Commonality in Returns, Liquidity, and Turnover Around the World*

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Abstract
We uncover similar cross-country and time-series patterns in co-movement or "commonality" in stock returns, liquidity, and trading activity across 40 developed and emerging countries. The extent to which the liquidity and turnover of individual stocks within a country move together is related to the same institutional characteristics as is co-movement in stock returns. Commonality is greater in countries with weaker investor protection and a more opaque information environment. Monthly variation in commonality in returns, liquidity, and turnover is also driven by common determinants. Commonality increases during times of high market volatility, large market declines, and high interest rates, and is negatively related to capital market openness. These results are consistent with theoretical models in which changes in the wealth and collateral value of traders and financial intermediaries endogenously affect liquidity, trading, and pricing.

Keywords: Commonality; stock returns; turnover; liquidity; international markets.
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1. Introduction

There is increasing interest in improving the understanding of the extent of co-movement – alternatively, "commonality" or "synchronicity" – in stock returns, liquidity, and trading activity across countries and over time. Decomposing returns, liquidity, and trading activity to measure how much of the price-formation or trading process is driven by systematic factors and how much is due to firm-specific causes is, after all, central to most models of asset pricing and trading. Understanding commonality is also important for asset managers concerned with diversifying their investment and trading strategies. Indeed, several studies document that return co-movement among individual stocks is trending down over time in the U.S. and that it is distinctly higher in some countries than others (Morck, Yeung, and Yu, 2000; Campbell, Lettau, Malkiel, and Xu, 2001; Jin and Myers, 2006).[1] Other studies demonstrate that there exists "commonality" in the liquidity of individual stocks in the U.S. (among others, Chordia, Roll, and Subrahmanyam, 2000; Hasbrouck and Seppi, 2001; Huberman and Halka, 2001; Coughenour and Saad, 2004).[2] Lo and Wang (2000) and, more recently, Cremers and Mei (2007) identify important common factors in the turnover of individual U.S. stocks.

To now, one important unanswered question, however, is whether and how commonality in stock returns, liquidity, and trading activity are linked across countries and over time. In this paper, we take an encompassing approach to answer this question. Our experiment examines 21,328 stocks from 40 developed and emerging countries for the period from January 1995 to December 2004. We specifically seek answers to a number of important questions. Are the cross-country patterns in commonality in returns, liquidity, and trading activity similar? Are they linked in a common way to the level of economic and institutional development of a country? Does the co-movement in returns, liquidity, and trading activity vary over time? Are there common macroeconomic or

[1] Various explanations for the trend pattern include increased institutional ownership (Xu and Malkiel, 2003), more volatile or even opaque firm fundamentals (Wei and Zhang, 2006; Rajgopal and Venkatachalam, 2005), that newly listed firms are increasingly younger or riskier (Fink, Fink, Grullon, and Weston, 2005; Brown and Kapadia, 2007), and that product markets are more competitive now (Irvine and Pontiff, 2005). Globalization is another possible force at work; Li, Morck, Yang, and Yeung (2004) find a similar, albeit weaker, pattern in many emerging markets around the time of capital market liberalizations. Brandt, Brav, and Graham (2005) argue that the trend in idiosyncratic volatility, and thus in the level of commonality in returns, is a statistical illusion.

[2] There are only a few studies of liquidity commonality in other markets. See Brockman and Chung (2002) for evidence of commonality in liquidity in Hong Kong, Domowitz, Hansch, and Wang (2005) for Australia. Two recent cross-country studies are Qin (2006) and Brockman, Chung, and Pérignon (2006). None of these studies attempts to explain cross-country variation in commonality in liquidity.

capital market-related forces at work that affect how commonality in returns, liquidity, and trading activity varies over time?

There are good reasons to think that commonality patterns in stock returns, liquidity, and trading activity are linked. Market microstructure theory establishes a role for liquidity in the price formation process of individual securities. Several empirical studies show that liquidity is priced as a characteristic or as a systematic source of risk (Amihud and Mendelson, 1986; Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Lee, 2006; Sadka, 2006; Korajczyk and Sadka, 2008). If liquidity is systematically related to expected returns, co-variation in liquidity may be related to co-variation in returns. Trading volume as an aggregation of order flows may also be linked. Indeed, Hasbrouck and Seppi (2001) show that common factors in returns have a microstructure foundation in order flows. A key finding of Cremers and Mei (2007) is that trading due to systematic returns can account for a large fraction of common variation in turnover. Chordia, Roll, and Subrahmanyam (2000) hypothesize that commonality in liquidity can also be traced to common variation in trading activity. Finally, Morck et al. (2000) argue that information acquisition is endogenous (in the spirit of Grossman and Stiglitz, 1980; Shleifer and Vishny, 1997), so a low level of information acquisition translates into high return co-movement. Since information is an important driving factor of liquidity and trading activity, the level of firm-specific information acquisition can create a link between commonality in returns, liquidity, and trading activity.

Recent theoretical models that investigate the role of funding constraints for liquidity provision also motivate us to seek out common patterns in commonality. In Kyle and Xiong (2001), Gromb and Vayanos (2002), Morris and Shin (2004), and Brunnermeier and Pedersen (2007), financial intermediaries make markets by absorbing temporary liquidity shocks. They face funding constraints and obtain financing by posting margins or by pledging securities that they hold as collateral. When markets decline or when uncertainty about fundamentals increases, these intermediaries either endure a loss in their collateral values or hit their margin limits and are forced to liquidate their positions. Different models explore different market mechanisms and different consequences of such events. In Kyle and Xiong, shocks to noise traders make prices move away from fundamentals and induce arbitrageurs to provide liquidity in taking advantage of arbitrage opportunities. The arbitrageurs are risk averse, however, and,

following market declines, they become demanders, rather than suppliers, of liquidity as they liquidate their positions in other risky assets. Gromb and Vayanos emphasize the welfare and regulator implications of a reduction in supply of liquidity that stems from a drop in the collateral value of arbitrageurs. The Morris-Shin and Brunnermeier-Pedersen models both focus on how intermediaries are forced to liquidate positions due to margin constraints when markets decline or volatility increases. In their models, one trader's hitting his loss limit or funding constraint leads to falling prices and greater illiquidity and makes other traders hit their respective limits. Early liquidations give better prices, so traders rush to liquidate following negative shocks and liquidity "black holes" or "spirals" emerge, analogous to a model of bank runs.

What is common in these models is a general prediction that large market declines increase the demand for liquidity as agents liquidate their positions across many assets and reduce the supply of liquidity as liquidity suppliers hit their funding constraints. So, commonality in asset returns, liquidity, and trading activity all arise naturally and, most importantly, the extent of commonality is intensified during periods of market volatility. So far, there is only limited empirical evidence. Ang and Chen (2002) show that the returns of individual U.S. stocks become more correlated during market declines, but they do not consider co-movement in liquidity and trading activity. Hameed, Kang and Viswanathan (2007) find that the liquidity of stocks decreases and commonality in liquidity increases during large market declines, but they do not investigate time-series patterns in commonality in returns and trading activity. Both studies also exclusively focus on U.S. markets.

We think that a global perspective is valuable for three reasons. First, although liquidity spirals occur in U.S. markets, they seem likely to be more prevalent and more disruptive in less developed capital markets. Second, country-specific commonality patterns in returns, liquidity, and trading activity may be differently affected by these crises, depending on the economic, financial, and institutional development of the country. So a cross-country perspective potentially enhances the power of the tests of the key predictions of these models. Third, we may be able to draw policy lessons from studying which country characteristics serve to mitigate the prevalence and severity of liquidity crises.

Our paper uncovers two new findings. First, commonality in daily returns, liquidity (measured by the price impact proxy of Amihud, 2002), and trading activity (measured by turnover) differ substantially across the 40 countries in our sample and, most interestingly, they do so in a similar way. Developed markets like Canada, the U.K., and the U.S. exhibit much less commonality in returns, liquidity, and turnover than less developed markets, such as China, Pakistan, Taiwan and Turkey. The cross-sectional correlations among the three commonality measures are around 0.70 or higher and each of the commonality measures is correlated with a country's GDP per capita at around -0.50. Cross-sectional regressions indicate that, even after controlling for GDP per capita and various other structural variables like the breadth of the stock market and a measure of macroeconomic instability, commonality in returns, liquidity, and turnover is higher in countries with weaker legal protection of minority shareholders' rights and a poorer information environment.

Second, commonality in returns, liquidity, and turnover in different countries varies significantly over time and in a "common" or systematic way. We compute monthly R^2-measures of commonality using daily data for each of the 40 countries. Our three commonality measures are positively correlated over time in almost all 40 countries. Commonality is more volatile in less developed countries. All three commonality measures increase during financial crises, such as the 1997 Asian financial crisis, the 1998 LTCM crisis, and the period after September 11, 2001. We estimate seemingly unrelated regression (SUR) models across countries to relate commonality in returns, liquidity, or turnover to country-level time-series variables. We find that each type of commonality increases in periods of high market volatility and during times of large market declines, consistent with Brunnermeier and Pedersen (2007), Hameed, Kang, and Viswanathan (2006), and Ang and Chen (2002). Higher interest rates induce higher commonality. This effect is also in line with the models of Kyle and Xiong (2001), Gromb and Vayanos (2002), and Brunnermeier and Pedersen (2007), because financial intermediaries are more likely to hit their capital constraints when interest rates are higher. In addition, commonality decreases when capital flows increase, so that capital market openness is associated with less commonality across individual securities within a country. These common determinants have a similar effect on all three types of

commonality, but we show that their economic impact is much greater for less developed countries with poorer investor protection and disclosure requirements.

Our study makes contributions to the growing commonality literature in Finance and has some potential implications for policy. First, we find supportive evidence of a supply effect on liquidity as advocated in models by Brunnermeier and Pedersen (2007), Morris and Shin (2004), Kyle and Xiong (2001), and Gromb and Vayanos (2002). Large market shocks impact the aggregate collateral of financial intermediaries which force many asset holders to liquidate their positions; these funding constraints impact, in turn, the liquidity, pricing, and trading of many assets. The evidence is admittedly only indirect. But, the fact that commonality in returns, liquidity, and turnover is more prevalent, and occur with more intensity, in less developed countries with weaker institutions suggests new avenues for research. Our findings specifically point to investor protection and transparency as key factors for cross-sectional patterns in commonality, but funding constraints matter for time-series dynamics, especially around crises. How they are empirically linked, in turn, is subject for future investigations.

Second, our study may help to connect what appear as unrelated empirical findings on commonality in returns, liquidity and turnover. Why commonality in liquidity appears to be a priced risk factor in the cross-section of returns (Acharya and Pedersen, 2005; Lee, 2006) may arise from the same market forces as the asymmetric correlations in asset returns on downside movements (Ang and Chen, 2002; Ang, Chen, and Xing, 2006). Our results also provide support for the link between higher crash frequencies and greater commonality in returns across countries (Jin and Myers, 2006), for Hasbrouck and Seppi's (2001) finding that the first principal component of the order flows of the 30 Dow stocks explains two-thirds of the common variation in their returns, and for the "inextricable link" between systematic factors that drive firm turnover and those that drive returns (Cremers and Mei, 2007).

Third, policy-makers may be able to draw important implications from evidence that funding constraints of financial intermediaries drive many empirically-observed market phenomena. Central banks concerned about market liquidity during periods of market stress may be able to minimize the risk of "liquidity spirals" that magnify co-movement of returns, liquidity and turnover activity across assets on the downside by

boosting the funding of financial intermediaries or by improving corporate governance and transparency.

2. Data and empirical measures of commonality

In this section, we describe the data sources, the screening procedures, and the variable definitions we use to construct the commonality measures.

2.1 Data sources and screens

We collect the daily total return index (*RI*), the daily trading volume (*VO*; expressed in 1,000 shares), the daily adjusted price (*P*; in local currency), and the market capitalization at the beginning of each year (*MV*; expressed in million US$) for individual stocks from Datastream. Our final sample includes 21,328 stocks from 40 countries for the period January 1995 to December 2004. According to the classification by International Finance Corporation (IFC) of the World Bank Group, 21 out of these 40 countries are developed (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, the U.K., and the U.S.) and 19 countries are emerging (Argentina, Brazil, Chile, China, Greece, India, Indonesia, Israel, Malaysia, Mexico, Pakistan, Philippines, Poland, Portugal, South Africa, South Korea, Taiwan, Thailand, and Turkey).

We restrict the sample to stocks from major exchanges, which are defined as the exchanges on which the majority of stocks in that country are listed. We acknowledge that we have some discretion in choosing which exchanges to include in the sample. We try to strike a balance between obtaining maximum breadth in each country and avoiding problems related to differences in trading mechanisms and conventions. For the U.S., we use NYSE data only, because trading volume definitions are different on Nasdaq. For a few other countries we use data from more than one stock exchange: China (Shenzen and Shanghai), Japan (Osaka and Tokyo), and Germany (Frankfurt and Xetra). Datastream reports that the volume definitions used by different exchanges are the same for these countries. For Brazil, we use data after 1999 because of a change in trading volume definitions. We exclude stocks with special features, such as depositary receipts (DRs),

real estate investment trusts (REITs), and preferred stocks.[3] To limit the effect of survivorship bias, we include dead stocks in the sample.

We use the following screens. To exclude non-trading days, we define days on which 90% or more of the stocks listed on a given exchange have a return equal to zero as non-trading days. We also exclude a stock if the number of zero-return days is more than 80% in a given month. Ince and Porter (2006) call for caution in handling data errors in Datastream. Similar to their screen, we set daily returns to missing if

$$(1 + R_{i,d})(1 + R_{i,d-1}) \leq 0.5\,, \tag{1}$$

where $R_{i,\mathrm{d}}$ and $R_{i,d-1}$ are the stock returns of firm i on day d and $d-1$, respectively, and at least one is greater than or equal to 100%. We also set daily returns to missing if the value of the total return index for either the previous or the current day is below 0.01.

