, New York, and Texas) and states with one large dominant firm (Arkansas, home of Walmart, and Washington, home of Microsoft) from our sample. The results reported in Internet Appendix

Table A5 indicate that imposing this restriction on our sample does not affect our previous inference.

4.4 MSA and Regional Analysis

Finally, we examine whether the choice of the geographical unit of observation affects our results. We begin by replicating our baseline analysis after restricting the definition of 'local' to Metropolitan Statistical Areas, as defined by the Bureau of Economic Analysis. Due to data availability, this analysis is limited to a shorter period (i.e., 1990-2008) and uses annual observations. Notwithstanding these limitations, we expect that our inferences would hold, if the baseline results are due to a persistent local phenomenon. To compute the MSA annual Amihud and relative spread measures, we first compute for each firm in an MSA the yearly average of its Amihud and relative spread measures. Then, we compute a value weighted average at the MSA level of the annual firm-level measures.

The results reported in Table 4 for the MSA-level tests continue to support our first hypothesis. Lagged MSA economic conditions predict the subsequent *year* MSA-level liquidity.[8] By contrast, when we redefine 'local' in terms of the four divisions of the U.S. Census Bureau, there is no significant relation between regional liquidity and lagged regional economic conditions. The results from the regional analysis are reported in Internet Appendix Table A6. Overall, these results suggest that the relation between economic variables and liquidity a local component in liquidity rather than a national component since regional economic conditions, which are arguably more related to the national business cycle as opposed to the business cycle of states or MSA's, do not predict local liquidity.

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[8] In the Internet Appendix Table A7, we show that the MSA economic conditions predict liquidity even when we use the Corwin and Schultz (2012) spread measure, the Lesmond, Ogden, and Trzcinka (LOT) (1999) measure, and the turnover of local stocks.

5. Additional Results

Our baseline evidence shows that local liquidity varies directly with local economic conditions. In this section, we test auxiliary predictions of our main hypothesis to ensure that the documented link between state-level liquidity and economic conditions is not spurious or simply a reflection of a different mechanism that affects both liquidity and local economic conditions.

5.1 Local Economic Conditions and Firm Localness

Our first hypothesis suggests that the relation between local economic conditions and local stock liquidity should depend on the degree of firm localness. Specifically, the link between local stock liquidity and economic conditions should be stronger for firms whose returns are more sensitive to local shocks or whose investor base is more local. To test this conjecture, we classify firms based on size or affiliation to the S&P 500 index and replicate our analysis for the segmented samples of stocks. We expect that the link between stock liquidity and local economic conditions would be weaker for firms that are less local, i.e., larger or S&P 500 firms.

We test this auxiliary hypothesis in Table 5. In Panel A, we form two local stock portfolios for each state based on whether the firm market capitalization is above or below the NYSE median as of the previous quarter-end. We classify the corresponding portfolios as Large and Small, respectively. Similarly, in Panel B we form two local stock portfolios for each state based on whether the firm is included in the S&P 500 index as of the previous quarter-end. Then, we replicate our baseline analysis for each set of state portfolios.

The evidence in Table 5 is consistent with the prediction that stock liquidity depends more strongly on local economic conditions for firms that are more local. In particular, the evidence in Panel A indicates that the effect of local economic condition on stock liquidity is larger among Small firms than Large firms. This holds whether we focus on the state Amihud illiquidity or relative spread measure. Similarly, in Panel B, we find that the effect of local economic conditions on liquidity is larger among Non-S&P 500 stocks than S&P 500 firms.

5.2 Local Economic Conditions and Exogenous Variation in Liquidity

To further examine the link between local liquidity and economic conditions, we exploit exogenous variation in liquidity that is unrelated to other phenomena that might cause a spurious correlation between liquidity and the local economy. Specifically, we build on the finding in Loughran and Schultz (2005) that liquidity is scarcer in rural regions. Also, we exploit the introduction of decimalization on the New York Stock Exchange (NYSE) between August of 2000 and January of 2001, which has increased the liquidity of all stocks (e.g., Bessembinder (2003), Chakravarty, Wood, and Van Ness (2004)).

Our conjecture is that when liquidity is on average lower (i.e., in rural areas and/or prior to decimalization), the trading activity of a small group of investors would have a stronger impact on the liquidity of local stocks. This conjecture implies that local economic conditions would have a stronger effect on stock liquidity in rural states and prior to decimalization.

We test this auxiliary hypothesis in Table 6, where we expand the baseline model to include indicator variables that reflect the state-level degree of rural population and the advent of decimalization. The rural dummy is based on Census data and takes the value of one when the percentage of state population living in rural areas is above the median rate during the year. The pre-decimalization dummy is equal to one for years up to 2001. We also include interactions of these dummy variables with the state-economic activity index. The interaction terms measure the incremental effect of state economic conditions on the liquidity of firms in rural states and before the decimalization event. We expect these interaction terms to be negatively related to state Amihud illiquidity and relative spreads.

The evidence in Table 6 is consistent with our predictions. The coefficient estimates on the rural and pre-decimalization dummy variables are positive. Thus, firms in rural states have lower liquidity and liquidity was lower prior to decimalization. Most importantly, the coefficient on the interaction term of the rural dummy with the local economic activity index is negative and statistically significant. Therefore, the liquidity of rural stocks, which is on average lower, is also more sensitive to local economic conditions.

The coefficient on the interaction between pre-decimalization and local economic activity is not statistically significant, which suggests that decimalization did not on average affect the link between local economic conditions and liquidity. However, decimalization had a strong impact on firms in rural states. Specifically, in regressions (3) and (6), we include three terms: two double interactions (State Econ × Rural, State Econ × PreDecimal) and a triple interaction term (State Econ × Rural × PreDecimal). The triple interaction term takes on a negative and statistically significant estimate, suggesting that decimalization did in fact affect the link between local economic conditions and liquidity in rural states, where liquidity is scarcer to begin with.

5.3 Impact of Firm Size, Stock Returns, and Lagged Liquidity

Next, we modify our baseline regression specification to ensure that the significance of local economic conditions is not driven by the serial autocorrelation in the liquidity measures or the relation between liquidity and returns as well as liquidity and firm size. We report the results for these augmented specifications in Table 7.

As shown in columns (1), (4), (5) and (8), lagged liquidity is indeed a significant predictor of current liquidity. However, even after controlling for lagged liquidity, the lagged state economic activity index is statistically significant. For example, in the Amihud illiquidity model (see column (1)), the estimate on the state economic activity index is −0.048 (t-statistic =

−2.72). Similarly, in the relative spread model (see column (5)), the estimate on the state economic activity index is −0.016 (t-statistic = −2.18).

Several previous studies find that liquidity deteriorates when returns are low (e.g., Chordia, Roll, and Subrahmanyam (2001), Chordia, Sarkar, and Subrahmanyam (2005), and Hameed, Kang, and Viswanathan (2010)), and Korniotis and Kumar (2013) show that local economic conditions predict future returns. To ensure that our baseline estimates are not somehow mechanically induced, we add the past, contemporaneous, and future returns of the firms headquartered in the state as additional control variables. As expected, the value-weighted returns of local firms are significantly related to state liquidity. However, even after controlling for stock returns of local firms, the local economic activity index remains significant. For example, in the Amihud illiquidity model (see column (2)), the estimate on the state economic activity index is −0.143 (t-statistic = −2.16). Similarly, in the relative spread model (see column (6)), the estimate on the state economic activity index is −0.053 (t-statistic = −2.07).

Firm size is also known to be related to liquidity with large firms typically experiencing more ample liquidity. If deteriorating local conditions lead to excess selling of local stocks, the prices and thus market capitalization of local firms will decrease, causing local liquidity to decrease. To ensure that the relation between local economic conditions and local liquidity is not just a manifestation of the size-liquidity phenomenon, we add a size control variable in our regressions. The size index is the average market size of all firms headquartered in a state. As expected, the state size index is negatively correlated to the Amihud illiquidity measure (see regressions (3) and (4)) and the relative spread (see regressions (7) and (8)). However, despite the strong relation between size and liquidity, the state economic activity index remains a statistically significant predictor of state illiquidity in the presence of the size controls.