2.2 Trading activity and liquidity measures

We use daily turnover as a measure of the trading activity in individual stocks. Turnover is defined as the number of shares traded on a given day divided by the total number of shares outstanding. Lo and Wang (2000) argue that turnover is a natural measure of trading activity. They also show that turnover is non-stationary. Therefore, we measure turnover in logs and detrend the resulting series with a 100-day moving average. The moving average is calculated using the available data over the past 100 days. A similar approach is taken by, among others, Campbell, Grossman, and Wang (1993), Lo and Wang (2000), and Griffin, Nardari, and Stulz (2007). To avoid the problem of taking the logarithm of zero daily turnover, several studies (e.g., Llorente, Michaely, Saar, and Wang, 2002), add a constant to turnover. Because the choice of this constant is arbitrary, we simply add one to turnover before we take logs. Our turnover measure for stock i on day d can be expressed as follows:

[3] Some examples of "name filters" that we implement to detect stocks with special features are the following. In Belgium, we drop type AFV and VVPR (type indicated by Datastream) shares, as they have preferential dividend or tax incentives. In Canada, we discard income trusts. In Mexico, we remove type ACP and BCP shares, as they have the special feature of being convertible into series A and B shares, respectively. In France, we discard type ADP and CIP shares, as they have no voting rights, but have preferential dividend rights. In Germany, we exclude type GSH shares, as they have fixed dividends and no voting rights. In Italy, we drop RSP shares due to non-voting provisions. However, in Brazil, all PN shares were included in the sample though they are preferred stocks, because these constitute the majority of stocks covered by Datastream. For U.S. stocks, we can use Cusip codes to exclude shares with special features, as the two digits from the 7th digit of Cusip are equal to 10 for common stock.

$$TV_{i,d} \equiv \log\left(1+\frac{VO_{i,d}}{NSH_{i,y}}\right) - \frac{1}{N}\sum_{k=1}^{100}\log\left(1+\frac{VO_{i,d-k}}{NSH_{i,y}}\right), \quad (2)$$

where $VO_{i,d}$ is the trading volume of stock i on day d and $NSH_{i,y}$ is the number of shares outstanding at the beginning of the year y. We discard daily observations of $VO_{i,d}$ that are greater than $NSH_{i,y}$.

The liquidity of a stock can broadly be defined as the ability to trade large quantities of the stock quickly, at low cost, and with little impact on the price. The market microstructure literature has produced a wide variety of alternative proxies for the liquidity of individual stocks. Arguably the most refined of these measures (e.g., the bid-ask spread, the transaction-by-transaction market impact, and the probability of informed trading) are based on detailed microstructure data. As these data are generally not available for markets outside the U.S., we turn to an alternative proxy of liquidity.[4]

The liquidity proxy we use is the price impact measure of Amihud (2002). He suggests the daily ratio of absolute stock return to dollar volume as a proxy for the illiquidity of a stock. This measure closely adheres to the intuitive description of liquid markets as those that accommodate trading with the least effect on price. Amihud (2002) presents empirical evidence for the U.S. indicating that this measure is strongly positively related to microstructure estimates of illiquidity, including the bid-ask spread, price impact, and fixed trading costs. Goyenko, Holden, Trzcinka, and Lundblad (2006) investigate to what extent different liquidity proxies capture high-frequency measures of transaction costs based on U.S. data. The Amihud measure performs well relative to other proxies as a measure of several important aspects of transaction costs.[5] Hasbrouck (2006) reports that: "among the daily proxies, the Amihud illiquidity measure is most strongly correlated with the TAQ-based price impact coefficient" (p. 22). Finally, Lesmond (2005) shows that the Amihud measure has a high correlation with bid-ask spreads in 23 emerging markets. Table A5 in the appendix (discussed in detail below) shows that commonality in Amihud liquidity is significantly positively correlated with commonality in spreads in the U.S.

[4] Brockman, Chung, and Pérignon (2006) construct daily time-series of spreads and depth for stocks on 47 different stock exchanges over a short period of time.

[5] Specifically, Goyenko et al. (2006) conclude: "Not surprisingly, we find that measures intended to capture other features of transactions cost, Amihud, Pastor and Stambaugh, and Amivest, do a poor job of estimating effective spread." (p. 9). But "Amihud has the highest correlation with the 5-minute price impact" (p. 33) and "For the realized spread horseraces, the Amihud measure is the best overall." (p. 7).

Many recent empirical studies rely on the Amihud liquidity measure to capture systematic liquidity risk and even commonality in liquidity across stocks. Acharya and Pedersen (2005) employ the measure in their investigation of the role of liquidity risk in asset prices. Spiegel and Wang (2005) investigate the link between the idiosyncratic volatility and Amihud liquidity (as well as other liquidity measures) for individual stocks. Watanabe and Watanabe (2006) use Amihud liquidity to uncover time-variation in liquidity betas and the liquidity risk premium. Avramov, Chordia, and Goyal (2006) use the Amihud measure in their analysis of the relationship between liquidity and short-run stock return reversals. Finally, Kamara, Lou, and Sadka (2007) link variation in commonality in Amihud liquidity across stocks to differences in institutional ownership.

Similar to our definition of turnover, we add a constant to the Amihud price impact measure and take logs. We multiply the result by -1 to arrive at a variable that is increasing in the liquidity of individual stocks:

$$RV_{i,d} \equiv -\log\left(1 + \frac{|R_{i,d}|}{P_{i,d}VO_{i,d}}\right), \tag{3}$$

where $R_{i,d}$ is the return in local currency, $P_{i,d}$ is the price in local currency, and $VO_{i,d}$ is the trading volume of stock i on day d.

To ensure that our measures of commonality in returns, commonality in Amihud (2002) liquidity, and commonality in turnover are based on the same sample of stocks, we drop a stock from the sample on a day when either the return (R), turnover (TV), or Amihud liquidity measure (RV; for return-volume) is missing. We also discard stock-day observations with a daily return in the top or the bottom 0.1%, or when TV or RV is in the top 0.1%, of the cross-sectional distribution within a country.

In addition to daily time-series of RV and TV for each stock, we construct monthly time-series by calculating the equally-weighted average of the daily RV and TV in a given month for that stock. We construct monthly return index and price series by taking the end-of-month total return index and the end-of-month adjusted price from the daily data files. For the monthly returns, we again adopt the screen suggested by Ince and Porter (2006) and discard stock-month observations if

$$(1 + R_{i,m})(1 + R_{i,m-1}) \leq 0.5, \tag{7}$$

where $R_{i,m}$ and $R_{i,m-1}$ are the stock returns of firm i in month m and $m-1$, respectively, and at least one is greater than or equal to 300%. We set monthly returns to missing if the total return index for either the previous month or the current month is smaller than 0.01. We exclude stock-month observations with a monthly stock price or return in the top or the bottom 2.5%, or a TV or RV in the top 2.5%, of the cross-sectional distribution within a country. We carry out these distribution-based screens simultaneously.

2.3 Commonality measures

Inspired by Roll (1988), the study of Morck, Yeung, and Yu (2000) uses the R^2 of a regression of individual stock returns on the market return as a measure of the extent to which the stock prices of individual firms within a country move together. Following their approach, we obtain monthly measures of commonality in returns (R^2_R) and commonality in turnover (R^2_{TV}) for each stock by taking the R^2s from the following regressions, based on daily observations within a month:

$$R_{i,d} = a_i^R + \sum_{j=-1}^{1} b_{i,j}^R R_{m,d+j} + \varepsilon_{i,d}^R , \tag{4}$$

$$TV_{i,d} = a_i^{TV} + \sum_{j=-1}^{1} b_{i,j}^{TV} TV_{m,d+j} + \varepsilon_{i,d}^{TV} , \tag{5}$$

where $R_{m,d}$, and $TV_{m,d}$ denote the aggregate return and turnover in the country of stock i, obtained as the market-value (at the beginning of each year) weighted average of the corresponding variables for all stocks in the country (excluding stock i).

We do not want our measure of commonality in Amihud liquidity to be mechanically driven by commonality in returns or commonality in turnover, so we run the following filtering regression that controls for turnover and returns for each stock:

$$RV_{i,d} = \alpha_i + \beta_i RV_{i,d-1} + \gamma_i R_{i,d-1} + \delta_i TV_{i,d-1} + \phi_i R_{m,d-1} + \omega_{i,d}^{RV} . \tag{6}$$

We use the residuals from (6) to construct a monthly measure of commonality in liquidity (R^2_{RV}) by taking the R^2 from the following regression, based on daily observations within a month:

$$\hat{\omega}_{i,d}^{RV} = a_i^{RV} + \sum_{j=-1}^{1} b_{i,j}^{RV} \hat{\omega}_{m,d+j}^{RV} + \varepsilon_{i,d}^{RV} , \tag{7}$$

where $\hat{\omega}_{m,d}^{RV}$ denotes the aggregate residual from regression (6) in the country of stock *i*, obtained as the market-value (at the beginning of each year) weighted average of the residuals for all stocks in the country (excluding stock *i*).

In line with Chordia, Roll, and Subramanyam (2000), we include one-day leading and lagging aggregate returns, turnover, and (filtered) liquidity in the commonality regressions (4), (5), and (7). We require a minimum number of 10 daily observations to estimate the R^2 of a stock in a given month. We construct a monthly time-series of the R^2 measures at the country-level by taking the equally-weighted average of the R^2 of the individual stocks in a month. We impose a minimum number of 10 stocks for the calculation of these aggregate R^2 measures for a country in a given month. We note that we include lagged liquidity on the right hand side of regression (6) and thus essentially take the innovation in liquidity because we are interested in measuring whether the changes in the liquidity of individual stocks are correlated within a country. Since turnover already is a flow variable, taking first differences is not necessary. As a robustness check, we redo all our analyses with an alternative measure of R^2_{RV} based on the changes in liquidity rather than the residuals from (6). The average value of this alternative R^2_{RV} is higher, but the results from our cross-sectional and time-series analyses (not tabulated) are very similar.

Since we want to compare commonality across countries and over time, sample selection is an important concern. It is well-known that Datastream coverage has improved considerably over time, in particular for emerging markets. In addition, we require each stock to have a minimum number of 10 daily observations on its return, liquidity, and turnover within a month, so it is possible that we exclude a relatively larger fraction of illiquid stocks for some countries than for others. We address this concern in the following ways. First, our overall approach is similar to studies that examine differences in commonality in returns across countries (Morck, Yeung, and Yu, 2000; Jin and Myers, 2006) to facilitate a direct comparison with their findings.[6] Second, our sample period starts in 1995 to avoid issues with improvements in coverage in earlier years. This year coincides with the exclusive period of analysis of Morck et al. and the

[6] Morck, Yeung and Yu examine 40 countries like we do, except their criteria exclude Argentina, Israel, and Switzerland, and ours exclude the Colombia, the Czech Republic, and Peru. Jin and Myers examine 40 countries, but their criteria exclude Brazil, Greece, Indonesia, Israel, Italy, Pakistan, and the U.S., and ours exclude Colombia, the Czech Republic, Hungary, Luxembourg, Peru, Russia, and Venezuela.

midpoint of the Jin-Myers study (1990-2002). Third, we follow Morck et al. and control for the number of stocks in our sample for each country in the cross-sectional regressions. Fourth, we alleviate the data requirements by constructing various alternative commonality measures. In particular, we run regressions (4), (5), and (7) for each year as well as over the entire sample period based on daily and weekly data (with one and five leads/lags of the independent variable). Our tests with each of these alternative commonality measures yield similar results.

Our commonality measures are not suitable to use as the dependent variable in regressions, because their values always fall within the interval [0, 1]. Following Morck et al. (2000), we use the logistic transformation of the R^2 measures, $\ln[R^2/(1-R^2)]$, in both the cross-sectional and the time-series regressions.

3. Empirical analyses of commonality in returns, liquidity, and turnover

We begin this section with a discussion of summary statistics of the main variables in our analysis. We then report the results of our cross-sectional and time-series analyses of commonality in returns, liquidity, and turnover.

3.1 Summary statistics and correlations

Table 1 presents summary statistics of market returns, Amihud (2002) liquidity, turnover, R^2_R, R^2_{RV}, and R^2_{TV} for each of the 40 countries in the sample. Countries are listed in order of decreasing GDP per capita. Returns are expressed as a percentage per month. By construction, Amihud liquidity is negative, with larger values (i.e., values closer to zero) indicating greater liquidity. Turnover is expressed as a percentage per day. The average Amihud liquidity and turnover per country lie in the same range of values as reported by Lesmond (2005). We note that a direct comparison of the level of liquidity and turnover across countries is not possible, because trading volume definitions differ across countries. This measurement issue does not affect our analysis, as we only relate the liquidity and turnover of stocks within a country.

The average values of R^2_R, R^2_{RV}, and R^2_{TV} vary substantially across the 40 countries and they do so in a similar way. All three types of commonality are greater in less developed countries. Among countries like China, India, and Pakistan, commonality averages above 30% (R^2_R and R^2_{TV}) and 10% (R^2_{RV}), respectively, whereas those among countries like Japan, Norway and the U.S. average around 20% (R^2_R and R^2_{TV}) and 5%

(R^2_{RV}), respectively. The cross-country dispersion in R^2_R for returns is greater than that for R^2_{RV} and R^2_{TV}. The correlations of average R^2_R, R^2_{RV}, and R^2_{TV} with GDP per capita are equal to -0.61, -0.40, and -0.48, respectively. Not only the level, but also the time-series volatility, of commonality is higher in less developed countries. The cross-sectional correlation between the standard deviation of monthly R^2_R, R^2_{RV}, and R^2_{TV} in a country with GDP per capita is negative and large (between -0.40 and -0.60).

Figure 1 further confirms that commonality is greater in less developed countries. The figure depicts bar graphs of the average R^2_R, R^2_{RV}, and R^2_{TV} in 40 countries, sorted from high to low. It is striking how consistent the ranking of countries is across the three commonality measures. Most countries appear at a very similar position in all three bar graphs. Rank correlations between the three commonality measures are 0.66 or higher. The ranking of countries for each of the three commonality measures is quite stable over time. The rank correlations between commonality measures computed in adjacent years averages around 0.90 for R^2_R, 0.80 for R^2_{TV} and 0.63 for R^2_{RV}.