Overall, the estimates from the augmented regression models show that the significance of the state economic activity index is not due to autocorrelation biases. Our results also do not merely reflect the previously documented relation between liquidity and returns and liquidity and firm size. [9]

6. Amplification Role of Local Capital Markets

In this section, we test our second hypothesis (H2) to assess the potential channels through which local economic conditions affect the liquidity of local stocks. For this analysis, we augment our baseline liquidity regression model by including characteristics of the local capital market environment and their interactions with the local economic activity index.

As previously described, we first classify state-quarters based on the tightness of funding constraints faced by local investors, the opacity of the information environment of local firms, the ownership levels of local institutions, and the difference in the trading intensity of local and non-local institutions in local stocks. Then, we add the corresponding indicator variables and their interactions with the state economic activity indices to our baseline liquidity regression specifications to test whether local capital market conditions affect the level of local liquidity and its relation with local economic conditions.

Table 8 reports the results of our tests of the second hypothesis. The regression estimates indicate that in the single-interaction-term specifications (see columns (1) through (4)), all coefficient estimates are consistent with our second set of predictions (H2). In particular, as shown in column (1), both the positive coefficient estimates of State Fund Constraint (SF) as well as the negative coefficient estimates of State Econ Act × SF interaction variable are

[9] For completeness, in the Internet Appendix, we estimate all our baseline regressions with the additional controls, i.e., lagged illiquidity, state market capitalization, and state return indices. See Tables A8 to A10. In all cases, we find that the state-economic activity index is a statistically significant predictor of liquidity in the presence of these additional control variables.

statistically significant. Consistent with the notion that binding local funding constraints restrict the proportion of liquidity providers for local stocks, these estimates imply that the liquidity of local stocks is lower in state-quarters characterized by binding funding constraints and that this effect is amplified during local economic downturns.

Similarly, in column (2), the positive coefficient estimates of State Opacity (SO) and the negative coefficient estimates of State Econ Act × SO interaction are statistically significant. Hence, consistent with our conjecture that liquidity suppliers demand higher compensation when adverse selection is more severe, the liquidity of local stocks is lower in state-quarters characterized by high opacity and this effect is amplified during local economic downturns.

The next two models in Table 8 focus on the impact of local ownership and trading intensity on local liquidity. The coefficient estimate of State Local IO (SL) is positive, while that of the State Econ Act × SL interaction variable is negative, and both are statistically significant (see column (3)). This evidence supports the conjecture that local investors are more likely to behave as the informed liquidity demanders of the VW2012 model and, as a result, higher local holdings would result in lower local stock liquidity and a stronger relation between local economic conditions and local liquidity.

In column (4), only the negative coefficient estimate of State Econ Act × State Rel Local Trade (SR) interaction variable is statistically significant. Therefore, in state-quarters that are characterized by average economic conditions, large differences between local and non-local investors in the trading of local stocks do not affect local stock liquidity. However, consistent with the idea that local investors would demand greater liquidity during economic downturns, the relation between local economic conditions and local liquidity is indeed stronger in state-quarters that are characterized by high relative local trading.

In the full model specification (see column (5)), we find that the coefficient estimates of three of the four interaction terms become marginally significant. The full specification results, however, should be interpreted with caution because the sample size is significantly smaller due to the lack of availability of the funding constraint data before 1993 and the limited presence of NYSE-listed broker-dealers across the U.S. In model (6), we drop the funding constraint indicator from the specification to relax this severe data constraint. The more parsimonious specification estimated for the larger sample again supports our second hypothesis (H2).

Overall, the evidence in Table 8 indicates that market segmentation created by local investors' preference for local stocks can largely explain the relation between local liquidity and local economic conditions. Supporting our second hypothesis, these results imply that local capital market conditions affect the liquidity of local stocks both directly and through their impact on the relation between local economic conditions and subsequent local stock liquidity.

7. Summary and Conclusion

Understanding the determinants of stock liquidity is important because it has direct implications for investors' ability to diversify volatility and liquidity shocks. Motivated by the recent literature on the geographical segmentation of U.S. capital markets and the evidence on localized trading, we posit that state-level economic conditions would affect the subsequent liquidity levels of local stocks.

Consistent with this conjecture, we show that the location of a firm affects its stock liquidity. Specifically, there is an economically significant local component in stock liquidity that varies with local economic conditions. The liquidity of firms headquartered in a U.S. state is systematically higher (lower) when the local economy performs well (poorly). Further, the impact of local economic conditions on local stock liquidity is stronger when local funding constraints are more binding, the local information environment is more opaque, local institutions hold larger stakes in local stocks, and there are larger differences in trading of local stocks between local and non-local investors.

Unlike most of the evidence in the existing literature, our findings demonstrate that real macroeconomic conditions do affect liquidity. In particular, the business conditions that seem to matter most are the local economic conditions. This is an intuitive finding, because the state of the local economy is more salient to local investors than the state of the national economy. Much like blizzards in the locale of a firm affect its liquidity (Loughran and Schultz (2004)), a deteriorating local economy can make local investors more risk averse and more pessimistic, which lowers the liquidity of local firms that they invest and trade in.

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Table 1 – Summary Statistics.

This table reports summary statistics for all the variables used in the analysis, covering the period from 1980 to 2008. See Appendix for details on definitions of variables.

Variable	Mean	SD	5th Pctl	25th Pctl	Median	75th Pctl	95th Pctl	Auto-Correl.
(1) State Amihud Illiquidity	-15.813	1.471	-18.122	-16.805	-15.843	-14.929	-13.279	0.628
(2) State Relative Spread	-4.664	1.169	-6.958	-5.259	-4.338	-3.871	-3.163	0.900
(3) Metro Area Amihud Illiquidity	-14.820	2.326	-18.748	-16.237	-14.844	-13.273	-11.144	0.568
(4) Metro Area Relative Spread	-4.264	1.222	-6.677	-4.847	-4.074	-3.443	-2.551	0.710
(5) State Economic Activity Index	0.000	0.602	-0.872	-0.342	-0.044	0.298	0.958	0.443
(6) Metro Area Economic Activity Index	0.000	0.470	-0.614	-0.162	0.105	0.357	0.791	0.265
(7) U.S. Economic Activity Index	0.000	0.583	-1.028	-0.448	0.075	0.459	0.856	0.826
(8) Term Spread	0.000	1.000	-1.366	-0.759	-0.044	0.680	1.631	0.861
(9) Default Spread	0.000	1.000	-1.068	-0.719	-0.234	0.466	1.746	0.695
(10) State Quarterly Stock Return	0.029	0.115	-0.168	-0.030	0.033	0.094	0.206	0.010
(11) State Market Capitalization	18.823	0.884	17.337	18.291	18.808	19.422	20.207	0.954
(12) State Funding Constraint	0.536	0.499	0.000	0.000	1.000	1.000	1.000	0.021
(13) State Opacity	0.499	0.500	0.000	0.000	0.000	1.000	1.000	0.700
(14) State Local Institutional Ownership	0.500	0.500	0.000	0.000	0.500	1.000	1.000	0.741
(15) State Local minus Non-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 Relative Spread are measured in quarter t, while all real macroeconomic variables are measured in quarter $t-1$. Other U.S.-level variables (i.e., term spread and default spread) are measured in quarter $t-1$. The sample period is from 1980 to 2008. [a], [b], and [c] denote correlation coefficients that are significantly different from zero at the 1%, 5%, and 10% levels, respectively. See Appendix for details on definitions of variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) State Amihud Illiquidity		0.662[a]	-0.292[a]	-0.073[a]	0.126[a]	-0.088[a]	-0.013	-0.392[a]
(2) State Relative Spread	0.672[a]		-0.416[a]	-0.196[a]	0.061[a]	-0.144[a]	0.036[a]	-0.670[a]
(3) State Econ Act	-0.268[a]	-0.341[a]		0.467[a]	-0.277[a]	-0.192[a]	-0.057[a]	0.365[a]
(4) US Econ Act	-0.071[a]	-0.084[a]	0.476[a]		-0.147[a]	-0.277[a]	0.002	0.239[a]
(5) Term Spread	0.148[a]	0.048[a]	-0.317[a]	-0.229[a]		0.318[a]	0.029[b]	0.036[a]
(6) Default Spread	-0.108[a]	-0.152[a]	-0.200[a]	-0.218[a]	0.335[a]		-0.020	0.023[c]
(7) State Quarterly Return	-0.012	0.022	-0.047[a]	0.010	0.030[b]	-0.040[a]		-0.121[a]
(8) State Market Capitalization	-0.362[a]	-0.672[a]	0.357[a]	0.227[a]	-0.004	0.032[b]	-0.105[a]	

Table 3 – Relation between State Quarterly Aggregate Stock Liquidity and Past Economic Activity: Panel and Fama-MacBeth (1977) Estimates.

The table reports predictive linear regression estimates for the relation between the aggregate quarterly liquidity of stocks headquartered in the state and state-level real economic conditions. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The main independent variables are *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. *State Amihud Illiquidity* and *State Relative Spread* are measured in quarter *t,* while all predictors are measured in quarter $t - 1$. Columns (1) to (5) report panel regression coefficient estimates and t-statistics. All panel specifications include state fixed effects, *State FE*, and specification (5) also includes calendar quarter fixed effects, *Qtr FE*. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. Columns (6) reports time-series mean coefficients of Fama-MacBeth (1977) quarterly state-level cross-sectional regressions. Newey-West (1987) corrected t-statistics are in parentheses. The fit measure is the average cross-sectional adjusted-R^2.

	Panel Estimation					FM
	(1)	(2)	(3)	(4)	(5)	(6)
			State Amihud Illiquidity			
State Econ Act	-0.677			-0.699	-0.153	-0.534
	(-10.31)			(-7.98)	(-2.30)	(-13.95)
US Econ Act		-0.270		-0.070		
		(-5.94)		(-0.97)		
Term Spread			0.226	0.150		
			(6.20)	(4.48)		
Default Spread			-0.224	-0.324		
			(-7.20)	(-8.69)		
N [Avg N]	5,747	5,747	5,747	5,747	5,747	[49]
Adj R^2 [Avg Adj R^2]	10.4%	1.9%	5.0%	16.1%	48.0%	[2.6%]
			State Relative Spread			
State Econ Act	-0.979			-1.104	-0.057	-0.217
	(-15.44)			(-12.93)	(-1.80)	(-16.13)
US Econ Act		-0.466		-0.146		
		(-22.09)		(-2.00)		
Term Spread			0.176	-0.119		
			(14.81)	(-5.40)		
Default Spread			-0.258	-0.318		
			(-17.48)	(-12.34)		
N [Avg N]	5,090	5,090	5,090	5,090	5,090	[48]
Adj R^2 [Avg Adj R^2]	20.6%	4.7%	3.7%	27.5%	88.4%	[4.0%]
Qtr FE	No	No	No	No	Yes	NA
State FE	Yes	Yes	Yes	Yes	Yes	NA

Table 4 – Relation between MSA Aggregate Annual Stock Liquidity and Economic Activity: Panel and Fama-MacBeth (1977) Estimates.

The table reports predictive linear regression estimates for the relation between the aggregate annual liquidity of stocks headquartered in the metro statistical area (MSA) and MSA-level real economic conditions. The dependent variable is one of the state-year liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The annual measures are based on average daily Amihud and Rel Spread within one year to come at annual measures;The main independent variables are *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. *State Amihud Illiquidity* and *State Relative Spread* are measured in year *t,* while all predictors are measured in year $t - 1$. Columns (1) to (5) report panel regression coefficient estimates and t-statistics. All panel specifications include state fixed effects, *State FE*, and specification (5) also includes calendar year fixed effects, *Year FE*. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. Columns (6) reports time-series mean coefficients of Fama-MacBeth (1977) annual state-level cross-sectional regressions. Newey-West (1987) corrected t-statistics are in parentheses. The fit measure is the average cross-sectional adjusted-R^2.

	Panel Estimation					FM
	(1)	(2)	(3)	(4)	(5)	(6)
			MSA Amihud Illiquidity			
MSA Econ Act	-0.742			-0.323	-0.243	-0.326
	(-7.95)			(-3.74)	(-2.86)	(-2.45)
US Econ Act		-0.459		-1.656	0.556	
		(-11.37)		(-19.80)	(3.03)	
Term Spread			0.225	-0.094	-0.060	
			(9.49)	(-3.53)	(-1.10)	
Default Spread			-0.150	-0.263	-0.505	
			(-6.65)	(-7.40)	(-11.95)	
N [Avg N]	4,793	7,170	7,170	4,793	4,793	[208]
Adj R^2 [Avg Adj R^2]	3.6%	2.6%	1.8%	22.9%	37.8%	[8.1%]
			MSA Relative Spread			
MSA Econ Act	-0.414			-0.186	-0.154	-0.195
	(-5.96)			(-2.64)	(-2.13)	(-2.74)
US Econ Act		-0.605		-1.583	0.544	
		(-29.18)		(-45.58)	(5.18)	
Term Spread			0.147	-0.190	-0.052	
			(13.43)	(-14.90)	(-2.07)	
Default Spread			-0.164	-0.229	-0.473	
			(-14.23)	(-16.15)	(-25.64)	
N [Avg N]	4,753	6,339	6,339	4,753	4,753	[207]
Adj R^2 [Avg Adj R^2]	2.6%	8.7%	2.3%	42.3%	79.3%	[9.8%]
Year FE	No	No	No	No	Yes	NA
MSA FE	Yes	Yes	Yes	Yes	Yes	NA

Table 5 – Panel Estimates of the Relation between State Quarterly Liquidity and Economic Activity by Firm Localness.

The table reports panel regression estimates for the relation between the aggregate quarterly liquidity of stocks headquartered in the state and state-level real economic conditions when we segment firms by localness. In Panel A, we segment firms using their equity market capitalization as of the previous quarter-end. *Small* (*Large*) portfolios include firms whose equity market capitalization is below (above) the NYSE median. In Panel B, we segment firms by whether they are part of the S&P 500 index. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The main independent variables are *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. *State Amihud Illiquidity* and *State Relative Spread* are measured in quarter *t,* while all predictors are measured in quarter $t - 1$. Columns (1) to (5) report panel regression coefficient estimates and t-statistics. All panel specifications include state fixed effects, *State FE*, and specification (5) also includes calendar quarter fixed effects, *Qtr FE*. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. The p-values for the test of difference in coefficients between groups are in square brackets.

Panel A – Firm Localness based on Size.