We want to emphasize that these correlations are not hard-wired in the construction of the commonality measures. There is no a priori relation between the return and the trading volume of an individual stock on a given day. Of course, Amihud liquidity is defined as the absolute return over the product of a stock's price with its trading volume on a given day and thus shares components with both returns and turnover. Interestingly, time-series correlations between the returns, liquidity, and turnover of individual stocks (not tabulated) are low. The average contemporaneous correlation between daily returns and Amihud liquidity across all the stocks in the sample is equal to -0.03. The average correlation between returns and turnover amounts to 0.14, and the average correlation between Amihud liquidity and turnover is -0.16. In addition – as discussed in section 2.3 above – we run a filtering regression for the Amihud liquidity of individual stocks to avoid a mechanical relation between commonality in liquidity and commonality in returns and turnover.

To get an idea about how aggregate returns, liquidity, turnover, R^2_R, R^2_{RV}, and R^2_{TV} are related, we calculate correlations between these variables. Panel A of Table 2 shows cross-sectional correlations across the 40 countries in our sample. Correlations between R^2_R, R^2_{RV}, and R^2_{TV} across countries are 0.69 or higher. Furthermore, R^2_R, R^2_{RV},

and R^2_{TV} are higher in countries with higher returns, lower liquidity, and higher turnover. Average market returns are highly negatively correlated with average liquidity.

Panel B of Table 2 presents average time-series correlations between the aggregate *R*, *RV*, *TV*, R^2_R, R^2_{RV}, and R^2_{TV} in each country. The three commonality measures are not only highly correlated across countries, but also exhibit common variation over time within a country. Average time-series correlations between R^2_R, R^2_{RV}, and R^2_{TV} range from 0.24 to 0.37 and correlations are positive for 36, 39, or 40 out of the 40 countries in our sample. These findings suggest that there are common factors in the commonality in returns, liquidity, and turnover in individual countries. Hasbrouck and Seppi (2001), Kamara, Lou, and Sadka (2007), and Korajczyk and Sadka (2008) report a positive relation between common factors in liquidity and returns in the U.S.

3.2 Cross-sectional analysis of commonality

We are interested in whether the economic and institutional development of a country influence the extent of co-movement in the returns, liquidity, and turnover of individual stocks and whether they do so in a common way. We run cross-sectional regressions of the average R^2_R, R^2_{RV}, and R^2_{TV} in 40 countries on various country characteristics. As measures of economic and financial development, we take GDP per capita, stock market capitalization over GDP, bank deposits over GDP (as a measure of the funding liquidity of the domestic financial system, from Beck, Demirgüç-Kunt, and Levine, 2000), and bank concentration (Beck, Demirgüç-Kunt, and Levine, 2006, show that countries with a more concentrated banking system are less likely to suffer a systemic banking crisis). We use the good government index of Morck et al. (2000), judicial efficiency, and rule of law as measures of investor protection. Accounting standards, financial disclosure, accounting principles, and analyst following are proxies for the information environment of firms in different countries (Chang, Khanna, and Palepu, 2000; Bushman, Piotroski, and Smith, 2004; and, Jin and Myers, 2006). Inspired by the findings of Dyck, Volchkova, and Zingales (2007), we also look at media development. Following Morck et al. (2000), we include the following control variables: the geographical size of the country, the number of stocks in our sample, the time-series volatility of GDP growth (a measure of macroeconomic instability), and industry and firm Herfindahl indices (to capture the effect of a few large firms dominating the economies of some countries). The first table in the

appendix, Table A1, gives an overview of the definitions and sources of these variables. Table A2 presents summary statistics.

We run cross-sectional regressions of the logistic transformation of the average R^2_R, R^2_{RV}, and R^2_{TV} at the country-level on these variables. First, we run regressions on each of the country characteristics individually. Next, we investigate which of the country characteristics have an effect on commonality after controlling for the general level of development in a country, measured by GDP per capita. Finally, we run a number of cross-sectional regressions on multiple country characteristics in addition to GDP per capita and the control variables.

Panel A of Table 3 shows the estimation results of regressions on individual country characteristics. Many country characteristics have a significant relation with commonality. The coefficients always have the same sign for all three commonality measures, with the exception of a single insignificant coefficient on the firm Herfindahl index. The coefficients are generally also of the same order of magnitude. R^2_R, R^2_{RV}, and R^2_{TV} are significantly higher in countries that are less developed, have weaker investor protection, and are characterized by a more opaque information environment. We observe particularly strong effects for ln(GDP per capita), the good government index, judicial efficiency, rule of law, accounting standards, financial disclosure, and media development.

The economic significance of the effects of these variables is large.[7] A one standard deviation (σ) increase in ln(GDP per capita) relative to the mean is associated with a decrease in R^2_R of 4.63% (equal to 0.53 times the cross-sectional standard deviation of R^2_R, σ_R); a decrease in R^2_{RV} of 0.67% (which equals $0.28\times\sigma_{RV}$); and a decrease in R^2_{TV} of 2.06% ($0.40\times\sigma_{TV}$). An increase of one standard deviation in the good government index reduces R^2_R by 5.33% ($0.61\times\sigma_R$), R^2_{RV} by 0.72% ($0.29\times\sigma_{RV}$), and R^2_{TV} by 2.15% ($0.41\times\sigma_{TV}$). The effect of a one standard deviation increase in accounting

[7] Since the dependent variables are the logistic transformations of the R^2 measures, the impact of a one standard deviation (σ) increase in the value of the country characteristic (relative to the mean of the country characteristic μ) on R^2 can be computed using the following expression:

$$\Delta R^2 = e^{\alpha+\beta\times(\mu+\sigma)}/(1+e^{\alpha+\beta\times(\mu+\sigma)}) - e^{\alpha+\beta\times\mu}/(1+e^{\alpha+\beta\times\mu}),$$

where α and β are the intercept and the estimated coefficient on the country characteristic. We caution the reader that, because the estimated relation is non-linear, this approach only works well for small changes in the country characteristic.

standards is a decrease of 3.57% ($0.41\times\sigma_R$) in R^2_R, of 0.64% ($0.26\times\sigma_{RV}$) in R^2_{RV}, and of 1.49% ($0.29\times\sigma_{TV}$) in R^2_{TV}.

Panel B of Table 3 indicates that several proxies of institutional development have an impact on commonality that goes beyond the effect of a country's general economic development. After the inclusion of ln(GDP per capita) in the regressions, the good government index, financial disclosure, and media development still have a negative coefficient in all three commonality regressions that is significant at the 5% level or better. The regressions explain a substantial part of the cross-sectional variation in commonality. The regression R^2 is up to 0.56 for R^2_R, up to 0.36 for R^2_{RV}, and up to 0.35 for R^2_{TV}.

In contrast to the results for several of the governance and transparency variables, none of our measures of the development of a country's financial system (stock market capitalization over GDP, bank deposits over GDP, and bank concentration) is able to explain cross-sectional differences in commonality once we control for GDP per capita. This seems to suggest that the role of financial intermediaries as a driving force of commonality may be limited. Of course, our measures of the funding liquidity of the financial system are coarse. Also, Brunnermeier and Pedersen (2007) and other models predict that commonality arises in times of tight funding constraints, while our country characteristics are averages over long periods of time. We expect our time-series analyses below to be more powerful in testing the predictions of these models.

In panel C of Table 3, we run a horse race between the good government index and several proxies for a firm's information environment in various countries. Of course, we do so at the risk of losing precision from increasing collinearity among country variables and from exhausting degrees of freedom. In each model, we include ln(GDP per capita) and the control variables to account for various structural explanations for commonality based on, among other things, common variation in economic fundamentals. The good government index dominates in the regressions of commonality in returns, leaving little additional room for the accounting variables in explaining cross-country patterns in commonality. We do not confirm the result of Jin and Myers (2006) that governance and information environment variables both play a significant role in explaining commonality in returns, but, to be fair, we use different accounting variables. The good governance index also still has a significantly negative coefficient in several of

the regressions of commonality in liquidity and turnover, although the results are a bit weaker. The coefficients on the accounting variables have the expected sign, but are no longer significant at conventional significance levels.

3.3 Implications

Our results to now suggest that commonality is greater in countries with weak governance and an opaque information environment. Why would the returns, liquidity, and turnover of individual stocks exhibit stronger co-movement in these countries? Morck et al. (2000) argue that weak institutions discourage the acquisition of information about individual stocks. Since information is an important driving factor of trading activity and since trading activity is an important determinant of liquidity, this argument could carry over to co-movement in turnover and liquidity.

Commonality in returns, liquidity, and turnover can arise due to systematic variation in the desire to transact. There are many reasons why investors trade. Chordia, Huh, and Subrahmanyam (2006) and Griffin, Nardari, and Stulz (2007) discuss theoretical research on trading activity and identify the following main motives for trading: asymmetric information, dispersion of opinion, portfolio rebalancing needs, taxes, and life-cycle considerations. Several of these motives can affect many stocks at the same time in an environment with weak investor protection and poor transparency. For example, if investors lack sufficient information about individual stocks due to poor disclosure or if weak legal institutions create uncertainty about the future payoffs to dispersed outside investors, stock-specific trading activity resulting from dispersion of opinion is likely to be less prevalent. Past performance is also an important determinant of trading activity. See Chordia, Huh, and Subrahmanyam (2006) for evidence based on individual U.S. stocks, Griffin, Nardari, and Stulz (2007) for an analysis of market-wide effects in 46 countries, and Brennan and Cao (1997) for evidence on international investors. If individual stock prices are less likely to be informative, momentum or positive feedback traders might trade many stocks simultaneously based on general market movements (e.g., Ozoguz, 2006). Gorton and Pennacchi (1993) show that liquidity traders can minimize their losses to investors with superior information by trading in several different securities at the same time. So, basket trading may be more pervasive in opaque countries with weak investor protection.

Theoretical models of the provision of liquidity (e.g., Kyle and Xiong, 2001; Brunnermeier and Pedersen, 2007) suggest another reason for greater commonality in returns, liquidity, and turnover in less developed countries. Weak institutions can induce financial intermediaries that hit their capital constraints to reduce their positions and the provision of liquidity for many securities at the same time due to, for example, lack of information about the fundamentals of individual securities. In addition, Jin and Myers (2006) show that stocks in opaque countries are more likely to crash. Their finding could imply that financial intermediaries are more prone to hit their funding constraints in these countries, resulting in greater co-movement in returns, liquidity, and trading activity.

Since Morck et al. (2000), a debate has developed on the issue whether a high R^2_R signifies less incorporation of firm-specific information into stock prices. Durnev, Morck, Yeung, and Zarowin (2003), Durnev, Morck, and Yeung (2004), and Li, Morck, Yang, and Yeung (2004) present evidence that greater commonality in returns is associated with less informative stock prices. Ashbaugh, Gassen, and LaFond (2005), Kelly (2005), and Lee and Liu (2006) challenge the conclusion that R^2_R is negatively related to the information content of stock prices.

Our results shed new light on this debate. The finding that commonality in turnover is greater in less developed countries indicates that investors move in and out of many stocks at the same time in these markets. Market microstructure research suggests a direct link between prices, liquidity, and trading activity. Pindyck and Rotemberg (1993) suggest that correlated trading or herding can explain excess co-movement of individual stock prices. Greater market-wide swings in trading activity are thus likely to be associated with greater commonality in returns and liquidity.

We do not take a stance on the direction of the causal relation between commonality in returns, liquidity, and turnover. We also do not provide direct evidence on the level of information acquisition or firm-specific risk arbitrage in different countries. But the results of our cross-sectional analysis are consistent with the hypothesis that traders and financial intermediaries respond to shocks that affect the demand for and the supply of individual stocks and their liquidity in a way that affects more securities at the same time in countries with weaker governance and poorer transparency. This explanation of the relation between institutional development and commonality in returns, liquidity, and turnover requires further tests, but it is striking that

cross-country differences in commonality in liquidity and trading activity are related to the same institutional factors as differences in the extent to which stock prices move together. To the best of our knowledge, this is a new finding.

3.4 Time-series analysis of commonality

Our monthly time-series of R^2_R, R^2_{RV}, and R^2_{TV} allow us to investigate which underlying economic forces generate time-variation in commonality in returns, liquidity, and turnover. Figure 2 shows that R^2_R, R^2_{RV}, and R^2_{TV} are substantially larger in some periods than in others. Especially in Malaysia and Turkey, the three commonality measures are very volatile. The graphs suggest that common time-series variation in the returns, liquidity, and turnover of individual stocks rises markedly during financial crises. For example, after the start of the Asian crisis in Malaysia with the attack of the Ringgit in July 1997, there is a large increase in the commonality measures for Malaysia. R^2_R jumps from 19% to 70% in the subsequent quarter, R^2_{RV} increases from 6% in June to 18% in August to 24% in September, and R^2_{TV} rises from 25% in June to 51% in September. Commonality also increases dramatically during the financial crisis in Turkey in November-December 2000 (from 44% in October to 84% in December for R^2_R; from 12% to 18% for R^2_{RV}, and from 30% to 40% for R^2_{TV}).

In Japan and the U.S., R^2_R, R^2_{RV}, and R^2_{TV} are less volatile. Nevertheless, we observe interesting patterns in commonality over time. Commonality is also greater during periods of market turmoil in these countries. For example, commonality shows a peak in the U.S. during the LTCM crisis in August 1998 and after September 11, 2001. The effects of these crises on commonality appear to transcend national borders and are also observed in a number of other countries. We note that R^2_R increases in the U.S. over the period 2002-2004, in line with the finding of Brandt, Brav, and Graham (2005) that the idiosyncratic volatility of U.S. stocks fell over this period.

The patterns we observe in Figure 2 could also just be a manifestation of noise in our commonality measures. To assess this conjecture, we now turn to a systematic analysis of the determinants of time-variation in commonality. We run time-series regressions of the R^2_R, R^2_{RV}, and R^2_{TV} in 40 countries on various country-level variables. We distinguish three groups of explanatory variables. First, we use the market return, market volatility, and aggregate Amihud liquidity and turnover as proxies for capital market conditions. These conditions can influence commonality through various channels, for example, by

affecting the funding liquidity of financial intermediaries or the amount of liquidity-based or positive feedback trading. Second, inflation, industrial production, and the short-term interest rate serve as proxies of a country's macroeconomic conditions, which can affect demand and supply in the stock market. The interest rate also measures changes in investment opportunities and capital constraints. Third, international investors play an increasingly important role in many countries. Therefore, we use the aggregate stock return on the U.S. market, the return on the MSCI EAFE (Europe, Australasia, and Far East) index, the net flow of U.S. equity investments to a country, the gross capital flow between the U.S. and a country (as a percentage of GDP), and the exchange rate of the currency of a country relative to a basket of major currencies as explanatory variables in the regressions. Table A3 provides variable definitions and data sources and Table A4 presents summary statistics.

Table 4 shows the estimation results of seemingly unrelated regression (SUR) models to relate monthly R^2_R, R^2_{RV}, and R^2_{TV} to country-level time-series variables. Our SUR models restrict the coefficients to be equal across countries.[8] We also run country-by-country time-series regressions on the same variables. We evaluate the ability of individual variables to explain time-series variation in commonality on the basis of the magnitude and significance of the SUR coefficient as well as the number of (significant) coefficients of the same sign in the country-by-country regressions.

We observe the strongest results for market volatility, the short-term interest rate, and gross capital flows. These three variables have a statistically significant coefficient at the 1% level in the SUR models for all three commonality measures. In addition, they have a (significant) coefficient of the same sign in many of the country-by-country regressions. The sign of the coefficients on these three variables is the same for all three commonality measures. Commonality is greater when markets are more volatile, interest rates are higher, and gross capital flows are smaller.

[8] We note that differences in trading volume definitions impede a direct comparison of Amihud liquidity and turnover across countries, so the coefficients on these variables should be interpreted with caution.

The economic impact is particularly manifest for market volatility.[9] Ceteris paribus, an increase of one standard deviation in market volatility relative to the mean is associated with a rise in R^2_R of 4.03% (equal to 0.45 times the average time-series standard deviation of R^2_R, $\sigma_{t,R}$); in R^2_{RV} of 0.63% (equals $0.15\times\sigma_{t,RV}$); and in R^2_{TV} of 2.45% ($0.41\times\sigma_{t,TV}$). An increase of one standard deviation in the short-term interest rate in a country raises R^2_R by 0.96%; R^2_{RV} by 0.09%; and R^2_{TV} by 0.20%. And a one standard deviation increase in gross capital flows is accompanied by a drop in R^2_R of 0.66%; in R^2_{RV} of 0.06%; and in R^2_{TV} of 0.22%. The economic significance of the effects of interest rates and gross capital flows on commonality seems modest. But explaining time-series variation in R^2_R, R^2_{RV}, and R^2_{TV} is harder than explaining cross-sectional variation. And our SUR models include multiple variables at the same time. We also note that we take the average across countries of the time-series mean and standard deviation of the explanatory variables to gauge the economic significance. The effects can be more pronounced for individual countries.

Several other variables have a notable effect on one or more of the commonality measures. R^2_R and R^2_{RV} are negatively related to the aggregate stock market performance in a country. In contrast, R^2_{TV} exhibits a positive relation to market returns. We also find that the higher turnover is, the lower is the commonality in returns and turnover. Unreported results indicate little evidence that spillovers from U.S. markets have an important influence on commonality in other countries. U.S. market volatility and large U.S. market declines are not able to explain time-series variation in our commonality measures when we control for local market volatility and market declines.

Our time-series analyses uncover a number of common determinants of variation in commonality in returns, liquidity, and turnover. That commonality increases during times of high market volatility is a finding consistent with the predictions of

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[9] The impact of a one standard deviation (σ) increase in the value of a country-level time-series variable (relative to its mean) on R^2 can be computed using the following expression:

$$\Delta R^2 = e^{\alpha+\beta\times(\mu+\sigma)+\gamma'\times\lambda}/(1+e^{\alpha+\beta\times(\mu+\sigma)+\gamma'\times\lambda}) - e^{\alpha+\beta\times\mu+\gamma'\times\lambda}/(1+e^{\alpha+\beta\times\mu+\gamma'\times\lambda}),$$

where α, β, and γ are the intercept, the estimated coefficient on the time-series variable of interest, and the vector of coefficients on the other time-series variables in the SUR model, respectively; μ and λ are the mean of the time-series variable of interest and the vector of means of the other time-series variables, respectively. For μ and λ, we take the average across countries of the time-series mean of these variables. For σ, we take the average across countries of the time-series standard deviation of the variable of interest. To express the economic significance as a fraction of one standard deviation of the commonality measures, we compute the average across countries of the time-series standard deviations of R^2_R, R^2_{RV}, and R^2_{TV}.

Brunnermeier and Pedersen (2007). Their model focuses on the capital needs of financial intermediaries. The capital constraints of intermediaries depend on their financiers' margins. Because margins are increasing in volatility, intermediaries are more likely to hit their capital constraints when volatility increases. As financial intermediaries are forced to reduce their positions in these situations, liquidity and prices decrease for many individual stocks simultaneously. The reduction in liquidity leads to even higher margins, resulting in a spiral effect that can cause sudden market-wide liquidity dry-ups. In addition, a "loss spiral" can arise as a result of a reduction in the collateral value of the securities that intermediaries hold. The theoretical models of Gromb and Vayanos (2002), Kyle and Xiong (2001), Morris and Shin (2003), and Vayanos (2004) describe similar mechanisms through which changes in market values or volatility lead to asset liquidation and selling pressure, which adversely affect market liquidity. A rise in interest rates also leads to a tightening of intermediaries' capital constraints. The positive impact of interest rates on commonality is thus also in line with these models. The negative relation between capital flows and commonality suggests that commonality in returns, liquidity, and turnover is reduced when capital markets become more open.

If financial crises lead to greater commonality through an effect on the wealth and the collateral of traders and financial intermediaries, commonality should increase during episodes of market declines. In other words, the effect of volatility on commonality should be asymmetric. In Table 5, we present the results of time-series regressions of R^2_R, R^2_{RV}, and R^2_{TV} on negative and positive market returns. We find a strong negative relation between all three measures of commonality and negative market returns, indicating that commonality rises during market declines. There is also evidence that commonality increases when the market goes up, but this effect is smaller and less consistent in the country-by-country regressions.

We examine whether the magnitude of market returns matters by distinguishing between large negative, small, and positive market returns (see Hameed, Kang, and Viswanathan, 2006). We define large negative (positive) market returns as returns that are more than one standard deviation below (above) the mean market return for each country. Table 5 shows that co-movement in returns, liquidity, and turnover increases most dramatically when there is a large drop in the market, which supports models such as Kyle and Xiong (2001) and Brunnermeier and Pedersen (2007). One other result in

Table 5 merits discussion. Commonality in turnover increases significantly in periods of large positive market returns. A potential explanation is that in many countries positive feedback trading involves multiple stocks at the same time (basket trading).

Table A5 presents a robustness check of these results for the U.S. market. Following Hameed et al. (2006), we use transaction-level data from the NYSE Trades and Automated Quotations (TAQ) and the Institute for the Study of Securities Markets (ISSM) data sets to construct a monthly time-series of commonality in spreads based on the proportional quoted spread for individual stocks. Panel A shows that the R^2 measure of commonality in liquidity based on spreads is significantly positively related to R^2_R, R^2_{RV}, and R^2_{TV}. Panel B (Panel C) shows regression results of all four commonality measures on negative and positive market returns (large negative, small, and positive market returns). The estimation results are comparable for commonality in spreads, liquidity, turnover, and returns. We conclude that our measure of commonality in liquidity based on the Amihud liquidity measure displays similar patterns of time-series variation as a measure of commonality in liquidity based on detailed microstructure data.

3.5 Time-series analysis of commonality in less/more developed countries

If the economic and institutional development of a country has a bearing on the extent that shocks to the demand for and the supply of stocks and liquidity affect multiple stocks simultaneously, we expect that commonality is differentially affected by various time-series variables in less and more developed countries. Table 6 reports the estimation results of SUR models in which the coefficients of the independent variables are allowed to differ between less and more developed countries. We use market volatility, interest rates, and gross capital flows as independent variables. We define less developed countries as countries with a below median level of development on three different dimensions: GDP per capita, the good government index, and accounting standards. We note that although these variables are positively correlated across countries, they yield different classifications of less/more developed countries. For example, 12 out of the 35 countries for which the accounting standards index is available are classified differently on the basis of this variable than on the basis of GDP per capita.

The positive effect of market volatility on R^2_R, R^2_{RV}, and R^2_{TV} is substantially more pronounced for less developed countries. The effect of volatility is roughly twice as large in less than in more developed countries. A Wald test indicates that the differences

are statistically significant (*p*-values are below 0.001). Our interpretation is as follows. In less developed countries, traders and financial intermediaries facing binding funding constraints as a result of high volatility are more likely to reduce their positions in many securities simultaneously, because of weak governance and poor transparency. Consistent with this argument, we find that the positive impact of interest rates on commonality stems entirely from less developed countries.

Gross capital flows have a positive effect on commonality in less developed countries, but a negative effect in more developed countries. This finding suggests that stock markets benefit from financial openness, but only when a certain threshold level of development has been reached. In line with this conjecture, Chinn and Ito (2006) conclude that "… a higher level of financial openness contributes to the development of equity markets only if a threshold level of general legal systems and institutions is attained." A complementary view is that in less developed markets, foreign investors are less well informed than local investors (see, e.g., Brennan and Cao, 1997; Choe, Kho, and Stulz, 2005; Dvorak, 2005). It is therefore possible that foreign investors have an incentive to move in and out of securities across the board in these countries, which leads to greater commonality. In more developed countries, capital market openness decreases the extent to which the returns, liquidity, and turnover of individual stocks are correlated. This effect is consistent with the evidence of Grinblatt and Keloharju (2000) that foreign investors are more sophisticated and better informed than domestic investors in Finland (a country in our sample that is classified as developed based on each of the three measures of development).

We examine the effect of market declines on commonality in less and more developed countries in Table 7. For all three commonality measures and for all three development criteria, we find that the impact of large negative market returns on commonality is significantly greater in less developed countries. We argue that emerging markets are more fragile during large market declines because of a lack of economic and institutional development. When financial intermediaries hit their funding constraints in less developed countries, they cut down their positions and the supply of liquidity for many individual stocks. As a result, investors in these countries face a reduced provision of liquidity exactly when they need it most. Since commonality in returns also increases

during market declines, there is also an adverse effect on the potential of investors to diversify the risk of individual stocks within a country.

A second result in Table 7 is that the difference in the coefficient on large positive market returns in less and more developed countries is often statistically significant. Large positive market returns have a positive impact on commonality in less developed markets. This effect is relatively small and not consistently significant across different development measures for R^2_R and R^2_{RV}. But for R^2_{TV}, the coefficient on large positive market returns in less developed markets is highly significant and of the same order of magnitude as the coefficient on large negative returns. The activity of positive feedback traders is less likely to reflect information-based trading in less developed markets. It is therefore plausible that this activity affects multiple securities at the same time in these markets, inducing higher commonality in returns, liquidity, and turnover.

Our time-series regressions not only reveal a number of common determinants of time-series variation in commonality in returns, liquidity, and turnover, but also show that measures of corporate governance and transparency affect their relation with the commonality measures in a common way. It is remarkable that all the differences between the SUR coefficients for less/more developed countries reported in Tables 6 and 7 have the same sign for R^2_R, R^2_{RV}, and R^2_{TV} (with the exception of one case in which the difference if insignificant) and the vast majority are statistically significant

4. Conclusions

This paper uncovers common cross-country and time-series patterns in commonality in stock returns, liquidity, and trading activity in 40 stock markets around the world. We observe much greater co-movement in the returns, liquidity, and turnover of individual stocks in emerging markets than in developed stock markets. The extent of commonality in a country is inversely related to measures of its economic and institutional development. Commonality is greater in countries with weak corporate governance and an opaque information environment.

Our analysis also uncovers substantial time-series variation in commonality in returns, liquidity, and turnover. We show that commonality becomes greater during times of market turmoil, when market volatility and interest rates increase and when there is a large decline in the market. The effects of an increase in market volatility and interest

rates and a large drop in the market are more pronounced in poorer countries with weaker institutions. We find evidence that capital market openness can mitigate systematic co-variation in returns, liquidity, and turnover, but only for countries that are sufficiently developed.

We interpret the evidence as being consistent with theoretical models in which changes in asset values affect liquidity through an effect on the wealth and collateral of financial intermediaries – see, e.g., Kyle and Xiong (2001) and Brunnermeier and Pedersen (2007). During financial crises, intermediaries are forced to reduce their positions and the supply of liquidity, which leads to a drop in both the price and the liquidity of individual stocks. Since their response to tightening funding constraints affects many securities at the same time, commonality increases. This effect is stronger in countries in which market participants have limited access to information about firms and cannot rely on harvesting the future returns of their investments because of poor transparency and weak investor protection.

Our results suggest that commonality in returns, liquidity, and trading activity is driven by common economic forces. Although our time-series regressions point at an important role for factors that are related to the capital constraints of financial intermediaries, there may be alternative explanations for the link between co-movement in stock returns, liquidity, and turnover that we have not considered. In particular, attributes of the demand for stocks and liquidity across countries and over time (for example, the characteristics and trading behavior of investors in different markets and different periods) may help to understand the common causes of variation in commonality in returns, liquidity, and turnover. We invite future theoretical and empirical work to address these issues.