	Small	Large	P-value Difference	Small	Large	P-value Difference
	State Amihud Illiquidity			State Relative Spread		
State Econ Act	-0.781	-0.667	[0.06]	-0.945	-0.847	[0.08]
	(-8.26)	(-7.91)		(-10.38)	(-9.27)	
US Econ Act	-0.259	-0.379	[0.01]	-0.407	-0.583	[0.00]
	(-4.87)	(-5.00)		(-9.02)	(-8.16)	
Term Spread	0.130	-0.264	[0.00]	-0.063	-0.269	[0.00]
	(6.01)	(-6.97)		(-4.21)	(-10.86)	
Default Spread	-0.297	-0.351	[0.21]	-0.371	-0.287	[0.00]
	(-10.11)	(-6.85)		(-18.79)	(-10.25)	
State FE	Yes	Yes		Yes	Yes	
N	5,723	5,002		5,059	4,070	
Adj R^2	26.7%	29.3%		32.8%	33.2%	

Panel B – Firm Localness based on S&P500 Affiliation

	Non-S&P500	S&P500	P-value Difference	Non-S&P500	S&P500	P-value Difference
	State Amihud Illiquidity			State Relative Spread		
State Econ Act	-0.921	-0.766	[0.02]	-0.947	-0.825	[0.04]
	(-8.56)	(-6.63)		(-8.74)	(-7.81)	
US Econ Act	-0.333	-0.202	[0.00]	-0.344	-0.833	[0.00]
	(-3.76)	(-2.85)		(-6.23)	(-7.39)	
Term Spread	0.158	-0.297	[0.00]	-0.074	-0.336	[0.00]
	(4.86)	(-8.22)		(-4.16)	(-8.34)	
Default Spread	-0.305	-0.240	[0.17]	-0.361	-0.289	[0.01]
	(-7.94)	(-4.42)		(-14.80)	(-7.23)	
State FE	Yes	Yes		Yes	Yes	
N	5,736	4,444		5,083	3,096	
Adj R^2	24.6%	30.0%		31.1%	36.9%	

Table 6 – Panel Estimates of the Relation between State Quarterly Liquidity and Economic Activity Controlling for Exogenous Variation in Liquidity: Urban vs. Rural and Post-Decimalization.

The table reports expanded predictive panel linear regression estimates. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The main independent variables are lagged *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. All panel specifications include state fixed effects, *State FE*. The additional control variables are based on two dummy variables. The first one is the rural dummy variable that takes the value of 1 for states where the percentage of state population living in rural areas above the median percentage across all states. The second one is the PreDecimal dummy variable that takes the value of 1 for all quarters before 2001. The PreDecimal variable captures the period before the implementation of decimal trading. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. Newey-West (1987) corrected t-statistics are in parentheses.

	State Amihud Illiquidity			State Relative Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
Rural Dummy	0.531	0.474	0.394	0.222	0.213	0.293
	(15.65)	(14.06)	(5.60)	(15.56)	(15.05)	(9.90)
PreDecimal Dummy			0.039			1.012
			(0.18)			(10.55)
Rural×PreDecimal			0.068			0.042
			(0.85)			(1.34)
State Econ Act	-0.308	-0.177	-0.269	-0.165	-0.123	-0.130
	(-9.74)	(-5.74)	(-5.50)	(-12.18)	(-9.09)	(-6.34)
State Econ×Rural		-0.721	-0.347		-0.252	-0.325
		(-12.22)	(-2.86)		(-9.73)	(-6.11)
State Econ×PreDecimal			0.078			0.034
			(1.28)			(1.24)
State Econ×Rural×PreDecimal			-0.544			-0.260
			(-3.88)			(-1.71)
US Econ Act	0.101	0.117	0.111	-0.072	-0.067	-0.114
	(1.12)	(1.30)	(1.23)	(-1.98)	(-1.85)	(-3.18)
Term Spread	-0.024	-0.043	-0.039	-0.114	-0.119	-0.009
	(-0.48)	(-0.88)	(-0.78)	(-4.18)	(-4.41)	(-0.32)
Default Spread	0.046	0.033	0.031	0.007	0.005	0.020
	(1.07)	(0.76)	(0.72)	(0.34)	(0.24)	(0.92)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,747	5,747	5,747	5,090	5,090	5,090
Adj R^2	32.3%	33.8%	33.9%	83.0%	83.2%	83.7%

Table 7 – Relation between State Quarterly Liquidity and Economic Activity Controlling for State Portfolio Firm Size, Stock Returns, and Lagged Liquidity.

The table reports expanded predictive panel linear regression estimates. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The main independent variables are lagged *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. All panel specifications include state fixed effects, *State FE*. The additional control variables are the lagged liquidity measure and lagged mean market capitalization of the state portfolio, as well as its lagged, contemporaneous, and one-quarter-ahead value-weighted stock return. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. Newey-West (1987) corrected t-statistics are in parentheses.

	State Amihud Illiquidity				State Relative Spread			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State Amihud_{t-1}	0.787			0.686				
	(39.36)			(21.96)				
State Relative Spread_{t-1}					0.833			0.814
					(35.57)			(31.09)
State Return Index_{t-1}		-0.638		-0.811		-0.580		-0.277
		(-4.46)		(-8.78)		(-8.66)		(-11.06)
State Return Index_{t}		-1.152		-1.054		-0.538		-0.559
		(-8.03)		(-13.69)		(-9.85)		(-16.13)
State Return Index_{t+1}		0.621		0.289		0.169		0.200
		(5.32)		(4.00)		(3.01)		(5.13)
State Market Cap			-1.337	-0.427			-0.236	-0.045
			(-18.08)	(-9.50)			(-3.65)	(-2.74)
State Econ Act	-0.048	-0.143	-0.048	-0.037	-0.016	-0.053	-0.042	-0.009
	(-2.72)	(-2.16)	(-1.98)	(-2.04)	(-2.18)	(-2.07)	(-2.05)	(-2.00)
US Econ Act	0.070	0.126	0.030	0.057	-0.012	-0.034	-0.099	0.008
	(1.94)	(3.12)	(0.93)	(1.59)	(-0.81)	(-2.05)	(-6.50)	(0.51)
Term Spread	0.024	0.048	0.040	0.055	0.001	-0.122	-0.098	-0.020
	(1.36)	(2.08)	(2.55)	(2.75)	(0.11)	(-8.05)	(-6.86)	(-1.49)
Default Spread	-0.082	0.082	-0.013	-0.047	0.028	0.010	0.005	0.020
	(-5.55)	(4.45)	(-1.00)	(-2.88)	(3.86)	(1.25)	(0.52)	(3.10)
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5,741	5,653	5,647	5,647	5,041	5,040	4,991	4,991
Adj R^2	78.3%	51.0%	64.1%	81.2%	95.7%	89.3%	88.9%	96.2%

Table 8 – Relation between State Quarterly Liquidity and Economic Activity, Conditional on Local Capital Market Conditions.

The table reports predictive linear regression estimates for the relation between the aggregate liquidity of stocks headquartered in the state and state-level real economic conditions, conditional on state-level funding constraints, information environment opacity, and local institutional ownership and relative trading. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. In addition to *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread,* the main independent variables also comprise *State Fund Constraint (SF)*, *State Opacity (SO)*, *State Local IO (SL)*, and *State Rel Local Trade (SR)*. The latter four variables are state-quarter indicators. *State Amihud Illiquidity* and *State Relative Spread* are measured in quarter *t,* while all real macroeconomic predictors are measured in quarter $t-1$. Other US-level predictors (i.e., term spread and default spread) are measured in quarter $t-1$. *State Fund Const*, *Local IO*, and *Rel Local Trading* are measured in quarter *t,* while the *State Opac* is measured in quarter $t-1$. Columns (1-6) report panel regression coefficient estimates and t-statistics. All panel specifications include state fixed effects, *State FE*. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. See Appendix for further details on definitions of variables.

Table 8 – continued…

	Panel Estimates					
	(1)	(2)	(3)	(4)	(5)	(6)
	State Amihud Illiquidity					
State Econ Act	0.003	-0.069	0.008	0.016	0.064	0.109
	(0.01)	(-0.57)	(0.07)	(0.16)	(0.41)	(0.94)
State Fund Constraint (SF)	0.182				0.081	
	(2.42)				(1.31)	
State Opacity (SO)		0.417			0.588	0.242
		(3.00)			(4.00)	(1.78)
State Local IO (SL)			0.390		0.211	0.470
			(3.22)		(1.51)	(4.45)
State Rel Local Trade (SR)				-0.056	-0.063	-0.071
				(-1.11)	(-1.87)	(-1.47)
State Econ Act×SF	-0.477				-0.202	
	(-8.73)				(-3.03)	
State Econ Act×SO		-0.400			-0.145	-0.035
		(-2.72)			(-1.18)	(-0.24)
State Econ Act×SL			-0.563		-0.236	-0.567
			(-5.37)		(-1.43)	(-4.06)
State Econ Act×SR				-0.628	-0.166	-0.513
				(-5.50)	(-1.60)	(-4.37)
N [Avg N]	1,053	4,502	5,747	5,703	949	4,502
Adj R^2 [Avg R^2]	18.9%	19.2%	13.8%	11.3%	37.7%	23.7%
	State Relative Spread					
State Econ Act	0.321	0.101	0.256	0.217	0.240	0.329
	(1.09)	(0.76)	(1.53)	(1.49)	(1.21)	(1.37)
State Fund Constraint (SF)	0.404				0.182	
	(4.00)				(3.49)	
State Opacity (SO)		1.254			1.645	1.046
		(8.43)			(11.80)	(7.31)
State Local IO (SL)			0.779		0.207	0.516
			(5.01)		(1.31)	(5.35)
State Rel Local Trade (SR)				-0.020	0.078	0.010
				(-0.32)	(1.10)	(0.24)
State Econ Act×SF	-0.798				-0.205	
	(-4.37)				(-2.07)	
State Econ Act×SO		-0.554			-0.294	-0.093
		(-2.76)			(-1.49)	(-0.69)
State Econ Act×SL			-1.035		-0.344	-0.730
			(-6.38)		(-2.06)	(-5.22)
State Econ Act×SR				-0.988	-0.127	-0.639
				(-6.34)	(-1.89)	(-4.90)
N [Avg N]	1,025	4,472	5,090	5,090	949	4,472
Adj R^2 [Avg R^2]	19.9%	42.6%	25.3%	15.3%	67.7%	48.9%
US Econ Act	Yes	Yes	Yes	Yes	Yes	Yes
US Econ Act×Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Term & Default Spreads	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes

APPENDIX

Definition of Variables

Variable	*Short Name*	Definition	Data Source
State (Metro Statistical Area) Amihud Illiquidity	*State (MSA) Amihud*	Natural logarithm of the value-weighted state portfolio Amihud liquidity measure of firms headquartered in the state (MSA). A firm Amihud liquidity measure is the quarterly mean daily ratio of its absolute stock return to its dollar volume.	CRSP
State (Metro Statistical Area) Portfolio Relative Spread	*State (MSA) Relative Spread*	Natural logarithm of the value-weighted state portfolio relative spread of firms headquartered in the state (MSA). The firm relative spread is the quarterly mean difference between its daily closing ask and bid prices divided by the midpoint of the bid-ask spread.	CRSP
State (Metro Statistical Area) Income Growth	*State (MSA) Inc Gr*	State-level (MSA-level) labor income quarterly growth.	Bureau of Economic Analysis (BEA)
State (Metro Statistical Area) Relative Unemployment	*State (MSA) Rel Unemp*	It is the ratio of current quarter state (MSA) unemployment rate to the moving average over the prior16 quarters.	Bureau of Labor Statistics (BLS)
State Housing Collateral Ratio	*State Hy*	Computed using the Lustig and van Nieuwerburgh (2005) method using state-level data.	
Metro Statistical Area Housing Price Growth	*State Hy*	Growth in price index of residential real estate in the MSA.	Federal Housing Finance Agency (FHFA)
State (Metro Statistical Area) Economic Activity Index	*State (MSA) Econ Act*	Computed for each state-quarter (MSA-quarter) by adding the standardized values of state (MSA) income growth and hy, and subtracting the standardized value of relative unemployment, and dividing by three.	
US Income Growth	*US Inc Gr*	US labor income quarterly growth.	Bureau of Economic Analysis (BEA)
US Relative Unemployment	*US Rel Unemp*	It is the ratio of current quarter US unemployment rate to the moving average over the prior16 quarters.	Bureau of Labor Statistics (BLS)
US Housing Collateral Ratio	*US hy*	From Stijn van Nieuwerburgh's web site.	
US Economic Activity Index	*US Econ Act*	Computed for each quarter by adding the standardized values of U.S. income growth and hy, and subtracting the standardized value of U.S. relative unemployment, and dividing all by three.	
Ten-Year - One-Year Gov Bond	*Term Spread*	Ten-year government bond yield minus one-year government bond yield, from Board of Governors of the Federal Reserve System.	Fed
Baa Corp Bond - One-Year Gov Bond	*Default Spread*	Baa-rated corporate bond yield minus ten-year government bond yield, from Board of Governors of the Federal Reserve System.	Fed
State Quarterly Stock Return	*State Return Index*	The value-weighted portfolio quarterly return of firms headquartered in the state.	CRSP
State Market Capitalization	*State Market Cap*	Mean of log market capitalization of firms headquartered in the state at previous quarter-end.	CRSP
State Funding Constraint	*State Fund Const*	First, we compute value weights daily returns of portfolio of stocks headquartered in the state that have SIC code equal to 6211 (investment banks; securities brokers and dealers) and listed on NYSE. Then, we compute the residuals from a one-factor market model regression of this portfolio returns. The state funding constraint indicator is equal to 1 when the state mean daily residual is negative (capital constrained) and 0 (unconstrained) otherwise.	CRSP

Variable	*Short Name*	Definition	Data Source
State Opacity	*State Opac*	Each quarter, we sort stocks into deciles by dollar volume (high to low), analyst following (high to low), and analyst forecast error (low to high). Volume is the quarterly aggregate dollar volume. Analyst following is the number of analysts following the firm in the quarter. Analyst forecast error is the absolute difference between the mean analysts' earnings forecast and the actual firm earnings in the quarter divided by the firm's stock price. We cumulate the three rankings and compute the value-weighted mean of the cumulative ranking for each state-quarter. The state opacity indicator is equal to 1 when the state ranking is above the sample median during the quarter and 0 otherwise. 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.	CRSP, IBES
State Local Institutional Ownership	*Local IO*	Local institutional ownership is the fraction of shares outstanding of firms headquartered in the state held by institutional investors headquartered in the state. The local IO indicator is equal to 1 when the local IO for the state is above the sample median during the quarter and 0 otherwise.	13(f) Thomson Reuters, Compact Disclosure
State Local minus Non-Local Trading	*Rel Local Trading*	The Rel Local Trading indicator is equal to 1 when the difference between changes in value of local and non-local IO for the state is in the top or bottom quintile during the quarter and 0 otherwise.	13(f) Thomson Reuters, Compact Disclosure
State Rural population	*Rural*	Indicator variable equal to 1 when the fraction of state population living in rural areas is above the sample median during the quarter and 0 otherwise.	Census
Pre-decimalization Period	*PreDecimal*	Indicator variable equal to 1 for years prior to 2001 and 0 otherwise.	

Internet Appendix

Local Business Cycles and Local Liquidity*

Table A1 – Relation between State Quarterly Liquidity and Components of Economic Activity Index.

The table reports predictive linear regression estimates for the relation between the aggregate liquidity of stocks headquartered in the state and the components of the state-level economic activity index. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The main independent variables are *State Inc Gr*, *State Rel Unemp*, and *State hy*. The panel specifications also include *US Inc Gr*, *US Rel Unemp*, *US hy*, *Term Spread*, and *Default Spread*, as well as state fixed effects, *State FE*. *State Amihud Illiquidity* and *State Relative Spread* are measured in quarter *t,* while all real macroeconomic predictors are measured in quarter $t - 1$. Other US-level predictors (i.e., term spread and default spread) are measured in quarter $t - 1$. Columns (1) and (3) report panel regression coefficient estimates and robust t-statistics in parentheses adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. Columns (2) and (4) report time-series mean coefficients of Fama-MacBeth (1977) quarterly state-level cross-sectional regressions and Newey-West (1987) t-statistics in parentheses. The fit measure is the average cross-sectional adjusted-R^2. See Appendix for details on definitions of variables.