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Table 1: Summary statistics

This table reports the average market return (R), Amihud (2002) liquidity (RV), and turnover (TV), as well as the average and the standard deviation of commonality in returns (R^2_R), commonality in Amihud liquidity (R^2_{RV}), and commonality in turnover (R^2_{TV}) for 40 countries. Countries are listed in order of decreasing GDP per capita. The first three columns present the number of stocks in the sample, the first month in the sample, and GDP per capita (in US$) in 2003 for each country. The next four columns contain the time-series averages (over the period from the first month in the sample to 2004:12) of the value-weighted average of R (% per month), RV, and TV (% per day) across the individual stocks in each country. The time-series standard deviation of R is also reported. The final six columns depict the time-series average and the time-series standard deviation of the equally-weighted average of R^2_R, R^2_{RV}, and R^2_{TV} across the individual stocks in each country. Stock returns are in % per month and in local currency. Monthly liquidity for individual stocks is calculated as the average of the daily Amihud measures – computed as the absolute stock return divided by local currency trading volume. The Amihud measure is multiplied by –10,000. Turnover for individual stocks is defined as the average daily volume over the number of shares outstanding. Commonality for individual stocks is measured by the R^2 of monthly regressions of daily values of R, RV, and TV for individual stocks on the (lead, lag, and contemporaneous) aggregate values of R, RV, and TV at the country level. The screening procedures applied in the selection of the sample are described in section 2. The final row contains correlation coefficients of the variables in the columns of the table with GDP per capita. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	# stocks	From	GDP per capita	Market return		Liquidity	Turnover	R^2_R (%)		R^2_{RV} (%)		R^2_{TV} (%)	
				mean	st.dev.	mean	mean	mean	st.dev.	mean	st.dev.	mean	st.dev.
Japan	1,391	1995:01	37,549	-0.08	5.01	-0.00	0.18	28.75	6.92	8.51	2.75	25.11	6.25
Norway	219	1995:01	37,165	1.21	5.71	-0.11	0.29	28.10	8.13	7.44	2.26	20.41	3.78
United States	2,253	1995:01	34,590	1.39	4.15	-0.03	0.37	27.43	7.79	7.76	3.43	20.85	4.05
Switzerland	252	1995:01	33,443	1.13	5.42	-0.94	0.18	24.91	5.71	6.89	1.91	20.41	3.39
Denmark	193	1995:01	29,672	1.04	4.43	-0.07	0.20	24.90	6.54	7.03	1.81	20.68	4.25
Sweden	447	1995:01	27,033	1.26	6.61	-0.08	0.35	26.53	6.95	7.19	2.10	19.44	3.20
Ireland	42	2000:07	24,864	1.20	5.76	-0.35	0.19	25.21	7.24	8.75	5.75	22.60	4.77
Hong Kong	886	1995:01	24,810	1.18	8.77	-0.10	0.21	30.85	8.97	7.53	2.46	24.92	5.56
United Kingdom	2,411	1995:01	24,423	0.90	4.41	-0.17	0.37	25.09	5.24	7.55	2.80	18.62	2.76
Austria	112	1995:01	23,808	0.78	4.22	-1.20	0.16	25.28	5.60	7.12	2.95	24.17	6.34
Netherlands	222	1995:01	23,300	0.92	5.40	-0.14	0.40	26.40	6.73	6.97	2.99	20.73	4.26
Finland	140	1996:02	23,200	1.93	9.65	-0.41	0.31	28.51	9.73	7.22	2.91	20.71	6.21
Canada	1,323	1995:01	22,966	1.29	4.15	-0.90	0.24	20.58	3.71	7.44	2.45	18.46	2.11
Singapore	418	1995:01	22,767	0.74	8.07	-1.11	0.14	30.68	8.77	8.16	2.40	26.79	7.14
Germany	1,467	1995:01	22,750	0.39	6.83	-4.94	0.17	31.65	10.65	6.93	2.70	23.37	7.24

Table 1, continued

	# stocks	From	GDP per capita	Market return		Liquidity	Turnover	R^2_R (%)		R^2_{RV} (%)		R^2_{TV} (%)	
				mean	st.dev.	mean	mean	mean	st.dev.	mean	st.dev.	mean	st.dev.
Belgium	141	1995:01	22,240	0.95	5.15	-0.55	0.10	26.53	6.85	8.08	3.19	23.58	4.33
France	994	1995:01	22,217	1.11	5.72	-0.96	0.29	23.13	4.09	6.97	1.90	20.64	2.72
Australia	1,417	1995:01	20,229	1.08	3.27	-0.80	0.23	22.39	6.22	6.74	1.44	20.25	3.41
Italy	331	1995:01	18,631	1.05	6.36	-0.21	0.36	29.54	7.96	9.09	5.38	23.00	6.13
Israel	102	1995:01	18,257	1.35	6.51	-1.29	0.10	50.32	11.63	9.32	4.46	35.08	9.63
Taiwan	693	1995:01	13,953	0.09	7.99	-0.01	0.78	41.49	12.42	16.71	13.02	30.89	7.47
Spain	178	1995:01	13,861	1.40	5.58	-0.19	0.33	30.15	8.40	8.90	7.68	21.47	5.09
New Zealand	122	1995:01	13,399	1.03	4.00	-1.53	0.12	23.07	7.26	7.19	4.18	20.29	4.02
South Korea	789	1995:01	10,890	0.52	10.80	-0.00	0.83	32.93	10.00	10.50	6.26	25.07	8.25
Portugal	83	1995:01	10,405	0.98	5.46	-1.31	0.17	29.77	9.18	8.03	4.58	22.10	6.07
Greece	355	1995:01	10,265	1.25	9.73	-3.18	0.22	43.29	14.61	13.10	8.55	23.00	7.64
Argentina	63	1995:01	7,927	2.01	10.05	-0.88	0.06	49.48	15.53	10.41	6.30	31.70	8.68
Mexico	99	1995:01	5,934	1.83	8.00	-0.05	0.11	43.35	10.57	11.42	7.19	32.20	7.92
Chile	118	1995:01	4,965	1.02	5.93	-0.00	0.04	37.04	9.93	7.66	2.78	23.83	5.54
Poland	101	1996:07	4,309	0.67	8.21	-1.46	0.11	36.56	10.68	7.46	3.03	23.21	5.25
Malaysia	644	1995:01	3,875	0.56	9.95	-1.44	0.11	39.16	13.06	10.13	4.40	30.46	8.77
Brazil	162	1999:02	3,538	3.01	8.45	-0.83	0.22	38.17	7.62	8.26	5.54	26.86	5.20
Turkey	219	1995:01	2,956	5.36	16.80	-10.96	0.57	46.78	12.76	13.63	7.75	30.12	7.69
South Africa	581	1995:01	2,910	1.04	6.27	-0.64	0.14	26.26	7.61	7.32	2.21	20.83	4.18
Thailand	157	1995:01	2,021	0.03	11.27	-0.09	0.25	41.20	9.03	8.10	2.94	32.93	7.59
Philippines	176	1995:01	991	0.18	9.59	-0.16	0.11	32.14	8.84	6.94	2.28	21.40	5.80
China	1,246	1995:01	856	0.68	8.35	-0.09	0.51	53.80	15.57	16.28	10.39	42.68	15.89
Indonesia	305	1995:01	728	1.75	11.59	-0.00	0.14	31.21	9.23	7.14	1.98	26.80	7.62
India	398	1995:02	450	0.99	8.11	-0.41	0.16	34.54	10.35	10.54	5.41	22.27	4.73
Pakistan	78	1995:01	441	0.87	11.47	-0.18	0.88	47.30	11.56	9.38	6.08	26.40	8.64
correlation with GDP per capita				-0.17	-0.63[a]	0.16	-0.07	-0.61[a]	-0.57[a]	-0.40[a]	-0.40[a]	-0.48[a]	-0.50[a]

Table 2: Correlations between aggregate returns, liquidity, turnover, and commonality in returns, liquidity, and turnover

This table presents cross-sectional and time-series correlations between returns (R), liquidity (RV), turnover (TV), commonality in returns (R^2_R), liquidity (R^2_{RV}), and turnover (R^2_{TV}). Panel A depicts the cross-sectional correlations between the time-series averages of R, RV, TV, R^2_R, R^2_{RV}, and R^2_{TV} across 40 countries. Panel B shows the time-series correlations between monthly R, RV, TV, R^2_R, R^2_{RV}, and R^2_{TV} over the period 1995:01-2004:12. The table cells contain the average time-series correlation across the 40 countries. The number of countries that have a negative, respectively a positive correlation are presented in parentheses. The construction of the variables is described in Table 1.

PANEL A: CROSS-SECTIONAL CORRELATIONS

	R	RV	TV	R^2_R	R^2_{RV}	R^2_{TV}
R	1					
RV	-0.65	1				
TV	0.05	-0.07	1			
R^2_R	0.22	-0.24	0.22	1		
R^2_{RV}	0.16	-0.25	0.47	0.72	1	
R^2_{TV}	0.09	-0.12	0.14	0.85	0.69	1

PANEL B: TIME-SERIES CORRELATIONS

	R	RV	TV	R^2_R	R^2_{RV}	R^2_{TV}
R	1					
RV	0.12 (8,32)	1				
TV	0.24 (6,34)	-0.03 (24,16)	1			
R^2_R	-0.28 (39,1)	-0.13 (28,12)	0.03 (13,27)	1		
R^2_{RV}	-0.04 (24,16)	-0.06 (22,18)	0.04 (16,24)	0.28 (4,36)	1	
R^2_{TV}	-0.01 (22,18)	-0.06 (27,13)	0.05 (15,25)	0.37 (0,40)	0.24 (1,39)	1

Table 3: Cross-sectional regressions of commonality in returns, liquidity, and turnover on country characteristics

This table reports OLS estimation results of cross–sectional regressions of the logistic transformation of the time–series average of aggregate commonality in returns (R^2_R), liquidity (R^2_{RV}), and turnover (R^2_{TV}) in 40 countries on various country characteristics. Panel A depicts the estimated coefficient in regressions on individual country characteristics as well as the R^2 of the regression. Panel B shows estimation results of regressions on both Ln (GDP per capita) and individual country characteristics. Panel C presents estimates of regressions on multiple country characteristics and a number of control variables. The country characteristics and the control variables are described in Table A1. Intercepts are suppressed to conserve space. Significance at the 1%, 5%, and 10% level (based on standard errors that are robust for heteroskedasticity) is indicated by [a], [b], and [c], respectively.

PANEL A: CROSS-SECTIONAL REGRESSIONS ON INDIVIDUAL COUNTRY CHARACTERISTICS

	R^2–returns		R^2–liquidity		R^2–turnover		# obs.
	char.	R^2	char.	R^2	char.	R^2	
Economic/financial development							
Ln (GDP per capita)	-0.1709 [a]	0.32	-0.0690 [b]	0.12	-0.0894 [b]	0.19	40
Stock market cap. / GDP	-0.0017 [b]	0.09	-0.0008 [b]	0.05	-0.0010	0.06	40
Bank deposits / GDP	-0.3250 [c]	0.10	-0.1462 [c]	0.06	-0.0570	0.01	38
Bank concentration	-0.4797 [c]	0.05	-0.4241 [c]	0.08	-0.2590	0.03	39
Investor protection							
Good government index	-0.0534 [a]	0.50	-0.0199 [b]	0.16	-0.0251 [a]	0.28	38
Judicial efficiency	-0.0861 [a]	0.28	-0.0247 [a]	0.25	-0.0455 [a]	0.20	38
Rule of law	-0.1144 [a]	0.44	-0.0392 [b]	0.14	-0.0590 [a]	0.26	40
Information environment							
Accounting standards	-0.0171 [b]	0.22	-0.0085 [b]	0.12	-0.0084 [c]	0.12	35
Financial disclosure	-0.0135 [a]	0.37	-0.0085 [a]	0.35	-0.0066 [a]	0.23	37
Accounting principles	0.0001	0.00	0.0008	0.03	0.0001	0.00	37
Analyst following	-0.0175 [b]	0.13	-0.0110 [b]	0.13	-0.0086 [b]	0.08	37
Media development	-0.0126 [a]	0.39	-0.0053 [a]	0.23	-0.0054 [b]	0.19	36
Control variables							
Ln (Geographical size)	0.0224	0.02	0.0126	0.01	0.0048	0.00	40
Ln (Number of stocks)	-0.0929	0.07	0.0057	0.00	-0.0361	0.02	40
GDP growth volatility	0.0061	0.01	-0.0020	0.00	0.0085	0.03	40
Industry Herfindahl index	0.0177	0.05	0.0036	0.00	0.0039	0.01	40
Firm Herfindahl index	0.0063	0.00	-0.0187	0.06	-0.0060	0.01	40

Table 3, continued

PANEL B: CROSS-SECTIONAL REGRESSIONS ON INDIVIDUAL COUNTRY CHARACTERISTICS AND LN (GDP PER CAPITA)

	R^2–returns			R^2–liquidity			R^2–turnover			# obs.
	lnGDPp/c	**char.**	**R^2**	**lnGDPp/c**	**char.**	**R^2**	**lnGDPp/c**	**char.**	**R^2**	
Economic/financial development										
Stock market cap. / GDP	-0.1600 [a]	-0.0005	0.33	-0.0606 [c]	-0.0004	0.12	-0.0820 [c]	-0.0003	0.20	40
Bank deposits / GDP	-0.1416 [a]	-0.0989	0.29	-0.0402	-0.0821	0.11	-0.0724 [b]	0.0586	0.14	38
Bank concentration	-0.1673 [a]	-0.0857	0.32	-0.0570	-0.2897	0.15	-0.0872 [b]	-0.0535	0.19	39
Investor protection										
Good government index	0.1640 [b]	-0.0911 [a]	0.56	0.0977	-0.0423 [b]	0.22	0.1047 [b]	-0.0492 [a]	0.35	38
Judicial efficiency	-0.0761	-0.0540	0.31	0.0124	-0.0444	0.14	-0.0065	-0.0428 [c]	0.20	38
Rule of law	-0.0124	-0.1085 [b]	0.45	0.0057	-0.0512 [c]	0.18	-0.0103	-0.0541	0.26	40
Information environment										
Accounting standards	-0.1189 [b]	-0.0126 [c]	0.33	-0.0527	-0.0065	0.17	-0.0503	-0.0065	0.17	35
Financial disclosure	-0.1037 [b]	-0.0100 [a]	0.46	-0.0094	-0.0081 [b]	0.36	-0.0269	-0.0057 [b]	0.24	37
Accounting principles	-0.1737 [a]	0.0009	0.31	-0.0527	-0.0065	0.30	-0.0664 [b]	0.0004	0.11	37
Analyst following	-0.1508 [a]	-0.0078	0.32	-0.0419	-0.0083	0.16	-0.0512	-0.0053	0.14	37
Media development	0.2797	-0.0306 [a]	0.43	0.2185 [c]	-0.0193 [b]	0.31	0.2757 [b]	-0.0232 [a]	0.29	36
Control variables										
Ln (Geographical size)	-0.1871 [a]	-0.0232	0.34	-0.0726 [b]	-0.0050	0.12	-0.1037 [a]	-0.0204	0.22	40
Ln (Number of stocks)	-0.1619 [a]	-0.0538	0.34	-0.0730 [b]	0.0233	0.12	-0.0869 [c]	-0.0152	0.20	40
GDP growth volatility	-0.1751 [a]	-0.0042	0.32	-0.0755 [b]	-0.0064	0.13	-0.0860 [c]	0.0035	0.20	40
Industry Herfindahl index	-0.1671 [a]	0.0151	0.36	-0.0685 [c]	0.0025	0.12	-0.0888 [b]	0.0025	0.19	40
Firm Herfindahl index	-0.1753 [a]	0.0141	0.34	-0.0642 [b]	-0.0157	0.16	-0.0888 [b]	-0.0019	0.19	40

Table 3, continued

PANEL C: CROSS-SECTIONAL REGRESSIONS ON MULTIPLE COUNTRY CHARACTERISTICS AND CONTROL VARIABLES												
	R^2–returns				R^2–liquidity				R^2–turnover			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Intercept	0.0870	0.5280	0.1771	-0.2079	-2.0913 [a]	-1.8319 [a]	-2.3078 [a]	-2.6627 [a]	-0.5653	-0.4213	-0.5265	-1.2260
Ln (GDP per capita)	0.1451 [b]	0.1129 [c]	0.1297 [c]	0.2157	0.0703	0.0620	0.0857	0.1681	0.0811	0.0737	0.0776	0.2134 [c]
Good government index	-0.0874 [a]	-0.0766 [a]	-0.0879 [a]	-0.039 [a]	-0.0353 [c]	-0.0258	-0.0391 [b]	-0.0352	-0.0430 [c]	-0.0368 [c]	-0.0424 [b]	-0.0362 [c]
Accounting standards	0.0010				-0.0031				0.0006			
Financial disclosure		-0.0044				-0.0052				-0.0022		
Analyst following			-0.0024				-0.0056				0.0020	
Media development				-0.0073				-0.0074				-0.0109
Ln (Geographical size)	-0.0185	-0.0199	-0.0198	-0.0107	-0.0140	-0.0116	-0.0108	0.0016	-0.0282 [b]	-0.0283 [b]	-0.0291 [b]	-0.0216 [c]
Ln (Number of stocks)	-0.0136	0.0056	0.0174	0.0062	0.0367	0.0129	0.0386	0.0089	-0.0201	-0.0152	-0.0222	-0.0069
GDP growth volatility	0.0037	0.0021	0.0032	0.0004	0.0027	-0.0003	0.0003	-0.0033	0.0108	0.0104	0.0118	0.0091
Industry Herfindahl index	0.0138	0.0055	0.0111	0.0038	0.0214	0.0154 [c]	0.0210 [c]	0.0121	0.0056	0.0023	0.0062	-0.0016
Firm Herfindahl index	-0.0013	0.0089	0.0049	0.0174	-0.0364 [c]	-0.0284 [b]	-0.0298 [c]	-0.0159	-0.0080	-0.0048	-0.0106	0.0053
R^2	0.62	0.67	0.65	0.68	0.42	0.48	0.42	0.45	0.45	0.47	0.46	0.48
# observations	35	37	37	36	35	37	37	36	35	37	37	36

Table 4: Time-series regressions of commonality in returns, liquidity, and turnover on country-level time-series variables

This table presents estimation results of time-series regressions of the logistic transformation of aggregate commonality in returns (R^2_R), liquidity (R^2_{RV}), and turnover (R^2_{TV}) in 40 countries on different groups of country-level time-series variables. The column labeled 'SUR coef.' depicts the estimated coefficients in three different seemingly unrelated regression (SUR) models: (i) Capital market conditions, (ii) Macroeconomic conditions, and (iii) International conditions. The table also presents the number of negative and positive coefficients (as well as the number of coefficients that is significant at the 10% level) in 40 country-by-country time-series regressions on the same groups of variables. Finally, the table shows the number of observations in the SUR model and the average R^2 across the 40 individual country regressions. The "International conditions" regressions are not run for the U.S. because the capital flow data are only available to/from the U.S. The country-level time-series variables are described in Table A3. Intercepts are suppressed to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	R^2–returns			**R^2–liquidity**			**R^2–turnover**		
	SUR coef.	**# < 0 (# sign.<0)**	**# > 0 (# sign.>0)**	**SUR coef.**	**# < 0 (# sign.<0)**	**# > 0 (# sign.>0)**	**SUR coef.**	**# < 0 (# sign.<0)**	**# > 0 (# sign.>0)**
Model (i): Capital market conditions									
Market return	-0.8857 [a]	40 (30)	0 (0)	-0.2216 [a]	26 (7)	14 (4)	0.3362 [a]	19 (1)	21 (5)
Market volatility	0.4342 [a]	0 (0)	40 (38)	0.1541 [a]	8 (0)	32 (17)	0.1659 [a]	2 (0)	38 (25)
Market liquidity	9.6378	16 (6)	24 (12)	-7.0517	16 (8)	24 (9)	5.7186	21 (6)	19 (5)
Market turnover	-16.2289 [a]	25 (6)	15 (3)	-2.8152	16 (1)	24 (2)	-17.5115 [a]	17 (5)	23 (4)
	# obs: 4612	avg. R^2: 0.50		# obs: 4612	avg. R^2: 0.14		# obs: 4612	avg. R^2: 0.15	
Model (ii): Macroeconomic conditions									
Inflation	0.0021 [b]	26 (13)	14 (4)	0.0034 [a]	22 (5)	18 (3)	0.0032 [a]	21 (4)	19 (6)
Industrial production	0.0027 [a]	19 (4)	21 (6)	-0.0000	19 (6)	21 (2)	-0.0012 [b]	26 (6)	14 (1)
Short-term interest rate	0.0098 [a]	7 (1)	33 (22)	0.0027 [a]	15 (5)	25 (14)	0.0025 [a]	11 (3)	29 (10)
	# obs: 4418	avg. R^2: 0.13		# obs: 4418	avg. R^2: 0.06		# obs: 4418	avg. R^2: 0.08	
Model (iii): International conditions									
U.S. market return	1.2753 [a]	9 (0)	30 (10)	0.2308	12 (5)	27 (4)	0.2173	12 (0)	27 (2)
EAFE market return	-0.0252 [a]	37 (24)	2 (0)	-0.0040	23(4)	16 (4)	-0.0043 [c]	31 (3)	8 (0)
Net % equity flow	0.0002 [c]	18 (3)	21 (4)	0.0004 [a]	16 (1)	23 (7)	0.0006 [a]	11 (0)	28 (8)
Gross capital flow / GDP	-0.0013 [a]	28 (13)	11 (3)	-0.0004 [a]	24 (8)	15 (3)	-0.0005 [a]	29 (15)	10 (2)
Exchange rate	0.0084 [a]	12 (1)	27 (10)	0.0015	19 (3)	20 (3)	0.0021 [c]	19 (0)	20 (3)
	# obs: 4340	avg. R^2: 0.16		# obs: 4340	avg. R^2: 0.08		# obs: 4340	avg. R^2: 0.08	

Table 5: Time-series regressions of commonality in returns, liquidity, and turnover on market returns

This table reports estimation results of time-series regressions of the logistic transformation of aggregate commonality in returns (R^2_R), liquidity (R^2_{RV}), and turnover (R^2_{TV}) in 40 countries on the contemporaneous market return in that country. The table depicts the estimated coefficients in two different seemingly unrelated regression (SUR) models that relate the commonality measures to different groups of independent variables. The table also presents the number of negative and positive coefficients (as well as the number of coefficients that is significant at the 10% level) in 40 country-by-country time-series regressions on the same variables. In regression model (i), the independent variables are negative market returns (R_M^-) and positive market returns (R_M^+). In regression model (ii), the independent variables are large negative market returns (R_M^{L-}), small market returns (R_M^S), and large positive market returns (R_M^{L+}). Large negative (positive) market returns are defined as returns that are more than one standard deviation below (above) the mean market return for each country. For each country, the standard deviation of the market return is greater than the mean, see Table 1. Finally, the table shows the number of observations in the SUR model and the average R^2 across the 40 individual country regressions. Intercepts are suppressed to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	R^2–returns			**R^2–liquidity**			**R^2–turnover**		
	SUR coef.	**# < 0 (# sign.<0)**	**# > 0 (# sign.>0)**	**SUR coef.**	**# < 0 (# sign.<0)**	**# > 0 (# sign.>0)**	**SUR coef.**	**# < 0 (# sign.<0)**	**# > 0 (# sign.>0)**
Model (i): negative/positive market returns									
R_M^-	-3.2421 [a]	39 (38)	1 (0)	-1.4754 [a]	26 (16)	14 (1)	-1.0856 [a]	35 (15)	5 (1)
R_M^+	0.5157 [a]	20 (2)	20 (4)	0.5864 [a]	17 (1)	23 (5)	0.9983 [a]	7 (0)	33 (15)
	# obs: 4612	avg. R^2: 0.16		# obs: 4612	avg. R^2: 0.05		# obs: 4612	avg. R^2: 0.06	
Model (ii): large/small negative/positive market returns									
R_M^{L-}	-2.2814 [a]	40 (36)	0 (0)	-0.9222 [a]	26 (13)	14 (1)	-0.6432 [a]	33 (19)	7 (1)
R_M^S	-1.3007 [a]	37 (19)	3 (0)	-0.0373 [a]	19 (6)	21 (1)	0.3985 [a]	13 (1)	27 (4)
R_M^{L+}	0.0685	22 (3)	18 (4)	0.2807 [a]	19 (3)	21 (6)	0.6685 [a]	10 (0)	30 (10)
	# obs: 4612	avg. R^2: 0.16		# obs: 4612	avg. R^2: 0.05		# obs: 4612	avg. R^2: 0.06	

Table 6: Time-series regressions of commonality in returns, liquidity, and turnover on country-level time-series variables for less/more developed countries

This table shows estimation results of various seemingly unrelated regression (SUR) models that relate the logistic transformation of aggregate commonality in returns (R^2_R), commonality in liquidity (R^2_{RV}), and commonality in turnover (R^2_{TV}) in 40 countries to three different country-level time-series variables separately. The estimated coefficient on each independent variable is allowed to be different for less developed vs. more developed countries. Less/more developed countries are defined as countries with a below/above-median value for the following three country characteristics: (i) GDP per capita, (ii) Good government index, and (iii) Accounting standards. For each of the 27 SUR models, the table presents the estimated coefficients for both groups of countries as well as the results of a Wald test on the equality of these coefficients. The country characteristics and country-level time-series variables are described in Table A1 and Table A3, respectively. Intercepts in all SUR models are equal for less/more developed countries and are suppressed to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	R^2–returns				**R^2–liquidity**				**R^2–turnover**			
	SUR coefficient		Wald		**SUR coefficient**		Wald		**SUR coefficient**		Wald	
	below median	above median	equality test	(*p*-value)	below median	above median	equality test	(*p*-value)	below median	above median	equality test	(*p*-value)
(i) Below/above median GDP per capita												
Market volatility	0.4614[a]	0.2910[a]	1514.3	(<0.001)	0.1758[a]	0.0724[a]	243.0	(<0.001)	0.1843[a]	0.0882[a]	318.5	(<0.001)
Short-term interest rate	0.0103[a]	-0.0195[a]	532.8	(<0.001)	0.0042[a]	-0.0169[a]	157.7	(<0.001)	0.0041[a]	-0.0121[a]	192.8	(<0.001)
Gross capital flow / GDP	0.0101[a]	-0.0011[a]	485.4	(<0.001)	0.0066[a]	-0.0002[a]	141.2	(<0.001)	0.0056[a]	-0.0004[a]	208.1	(<0.001)
(ii) Below/above median Good government index												
Market volatility	0.4587[a]	0.2369[a]	2276.0	(<0.001)	0.1799[a]	0.0642[a]	291.5	(<0.001)	0.1737[a]	0.0510[a]	396.3	(<0.001)
Short-term interest rate	0.0087[a]	-0.0745[a]	2475.6	(<0.001)	0.0043[a]	-0.0285[a]	325.3	(<0.001)	0.0035[a]	-0.0402[a]	1160.9	(<0.001)
Gross capital flow / GDP	0.0120[a]	-0.0009[a]	841.2	(<0.001)	0.0044[a]	-0.0002[a]	81.0	(<0.001)	0.0068[a]	-0.0003[a]	297.1	(<0.001)
(iii) Below/above median Accounting standards												
Market volatility	0.4834[a]	0.3469[a]	1185.8	(<0.001)	0.1859[a]	0.1471[a]	18.1	(<0.001)	0.1791[a]	0.1064[a]	215.3	(<0.001)
Short-term interest rate	0.0119[a]	-0.0164[a]	922.4	(<0.001)	0.0065[a]	-0.0037	80.0	(<0.001)	0.0048[a]	-0.0150[a]	487.9	(<0.001)
Gross capital flow / GDP	0.0021[a]	-0.0012[a]	337.0	(<0.001)	-0.0004	-0.0004[a]	0.0	(0.9285)	0.0013[a]	-0.0005[a]	90.0	(<0.001)

Table 7: Time-series regressions of commonality in returns, liquidity, and turnover on market returns for less/more developed countries

This table shows estimation results of various seemingly unrelated regression (SUR) models that relate the logistic transformation of aggregate commonality in returns (R^2_R), commonality in liquidity (R^2_{RV}), and commonality in turnover (R^2_{TV}) in 40 countries to the contemporaneous market return in that country. The estimated coefficient on each independent variable is allowed to be different for less developed vs. more developed countries. Less/more developed countries are defined as countries with a below/above-median value for the following three country characteristics: (i) GDP per capita, (ii) Good government index, and (iii) Accounting standards. The independent variables – large negative market returns (R_M^{L-}), small market returns (R_M^{S}), and large positive market returns (R_M^{L+}) – are defined in Table 5. For each of the 9 SUR models, the table presents the estimated coefficients for both groups of countries as well as the results of a Wald test on the equality of these coefficients. The country characteristics and country-level time-series variables are described in Table A1 and Table A3, respectively. Intercepts in all SUR models are equal for less/more developed countries and are suppressed to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	R^2–returns			**R^2–liquidity**			**R^2–turnover**		
	SUR coefficient		Wald	**SUR coefficient**		Wald	**SUR coefficient**		Wald
	below median	above median	equality test (*p*-value)	below median	above median	equality test (*p*-value)	below median	above median	equality test (*p*-value)
(i) Below/above median GDP per capita									
R_M^{L-}	-3.0382[a]	-1.1956[a]	73.8 (<0.001)	-1.5800[a]	0.1402	68.0 (<0.001)	-0.8244[a]	-0.3299[b]	8.3 (0.0040)
R_M^{S}	-0.8228[a]	-2.4829[a]	49.6 (<0.001)	-0.0823	-1.0059[a]	12.3 (<0.001)	1.0416[a]	-0.7954[a]	81.2 (<0.001)
R_M^{L+}	0.5841[a]	-0.9667[a]	85.3 (<0.001)	0.4647[a]	-0.0844	9.9 (0.0016)	1.0047[a]	-0.0707	56.8 (<0.001)
(ii) Below/above median Good government index									
R_M^{L-}	-3.1451[a]	-1.1412[a]	72.0 (<0.001)	-1.6909[a]	0.1977	76.7 (<0.001)	-1.0065[a]	-0.1024	23.8 (<0.001)
R_M^{S}	-0.4546[a]	-2.7929[a]	86.0 (<0.001)	-0.0396	-1.0302[a]	13.2 (<0.001)	1.1156[a]	-0.8723[a]	84.3 (<0.001)
R_M^{L+}	0.4525[a]	-1.0468[a]	70.9 (<0.001)	0.5968[a]	-0.2168	20.2 (<0.001)	1.0093[a]	-0.3418[a]	78.6 (<0.001)
(iii) Below/above median Accounting standards									
R_M^{L-}	-3.1490[a]	-1.5840[a]	59.6 (<0.001)	-1.3196[a]	-0.6956[a]	6.6 (0.0102)	-1.2154[a]	-0.3190[b]	24.5 (<0.001)
R_M^{S}	-0.3033	-2.1087[a]	56.2 (<0.001)	-0.3334	-0.4472[b]	0.1 (0.7093)	0.9792[a]	-0.3273[b]	35.5 (<0.001)
R_M^{L+}	0.2861	-0.4719[a]	19.0 (<0.001)	0.2405	0.4653[a]	1.2 (0.2671)	0.8821[a]	0.2655[b]	16.4 (<0.001)

Figure 1: Commonality in returns, liquidity, and turnover in 40 countries

This figure depicts the average commonality in returns (R^2_R), commonality in liquidity (R^2_{RV}), and commonality in turnover (R^2_{TV}) in 40 countries over the period 1995:01-2004:12. The construction of the commonality measures is described in Table 1.

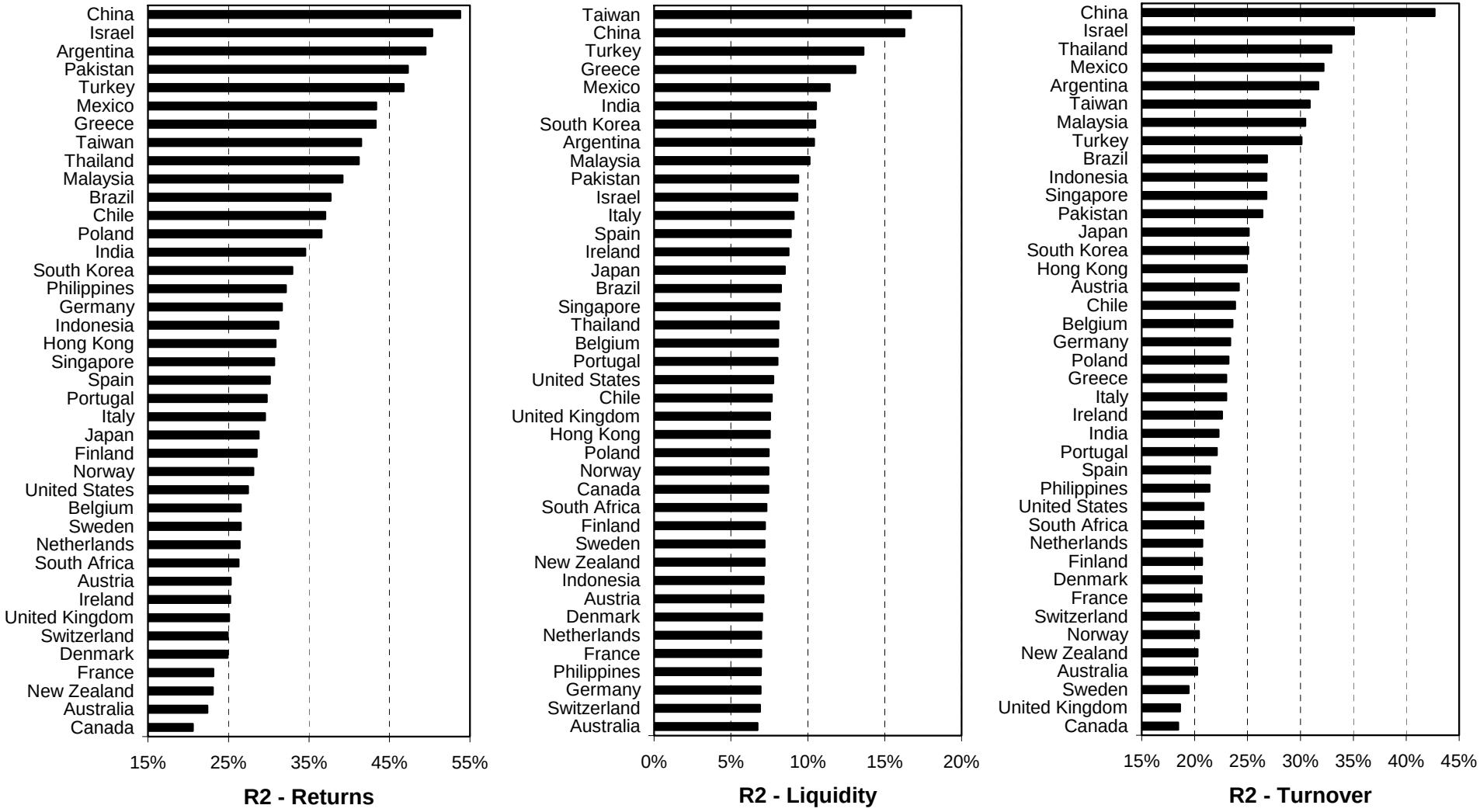
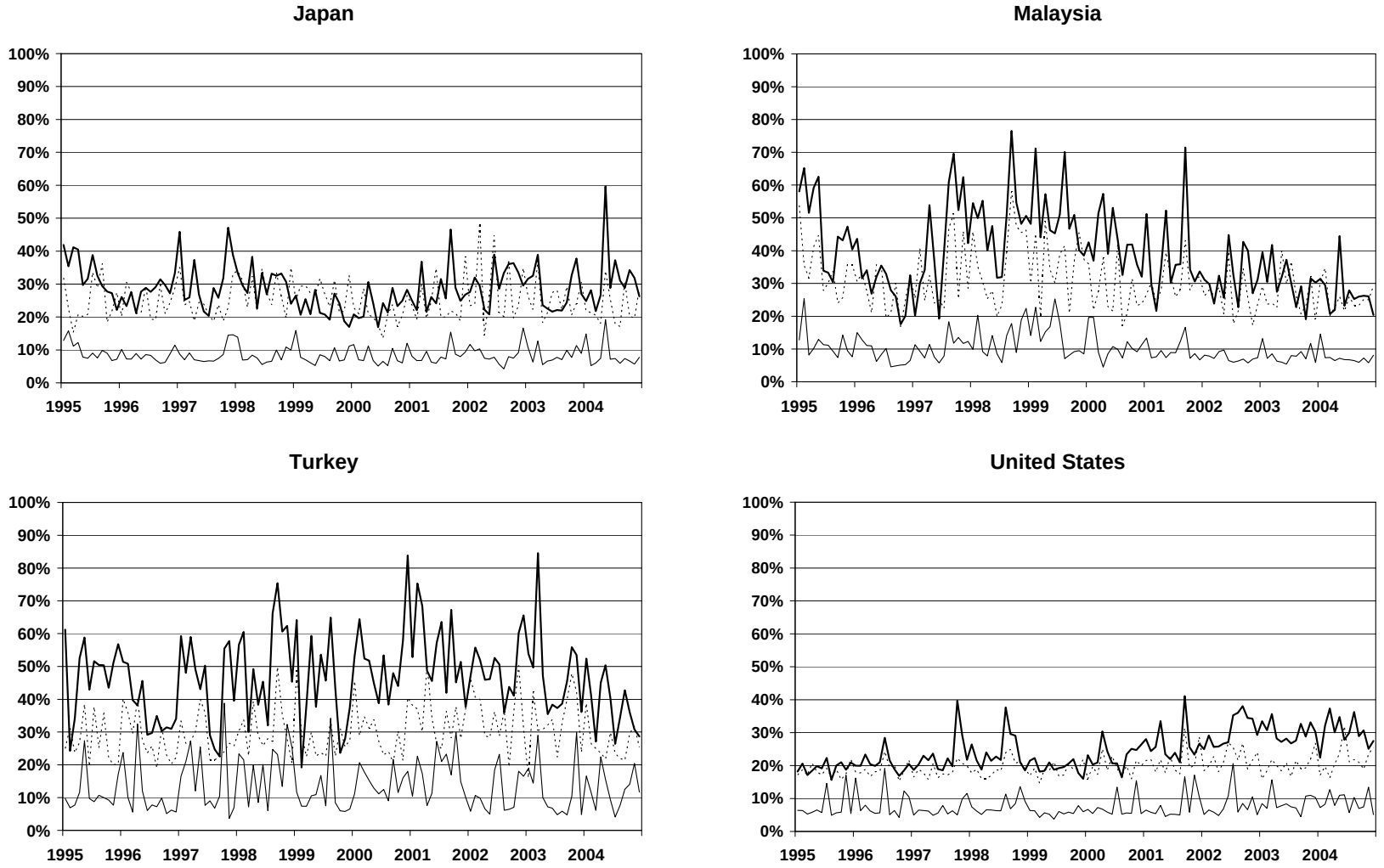


Figure 2: Time-series development of commonality in returns, liquidity, and turnover

This figure depicts the average commonality in returns (R^2_R, thick solid line), commonality in liquidity (R^2_{RV}, thin solid line), and commonality in turnover (R^2_{TV}, dashed line) in four countries for each month during the sample period 1995:01-2004:12. The construction of the commonality measures is described in Table 1.



APPENDIX
Table A1: Country characteristic definitions

VARIABLE	DESCRIPTION	SOURCE
GDP per capita	Gross domestic product per capita (in US$) in 2003.	World Development Indicators
Stock market capitalization / GDP	Stock market capitalization as share of GDP. Average over 1999-2003.	World Development Indicators
Bank deposits / GDP	Demand, time, and saving deposits in deposit money banks as a share of GDP. Average over 1995-2004.	Beck, Demirgüc-Kunt, and Levine (2000)
Bank concentration	Assets of three largest banks as a share of assets of all commercial banks. Average over 1996-2004.	Beck, Demirgüc-Kunt, and Levine (2000)
Good government index	Following Morck et al. (2000), the good government index is defined as the sum of the following three indices from the International Country Risk Guide (each ranging from zero to ten): (i) government corruption, (ii) the risk of expropriation of private property by the government, and (iii) the risk of the government repudiating contracts. Lower scores for each index indicate less respect for private property.	La Porta et al. (1998)
Judicial efficiency	Assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms" produced by the country risk rating agency Business International Corp. Scale from zero to 10 with lower scores indicating lower efficiency levels.	La Porta et al. (1998)
Rule of law	Assessment of the law and order tradition in the country produced by the country risk rating agency International Country Risk (ICR). Scale from zero to 10 with lower scores indicating less tradition for law and order.	La Porta et al. (1998)
Accounting standards	Index created by the Center for Financial Analysis and Research (CIFAR) by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. Lower scores indicate lower accounting standards.	La Porta et al. (1998)
Financial disclosure	Assessment of the prevalence of disclosures concerning research and development (R&D) expenses, capital expenditures, product and geographic segment data, subsidiary information, and accounting methods, on the basis of CIFAR's 1995 International Accounting and Auditing Trends. Lower scores indicate less disclosure.	Bushman et al. (2004)

Table A1, continued

Accounting principles	Assessment of the extent to which (1) financial statements reflect subsidiaries on a consolidated basis and (2) general reserves are used, on the basis of CIFAR's 1995 International Accounting and Auditing Trends. Lower scores indicate weaker principles.	Bushman et al. (2004)
Analyst following	Average number of analysts following the largest 30 firms in each country in 1996.	Chang et al. (2000)
Media development	Average rank of the countries' media development (print and television) between 1993 and 1995. Lower scores indicate lower media development.	World Development Indicators
Ln (Geographical size)	Logarithm of the surface area of the countries in square kilometers.	United Nations Environmental Indicators
Ln (Number of stocks)	Logarithm of the total number of stocks for each country in our sample.	Table 1
GDP growth volatility	Following Morck et al (2000), the standard deviation of the growth in each country's Gross Domestic Product in the period 1995-2004 is used to measure macroeconomic stability	World Economic Outlook
Industry Herfindahl index	Following Morck et al. (2000), the industry Herfindahl index of country *j* is defined as $H_j = \sum_k h_{k,j}^2$, where $h_{k,j}$ is the combined value of the sales of all country *j* firms in industry *k* as a percentage of those of all country *j* firms.	Own computations
Firm Herfindahl index	Following Morck et al. (2000), the firm Herfindahl index of country *j* is defined as $\Gamma_j = \sum_i \gamma_{i,j}^2$, where $\gamma_{i,j}$ is the sales of firm *i* as a percentage of the total sales of all country *j* firms.	Own computations

Table A2: Summary statistics of country characteristics

This table shows summary statistics for the country characteristics used in the cross-sectional regressions reported in Table 3. The columns present the mean, the median, the minimum value, the maximum value, the standard deviation, and the number of observations for each country characteristic.

Country characteristic	Mean	Median	Min	Max	St.Dev.	# obs.
Economic/financial development						
Ln (GDP per capita)	9.15	9.68	6.09	10.53	1.29	40
Stock market cap. / GDP (%)	86.49	62.90	14.30	361.00	68.92	40
Bank deposits / GDP	0.66	0.63	0.22	2.09	0.35	38
Bank concentration	0.23	0.20	0.02	0.62	0.15	35
Investor protection						
Good government index	24.27	25.47	12.94	29.96	4.85	38
Judicial efficiency	7.89	8.88	2.50	10.00	2.25	38
Rule of law	7.63	8.43	2.73	10.00	2.26	40
Information environment						
Accounting standards	64.46	64.00	36.00	83.00	10.00	35
Financial disclosure	85.19	92.75	44.57	100.00	16.84	37
Accounting principles	71.75	68.48	23.91	100.00	25.92	37
Analyst following	14.72	12.87	3.19	32.40	7.73	37
Media development	76.96	83.61	29.51	96.72	18.29	36
Control variables						
Ln (Geographical size)	12.66	12.72	6.52	16.12	2.18	40
Ln (Number of stocks)	5.73	5.47	3.74	7.79	1.07	40
GDP growth volatility (%)	10.98	10.22	1.28	27.62	5.30	40
Industry Herfindahl index (%)	11.35	11.23	3.99	28.72	5.05	40
Firm Herfindahl index (%)	5.16	4.75	0.38	14.99	3.35	40

Table A3: Country-level time-series variable definitions

VARIABLE	DESCRIPTION	SOURCE
Market return / market liquidity / market turnover	Value-weighted average of, respectively, the return (in % per month), the Amihud liquidity (multiplied by minus 1 to arrive at a variable that is increasing in liquidity), and the turnover (in % per day) of all individual stocks in each country in a given month.	Own computations
Market volatility	Standard deviation (in %) of the daily market return of a country within a month. Daily market returns are computed as the value-weighted average of the returns of all individual stocks in each country on a given day.	Own computations
Inflation	% change in the consumer price index of each country, taken from the International Monetary Fund (IMF). Computed as the percentage change relative to the corresponding month in the previous year in order to account for seasonal patterns.	IMF's International Financial Statistics
Industrial production	% change in the industrial production index of each country. Computed as the percentage change relative to the corresponding month in the previous year.	IMF's International Financial Statistics
Short-term interest rate	Short-term interest rate (% per annum). For most countries, we take the short-term Treasury Bill rate (3-months). If that is not available, we use the money market rate, the short-term deposit rate, or the lending rate.	IMF's International Financial Statistics / Datastream
U.S. market return	Market return for the U.S., see description above.	Own computations
EAFE market return	Monthly % return on the "Europe, Australasia, and Far East" index of Morgan Stanley Capital International (MSCI).	MSCI
Net % equity flow	For each country, this variable is calculated as the difference of "Gross sales of foreign stocks by foreigners to U.S. residents" and "Gross purchases of foreign stocks by foreigners from U.S. residents"; computed as a percentage of the sum of gross sales and purchases of foreign stocks by foreigners to/from U.S. residents. A positive net % equity flows indicates that U.S. residents are net buyers of foreign stocks.	Treasury International Capital (TIC)
Gross capital flow / GDP	For each country, this variable is calculated as the sum of "Gross sales of long-term domestic and foreign securities by foreigners to U.S. residents" and "Gross purchases of long-term domestic and foreign securities by foreigners from U.S. residents"; computed as a percentage of the country's gross domestic product in current U.S. dollars in the same year.	Treasury International Capital (TIC)
Exchange rate	Monthly % return in the value of each country's national currency relative to the SDR (or special drawing right), a basket of major currencies used as a unit of account by the IMF. A positive exchange rate return indicates a depreciation of the currency relative to the SDR.	IMF's International Financial Statistics

Table A4: Summary statistics of country-level time-series variables

This table depicts summary statistics for the country-level time-series variables used in the regressions reported in Table 4. The columns present the mean and the standard deviation of each of the variables for 40 countries. Summary statistics for the other variables are presented in Table 1.

	Market volatility		**Inflation**		**Industrial production**		**Short-term interest rate**		**Net % equity flow**		**Gross capital flow / GDP**		**Exchange rate**	
	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.
Argentina	1.85	1.05	4.70	10.47	2.42	8.22	11.20	15.37	1.87	29.31	21.98	12.21	1.18	7.43
Australia	0.70	0.29	2.68	1.68	-0.84	9.36	5.55	1.02	5.70	18.70	35.80	9.08	0.09	2.74
Austria	0.72	0.31	1.71	0.74	4.79	4.05	3.44	0.85	-4.33	41.86	14.60	4.69	-0.03	1.64
Belgium	0.89	0.56	1.76	0.65	2.55	3.98	3.30	0.88	-9.21	31.61	43.66	8.18	-0.01	1.66
Brazil	1.54	0.51	22.27	73.82	2.48	5.55	25.54	11.73	13.72	25.82	19.03	7.14	1.24	7.56
Canada	0.85	0.48	2.02	0.88	3.10	3.59	4.07	1.48	1.34	13.47	145.04	28.32	-0.06	1.96
Chile	0.88	0.45	4.40	2.28	3.09	4.24	8.66	5.17	0.06	42.61	24.41	14.16	0.36	2.55
China	1.64	1.01	3.11	5.71	-0.11	4.89	4.55	3.25	25.78	73.40	16.19	11.09	0.04	1.39
Denmark	0.86	0.42	2.17	0.53	2.33	7.04	3.89	1.22	1.96	40.25	23.76	15.40	-0.02	1.65
Finland	1.91	1.02	1.39	1.00	5.34	4.98	3.56	1.07	11.58	53.76	17.51	9.45	-0.02	1.71
France	1.16	0.58	1.57	0.62	0.52	4.56	3.11	0.66	6.22	20.85	50.33	24.77	-0.04	1.67
Germany	1.30	0.65	1.41	0.52	1.75	2.87	3.23	0.85	1.13	24.96	18.23	8.10	-0.02	1.66
Greece	1.50	0.76	4.67	2.21	1.46	4.62	7.74	4.54	7.81	60.44	8.86	3.82	0.10	1.94
Hong Kong	1.48	0.83	0.88	4.68	-4.64	6.12	4.17	2.56	3.17	17.96	189.90	64.46	0.06	1.36
India	1.49	0.69	6.41	3.72	6.72	3.95	13.00	1.65	36.74	56.30	2.30	1.43	0.34	1.73
Indonesia	1.82	1.09	14.57	18.52	2.38	9.80	19.38	17.80	8.88	47.81	5.85	3.43	1.94	13.90
Ireland	1.09	0.55	3.05	1.54	12.06	9.47	4.23	1.56	7.38	25.99	298.95	179.10	-0.05	1.65
Israel	1.27	0.48	4.94	4.35	2.98	6.67	10.03	3.61	23.69	44.36	40.84	13.34	0.38	2.41
Italy	1.19	0.57	2.75	1.09	1.94	11.93	4.94	2.76	7.00	30.11	13.77	8.42	-0.07	1.87
Japan	1.25	0.49	-0.05	0.88	0.94	5.20	0.28	0.43	12.29	20.78	86.86	15.87	0.12	2.58

Table A4, continued

	Market volatility		Inflation		Industrial prod.		Short-term interest rate		Net % equity flow		Gross capital flow / GDP		Exchange rate	
	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.	mean	st.dev.
Malaysia	1.36	1.14	2.49	1.33	7.80	8.84	4.23	1.85	1.21	51.99	15.39	10.10	0.44	3.44
Mexico	1.41	0.69	15.36	12.32	2.96	6.26	19.25	13.81	-3.95	27.53	15.64	4.51	0.76	4.05
Netherlands	1.13	0.63	2.43	0.93	1.31	2.73	3.05	0.58	-6.46	20.56	59.80	35.46	-0.01	1.65
New Zealand	0.77	0.43	2.04	1.14	4.11	7.83	6.57	1.63	-4.91	48.02	10.23	3.47	0.00	2.78
Norway	1.04	0.49	2.12	1.06	1.48	4.87	5.50	1.80	0.82	44.35	114.62	134.76	-0.02	2.02
Pakistan	1.86	0.95	6.57	3.67	5.43	9.37	8.23	4.32	6.55	121.78	0.88	0.67	0.63	2.58
Philippines	1.32	0.71	5.85	3.17	0.59	4.93	10.67	4.04	11.76	47.86	13.20	5.47	0.80	3.22
Poland	1.69	0.79	10.43	8.50	7.20	6.11	15.86	6.86	17.63	77.73	7.18	4.65	0.25	2.52
Portugal	0.83	0.44	3.09	0.88	2.67	4.64	11.21	2.54	9.92	62.25	17.74	12.98	-0.02	1.80
Singapore	1.19	0.61	0.90	1.02	6.09	11.05	1.43	0.82	0.40	27.99	276.07	56.40	0.16	1.69
South Africa	0.98	0.51	6.44	3.03	2.41	4.23	12.24	3.06	27.09	60.02	3.78	2.07	0.52	4.21
South Korea	2.01	0.93	3.84	1.85	8.48	9.24	7.99	5.06	29.90	44.63	14.84	10.56	0.41	5.50
Spain	1.14	0.54	3.05	0.92	2.51	3.42	4.51	2.30	-1.32	38.27	14.81	5.67	-0.02	1.65
Sweden	1.38	0.74	1.16	1.07	1.61	4.94	4.31	1.81	5.76	39.03	32.67	16.34	-0.03	2.00
Switzerland	0.73	0.37	0.86	0.59	2.13	4.62	1.55	1.02	2.45	23.72	91.42	36.73	-0.05	1.93
Taiwan	1.58	0.59	1.19	1.59	4.91	7.34	4.70	2.36	17.90	53.34	21.57	16.00	-0.06	1.15
Thailand	1.83	0.86	3.41	2.79	6.35	7.87	5.78	5.94	5.68	45.58	16.35	8.97	0.51	4.28
Turkey	2.77	1.23	59.98	28.11	4.98	8.75	62.27	38.88	22.26	65.28	12.85	18.91	3.17	5.01
United Kingdom	0.91	0.48	2.62	0.79	0.60	1.75	5.29	1.12	2.32	8.46	155.82	53.61	-0.11	1.51
United States	1.06	0.52	2.46	0.69	3.26	3.36	3.84	1.80	NA	NA	NA	NA	0.06	1.39

Table A5: Regressions of commonality in spreads, returns, liquidity, and turnover for the U.S.

This table reports estimation results of time-series regressions of the logistic transformations of commonality in spreads, commonality in returns (R^2_R), commonality in liquidity (R^2_{RV}), and commonality in turnover (R^2_{TV}) for the U.S. Commonality in spreads is measured as the equally-weighted average of the R^2 (in %) of monthly regressions of daily values of the proportional quoted spread for individual stocks on the (lead, lag, and contemporaneous) aggregate values of the proportional quoted spread at the country level. Following Hameed, Kang, and Viswanathan (2006), we adjust spreads for deterministic time-series variations such as changes in tick-size, time trend, and calendar effects. Panel A depicts the coefficients of regressions of commonality in spreads on commonality in returns, liquidity, and turnover. Panel B displays the coefficients of regressions of commonality in spreads, returns, liquidity, and turnover on negative market returns (R_M^-) and positive market returns (R_M^+). Panel C presents the coefficients of regressions of commonality in spreads, returns, liquidity, and turnover on large negative market returns (R_M^{L-}), small market returns (R_M^S), and large positive market returns (R_M^{L+}). Large negative (positive) market returns are defined as returns that are more than one standard deviation below (above) the mean market return for each country. Quoted spread data are available for the period 1995:01-2003:12. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

PANEL A: REGRESSIONS OF R^2–SPREADS ON R^2–RETURNS, R^2–LIQUIDITY, AND R^2–TURNOVER

	Intercept	R^2–returns	R^2–liquidity	R^2–turnover	R^2
R^2–spreads	-1.1319 [a]	0.2908 [a]			0.25
R^2–spreads	-0.9305 [a]		0.1965 [a]		0.12
R^2–spreads	-0.8633 [a]			0.4183 [a]	0.19

PANEL B: REGRESSIONS OF COMMONALITY MEASURES ON NEGATIVE/POSITIVE MARKET RETURNS

	Intercept	R_M^-	R_M^+		R^2
R^2–spreads	-1.4785 [a]	-2.1045 [b]	0.7716		0.04
R^2–returns	-1.1795 [a]	-7.5559 [a]	2.0288		0.19
R^2–liquidity	-2.7283 [a]	-5.7617 [a]	3.6087 [b]		0.09
R^2–turnover	-1.4570 [a]	-4.1226 [a]	1.7112 [c]		0.15

PANEL C: REGRESSIONS OF COMMONALITY MEASURES ON SMALL/LARGE, NEGATIVE/POSITIVE MARKET RETURNS

	Intercept	R_M^{L-}	R_M^S	R_M^{L+}	R^2
R^2–spreads	-1.4628 [a]	-1.9436 [b]	-0.0172	0.7362	0.05
R^2–returns	-1.0987 [a]	-6.4487 [a]	-2.9666	2.2815 [c]	0.24
R^2–liquidity	-2.6953 [a]	-5.4858 [a]	2.9621	2.9579 [b]	0.10
R^2–turnover	-1.4294 [a]	-3.8406 [a]	0.6131	1.4775 [c]	0.16