	State Amihud Illiquidity		*State Relative Spread*	
	Panel	*FM*	*Panel*	*FM*
	(1)	(2)	(3	(4)
State Inc Gr	-0.249	-0.392	-0.388	-0.120
	(-4.87)	(-15.64)	(-4.21)	(-12.35)
State Rel Unemp	0.098	0.087	0.052	0.005
	(2.03)	(3.01)	(0.97)	(0.33)
State hy	-0.357	-0.078	-0.488	-0.074
	(-6.26)	(-2.84)	(-14.19)	(-4.47)
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)	
Term Spread	0.235		0.113	
	(6.05)		(4.09)	
Default Spread	-0.144		-0.092	
	(-4.51)		(-3.76)	
State FE	Yes	NA	Yes	NA
N [Avg N]	5,747	[49]	5,090	[48]
Adj R^2 [Avg R^2]	24.2%	[4.9%]	52.0%	[9.0%]

Table A2 – Fama-MacBeth (1977) Estimates of the Relation between State Quarterly Liquidity and Economic Activity by Sub-Periods.

This table reports predictive linear regression estimates for the relation between the aggregate liquidity of stocks headquartered in the state and state-level real economic conditions for six sub-periods, from 1980 through 2008. The dependent variable is the state-quarter average liquidity measure based on *State Amihud Illiquidity* or *State Relative Spread*. The independent variable is the lagged state economic activity index, *State Econ Act*. The reported coefficients for each sub-period are time-series means of Fama-MacBeth (1977) quarterly state-level cross-sectional regressions estimates. Newey-West (1987) corrected t-statistics are in parentheses. The fit measure is the average cross-sectional adjusted-R^2. See Table 1 for further details on definitions of variables.

		State	
Time Period		*Amihud Illiquidity*	*Relative Spread*
1980:Q1 to 1984:Q4	State Econ Act	-0.948	-0.282
		(-9.32)	(-6.16)
1985:Q1 to 1989:Q4	State Econ Act	-1.159	-0.168
		(-19.91)	(-4.61)
1990:Q1 to 1994:Q4	State Econ Act	-0.349	-0.250
		(-5.32)	(-7.68)
1995:Q1 to 1999:Q4	State Econ Act	-0.155	-0.174
		(-3.15)	(-6.85)
2000:Q1 to 2004:Q4	State Econ Act	-0.329	-0.175
		(-8.64)	(-5.47)
2005:Q1 to 2008:Q4	State Econ Act	-0.403	-0.235
		(-8.30)	(-17.82)

Table A3 – Relation between State Quarterly Liquidity and Economic Activity Using Alternative Liquidity Measures.

The table reports regression estimates for the relation between the aggregate liquidity of stocks headquartered in the state and state-level real economic conditions. The dependent variable is one of the alternative state-quarter liquidity measures, *State Corwin-Schultz Spread*, *State LOT*, or *State Turnover*. *State Corwin-Schultz Spread* is the natural logarithm of the value-weighted mean Corwin-Schultz (2012) spread of firms headquartered in the state. For each stock-quarter, the firm spread is the mean daily high-low spread based on equations (14) and (18) in Corwin and Schultz (2012). Negative daily spread estimates are set to zero. *State LOT* (1999) is the natural logarithm of the value-weighted mean LOT of firms headquartered in the state. For each stock-quarter, the firm LOT is the ratio of the number of zero daily returns to the total number of daily returns within a quarter for the stock. *State Turnover* is the natural logarithm of the value-weighted mean turnover of firms headquartered in the state. For each stock-quarter, the firm turnover is the ratio of quarter aggregate trading volume divided by the number of shares outstanding at the beginning of the quarter. The main independent variables are *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. *State Amihud Ind-Adj Illiquidity* and *State Relative Ind-Adj Spread* are measured in quarter t, while all predictors are measured in quarter $t-1$.

Panel A – Summary statistics

This panel reports summary statistics of the alternative state-quarter liquidity measures, *State Corwin-Schultz Spread*, *State LOT*, and *State Turnover*.

Variable	Mean	St. Dev.	5%	25%	Median	75%	95%
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 and Fama-MacBeth (1977) Regression Estimates.

Columns (1), (3) and (5) report panel regression coefficient estimates and t-statistics in parentheses adjusted for heteroskedasticity and serial correlation. All panel specifications include state fixed effects, *State FE*. The fit measure is the within-panel adjusted-R^2. Columns (2), (4), and (6) report time-series mean coefficients of Fama-MacBeth (1977) quarterly state-level cross-sectional regressions and Newey-West (1987) t-statistics in parentheses. The fit measure is the average cross-sectional adjusted-R^2.

	State CS Spread		*State LOT*		*State Turnover*	
	Panel	*FM*	*Panel*	*FM*	*Panel*	*FM*
	(1)	(2)	(3)	(4)	(5)	(6)
State Econ Act	-0.026	-0.184	-1.064	-0.208	0.521	0.177
	(-2.23)	(-8.21)	(-11.98)	(-10.96)	(9.22)	(11.12)
US Econ Act	-0.054		-0.249		0.127	
	(-2.71)		(-5.54)		(4.34)	
Term Spread	-0.031		-0.105		0.071	
	(-5.03)		(-6.53)		(6.55)	
Default Spread	0.061		-0.572		0.190	
	(5.83)		(-20.24)		(10.66)	
State FE	Yes	NA	Yes	NA	Yes	NA
N [Avg N]	5,789	[45]	5,785	[50]	5,747	[49]
Adj R^2[Avg Adj R^2]	4.7%	[2.3%]	33.3%	[3.6%]	26.3%	[1.8%]

Table A4 – Relation between State Quarterly Liquidity and Economic Activity Using Industry-Adjusted Liquidity.

The table reports predictive linear regression estimates for the relation between the aggregate industry-adjusted liquidity of stocks headquartered in the state and state-level real economic conditions. The dependent variable is one of the industry-adjusted state-quarter liquidity measures, *State Amihud Ind-Adj Illiquidity* or *State Relative Ind-Adj Spread*. Industry-adjusted state-quarter liquidity is the value-weighted mean industry-adjusted liquidity of firms headquartered in the state during the quarter. Firm industry-adjusted liquidity is the natural logarithm of the stock-quarter liquidity minus the mean of the same variable across firms with the same 2-digit SIC code. The main independent variables are *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. *State Amihud Ind-Adj Illiquidity* and *State Relative Ind-Adj Spread* are measured in quarter t, while all predictors are measured in quarter $t - 1$.

Panel A: Summary Statistics of State-Quarter Industry-Adjusted Liquidity.

This panel reports mean, median, and standard deviation of the state-quarter industry-adjusted liquidity measures, *State Amihud Ind-Adj Illiquidity* or *State Relative Ind-Adj Spread*.

	Mean	St. Dev.	Median
State Ind-Adj Amihud Illiquidity	-3.583	2.036	-3.767
State Ind-Adj Relative Spread	-0.873	0.555	-0.898

Panel B: Panel and Fama-MacBeth (1977) Regression Estimates.

Columns (1) and (3) report panel regression coefficient estimates and t-statistics in parentheses adjusted for heteroskedasticity and serial correlation. All panel specifications include state fixed effects, *State FE*. The fit measure is the within-panel adjusted-R^2. Columns (2) and (4) report time-series mean coefficients of Fama-MacBeth (1977) quarterly state-level cross-sectional regressions and Newey-West (1987) t-statistics in parentheses. The fit measure is the average cross-sectional adjusted-R^2.

	State IndAdj Amihud Illiquidity		*State IndAdj Relative Spread*	
	Panel	*FM*	*Panel*	*FM*
	(1)	(2)	(3)	(4)
State Econ Act	-0.344	-1.077	-0.308	-0.225
	(-3.02)	(-12.24)	(-9.66)	(-15.43)
US Econ Act	-0.265		0.117	
	(-3.69)		(3.89)	
Term Spread	-0.410		-0.088	
	(-13.37)		(-5.52)	
Default Spread	0.061		0.027	
	(1.49)		(1.46)	
State FE	Yes	NA	Yes	NA
N [Avg N]	5,746	[50]	5,083	[48]
Adj R^2	13.6%	[6.6%]	9.2%	[4.6%]

Table A5 – Relation between State Quarterly Liquidity and Economic Activity: Panel Estimates Excluding Large States and One-firm States.

The table reports panel regression estimates for the relation between the aggregate liquidity of stocks headquartered in the state and the state economic activity excluding the states of Arkansas, California, New York, Texas, and Washington. The dependent variable is one of the state-quarter liquidity measures, *State Amihud Illiquidity* or *State Relative Spread*. The main independent variables are *State Inc Gr*, *State Rel Unemp*, *State hy*, and *State Econ Act*. All specifications also include *US Inc Gr*, *US Rel Unemp*, *US hy*, *US Econ Act, Term Spread*, and *Default Spread*, as well as state fixed effects, *State FE*. *State Amihud Illiquidity* and *State Relative Spread* are measured in quarter *t,* while all real predictors are measured in quarter *t – 2*, and term and default spreads are measured in quarter *t – 1*. Robust t-statistics in parentheses adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2. See Appendix for details on definitions of variables.

	State Amihud Illiquidity		*State Relative Spread*	
	(1)	(2)	(3)	(4)
State Inc Gr	-0.475		-0.924	
	(-3.48)		(-4.44)	
State Rel Unemp	0.074		0.007	
	(1.41)		(0.13)	
State hy	-0.324		-0.447	
	(-5.17)		(-11.02)	
State Econ Act		-0.684		-1.172
		(-6.13)		(-12.28)
US Inc Gr	-0.151		-0.036	
	(-6.01)		(-2.16)	
US Rel Unemp	-0.176		-0.183	
	(-3.06)		(-3.14)	
US hy	-0.175		-0.359	
	(-3.58)		(-9.93)	
US Econ Act		-0.093		-0.158
		(-1.13)		(-1.95)
Term Spread	0.221	0.145	0.079	-0.112
	(5.25)	(3.98)	(2.36)	(-4.78)
Default Spread	-0.140	-0.316	-0.107	-0.320
	(-4.17)	(-7.76)	(-4.22)	(-11.18)
State FE	Yes	Yes	Yes	Yes
N	5,178	5,178	4,576	4,576
Adj R^2	22.5%	13.8%	54.6%	26.1%

Table A6 – Relation between U.S. Census Division Quarterly Liquidity and Economic Activity: Panel Estimates.

This table reports predictive linear regression estimates for the relation between the aggregate liquidity of stocks headquartered in each of the four U.S. Census Divisions and region-level real economic conditions. The dependent variable is one of the division-quarter liquidity measures, *Region Amihud Illiquidity* or *Region Relative Spread*. The main independent variable is *Region Econ Act*. Other independent variables are *US Econ Act*, *Term Spread*, and *Default Spread*. *Region Amihud Illiquidity* and *Region Relative Spread* are measured in quarter t, while all predictors are measured in quarter $t-1$. All specifications include division fixed effects, *Region FE*. Robust t-statistics in parentheses are adjusted for heteroskedasticity and serial correlation. The fit measure is the within-panel adjusted-R^2.

	(1)	(2)	(3)
	Region Amihud Illiquidity		
Region Econ Act	-0.316	-0.304	-0.244
	(-0.36)	(-0.37)	(-0.42)
N	460	460	460
Adj R^2	0.5%	2.4%	22.1%
	Region Relative Spread		
Region Econ Act	0.082	0.128	0.147
	(0.07)	(0.12)	(0.15)
N	420	420	420
Adj R^2	-0.2%	3.5%	9.1%
US Econ Act	No	Yes	Yes
Term Spread	No	No	Yes
Default Spread	No	No	Yes
Region FE	Yes	Yes	Yes

Table A7 – Relation between MSA Annual Liquidity and Economic Activity Using Alternative Liquidity Measures.

The table reports regression estimates for the relation between the aggregate liquidity of stocks headquartered in the state and state-level real economic conditions. The dependent variable is one of the alternative state-year liquidity measures, *State Corwin-Schultz Spread*, *State LOT*, or *State Turnover*. *State Corwin-Schultz Spread* is the natural logarithm of the value-weighted mean Corwin-Schultz (2012) spread of firms headquartered in the state. For each stock-year, the firm spread is the mean daily high-low spread based on equations (14) and (18) in Corwin and Schultz (2012). Negative daily spread estimates are set to zero. *State LOT* (1999) is the natural logarithm of the value-weighted mean LOT of firms headquartered in the state. For each stock-year, the firm LOT is the ratio of the number of zero daily returns to the total number of daily returns within a year for the stock. *State Turnover* is the natural logarithm of the value-weighted mean turnover of firms headquartered in the state. For each stock-year, the firm turnover is the ratio of quarter aggregate trading volume divided by the number of shares outstanding at the beginning of the year. The main independent variables are *State Econ Act*, *US Econ Act*, *Term Spread*, and *Default Spread*. *State Amihud Ind-Adj Illiquidity* and *State Relative Ind-Adj Spread* are measured in year t, while all predictors are measured in year $t-1$. Columns (1), (3) and (5) report panel regression coefficient estimates and t-statistics in parentheses adjusted for heteroskedasticity and serial correlation. All panel specifications include state fixed effects, *State FE*. The fit measure is the within-panel adjusted-R^2. Columns (2), (4), and (6) report time-series mean coefficients of Fama-MacBeth (1977) yearly state-level cross-sectional regressions and Newey-West (1987) t-statistics in parentheses. The fit measure is the average cross-sectional adjusted-R^2.

	MSA CS Spread		*MSA LOT*		*MSA Turnover*	
	Panel	*FM*	*Panel*	*FM*	*Panel*	*FM*
	(1)	(2)	(3)	(4)	(5)	(6)
MSA Econ Act	-0.113	-0.185	-0.113	-0.340	0.145	0.168
	(-3.94)	(-2.28)	(-2.14)	(-3.10)	(2.18)	(2.64)
US Econ Act	-0.397		-1.306		0.452	
	(-16.96)		(-42.91)		(12.48)	
Term Spread	-0.073		0.043		-0.058	
	(-7.87)		(3.18)		(-4.72)	
Default Spread	-0.034		-0.543		0.094	
	(-2.74)		(-34.51)		(5.35)	
MSA FE	Yes	NA	Yes	NA	Yes	NA
N [Avg N]	4,783	[208]	4,771	[207]	4,793	[208]
Adj R^2[Avg Adj R^2]	13.3%	[6.0%]	42.1%	[9.5%]	10.8%	[2.1%]

Table A8 – Relation between State Quarterly Liquidity and Economic Activity by Firm Localness Controlling for State Portfolio Firm Size and Stock Returns-.

The table reports predictive panel linear regression estimates similar to Table 5 in the main text when the model is expanded to include additional control variables: lagged liquidity and lagged mean market capitalization of the state portfolio, as well as its lagged, contemporaneous, and one-quarter-ahead value-weighted stock return.

Panel A – Firm Localness based on Size.

	Small	Large	P-value Difference	Small	Large	P-value Difference
	State Amihud Illiquidity			State Relative Spread		
State Econ Act	-0.532	-0.495	[0.11]	-0.565	-0.547	[0.16]
	(-4.13)	(-3.49)		(-3.69)	(-3.51)	
US Econ Act	-0.187	-0.167	[0.07]	-0.390	-0.446	[0.03]
	(-4.23)	(-2.52)		(-11.29)	(-8.42)	
Term Spread	0.230	-0.107	[0.00]	-0.068	-0.237	[0.00]
	(10.68)	(-2.35)		(-4.24)	(-8.47)	
Default Spread	-0.155	-0.121	[0.94]	-0.196	-0.077	[0.00]
	(-5.22)	(-2.82)		(-9.24)	(-2.68)	
State Market Cap	-0.925	-1.734	[0.00]	-1.075	-1.336	[0.00]
	(-10.74)	(-12.70)		(-16.90)	(-14.29)	
State Return Index$_{t-1}$	-1.330	0.487	[0.00]	-0.197	-0.082	[0.70]
	(-9.34)	(4.69)		(-3.51)	(-0.99)	
State Return Index$_{t}$	-2.026	-1.836	[0.07]	-1.058	-1.245	[0.12]
	(-14.25)	(-14.77)		(-11.79)	(-14.85)	
State Return Index$_{t+1}$	0.227	0.303	[0.00]	-0.072	-0.168	[0.53]
	(1.47)	(2.38)		(-1.23)	(-2.03)	
State FE	Yes	Yes		Yes	Yes	
N	5,723	5,002		5,059	4,070	
Adj R^2	42.2%	62.0%		70.5%	66.8%	

Table A8 – continued…

Panel B – Firm Localness based on S&P500 Affiliation

	Non-S&P500	S&P500	P-value Difference	Non-S&P500	S&P500	P-value Difference
	State Amihud Illiquidity			State Relative Spread		
State Econ Act	-0.328	-0.276	[0.09]	-0.247	-0.208	[0.12]
	(-2.14)	(-1.99)		(-3.00)	(-1.88)	
US Econ Act	-0.124	-0.004	[0.06]	-0.321	-0.511	[0.00]
	(-2.76)	(-0.07)		(-8.36)	(-7.15)	
Term Spread	0.264	-0.124	[0.00]	-0.079	-0.282	[0.00]
	(9.69)	(-2.69)		(-5.14)	(-7.98)	
Default Spread	-0.152	0.013	[0.00]	-0.168	-0.046	[0.00]
	(-5.94)	(0.31)		(-8.33)	(-1.22)	
State Market Cap	-1.033	-1.933	[0.00]	-1.203	-1.444	[0.00]
	(-18.01)	(-15.74)		(-18.72)	(-11.46)	
State Return Index$_{t-1}$	-1.306	0.447	[0.00]	-0.192	0.085	[0.14]
	(-10.15)	(4.00)		(-3.80)	(0.82)	
State Return Index$_{t}$	-1.616	-1.271	[0.01]	-1.003	-1.096	[0.76]
	(-17.47)	(-11.99)		(-13.33)	(-9.71)	
State Return Index$_{t+1}$	-0.421	0.202	[0.00]	-0.169	-0.212	[0.35]
	(-3.99)	(1.75)		(-2.65)	(-1.95)	
State FE	Yes	Yes		Yes	Yes	
N	5,736	4,444		5,083	3,096	
Adj R^2	46.8%	67.0%		74.3%	68.0%	

Table A9 – Relation between State Quarterly Liquidity and Economic Activity Controlling for Exogenous Variation in Liquidity, State Portfolio Firm Size and Stock Returns.

The table reports predictive panel linear regression estimates similar to Table 6 in the main text when the model is expanded to include additional control variables: lagged liquidity and lagged mean market capitalization of the state portfolio, as well as its lagged, contemporaneous, and one-quarter-ahead value-weighted stock return.

	State Amihud Illiquidity			State Relative Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
Rural Dummy	0.363	0.361	0.283	0.139	0.138	0.270
	(16.49)	(16.27)	(5.84)	(11.47)	(11.44)	(11.01)
PreDecimal Dummy			0.165			0.910
			(1.17)			(9.60)
Rural×PreDecimal			0.194			0.176
			(2.16)			(6.20)
State Econ Act	-0.122	-0.117	-0.153	-0.132	-0.127	-0.099
	(-6.09)	(-5.76)	(-4.67)	(-11.78)	(-11.16)	(-6.03)
State Econ×Rural		-0.227	-0.192		-0.129	-0.186
		(-2.61)	(-2.01)		(-3.26)	(-4.37)
State Econ×PreDecimal			0.052			0.025
			(1.25)			(1.11)
State Econ×Rural×PreDecimal			-0.164			-0.182
			(-1.62)			(-3.51)
US Econ Act	0.009	0.010	0.015	-0.110	-0.109	-0.144
	(0.15)	(0.16)	(0.26)	(-3.50)	(-3.48)	(-4.66)
Term Spread	0.057	0.056	0.049	-0.128	-0.129	-0.032
	(1.71)	(1.68)	(1.42)	(-5.33)	(-5.35)	(-1.35)
Default Spread	0.034	0.034	0.034	0.002	0.002	0.016
	(1.22)	(1.20)	(1.21)	(0.12)	(0.11)	(0.82)
State Market Cap	-1.389	-1.387	-1.386	-0.357	-0.355	-0.356
	(-71.96)	(-70.72)	(-70.58)	(-32.96)	(-32.71)	(-33.33)
State Return Index$_{t-1}$	-0.590	-0.591	-0.593	-0.387	-0.388	-0.325
	(-5.12)	(-5.13)	(-5.14)	(-5.67)	(-5.67)	(-4.83)
State Return Index$_{t}$	-1.178	-1.177	-1.178	-0.798	-0.797	-0.758
	(-10.34)	(-10.33)	(-10.35)	(-11.39)	(-11.36)	(-11.06)
State Return Index$_{t+1}$	0.225	0.225	0.230	0.036	0.036	-0.022
	(1.98)	(1.98)	(2.02)	(0.51)	(0.51)	(-0.32)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,747	5,747	5,747	5,090	5,090	5,090
Adj R^2	71.7%	71.7%	71.7%	87.3%	87.3%	87.7%

Table A10 – Relation between State Quarterly Liquidity and Economic Activity, Conditional on Local Capital Market Conditions and Controlling for State Portfolio Firm Size, Stock Returns, and Lagged Liquidity.

The table reports predictive panel linear regression estimates similar to Table 8 in the main text when the model is expanded to include additional control variables: lagged liquidity and lagged mean market capitalization of the state portfolio, as well as its lagged, contemporaneous, and one-quarter-ahead value-weighted stock return.

	Panel Estimates			
	State Amihud Illiquidity		*State Relative Spread*	
	(1)	(2)	(3)	(4)
State Econ Act	-0.100	-0.138	0.090	0.099
	(-0.98)	(-1.99)	(0.51)	(1.00)
State Fund Constraint (SF)	0.009		0.117	
	(0.20)		(2.73)	
State Opacity (SO)	0.414	0.256	1.420	0.988
	(4.99)	(3.37)	(11.65)	(10.97)
State Local IO (SL)	0.095	0.075	0.098	0.165
	(1.10)	(0.92)	(0.90)	(2.34)
State Rel Local Trade (SR)	-0.051	-0.049	0.016	0.027
	(-1.79)	(-1.55)	(0.53)	(0.98)
State Econ Act×SF	-0.103		-0.124	
	(-2.64)		(-1.87)	
State Econ Act×SO	-0.073	-0.165	-0.167	-0.062
	(-1.00)	(-1.85)	(-1.12)	(-0.64)
State Econ Act×SL	-0.091	-0.152	-0.201	-0.346
	(-1.98)	(-2.14)	(-2.02)	(-2.52)
State Econ Act×SR	-0.183	-0.154	-0.120	-0.290
	(-2.01)	(-2.57)	(-1.99)	(-3.81)
State Market Cap	-0.699	-0.823	-0.547	-0.718
	(-10.47)	(-15.28)	(-5.44)	(-14.49)
State Return Index$_{t-1}$	-1.448	-1.148	-0.072	-0.164
	(-8.57)	(-10.00)	(-0.46)	(-2.49)
State Return Index$_{t}$	0.261	3.095	24.593	1.603
	(0.02)	(1.45)	(1.25)	(1.39)
State Return Index$_{t+1}$	-0.081	-2.978	-24.564	-1.571
	(-0.01)	(-1.40)	(-1.25)	(-1.38)
N [Avg N]	949	4,502	949	4,472
Adj R^2 [Avg R^2]	63.4%	56.2%	75.2%	70.4%
US Econ Act	Yes	Yes	Yes	Yes
US Econ Act×Dummies	Yes	Yes	Yes	Yes
Term & Default Spreads	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes