National culture of secrecy and stock price synchronicity: cross-country evidence

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Abstract

This study investigates the relationship between the culture of secrecy and stock price comovement using a large sample of firms in 49 countries over the period 1990 to 2019. We find that stock prices in secretive societies comove more than stock prices in less secretive societies. This higher comovement occurs primarily because idiosyncratic volatility is lower. We attribute this finding to cultural biases in secretive societies which deter investors' information-seeking behavior. To support these conjectures, we provide evidence of stronger mean reversals (less informed trading) in these societies. Our results persist when we account for cross-country differences in firms' liquidity and information asymmetry, and when we control for cash flow uncertainty. Finally, the enforcement of insider trading laws in secretive countries is associated with less privately informed trading and lower idiosyncratic volatility.

Keywords: Culture of secrecy, Stock price synchronicity, idiosyncratic volatility, disclosure, private information

JEL codes: G14; G41; E71

1. Introduction

Why do stock prices comove more in some countries? For instance, in countries such as the U.S. and the U.K., stock price comovement, as measured by stock price synchronicity, is substantially lower than that in countries such as China or Saudi Arabia. In this study, we ask whether a deep-rooted social characteristic, such as a culture of secretiveness, is related to this cross-country heterogeneity in return comovement. To this end, we add to a rich but contradictory literature that examines cross-country determinants of stock price synchronicity (Morck et al., 2000; Jin and Myers, 2006; Bartram et al., 2012; Li et al., 2014; Eun et al., 2015; Fetherolf and Lovelace, 2023).

The literature on stock price synchronicity is based on the seminal work of Roll (1988). Roll finds that U.S. stocks exhibit low market model R^2 and suggests that the unexplained (firm-specific) variation can capture private information, noise, or both. Consequently, much of the discussion on what determines return comovement revolves around the interpretation of firm-specific variation (or idiosyncratic volatility). One strand of the literature supports the "*price informativeness*" hypothesis, suggesting that higher firm-specific return variation (lower R^2) reflects more informative stock prices (Morck et al., 2000; Jin and Myers, 2006; Kim et al., 2014). Others, however, propose an alternative "*noise*" hypothesis. For instance, Brandt et al. (2010) find that the jump in idiosyncratic volatility documented by Campbell et al. (2001) can be attributed to speculative trading by retail investors. To reconcile these conflicting hypotheses, Bartram et al. (2012) argue that there is both good and bad idiosyncratic volatility, and Kelly (2014) suggests that high firm-specific variation is associated with both private information and noise. Therefore, to address our research question, we should examine how secrecy relates to both components of R^2 - market-specific and firm-specific variation - with a particular emphasis on the latter.

To shed more light on the drivers of firm-specific variation, we also rely on Roll (1988). According to his conjectures, firms' fundamentals are impounded into stock prices via two channels: (i) the disclosure of public information, such as quarterly earnings, and (ii) the trading of investors who collect private information. Roll argues that the latter channel is more important than the former in explaining firm-specific return variation. Notably, he states that "*The financial press misses a great deal of relevant information generated privately*" [p. 564]. On these grounds, Veldkamp (2006) proposes a theoretical model where the amount of private information produced for a firm is associated with higher firm-specific return variation and lower stock price synchronicity.

Secrecy is important to understand why disclosure and private information acquisition vary across countries. From the disclosure perspective, societal secrecy refers to the managerial preference of withholding information from corporate outsiders, such as investors (Gray, 1988). Therefore, it is not surprising that the disclosure quality is worse in more secretive societies (Gray and Vint, 1995; Doupnik and Riccio, 2006). In turn, this lack of information sharing may exacerbate the existing information asymmetries between insiders and outsiders (Xu et al., 2020). Thus, in the presence of high information asymmetry, outsiders may be less tempted to engage in information acquisition. This is of particular importance in secretive societies, where people tend to avoid uncertainties and accept unequal distribution of power (Gray, 1998). Thus, from the private information perspective, societal secrecy is associated with more risk averse and uncertainty avoidant outside investors, which are less likely to produce their own information. This argument aligns with Chen et al. (2022), who find that investors in secretive societies are less informed relative to investors in nonsecretive societies.

We use a large sample of stock return data for all MSCI developed and emerging markets (49 countries) over the period 1990 to 2019. Our measure of synchronicity is based on the R^2 obtained from an expanded market model, as in Morck et al. (2000). To construct our main variable of interest, we follow Hope et al. (2008) and other empirical studies (Chen et al., 2017; Pasiouras et al., 2021), and we develop an overall index of national culture of secrecy (*Secrecy*) that is based on the conceptual model of Gray (1988). To proxy for disclosure quality, we use the first principal component of five frequently used variables: good government index (Morck et al., 2000), accounting disclosure (Jin and Myers, 2006), freedom of press (Kim et al., 2014), analysts' diversity (Chan and Hameed, 2006), and timeliness of reporting (Shaiban, 2011). Finally, we proxy private information acquisition using the private information trading measure of Llorente et al. (2002).

Our baseline results are summarized as follows. Synchronicity is higher in secretive societies, primarily because idiosyncratic volatility is lower. This finding is robust to the inclusion of numerous control variables (firm-level and/or country level) and fixed effects (industry and/or year fixed effects). Economically, one standard deviation increase in *Secrecy* is associated with a 10.50% (15.70%) increase in stock price synchronicity at the country-level (firm-level). As a next step, we investigate whether disclosure and/or private information explain our results, and particularly, the lower idiosyncratic volatility in secretive societies.

We first examine the role of disclosure quality. Consistent with previous studies, we find that disclosure is negatively associated both with secrecy (Gray, 1988; Doupnik and Riccio, 2006) and synchronicity (Morck et al., 2000; Jin and Myers, 2006). However, the latter relationship is mainly explained by the negative relationship between disclosure and systematic risk, while its relationship with idiosyncratic risk is statistically insignificant in most cases. Turning to our second mechanism, we report a negative association between secrecy and our private information proxy. Importantly, we show that private information is negatively correlated with synchronicity and positively correlated with idiosyncratic volatility. These results survive several robustness checks and provide some preliminary evidence that the lower idiosyncratic volatility in secretive societies is associated with a less information-seeking investor behavior.

Roll (1988) acknowledges that idiosyncratic volatility may not be solely attributed to private information, as it could also arise from a "frenzy" unrelated to concrete information. On these grounds, Li et al. (2014) and Kelly (2014) find that idiosyncratic volatility is higher in stocks with low liquidity and high information asymmetry. These findings could challenge the interpretation of our results for two reasons. First, there is substantial heterogeneity in firms' liquidity and information asymmetry between secretive versus non-secretive countries, which we may not have fully accounted for in our regressions. Second, Llorente et al. (2002) report that their private information measure is high in firms with high asymmetric information, which can itself lead to higher idiosyncratic volatility. To address the first concern, we follow Bartram et al. (2012), and we match firms across countries based on liquidity and information asymmetry proxies. Then, we regress differences in characteristics between matching groups. To address the second concern, we conduct a subsample analysis to examine whether the positive relationship between private information and idiosyncratic volatility persists even in low information asymmetry firms. The results support our main inferences.

Thus far, our analysis misses an important factor; uncertainty about firms' cash flows. Pastor and Veronesi (2003, 2006) propose theoretical models in which idiosyncratic volatility of cash flows increases idiosyncratic volatility of stock returns, a prediction which is later confirmed by several empirical studies (Wei and Zhang, 2006; Irvine and Pontiff, 2009). More recently, Bekaert et al. (2024) show that commonality in country idiosyncratic return variances can be explained by a global aggregate measure of idiosyncratic cash flow variance. Hence, failing to control for the cash flow uncertainty could lead to omitted variable bias if this uncertainty is correlated with the culture of secretiveness. To alleviate these concerns, we employ the measure of idiosyncratic cash flow volatility proposed by Bekaert et al. (2024). Consistent with the aforementioned studies, we find that cash flow uncertainty is strong and positively correlated with idiosyncratic return volatility. Nonetheless, our results regarding secrecy and private information remain qualitatively similar.

Then, we examine how the enforcement of insider trading laws relates to our results. In secretive societies, cultural biases may deter outside investors from following insiders' trades. This lack of monitoring provides more flexibility for insiders to capitalize on their inside private information (Frankel and Li, 2004). Hence, insiders' private information will be revealed through trading, unless the country has enforced insider trading laws. Altogether, if insider trading is permitted in secretive countries, we expect both private information and idiosyncratic volatility to be higher relative to secretive countries with enforced prohibitions. To test these conjectures, we employ a propensity score matching (PSM) approach using the first-enforcement year of Bhattacharya (2023) as the beginning of the treatment period. The findings are consistent with our expectations and provide support for our private information measure and its relationship with idiosyncratic volatility.

As a final step in our empirical analysis, we examine how endogeneity may bias our results. Reserve causality should not be a major concern in our empirical setting since culture is unlikely to be driven by stock price synchronicity. Furthermore, we alleviate omitted variable bias concerns by including a wide range of controls, along with year and/or industry fixed effects, in our regression models. Nevertheless, it is important to acknowledge the potential measure error in our survey-based measure of secretiveness. To address this, we employ a two-stage least squares (2SLS) regression methodology using the ethnolinguistic fractionalization as the instrumental variable (IV). The results of this analysis confirm our baseline findings.

Due to the absence of an exogenous cultural shock, we are unable to draw causal inferences. Nevertheless, in this paper, we show that there is greater return comovement in secretive societies, a finding which may be helpful for investors and fund managers. In fact, identifying cross-country patterns in return comovement could facilitate the construction of well-diversified global portfolios (Bekaert et al., 2009; Eun et al., 2015) boost the profitability of momentum strategies (Chen and Doukas, 2022), and reduce the adverse selection risk of liquidity providers (Brockman et al., 2024).

It is worth noting that unlike previous studies, we do not treat R^2 as a proxy for price informativeness. Instead, we use it as a starting point to examine cross-country patterns in return comovement and then break it down into its components. Similarly, we do not use our results on private information to infer that idiosyncratic volatility exclusively captures firm-specific information, since we cannot rule out market frenzies as an alternative explanation. Therefore, on the debate regarding the interpretation of idiosyncratic volatility we align with Kelly (2014), who points out: "*privately informed trade does cause prices to deviate from the market-model expected return, however, there remain other sources unrelated to firm-specific information as well*" [p. 4].

The rest of the paper is organized as follows. Section 2 discusses our data collection process and our methodology. Section 3 presents our empirical results. Section 4 outlines our main robustness tests. Section 5 concludes.

2. Data and methodology

In the subsections that follow, we first define the data selection criteria, and the variables used in the analysis. Then, we discuss the methodological setting. Further information about the variables and their sources is available in Table A1 of the Appendices.

2.1. Data selection

Our dataset includes stock return data for all MSCI developed and emerging markets. More precisely, for these countries, we download stock returns from Datastream (using the total return index) over the period 1990 to 2019. Then, we apply two criteria to filter our sample. First, we only include stocks that have at least 30 weeks of stock return data in a given year. Second, we exclude country-year observations in cases where the country has less than 25 stocks that meet the first criterion in that year. To account for the presence of outliers, we winsorize each firm's stock returns at the 1% and 99% levels, as in Francis et al. (2015).

2.1.1. Stock price synchronicity and its components

To calculate the measure of stock price synchronicity, we follow Morck et al. (2000), Jin and Myers (2006), and Eun et al. (2015). More specifically, R^2 is obtained using the following expanded market model:

$$r_{i,j,t} = a_{i,j} + b_{1,i} r_{m,j,t} + b_{2,i}\left[r_{U.S.,t} + ER_{j,t}\right] + b_{3,i} r_{m,j,t-1} + b_{4,i}\left[r_{U.S.,t-1} + ER_{j,t-1}\right] + b_{5,i} r_{m,j,t-2} + b_{6,i}\left[r_{U.S.,t-2} + ER_{j,t-2}\right] + b_{7,i} r_{m,j,t+1} + b_{8,i}\left[r_{U.S.,t+1} + ER_{j,t+1}\right] + b_{9,i} r_{m,j,t+2} + b_{10,i}\left[r_{U.S.,t+2} + ER_{j,t+2}\right] + \varepsilon_{i,j,t} \quad (1)$$

Returns on Eq. (1) are on a weekly basis (Wednesday to Wednesday). We do so to account for any calendar anomalies, such as the Monday effect (An and Zhang, 2013; Francis et al., 2015). In the equation, *i* denotes a firm index, *j* denotes a country index, and *t* is a time indicator (week). In this regard, $r_{i,j,t}$ is the weekly return of firm *i* of country *j* in week *t* of a year, and $r_{m,j,t}$ is the domestic market index return in the same time period.[1] Furthermore, the term $r_{U.S.,t} + ER_{j,t}$ stands for the U.S. market return, adjusted for changes in the local currency against the U.S. dollar. Furthermore, we include lags and leads to avoid thin trading issues (Dimson, 1979). Finally, each year, we calculate the country R^2 as the average R^2 of all firms in that country.

Considering that the R^2 obtained by Eq. (1) is highly skewed and is within the interval [0, 1], we apply the following logistic transformation of R^2:

$$Synchronicity_{j,t} = Ln\left(\frac{R^2_{j,t}}{1-R^2_{j,t}}\right) \quad (2)$$

[1] For each country *j*, we measure the domestic market index return using the Datastream Global Equity Indices.

where $Synchronicity_{j,t}$ is the stock price synchronicity of country *j* in year *t*, and $R^2_{j,t}$ is the R^2 obtained from Eq. (1) for country *j* in year *t*.

Stock price synchronicity, measured by R^2, reflects the relative size of firm-specific and market-specific variation. In other words, a high R^2 may indicate low levels of firm-specific variation, high levels of market-specific variation or both. Following Morck et al. (2000), we decompose our stock price synchronicity measure into market-specific variation and firm-specific variation. *Market-specific variation* is the average explained sum of squares as measured by Eq. (1), and *Firm-specific variation* is the average residual sum of squares as measured by Eq. (1). In our regressions, we use the natural logarithm of these subindices as the dependent variable.[2]

Previous studies on stock price synchronicity produce conflicting results depending on whether the analysis has been conducted at the country level or at the firm level. Dasgupta et al. (2010) offer the following explanation for this inconsistency: at the firm level, an increase in R^2 can be the outcome of an increase in market-specific variation, a decrease in firm-specific variation, and an increase in beta. They suggest that the mixed results on R^2 can be reconciled by the beta effect, which is ignored in country-level regressions. To alleviate this concern, we also conduct our analysis at the firm level. We measure stock price synchronicity using Eq. (2); however, this time we use the firm-level R^2 from Eq. (1) instead of the country's mean value. Furthermore, we include the firm-level beta in our models. Following Bartram et al. (2012), we decompose firm-level synchronicity into systematic risk and idiosyncratic volatility. *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1).

2.1.2. Indicator of the Culture of Secrecy

Building on Gray (1988) and Hope et al. (2008), we construct the key independent variable of secrecy with the use of the following three dimensions of national culture from Hofstede (1980): uncertainty avoidance, power distance, and individualism.[3]

Starting with the cultural dimension of uncertainty avoidance, Gray (1988) argues in favor of a positive relationship between uncertainty avoidance and secrecy. The underlying idea is that societies that are characterized by strong uncertainty avoidance will restrict the dissemination of information to

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[2] We do not apply the logistic transformation of Eq. (2) in this case, as these two variables are not bounded between unit and zero.

[3] Uncertainty avoidance is defined as "*the extent to which the members of a culture feel threatened by ambiguous or unknown situations*" (Hofstede et al., 2010, p. 191). Power distance is defined *as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally* (Hofstede et al., 2010, p. 61). Individualism (versus collectivism) "*stands for a society in which the times between individuals are loose: everyone is expected to look after him-or herself and his or her immediate family only*" (Hofstede et al., 2010, p. 519).

avoid conflict, restrict the uncertainties of competition and preserve security (Gray, 1988; Gray and Vint, 1995; Hope et al., 2008). The framework of Gray (1988) also points toward a positive association between a culture of power distance and secrecy, since people in high-power distance societies are expected to restrict information to preserve power inequalities. At the same time, people in these societies engage in less information-seeking behavior. For instance, Hofstede et al. (2010) found that in societies with a culture of large power distance, people read relatively few newspapers, and scandals involving those in power are well-expected and more easily kept secret. Finally, secrecy is consistent with a preference for collectivism rather than individualism (Gray, 1988). This happens because the focus is on the interest of the group most closely involved with the management of the corporation, rather than external parties like potential investors and the general public (Gray, 1988; Gray and Vint, 1995). As a result, people in collectivistic societies tend to be more secretive and less willing to share information with external parties compared to those in individualist societies (Mazboudi and Hasan, 2018).

Based on the above conceptual framework, Hope et al. (2008) suggest the estimation of an indicator of national culture secrecy to be used in empirical research. This is defined as the summation of uncertainty avoidance (UA) and power distance (PD) scores less the individualism (IND) score from Hofstede's framework, i.e., SECRECY = UA + PD – IND. Thus, we follow this approach, which has been widely employed in recent studies (Chen et al., 2017; Mazboudi and Hasan, 2018; Kanagaretnam et al., 2019; Pasiouras et al., 2021). All the scores for the national culture dimensions are from Hofstede Insights.

We should mention here that the national culture dimensions of Hofstede, and by extension our indicator of the culture of secrecy, are time invariant. While one could argue in favor of a time variant indicator, our approach is consistent with numerous studies that use the individual dimensions as well as with past studies on the culture of secrecy. There are two reasons that justify this approach. First, many scholars argue that: (i) differences in values between societies are deeply rooted in history and drive socioeconomic developments rather than the other way around (Beugelsdijk et al., 2015), and (ii) national culture remains stable over long time periods (Hofstede et al., 2010; Hofstede, 2011).[4] Second, Beugelsdijk et al. (2015) empirically show that while there can be some changes in individual dimensions of culture over time, such changes are absolute rather than relative. Hence, Hofstede's cultural values remain comparable in a cross-country setting such as ours.

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[4] For example, Hofstede (2011) mentions that "*Culture changes basic enough to invalidate the country dimension index rankings, or even the relevance of the dimensional model, will need either a much longer period – say, 50 to 100 years – or extremely dramatic events. Many differences between national cultures at the end of the 20th century were already recognizable in the years 1900, 1800 and 1700 if not earlier. There is no reason why they should not play a role until 2100 or beyond*" (p.22).

2.1.3. Country-related disclosure characteristics

To proxy for disclosure, we employ five variables that have been frequently used in previous literature. First, to account for the institutional environment, we use the good government index constructed as in Eun et al. (2015). This is calculated by taking the summation of the percentile ranks of the following two indices from the World Bank's Worldwide Governance Indicators (WGI) Project: (i) government effectiveness and (ii) control of corruption.[5] In general, a bad government has been associated with a lack of protection of private property, which in turn serves as a proxy for more opaqueness and shifts firm-specific risk from outside investors to inside managers (Jin and Myers, 2006). Along these lines, Morck et al. (2000) suggest that in countries with weak investor protection from corporate insiders, problems such as intercorporate income shifting could make firm-specific information less useful to risk arbitrageurs and therefore hinder its capitalization into stock prices.

The second indicator reflects the country-level perceptions about the strength of accounting and auditing standards. Data are from the Executive Opinion Survey of the World Economic Forum (WEF). The index that we use is based on the response to the following survey question: "*In your country, how strong are financial auditing and reporting standards?*". The respondents choose an answer in the range of 1 (extremely weak) to 7 (extremely strong), with the individual answers being aggregated at the country level by the WEF in the Global Competitiveness Report.[6]

Third, to account for the dissemination of information in the markets through the press, we control for the freedom of the press, as in Kim et al. (2014). We use annual information from Freedom House, which classifies countries into three groups based on its annual Freedom of the Press Survey. These are as follows: (i) Free rated as 1, (ii) Partly Free rated as 2, and (iii) Not Free rated as 3. Hence, a higher score indicates a lack of freedom of the press.

Fourth, as in Jin and Myers (2006), we control for the role of the diversity of analysts' forecasts using the following indicator:

[5] Data in the WGI project became first available in 1996, and were then published in 1998, 2000, 2002. After that point they became available on an annual basis. Thus, for the years 1997, 1999, and 2001 we take the average from the year before and the year after (e.g., average of 1996 and 1998 for 1997, etc.). Given that such indicators of the institutional environment do not change substantially from one year to the other, to avoid the loss of information, we use the 1996 values for the period 1990-1995. Furthermore, the results do not change when we restrict the analysis in the years 1996-2019. These estimations are available from the authors upon request.

[6] Data for this indicator are available on an annual basis for the period 2006-2019. This variable is similar to the one used in Jin and Myers (2006). In more detail, Jin and Myers (2006) also rely on a survey-based measure from the 1999 and 2000 Global Competitiveness Reports, where participants were asked to assess on a scale from 1 (strongly disagree) to 7 (strongly agree): (i) the extent to which "The level of financial disclosure required is extensive and detailed", and (ii) the ''availability of information". However, this question is not available in more recent versions of the Global Competitiveness Report, having been replaced by the variable that we use in our study. The correlation between the "accounting standards" indicator that we use and the "disclosure" variable in Jin and Myers (2006) is greater than 0.85. In untabulated regressions we use the original 1999-2000 data from Jin and Myers (2006) as a robustness test. The results remain the same.

$$Analyst\ diversity_{i,j,t} = \frac{\sigma_{i,j,t} / |\mu_{i,j,t}|}{\sqrt{N_{i,j,t}}} \quad (3)$$

where $\sigma_{i,j,t}$ is the standard deviation of analysts' forecasts of the firm's i earnings in year t, $\mu_{i,j,t}$ is the mean forecast of the firm's i earnings in year t, $N_{i,j,t}$ is the number of analysts following the firm i in year t, and j denotes a country index. We collect data on analysts' earnings forecasts from the Institutional Broker's Estimate System (I/B/E/S). In each year t, for each country j, country analyst diversity is the average analyst diversity of all firms in that country. We use the absolute value of mean earnings forecasts in Eq. (3) because any negative values could underestimate the degree of diversity of analysts' opinions.

Finally, our fifth disclosure variable is the measure of timeliness of financial reporting from Bushman et al. (2004), which considers the answers to the following interim reporting questions: (i) frequency of reports, (ii) count of disclosed times, and (iii) consolidation of interim reports. The indicator of timeliness is the average percentile rank within the sample of countries across these categories. Thus, higher values of the timeliness indicator reflect a higher frequency and comprehensiveness of financial accounting information reported by firms.

Ideally, we would prefer to use all five variables in the same regression model to account for different dimensions of information dissemination. However, since some of these variables are highly correlated, their simultaneous inclusion could raise multicollinearity concerns. To alleviate such concerns, we employ a Principal Component Analysis (PCA) technique. PCA allows us to reduce the dimensionality of correlated variables while retaining most of the variance in the original data (Abdi and Williams, 2010). For this reason, PCA has recently gained popularity among finance scholars (Correa and Goldberg, 2022; Pasiouras and Samet, 2022). Therefore, we extract the first principal component (*Disclosure*), which we use as our proxy for disclosure throughout the remainder of the study. It is noteworthy that *Disclosure* explains approximately 44% of the variance of the five original variables (Eigenvalue = 2.19).[7]

2.1.4. Acquisition of private information

[7] The second principal component explains 20.79% of the variance (Eigenvalue = 1.00011). Therefore, it explains as much variance as a single original variable. Hence, to facilitate readability, we report results only with the first principal component. However, the inclusion of the second component does not alter the interpretation of our results. Additionally, the Appendix presents further results with the use of the 5 disclosure variables (Table A2-A5).

Llorente et al. (2002) model investors' trading behaviors by examining trading volume and its relationship with stock return autocorrelation. Their model assumes that investors trade either to rebalance their portfolios for risk sharing (hedging) or to speculate on private information. Furthermore, they argue and show that these two different types of trades result in different volume-return dynamics.

For instance, when investors sell the stock for hedging purposes, the selling pressure decreases the stock return. Considering that the expectations for future stock payoffs remain the same, the lower returns of the current period will be followed by higher returns in the future period (negative autocorrelation). In contrast, when investors sell the stock due to speculation on their private information, the expectations for the future stock payoffs may decrease as the negative private information will be impounded into stock prices. Hence, the low return of the current period will be followed by a low return in the next period (positive autocorrelation). Llorente et al. (2002) argue that this pattern should be more observable in periods of high trading volume, where informational shocks are more likely to occur. To empirically test their predictions, they develop a private information measure that is based on stock return autocorrelation conditional on trading volume. They show that stocks with high (low) levels of informed trading exhibit return continuation (return reversals) following high-volume days.

To construct this private information acquisition measure, we estimate the following time-series regression for each firm-year:

$$r_{i,j,t} = a_{i,j} + \beta_{i,j} r_{i,j,t-1} + \gamma_{i,j} V_{i,j,t-1} + \theta_{i,j} r_{i,j,t-1} V_{i,j,t-1} + e_{i,j,t} \qquad (4)$$

where $r_{i,j,t}$ is the daily return of firm i of country j in day t of a year and $V_{i,j,t-1}$ is the log turnover detrended by subtracting a 200-days moving average. The coefficient of the interaction between stock return autocorrelation and trading volume, $\theta_{i,j}$, is the measure of private information acquisition.[8] Higher values of θ indicate a higher level of private information incorporated into stock prices. For our firm-level regressions, we use θ as obtained by Eq. (4). For our country-level regressions, we follow Fernandes and Ferreira (2009), and we use the median θ of firms within each country j in a year. Notably, several prominent studies in the field have used θ as a proxy of private information acquisition (Ferreira and Laux, 2007; Fernandes and Ferreira, 2009; Fresard, 2012; De Cesari and Huang-Meier, 2015).

[8] Llorente et al. (2002) do not include the main effect of the detrended log turnover in their calculations. In this case, $\theta_{i,j}$ may capture not only the joint effect of turnover with return autocorrelation, but also the effect of turnover itself. Therefore, to account for this issue, we also include the main effect of turnover in our calculations.

2.1.5. Control variables

We include several control variables commonly used in the relevant literature. Morck et al. (2000) argue that higher synchronicity might simply reflect fewer traded stocks. To account for this, they include the logarithm of the number of listed stocks in each market in their estimations. We follow the same approach, which is also consistent with Jin and Myers (2006), Fernandes and Ferreira (2009), and Eun et al. (2015). We also use the natural logarithm of GDP per capita to control for the overall economic development of a country (Morck et al., 2000; Jin and Myers, 2006; Doan et al., 2020) and its geographical size in square kilometers to account for the fact that smaller countries might have more geographically localized activities with implications for stock price comovement (Morck et al., 2000; Fernandes and Ferreira, 2009). To control for macroeconomic instability, we use the standard deviation of GDP growth, as in Morck et al. (2000), Jin and Myers (2006), Fernandes and Ferreira (2009), and Eun et al. (2015). Following the same studies, we use the firm Herfindahl index and the industry Herfindahl index. Countries with relatively few and large firms or industries are expected to have high R^2s. This is because having listed firms concentrated in a few industries means that their fundamentals could be highly correlated and their stock prices highly synchronous (Morck et al., 2000). Similarly, in markets dominated by a few very large firms, it is highly likely that the remaining listed firms will be suppliers or customers of these dominant firms, leading to a high degree of stock price synchronicity (Morck et al., 2000).

Firm fundamentals might also move together. To account for this, Morck et al. (2000) suggest the construction of an earnings comovement index of the firms' return on assets in each country. This index is constructed in a way that is analogous to the R^2 of stock price synchronicity, but it measures the synchronicity of firm fundamentals instead. Therefore, to calculate the earnings comovement index, we use the R^2 of the following regression model:

$$ROA_{i,j,t} = a_{i,j} + b_{i,t} ROA_{m,j,t} + \varepsilon_{i,j,t} \quad (5)$$

where $ROA_{i,j,t}$ is the return on assets (ROA) of firm *i* in country *j* in year *t*, and $ROA_{m,j,t}$ is the domestic market ROA in the same year. Each year, for every firm, the ROA regression is estimated using a five-year rolling window, as in Chan et al. (2013). Following Goldeng et al. (2008), we exclude observations if a firm's ROA is higher than 100% or lower than –100%. The former case means that the firm's profits were higher than its assets in a given year, while the latter case means that the firm lost all its assets in a given year. For each year, the country R^2 is measured at the average R^2 of all firms in the country. We calculate the country's ROA synchronicity as the logistic transformation of the country R^2.

Finally, we include two more control variables. First, we account for illiquidity using the bid-ask spread as in Chung and Zhang (2014). For each year, the country's bid-ask spread is the average bid-ask spread of all firms in the country. Second, we control for market return volatility. Li et al. (2014) purpose that the inclusion of market return volatility allows us to obtain more robust inferences regarding the determinants of synchronicity.

2.1.6. Descriptive statistics

Table 1 presents the list of the 49 countries of the sample and the corresponding period that we use to measure stock price synchronicity. We also show information about the main independent variable of interest (*Secrecy*), our five disclosure-related variables (*Good government index*, *Accounting standards*, *Lack of free press*, *Analyst diversity*, and *Timeliness of Reporting*),[9] and our measure of private information acquisition. The data reveal some interesting patterns. Countries with lower values of *Secrecy* (i.e., Australia, Canada, Denmark, U.S., among others) have low R^2, better disclosure, and higher values of *Private information*.

[Insert Table 1 Around Here]

Table 2 presents summary statistics for all variables, and Table 3 shows the correlation coefficients. In general, the summary statistics are similar to those reported in previous country-level studies (Morck et al., 2000; Jin and Myers, 2006; Eun et al., 2015). The correlation matrix shows a modest degree of correlation between the independent variables. As mentioned before, the highest correlations are between the disclosure variables. However, the use of their first principal component alleviates multicollinearity concerns. As a matter of fact, in all our regression models, variance inflation factors (VIFs) are well below 10. Thus, multicollinearity should not be an issue in our model specifications. To conserve space, we show summary statistics and correlations at the country level. Finally, one important takeaway from the correlation matrix is that both *Disclosure* and *Private information* appear to be lower in secretive societies.

[Insert Tables 2 and 3 Around Here]

2.2. Methodology

[9] Due to data availability, information about the accounting standards variable is restricted to the period 2006-2019. Similarly, information about the lack of press freedom is restricted to the period 2001-2016.

2.2.1. Model specification

To address our main research question, we conduct our analysis both at the country level and at the firm level. At the country level, we estimate the following panel regression model:

$$Synchronicity_{j,t} = a + b_1 Secrecy_j + b_2 X_{j,t} + \varepsilon_{j,t} \quad (6)$$

where $Synchronicity_{j,t}$ is the stock price synchronicity of country *j* in year *t*, $Secrecy_j$ is our measure of the culture of secrecy of country *j*, and $X_{j,t}$ is a vector of control variables of country *j* in year *t*. Furthermore, we replace *Synchronicity* with *Market-specific variation* or *Firm-specific variation* to examine the relationship between *Secrecy* and the components of *Synchronicity*.

In our empirical setting, it is likely that the residuals are correlated in two ways. First, the residuals can be correlated across years within a country, and second, they can be correlated across countries within a year. One possible solution to address this concern is to use the standard approach of two-way clustering (country clustering and year clustering). However, as outlined by Petersen (2009), this approach may yield biased results if the number of clusters is relatively small (usually less than fifty). In addition, Djogbenou et al. (2019) argue that two-way clustering may be problematic if cluster sizes greatly vary and/or one (or more) of the regressors is a dummy variable that varies at the cluster level. The latter two concerns are not a major issue in our empirical setting since our cluster sizes do not vary significantly, and we do not include dummy variables in our regressions. Hence, the main issue in our case is that the number of year clusters is sufficiently lower than 50.

To overcome this issue, we use the wild cluster bootstrap method. This method was proposed by Cameron et al. (2008), and its asymptotic validity was verified by Djogbenou et al. (2019). Specifically, in all our panel regressions, we estimate standard errors with country clustering and year cluster bootstrapping with 1,000 replications. All the models also include year fixed effects to account for common time effects that could influence stock price synchronicity (e.g., global crisis).[10]

At the firm level, we re-estimate Eq. (6) while including the following firm-level controls: (i) *Beta*, (ii) *Ln(Age)*, (iii) *Firm size*, (iv) *Book-to-market*, (v) *ROA*, (vi) *Leverage*, (vii) *ROA synchronicity*, (viii) *Bid-ask spread,* and (ix) *Return volatility*. All control variables are defined in Table A1 of the Appendices. We estimate standard errors with firm clustering and year cluster bootstrapping with 1,000 replications. Furthermore, in addition to year fixed effects, we include industry fixed effects in all our

[10] The use of a time invariant characteristic like national culture of secrecy does not allow us to estimate a model with country fixed effects. As an alternative to the approach of Cameron et al. (2008), we estimated a random effects model with year clustering. Our findings remain the same.

models. Finally, we rerun the regressions by replacing *Synchronicity* with either *Systematic risk* or *Idiosyncratic volatility*.

2.2.2. Visual illustration of the channels

Figure 1 is a visual depiction of the two pathways that go from *Secrecy* to *Synchronicity*; one via *Disclosure* and the other via *Private information*. When it comes to *Disclosure*, there are opposing forces at work. According to the price informativeness hypothesis, efficient dissemination of information through disclosure is associated with higher idiosyncratic volatility and lower R^2 (Morck et al., 2000; Jin and Myers, 2006). Therefore, in our context, less disclosure in secretive societies relates to lower *Idiosyncratic volatility*, and thus, higher *Synchronicity*. The symbols outside of the parentheses visualize this prediction. However, proponents of the noise hypothesis document a negative relationship between disclosure and idiosyncratic volatility (LeRoy and Porter, 1981; Teoh et al., 2006). Bartram et al. (2012) confirm this finding, and also report a negative relationship between disclosure and systematic risk. Altogether, these findings suggest the lower disclosure in secretive societies can be associated both with higher *Systematic risk* and higher *Idiosyncratic volatility*. Consequently, the relationship of *Disclosure* with *Synchronicity* is ambiguous, as it depends on the relative change in both *Systematic risk* and *Idiosyncratic volatility*. We depict these associations with the symbols in parentheses. Finally, the pathway via *Private information* is more straightforward. According to Veldkamp's (2006) theoretical predictions, speculation on private information should be positively associated with *Idiosyncratic volatility*. Hence, less informed trading in secretive societies is associated with lower *Idiosyncratic volatility* and higher R^2. The symbols +, ++, –, – –, and +/– indicate increase, strong increase, decrease, strong decrease, and uncertain outcome, respectively.

[Insert Figure 1 Around Here]

3. Empirical results

3.1. Baseline regressions

Table 4 shows our baseline regressions. At the country level (columns 1 to 3), we find evidence of higher return comovement in secretive societies. Specifically, in the regression of stock price synchronicity, *Secrecy* enters with a positive and statistically significant coefficient at the 1% level. In terms of economic significance, a one standard deviation increase in *Secrecy* is associated with 10.50% increase in synchronicity, which represents around 30.80% of its unconditional standard deviation across countries in our sample (0.105/0.341). Then, we decompose synchronicity in its two components.

In the regression of market-specific variation, *Secrecy* is negative but marginally statistically significant. However, in the case of firm-specific variation, *Secrecy* bears a negative and statistically significant coefficient at the 1% level.[11] Hence, these results provide preliminary evidence that in secretive societies, synchronicity is higher because firm-specific variation is lower. In terms of control variables, our results are consistent with previous stock price synchronicity studies. For instance, synchronicity is positively related to earnings comovement (Morck et al., 2000; Eun et al., 2015) and negatively related to bid-ask spread (Chan et al., 2013).

At the firm level (columns 4 to 6), the results are qualitatively similar to those reported at the country level, despite the inclusion of beta in our regressions.[12] More specifically, *Secrecy* has a positive and statistically significant coefficient at the 1% level in the regression of synchronicity. In terms of economic significance, a one standard deviation increase in *Secrecy* is associated with 15.70% increase in synchronicity, which represents around 19.60% of its unconditional standard deviation across countries in our sample (0.157/0.803).[13] Furthermore, in the regressions of idiosyncratic volatility, *Secrecy* enters with a negative and statistically significant coefficient at the 1% level, but it is statistically insignificant in the regressions of systematic risk. From the control variables, *Beta* is positively related to stock price synchronicity, a finding which is consistent with Li et al. (2014). Furthermore, we find that *Ln(Age)* is positively associated with synchronicity. This is in line with Dasgupta et al. (2010), who find that stock price synchronicity increases as firms become older, because market participants learn more about time-invariant firm characteristics. Finally, a handful of the remaining controls are also statistically significant, and their signs are in line with what was reported in previous studies (Boubaker et al., 2014; Eun et al., 2015; Qui et al., 2020).

[Insert Table 4 Around Here]

3.2. Secrecy, disclosure, and private information

In this section, we examine: (1) how *Secrecy* relates to our mediators, namely *Disclosure* and *Private information,* and (2) how our mediators relate to stock price synchronicity (and its components). To be consistent with our analysis so far, we run our regressions both at the country- and at the firm-levels.

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[11] In these regressions, we do not include *Return volatility*, because it is highly correlated with both market-specific variation (0.844) and firm-specific variation (0.932). Its inclusion however does not dramatically alter our results, as *Secrecy* remains significant in the case of firm-specific variation.

[12] For example, Li et al. (2014) replicate the estimations of Hutton et al. (2009). They show that with the inclusion of beta in the regressions, the association between opacity and synchronicity changes from positive to negative.

[13] The standard deviation of *Secrecy* (*Synchronicity*) in our firm-level sample is 52.21 (0.803).

Panel A of Table 5 reports the results of the country-level analysis. In column 1, where *Disclosure* is the dependent variable, *Secrecy* enters with a negative coefficient which is statistically significant at the 1% level. This finding suggests that in secretive societies the dissemination of public information is limited relative to non-secretive societies. In column 2, where *Synchronicity* is the dependent variable, *Disclosure* is negative and statistically significant at the 5% level. Then, in columns 3 and 4, we breakdown *Synchronicity* on its components. We find that *Disclosure* is statistically insignificant in both regressions of *Market*- and *Firm-specific variation*, a finding which is in line with Li et al. (2014).[14]

In columns 5 to 8, we conduct the analysis for our second mediator, *Private information*. Collectively, the results are consistent with our conjectures. First, in column 5, *Secrecy* is negative and statistically significant at the 1% level, indicating that in secretive societies, stock returns are associated with stronger mean reversals. Furthermore, *Private information* is negative and statistically significant at the 5% level in the regression of *Synchronicity*. By looking at the synchronicity components, *Private information* is positive and statistically significant at the 1% level in the regression of *Firm-specific variation*, while its relationship with *Market-specific variation* is statistically insignificant.

Panel B of Table 5 repeats the analysis at the firm-level. Similar to the country-level regressions, *Secrecy* is negatively associated with *Disclosure*, which in turn, is negatively associated with stock price synchronicity. Furthermore, the decomposition of synchronicity now provides some insights on the latter relationship. Specifically, we find a negative association between *Disclosure* and *Systematic risk*, while the relationship between *Disclosure* and *Idiosyncratic risk* is statistically insignificant. Finally, the results for *Private information* are consistent with what has been reported at the country-level.

[Insert Table 5 Around Here]

As a further step, we examine the relationship between our mediators and stock price synchronicity (and its components) when we also include *Secrecy* in the regressions (see Table A6 in the Appendices). The findings reveal some interesting patterns. First, the results for *Secrecy* resemble the ones reported in the baseline regressions of Table 4. Second, in the regressions of synchronicity, *Disclosure* loses its statistical significance when *Secrecy* is included in the model, possibly reflecting that disclosure-related decisions are often culturally driven (Gray, 1988; Gray and Vint, 1995). Third, the inclusion of *Secrecy*

[14] We conduct the same analysis for each one of the five disclosure-related variables (see Tables A2 to A5 in the Appendices). Overall, inferences on the relationship between secrecy and disclosure are similar. Same applies for the relationship between disclosure and synchronicity. Results on the components of synchronicity are more mixed, a fact which provides further justification for the use of the first principal component.

seems to absorb part of the explanatory power of *Private information*, as the magnitude of its coefficients is smaller than the ones reported in Table 5. However, *Private information* remains statistically significant at the 5% level, or better, in the regressions of synchronicity and firm-specific variation (idiosyncratic volatility). Finally, it is worth noting that the addition of *Secrecy* increases the adjusted R^2 in all cases.

3.3. Orthogonalization of secrecy against disclosure and private information

So far, our baseline results suggest that there is a positive relationship between secrecy and stock price synchronicity and a negative relationship between secrecy and idiosyncratic volatility. Furthermore, our findings support the private information mechanism, as the lower values of *Private information* in secretive societies are associated with higher synchronicity and lower idiosyncratic volatility. The results for the disclosure channel are somewhat inconclusive, especially when both *Secrecy* and *Disclosure* are used as independent variables. One potential explanation for this shortcoming could be that *Secrecy* and *Disclosure* exhibit a high degree of correlation (ρ= –66%), and therefore, it is difficult to distinguish the individual effect of each variable. At the same time, this strong negative correlation may pose a threat in our interpretation of *Secrecy*, as our results may partially reflect the influence of *Disclosure*. Hence, to alleviate these concerns, we follow the orthogonalization approach of Breuer et al. (2018). Specifically, we regress *Secrecy* on *Disclosure* and we then use the residual of the regression as our cultural measure. This approach allows us to focus on the part of *Secrecy* which is unrelated to *Disclosure*, and vice versa. For consistency, we also orthogonalize *Secrecy* against *Private information since* we have documented a significant negative relationship between them in Table 5.

Table 6 presents the results of this analysis. Both at the country- and at the firm-level, the results for orthogonalized *Secrecy* as consistent with what has been reported so far. Synchronicity is higher in secretive societies, and firm-specific variation (or idiosyncratic volatility) is lower. Furthermore, results for *Private information* are similar with the ones reported in Table 5. Interestingly, we gain some insights on the relationship between *Disclosure* and synchronicity. Initially, we report a negative relationship between disclosure and stock price synchronicity (at the firm-level). Then, by looking at the components of synchronicity, we observe the following pattern: disclosure is negatively associated with systematic risk, while there is no statistically significant relationship with idiosyncratic volatility. Therefore, these findings are generally consistent with Li et al. (2014), who show that the negative relationship between disclosure and synchronicity is explained by the negative relationship between disclosure and systematic risk. Therefore, orthogonalization enables us to disentangle the individual effects of disclosure on stock price synchronicity, while concurrently reinforcing our main inferences on *Secrecy*.

[Insert Table 6 Around Here]

3.4. PSM regressions

It is worth noting that our results may be subject to an important caveat. Bartram et al. (2012) suggest that pooling all observations in a regression model may not be the appropriate approach to examine the relationship between country-level characteristics and firm-level R^2. In fact, pooling leads us to compare the risk measures of firms across different countries. In other words, any relationship between country characteristics and stock price synchronicity, systematic risk, or idiosyncratic volatility may simply reflect cross-country differences in firm characteristics. Thus far, we address this concern by including several firm- and country-level controls in our regressions. However, as shown by Heckman et al. (1998), the inclusion of controls may not always be sufficient to capture the differences in observable characteristics across comparison groups.

To illustrate the degree of these cross-country differences, let us consider the U.S. case. Similar to Bartram et al. (2012), we observe that the mean R^2 (idiosyncratic volatility) of U.S. firms is substantially lower (higher) than that of non-U.S. firms.[15] Furthermore, the mean value of *Private information* is above the sample median. At the same time, the U.S. is among the countries with the lowest secrecy score and the country with the highest number of observations in our sample. Therefore, our results may be driven by the fact that a substantial fraction of our sampled firms have low R^2 (high idiosyncratic volatility), high values of *Private information*, and they are headquartered in a nonsecretive country. Finally, the U.S. is home to some of the largest and more liquid firms in our sample, characteristics which relate to a lower degree of information asymmetry and lower direct trading costs.

To account for the possibility that cross-country differences in firm characteristics explain our results, we employ the PSM approach of Bartram et al. (2012). Specifically, we match each non-U.S. firm with a U.S. firm based on four firm characteristics: (1) *Firm-size*, (2) *Book-to-market*, (3*) Ln(Age)*, and (4) *Bid-ask spread*. We use these four characteristics for several reasons. First, Bartram et al. (2012) argue that the first three are likely to be exogenous firm characteristics. Second, the private information measure of Llorente et al. (2002) is associated with high information asymmetry, as proxied by small firm size and high bid-ask spreads. Third, older firms have more transparent information environments

[15] Table 1 shows that the mean R^2 in the U.S. (0.228) is the lowest among our sampled countries. Consequently, in untabulated analysis, we observe that the mean idiosyncratic volatility of U.S. firms is one of the highest in our sample.

(Dasgupta et al., 2010), and lower information acquisition costs (Kelly, 2014). Last but not least, illiquidity can bias our results in various ways. Illiquidity has been associated with higher idiosyncratic volatility, poorer information environments (Li et al., 2014; Kelly, 2014), and stronger return reversals (Avramov et al., 2006). Finally, Gassen et al. (2020) document that cross-country differences in R^2 can be attributed to differences in liquidity. Therefore, matching could mitigate the concerns that our results are driven by cross-country differences in firms' characteristics, particularly those related to information asymmetry and liquidity.

To implement the PSM approach, we run a logit regression model every year and for every industry group. The dependent variable is a dummy which equals 1 for non-U.S. firms, and 0 otherwise. After estimating the propensity scores, we match non-U.S. firms with U.S. firms using one-to-one the nearest neighbor approach (with replacement). Then, we regress differences in the dependent variable between non-U.S. firms and their U.S. matches on differences in firm- and country-level characteristics. We use three different dependent variables in this analysis: (i) the log difference in R^2 ($ln(\Delta R^2)$)[16], (ii) the log difference in systematic risk ($ln(\Delta Syst)$), and (iii) the log difference in idiosyncratic volatility ($ln(\Delta IVol)$). Finally, in all our regressions, all independent variables are standardized.

Panel A of Table 7 presents the results of the PSM regressions. Columns 1 to 3 replicate our baseline regressions (columns 4 to 6 of Table 4), while columns 4 to 9 examine how our two mediators relate to *Synchronicity* and its components. Overall, the results are supportive of our earlier findings. In more detail, *Secrecy* is positive and statistically significant at the 1% level in the regression of R^2, and negative and statistically significant at the 1% level in the regression of idiosyncratic volatility. Furthermore, its relationship with systematic risk is statistically insignificant. When it comes to disclosure, our findings are consistent with Bartram et al. (2012). Specifically, we report a negative relationship between *Disclosure* and R^2, and this is because systematic risk is more strongly negatively related to *Disclosure* than idiosyncratic volatility. The negative relationship between *Disclosure* and *Idiosyncratic volatility* is consistent with both theoretical and empirical studies which support the noise hypothesis. LeRoy and Porter (1981) predict that with constant discount rates, better disclosure leads to lower volatility. Teoh et al. (2006) find that idiosyncratic volatility decreases with disclosure, because there is less uncertainty regarding firms' fundamentals and thus, less opportunities for investor disagreement. Finally, the results for our second mediator are in line with what reported so far. In fact, *Private information* is negatively related to R^2 and positively related to idiosyncratic volatility, while its relationship with systematic risk is not statistically significant.

[16] Consistent with Bartram et al. (2012), we take the log differences of R^2 instead of synchronicity, because R^2 is bounded between 0 and 1, whereas synchronicity can take negative values.

Next, we repeat the PSM exercise by matching firms from secretive societies with firms from less secretive societies, according to the median value of *Secrecy*. We do so, as there are significant differences in the composition of firms across these two groups, which may obscure our findings. Importantly, as shown in Table 3, firms in secretive countries tend to be less liquid, and as mentioned before, cross-country differences in liquidity could severely distort our inferences. Furthermore, untabulated correlation analysis shows that firms in secretive societies are smaller and have higher book to market ratios. Thus, we match firms from highly secretive countries with firms from less secretive countries using the same variables as in Panel A of Table 7. The results of this analysis are presented in Panel B of Table 7 and are consistent with our conjectures. *Secrecy* is positively correlated with R^2 and negatively correlated with *Idiosyncratic volatility*, with its coefficient being statistically significant at the 1% level in both cases. Furthermore, results for *Private information* are similar, albeit stronger in magnitude, compared to what was reported in Panel A, while *Disclosure* enters the regressions with statistically insignificant coefficients.

[Insert Table 7 Around Here]

Up to this point, we have interpreted our findings to suggest that investors in secretive societies are less likely to collect private information due to cultural biases. But what if it is also more costly to collect information in these societies? Costly information acquisition could be an alternative explanation of our results, because high information costs decrease the rent that traders can extract from collecting private information (Grossman and Stiglitz, 1980). To this end, Kelly (2014) proposes three measures to proxy for information acquisition costs: firm size, firm age, and analysts' coverage. In our matching approach so far, we have accounted for the first two measures. Now, we re-run our PSM exercise of Table 7 by adding also *Analyst diversity* in the list of variables we use in the matching process. Following Eun et al. (2015), we use *Analyst diversity* rather than the number of analysts following the firm, because we believe that it is a more direct proxy of analyst consensus. The results of this analysis are similar to what we have reported so far (see Table A7 in the Appendices), suggesting that cross-country differences in information acquisition costs are less likely to drive our results.

Finally, we conduct a two-step channel analysis as in Liang and Renneboog (2017), Griffin et al. (2021), and Duan et al. (2021). In the first step, we regress each one of our mediators on *Secrecy*. In the second step, we regress stock price synchronicity (and its components) on the mediator variable predicted from the first stage, or in other words, on the variation in the mediator that is explained by the culture of secrecy. This approach resembles an IV approach, with the difference being that culture is not treated as an instrument for the mediators (Griffin et al., 2021), since culture can influence synchronicity through additional channels than the ones considered in our study. The benefit of this approach is that it helps us disentangle the chain of associations between secrecy, our two mediators, and R^2. We conduct this analysis at the two PSM-matched samples to ensure that our results are not driven by any cross-country differences in firm characteristics. Furthermore, all independent variables are standardized, which allows us to compare estimated coefficients across models. Overall, the results of this analysis provide supporting evidence that the positive (negative) association between *Secrecy* and *Synchronicity* (*Idiosyncratic volatility*) may occur because *Secrecy* is negatively associated with *Private information*. When it comes to *Disclosure*, results are not conclusive, particularly regarding its relationship with the components of R^2 (see Table A8 in the Appendices).

4. Additional analysis and robustness tests

In this section, we provide additional analysis and robustness checks to ensure the validity of our findings. Specifically, we further analyze two key concepts of our study; idiosyncratic volatility and private information. With regards to idiosyncratic volatility, we examine whether our results hold for different levels of information asymmetry or when we account for idiosyncratic cash flow variability. Then, by using the enforcement of insider trading laws in secretive countries as shock, we investigate whether insiders' trading on private information decreases following the enforcement of such laws. Finally, we address some endogeneity concerns using a 2SLS IV approach.

4.1. Idiosyncratic volatility and information asymmetry

A typical challenge with any trading-based proxy for private information is that it may reflect a high level of either buy or sell-side trading, motivated by a frenzy unrelated to information (Kelly, 2014). This challenge is particularly relevant with our proxy, since Llorente et al. (2002) find that return continuation after high-volume days (high *Private information*) is typically observed in small and illiquid firms. Thus, it is possible that this return continuation is not related to informed trading but captures a market frenzy fueled by sentiment-driven behaviors such as herding. This concern is reinforced by previous studies who document that herding is more prevalent in high information asymmetry stocks, and particularly in small (Zhou and Lai, 2009) and illiquid stocks (Sias, 2004). For example, when a high information asymmetry stock experiences a sudden decrease in its price, herding will exacerbate the movement as traders mimic the behavior of others rather than relying on their own information (Zhou and Lai, 2009). Altogether, the issue that emerges with the interpretation of our results is whether the positive association between *Private information* and *Idiosyncratic volatility* could simply reflect waves of irrational trading activity giving rise to idiosyncratic risk.

In the previous section, we relied on the PSM approach of Bartram et al. (2012) to alleviate the concerns that our results are driven by country-level differences in firms' information environment. While insightful, this approach excludes some low information asymmetry stocks from the analysis. This is because firms in secretive societies are typically smaller and more illiquid than their non-secretive counterparts, suggesting that our PSM approach will produce matches that are also relatively small and illiquid. Thus, the question here is whether our results are also present in low information asymmetry (large and liquid) firms.

To address this question, we conduct a subsample analysis, using the median value of *Information asymmetry* as the cut-off point. *Information asymmetry* is defined as the first principal component of *Firm size* and *Bid-ask spread*. Our goal is to examine whether the relationship between *Private information* and *Idiosyncratic volatility* is observed only in firms with high asymmetric information. Table 8 presents the results of this analysis. We find that *Private information* is positive and statistically significant at the 5% level in both subsamples. The magnitude of its coefficient is larger in the *High information asymmetry* subsample (0.003 versus 0.002), but the mean difference in coefficients is indistinguishable from zero (t=0.84). Thus, our results persist even in low information asymmetry stocks, where it is less likely to observe a market frenzy.

[Insert Table 8 Around Here]

A point worth remembering is that *Secrecy* is negatively correlated with *Firm size* and positively correlated with *Bid-ask spread*, suggesting that in secretive societies, firms might be subject to higher information asymmetries. Therefore, if *Private information* simply captures firm information asymmetry, then, we should have found a positive, rather than negative, association between *Secrecy* and *Private information*.

Collectively, the evidence presented in this section supports our conjecture that the positive association between *Private information* and *Idiosyncratic volatility* reflects informed trading vis-à-vis a market frenzy caused by unsophisticated traders. However, as with most-trading based measures of private information, we cannot rule out the possibility that return continuation after high-volume days may at least partially reflect any herd-driven market hysteria. Under this scenario, the lower idiosyncratic volatility in secretive societies could also be associated with less market frenzies. Even so, this scenario does not contradict our cultural story. In secretive societies, the participation of retail traders is likely lower due to the existence of informed insiders who crowd out uniformed outsiders. Additionally, cultural biases in these societies may restrict individuals from mimicking the trading behavior of insiders. Consequently, the reduced influence of retail investors may contribute to fewer instances of market frenzies.

4.2. Idiosyncratic volatility and cash flow volatility

Conceptually, high idiosyncratic return volatility should reflect high idiosyncratic variability of cash flows. In other words, uncertainty about a firm's profitability should be associated with higher idiosyncratic risk (Pastor and Veronesi, 2003). As a matter of fact, several studies report a strong link between idiosyncratic return variance and cash flow variance (Wei and Zhang, 2006; Irvine and Pontiff, 2009; Bekaert et al., 2012). Hence, not accounting for such a variable in our regressions could raise omitted variable bias concerns, as idiosyncratic volatility of cash flows is probably associated with the culture of secrecy. Yet, the sign of this association is ambiguous. On the one hand, firms in secretive societies are less transparent (Gray and Vint, 1995; Doupnic and Riccio, 2006), which could complicate the prediction of future cash flows. On the other hand, secretiveness is negatively associated with innovation (Contigiani et al., 2018), implying that companies in secretive societies may adopt more traditional business models resulting in more predictable cash lows. If either is true, our results may not be attributed to the less information-seeking behavior of investors in secretive societies, but to less predictable cash flows due to lack of disclosure or to more predictable cash flows due to the firms' conservative business models.

To investigate this issue, we compute the idiosyncratic volatility of cash flows (IVROE) measure proposed by Bekaert et al. (2024). The benefit of this measure is that it removes systematic variation in cash flows through a factor model. Additionally, it makes fewer strong implicit assumptions compared to other proxies for idiosyncratic cash flow volatility previously used in the literature. We follow the authors' approach to compute return on equity (ROE) for both U.S. and non-U.S. firms. Then, we estimate the following model for each country:

$$ROE_{i,q} = \left(\alpha_{0,\mathrm{i}} + \alpha_1 Size_{\mathrm{i,q-1}} + \alpha_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) + \left(b_0 + b_1 Size_{\mathrm{i,q-1}} + b_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) WMKT_q^{ROE} + \left(c_0 + c_1 Size_{\mathrm{i,q-1}} + c_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) WSMB_q^{ROE} + \left(d_0 + d_1 Size_{\mathrm{i,q-1}} + d_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) WHML_q^{ROE} + \left(e_0 + e_1 Size_{\mathrm{i,q-1}} + e_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) MKT_{\mathrm{j},q}^{ROE} + \left(f_0 + f_1 Size_{\mathrm{i,q-1}} + f_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) SMB_{\mathrm{j},q}^{ROE} + \left(g_0 + g_1 Size_{\mathrm{i,q-1}} + g_2 B\mathrm{T}M_{\mathrm{i,q-1}}\right) HML_{\mathrm{j},q}^{ROE} + e_{i,q}^{ROE} \quad (7)$$

where $ROE_{i,q}$ denotes the ROE of firm i in quarter q, $Size_{i,q-1}$ denotes the size of firm i in quarter $q-1$ and $BTM_{i,q-1}$ denotes the book to market of firm i in quarter $q-1$. For each country j, $MKT_{\mathrm{j},q}^{ROE}$ is the value-weighted ROE of all firms at quarter q, $SMB_{j,q}^{ROE}$ is the difference between value-weighted ROE of firms belonging in the smallest tercile (in terms of size) and firms belonging in the largest tercile, and $HML_{j,q}^{ROE}$ is the difference between value-weighted ROE of firms in the highest BTM tercile and the lowest BTM tercile. For each country, the tercile classification is based on firms' capitalization and *BTM* measured at the end of each June. Global factors (denoted by W) are value-weighted country-level factors. In all regressions, we include firm fixed effects. Similar to *Idiosyncratic volatility*, we compute *IVROE* as the annualized standard deviation of the residuals of Eq. (7).

We now examine whether our inferences regarding the relationships between *Secrecy* and *Idiosyncratic volatility* and between *Private information* and *Idiosyncratic volatility* hold if we include *IVROE* in our regressions. For consistency, we conduct this analysis at the country-level, at the firm-level, and at the PSM-matched sample.[17] Panel A of Table 9 presents the results of this analysis. At the country-level regressions, *IVROE* represents the value-weighted *IVROE* of all firms in the country. In all models, *IVROE* enters the regressions with positive and highly statistically significant coefficients, a finding which supports the argument that idiosyncratic volatility of cash flows is an important determinant of idiosyncratic return volatility. However, both *Secrecy* and *Private information* have the expected signs, and are statistically significant at the 5% level, or better in all models, suggesting that our results remain robust to the inclusion of *IVROE*.

Bekaert et al. (2024) document a strong commonality in country idiosyncratic return volatility, which they link to global aggregate idiosyncratic cash flow variances. To ensure that our results remain robust after we account for this association, we re-run our country-level regressions by replacing *IVROE* by *Global IVROE*, which is computed as the value-weighted country *IVROE* of all countries. The results presented in Panel B of Table 9 are consistent with the findings of Bekaert et al. (2024), but also support our conjectures.

[Insert Table 9 Around Here]

4.3. Enforcement of insider trading laws and private information

Thus far, we have advocated for the importance of private information in explaining stock price comovement in secretive societies. In this section, we will analyze how insider information, a source of private information, relates to our findings. First, corporate insiders, such as managers, can utilize their private information to earn abnormal profits from insider trading. Second, outsiders, such as investors, can also earn abnormal returns by analyzing the trades of insiders (Rozeff and Zaman, 1988).

[17] PSM regressions are based on the sample where we match firms from high secretive societies to firms from low secretive societies as in Panel B of Table 7. Results remain robust to the alternative matched samples.

We argue that the outsiders' propensity to acquire private information is linked to cultural norms. Specifically, in secretive societies, cultural norms and values may dictate respect for hierarchy and social order, which restricts people's desire to challenge authority and question the status quo. In a business context, the latter argument can be refined as follows: in secretive societies, outsiders are less likely to monitor insiders' trading behavior. Under this scenario, insiders (or informed and well-connected outsiders) in secretive societies have more leeway to exploit their private information and earn abnormal returns. This happens because insiders' ability to profit on their private information is larger when there is less effective monitoring from outside investors (Frankel and Li, 2004).

Taken altogether, one should expect more insider trading in secretive societies, under one more condition; insider trading is legal. This condition creates two possible scenarios: scenario A (insider trading is illegal in a secretive country) and scenario B (insider trading is legal in a secretive country). Under scenario A, private information of insiders would not be reflected into stock prices. Furthermore, for the reasons described before, we do not expect outsiders to produce their own private information. Under scenario B, the only difference is that insiders are allowed to trade on their private information. Therefore, all else equal, we should expect higher values of idiosyncratic volatility and private information in countries of scenario B than in countries of scenario A.

To test the validity of these conjectures, we examine whether and how R^2, its components, and our two mediators change after the enforcement of insider trading laws in secretive societies. Following Bhattacharya (2023), we rely on the enforcement rather than the enactment of the law. In our sample, several countries have passed insider trading laws but never enforced them (Colombia, Egypt, Qatar, Russia, and Saudi Arabia), while one country has not even passed an insider trading law (United Arab Emirates). Interestingly, all these countries have high *Secrecy* values, as shown in Table 1. Hence, we use the dataset of Bhattacharya (2023), who lists whether a country has passed an insider trading law, the year of enactment, and the year of first prosecution (if the law was enforced). Therefore, for every country, we construct a dummy which equals 1 after the first prosecution year, and 0 otherwise. Countries that have passed but not enforced a law, or never passed a law, are assigned the value of 0 for the whole examination period. Since, our focus is on secretive societies, we limit our analysis to countries with above-median values of *Secrecy*.

We conduct a PSM analysis using the same firm characteristics for our matching process as in section 3.4 (log of firms' total assets, log of firm age, book-to-market ratio, and bid-ask spread). As before, matching on these characteristics alleviates the concern that our results will reflect information asymmetry or liquidity effects. The main difference is that now instead of running PSM regressions, we estimate the average treatment effect on the treated (ATTs). Essentially, ATTs measure the difference in means (of a variable of interest) between the treated firms and their PSM matches. In our analysis, the variables of interest are synchronicity and its components, along with our two mediators. We report the results of this analysis in Table 10. In line with our expectations, both idiosyncratic volatility and private information are higher for firms in countries where insider trading is legal. Nonetheless, it is noteworthy that both values are still below the mean values for the full sample, as we have now restricted our analysis to highly secretive countries. Furthermore, as one would expect, disclosure is lower in countries where insider trading is legal, while systemic risk is also higher, a finding which is consistent with the observed negative relationship between disclosure and systemic risk. Finally, there is some evidence that synchronicity is lower when insider trading is legal in a secretive country.

In untabulated analysis, we repeat this exercise for more transparent (less secretive) societies, and we report opposing results. In brief, the enforcement of insider trading laws seems to encourage private information acquisition and increase idiosyncratic volatility. One potential explanation for this asymmetric effect could be that in developed and transparent economies, insider trading deters outsiders from acquiring private information (Fishman and Hagerty, 1992). By contrast, in secretive societies, outsiders are culturally bounded from collecting private information, and therefore, a higher proportion of idiosyncratic volatility could be attributed to insider trading.

[Insert Table 10 Around Here]

4.4. Endogeneity checks

In this section, we attempt to address the potential endogeneity concerns that may challenge the validity of our baseline findings. First, the results presented thus far are unlikely to be driven by reverse causality. We have no reason to believe that stock price synchronicity could influence something as deep-rooted as culture. Second, the inclusion of various control variables used in earlier studies mitigates further potential concerns about omitted variables. However, there could still be some endogeneity concerns. For instance, we cannot rule out the possibility that the cultural indicators are subject to measurement error since they are based on survey responses. To address the issue of endogeneity in a more formal way, we rely on a 2SLS IV regression. The exogenous instrument we use is the ethnolinguistic fractionalization index from La Porta et al. (1999). Our approach to instrument culture with a fractionalization index is consistent with Kwok and Tadesse (2006), and Li et al. (2013), among others. In our case, the underlying idea is that heterogeneity in the population is negatively associated with trust, and lower trust results in grater secrecy and less information disclosure (Vangelisti et al., 2001; Dinesen and Sønderskov, 2012). These findings suggests that our instrument should satisfy the relevance criterion. At the same time, it may also satisfy the exclusion criterion, as we have no reason to believe that *Ethnolinguistic fractionalization* will have any direct association with synchronicity.

Table 11 presents the analysis of the 2SLS IV regressions at both the country-level (models 1 to 4) and the firm-level (models 5 to 8). In both cases, we include the same controls and fixed effects as in our baseline regressions of Table 4. Turning to the results, *Ethnolinguistic fractionalization* is negative and highly statistically significant in both first-stage regressions (models 1 and 5). Furthermore, the instrument passes the tests for weak identification and underidentification. Finally, in the second-stage regressions, results for instrumented *Secrecy* are similar, albeit stronger in magnitude in most cases, with what has been reported in our baseline regressions.

[Insert Table 11 Around Here]

One issue that might emerge with our 2SLS IV regressions is the magnitude of the coefficients relative to the OLS estimates. Our results show that the IV estimates are higher than the OLS estimates. While this is a common issue in the finance literature (Jiang, 2017), one may still wonder about the difference in the size of the coefficients between OLS and IV estimates. Ciacci (2021) suggests that the comparison should not be carried out using only the OLS coefficient as a benchmark. He proposes a framework based on Oster's (2019) methodology that considers the inclusion of controls, size of variances, movement of R^2, etc., to estimate a set of values where the true treatment effect should lie. This methodology allows the estimation of a parameter, known as the coefficient of proportionality or δ, to develop a formal bounding argument. Hence, we conduct a similar analysis for the regressions of stock price synchronicity, and we present the results in Table 12. For our baseline country-level specification, we find that the value of δ equals –3.183, which suggests that the magnitude of the IV coefficient could be justified.

[Insert Table 12 Around Here]

5. Conclusion

In this paper, we examine the association between the culture of secretiveness and stock price synchronicity. Using a large sample of 49 countries over three decades, we find that in secretive societies, stock price synchronicity is higher mainly because idiosyncratic volatility is lower. Motivated by this finding, we investigate the potential channels that could explain the negative relationship between secrecy and idiosyncratic volatility. Hence, we rely on Roll (1988), who argues that firm-specific variation could be influenced by disclosure of public information or speculation on private information by individual investors.

Through our study, we report evidence consistent with a private information story, which suggests that idiosyncratic volatility in secretive societies is lower, because cultural biases impede investors' information-seeking behavior. Specifically, we show that in secretive societies, return continuation after high-volume days is lower, which implies less trading on private information (Llorente et al., 2002). We further show that less trading on private information is associated with lower idiosyncratic volatility. Markedly, our findings remain the same when we account for cross-country differences in firms' asymmetric information and liquidity. With regards to disclosure, we also report a negative association with synchronicity, but this is primarily driven by its negative relationship with systematic risk.

As with any empirical study, our work comes with some limitations. First, since private information is of course, private, trading-based proxies like the one we use in this study may also reflect what Roll (1988) describes as a "frenzy" unrelated to information. While we have conducted several tests to moderate this concern, we cannot say with absolute certainty that our proxy solely captures informed trading. Furthermore, our findings do not necessarily indicate whether a low R^2 (or high idiosyncratic volatility) resembles private informativeness or noise. In fact, the degree to which private information is impounded into stock prices depends also on the individuals' investors' rational (or irrational) use of such information. Cipriani and Guarino (2005) analyzed a laboratory financial market where individuals received private information on the value of an asset that they would subsequently trade with a market maker. They show that the irrational use of private information accounted for 35% of the trades. Therefore, whether firm-specific return variation translates into more informative or noisier prices remains an open question to be addressed in future research.

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Figure 1

Visual illustration of the proposed channels

Figure 1 illustrated the two pathways that go from *Secrecy* to *Synchronicity*; one via *Disclosure* and the other via *Private information*. *Synchronicity* is the logistic transformation of R^2 obtained from Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). The symbols +, ++, –, – –, and +/– indicate increase, strong increase, decrease, strong decrease, and uncertain outcome, respectively. For the disclosure channel, the symbols outside (inside) the parenthesis denote the predicted association according to the price informativeness (noise) hypothesis.

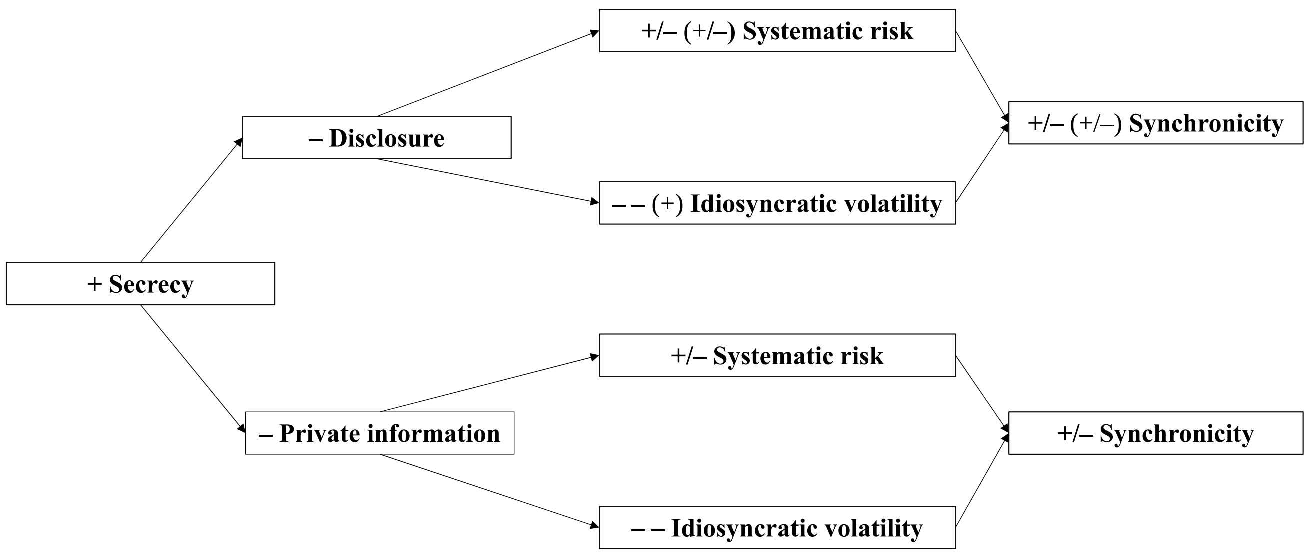

Table 1

R^2 around the globe

This table shows the list of the 49 countries of our sample, and the sample period used to estimate R^2 from eq. (1). *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Good government*, *Accounting standards, Lack of Free Press*, *Analyst diversity*, and *Timeliness or reporting* represent the country means of our five disclosure-related variables. *Private information* is the country mean of Llorente's et al. (2002) private information measure.

Countries	Period	R^2	Secrecy	Good government	Accounting standards	Lack of Free Press	Analyst diversity	Timeliness of reporting	Private information
Argentina	1994-2019	0.367	89	1.016	3.925	2.000	0.356	91.300	–0.026
Australia	1990-2019	0.237	–1	1.882	6.034	1.000	0.163	89.130	0.011
Austria	1990-2019	0.296	26	1.861	5.923	1.000	0.134	68.120	0.002
Belgium	1990-2019	0.277	84	1.812	5.705	1.000	0.181	63.040	–0.010
Brazil	1995-2019	0.282	107	1.059	4.853	2.000	0.248	86.960	–0.006
Canada	1990-2019	0.269	7	1.904	6.173	1.000	0.200	99.280	0.001
Chile	1990-2019	0.269	126	1.742	5.420	1.250	0.123	94.200	–0.005
China	1995-2019	0.445	90	0.983	4.448	3.000	0.118	N/A	–0.056
Colombia	1992-2019	0.297	134	0.909	4.547	2.250	0.132	62.320	0.000
Czech Republic	1994-2007	0.246	73	1.465	5.126	1.000	0.170	N/A	0.064
Denmark	1990-2019	0.269	–33	1.971	5.714	1.000	0.153	73.910	0.004
Egypt	1997-2019	0.346	125	0.711	4.397	2.750	0.178	N/A	–0.023
Finland	1990-2019	0.323	29	1.967	6.358	1.000	0.166	78.990	0.008
France	1990-2019	0.267	83	1.770	5.666	1.000	0.163	78.260	–0.004
Germany	1990-2019	0.273	33	1.862	5.756	1.000	0.192	68.120	–0.005
Greece	1990-2019	0.349	125	1.363	4.426	1.313	0.228	17.390	–0.018
Hong Kong	1990-2019	0.306	72	1.824	6.149	1.692	0.138	69.570	–0.015
Hungary	1995-2019	0.295	48	1.469	4.933	1.375	0.096	N/A	–0.014
India	1990-2019	0.251	69	0.971	4.963	2.000	0.096	45.650	–0.020
Indonesia	1990-2019	0.274	112	0.651	4.508	2.000	0.154	N/A	0.001
Ireland	1990-2019	0.296	–7	1.814	5.162	1.000	0.129	69.570	0.000
Israel	1990-2019	0.276	40	1.658	5.691	1.250	0.130	66.670	–0.010
Italy	1990-2019	0.365	49	1.389	4.208	1.750	0.189	86.960	–0.015
Japan	1990-2019	0.360	100	1.746	5.548	1.000	0.157	86.230	–0.024
Malaysia	1990-2019	0.348	110	1.417	5.502	3.000	0.119	65.220	–0.014
Mexico	1990-2019	0.305	133	0.996	4.817	2.438	0.242	84.780	–0.005
Netherlands	1990-2019	0.325	11	1.937	6.035	1.000	0.122	78.260	0.002
New Zealand	1990-2019	0.253	–8	1.933	6.260	1.000	0.084	68.120	0.013
Norway	1990-2019	0.292	12	1.951	6.181	1.000	0.258	94.200	0.006
Pakistan	1993-2019	0.269	111	0.475	4.224	2.813	0.146	51.450	–0.006
Peru	1994-2019	0.245	135	0.927	4.937	1.938	0.208	71.740	–0.002
Philippines	1990-2019	0.282	106	0.893	4.990	1.875	0.121	75.360	–0.004
Poland	1995-2019	0.298	101	1.454	4.877	1.063	0.147	N/A	–0.019
Portugal	1990-2019	0.300	135	1.681	4.712	1.000	0.166	62.320	–0.011
Qatar	2006-2019	0.417	148	1.444	5.720	3.000	0.055	N/A	–0.007
Russia	2001-2019	0.306	149	0.571	3.928	2.938	0.352	N/A	–0.029
Saudi Arabia	2006-2019	0.473	150	1.076	5.220	3.000	0.102	N/A	–0.046
Singapore	1990-2019	0.323	62	1.970	6.203	3.000	0.125	63.770	–0.005
South Africa	1990-2019	0.260	33	1.405	6.229	1.500	0.111	86.960	0.007
South Korea	1990-2019	0.299	127	1.462	4.686	1.438	0.208	17.390	–0.024
Spain	1990-2019	0.346	92	1.684	4.827	1.000	0.130	89.130	–0.011
Sweden	1990-2019	0.301	–11	1.958	6.068	1.000	0.201	86.230	0.001
Switzerland	1990-2019	0.304	24	1.934	5.920	1.000	0.133	73.910	0.007
Taiwan	1990-2019	0.396	110	1.552	5.492	1.000	0.167	17.390	–0.049
Thailand	1990-2019	0.320	108	1.090	5.006	2.313	0.194	89.130	–0.003
Turkey	1990-2019	0.409	114	1.105	4.506	2.250	0.215	17.390	–0.016
UAE	2004-2019	0.327	145	1.536	5.450	3.000	0.097	N/A	–0.003
U.K.	1990-2019	0.259	–19	1.879	5.954	1.000	0.106	97.830	–0.018
U.S.	1990-2019	0.228	–5	1.811	5.580	1.000	0.064	99.280	0.001

Table 2

Summary statistics

This table presents the summary statistics for the variables of our sample. Our sample consists of country-year observations of 49 countries during the period 1990 to 2019. R^2 is obtained from eq. (1), and *Synchronicity* is the logistic transformation of R^2. All remaining variables are defined at Table A1 in the Appendices.

Variable	N	Mean	Std. dev.	25th	Median	75th
R^2	1,354	0.306	0.075	0.253	0.288	0.337
Synchronicity	1,354	–0.841	0.341	–1.083	–0.904	–0.677
Secrecy	1,354	70.726	52.527	26.000	84.000	112.000
Good government	1,354	1.496	0.434	1.113	1.641	1.872
Accounting standards	674	5.287	0.737	4.725	5.351	5.933
Lack of Free Press	759	1.642	0.781	1.000	1.000	2.000
Analyst diversity	1,311	0.162	0.139	0.081	0.123	0.193
Timeliness of reporting	1,140	72.521	20.386	65.220	74.635	86.960
Disclosure	411	0.056	1.499	–1.423	0.474	1.355
Private information	1,354	–0.008	0.060	–0.023	–0.001	0.011
Std. dev (GDP growth)	1,354	2.688	1.140	1.805	2.422	3.407
Ln(GDP per capita)	1,354	9.742	1.149	9.028	10.095	10.645
Ln(size)	1,354	12.662	2.125	11.321	12.762	14.009
Ln(number of stocks)	1,354	5.639	1.190	4.779	5.416	6.551
Firm HHI	1,353	0.060	0.062	0.026	0.045	0.076
Industry HHI	1,353	0.124	0.073	0.077	0.110	0.151
ROA R^2	1,337	0.377	0.102	0.306	0.370	0.437
ROA synchronicity	1,337	–0.518	0.461	–0.820	–0.530	–0.254
Bid–ask spread	1,044	0.064	0.057	0.023	0.049	0.089
Return volatility	1,329	0.049	0.016	0.037	0.047	0.057

Table 3

Correlation matrix

This table presents pairwise correlations between the independent variables of our sample. Our sample consists of country-year observations of 49 countries during the period 1990 to 2019. All variables are defined at Table A1 in the Appendices. The symbols c, *b* and *a* denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Secrecy (1)	1.00															
Good government (2)	–0.67[a]	1.00														
Accounting standards (3)	–0.58[a]	0.77[a]	1.00													
Lack of Free Press (4)	0.60[a]	–0.64[a]	–0.42[a]	1.00												
Analyst diversity (5)	0.11[a]	–0.14[a]	–0.17[a]	–0.02	1.00											
Timeliness of reporting (6)	–0.37[a]	0.27[a]	0.27[a]	–0.19[a]	0.01	1.00										
Disclosure (7)	–0.71[a]	0.92[a]	0.82[a]	–0.78[a]	–0.02	0.42[a]	1.00									
Private information (8)	–0.11[a]	0.09[b]	0.10[c]	–0.11[b]	0.07[b]	0.17[a]	0.18[a]	1.00								
Std. dev (GDP growth) (9)	0.44[a]	–0.35[a]	–0.36[a]	0.47[a]	0.17[a]	–0.22[a]	–0.42[a]	–0.05	1.00							
Ln(GDP per capita) (10)	–0.51[a]	0.84[a]	0.59[a]	–0.49[a]	–0.05	0.26[a]	0.81[a]	0.06[c]	–0.12[a]	1.00						
Ln(size) (11)	0.11[a]	–0.47[a]	–0.37[a]	0.14[a]	0.12[a]	0.33[a]	–0.20[a]	–0.02	0.01	–0.40[a]	1.00					
Ln(number of stocks) (12)	–0.15[a]	0.10[a]	0.14[a]	–0.05	–0.09[b]	0.09[b]	0.13[b]	–0.07[b]	–0.31[a]	–0.01	0.19[a]	1.00				
Firm HHI (13)	0.05	–0.13[a]	–0.05	–0.02	–0.02	–0.08[b]	0.08	0.02	0.12[a]	–0.15[a]	–0.01	–0.50[a]	1.00			
Industry HHI (14)	0.17[a]	–0.21[a]	–0.16[a]	0.06	0.02	–0.27[a]	–0.09	0.01	0.21[a]	–0.21[a]	–0.01	–0.52[a]	0.89[a]	1.00		
ROA synchronicity (15)	0.12[a]	–0.16[a]	–0.07	0.05	0.17[a]	–0.06	0.03	–0.01	0.06[c]	–0.20[a]	0.06[c]	–0.02	0.07[c]	0.10[a]	1.00	
Bid–ask spread (16)	0.10[a]	–0.21[a]	0.01	–0.04	0.22[a]	0.03	–0.08	0.01	0.06	–0.24[a]	0.16[a]	–0.20[a]	0.15[a]	0.05	0.07[c]	1.00
Return volatility (17)	–0.14[a]	–0.09[a]	0.02	–0.09[c]	0.16[a]	–0.13[a]	0.07	0.02	–0.00	–0.20[a]	0.19[a]	0.37[a]	–0.02	–0.04	0.12[a]	0.33[a]

Table 4

Baseline regressions

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. The sample consists of country-year observations and firm-year observations. *Synchronicity* is the logistic transformation of R^2 obtained from Eq. (1). *Market-specific variation* is the average explained sum of squares of Eq. (1). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). All independent variables are defined in Table A1. In models 1 to 3 (4 to 6), *t*-statistics in parentheses are based on standard errors with country (firm) clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2–tail test.

	Country–level			Firm–level		
	Synchronicity	Market–specific variation	Firm–specific variation	Synchronicity	Systematic risk	Idiosyncratic volatility
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy	0.002***	–0.002*	–0.004***	0.003***	0.000	–0.001***
	(3.61)	(–1.88)	(–2.92)	(11.80)	(1.23)	(–6.07)
Std. dev (GDP growth)	0.014	0.123***	0.117***	–0.089***	0.012***	0.024***
	(0.83)	(3.99)	(3.55)	(–6.75)	(6.00)	(17.27)
Ln(GDP per capita)	0.015	–0.095**	–0.084	–0.082***	–0.013***	–0.003
	(0.53)	(–2.09)	(–1.64)	(–4.49)	(–4.44)	(–0.80)
Ln(size)	0.014	–0.024	–0.039***	–0.019***	0.000	0.002***
	(1.19)	(–1.29)	(–2.40)	(–3.91)	(0.22)	(3.04)
Ln(number of stocks)	–0.033	0.244***	0.304***	–0.036*	0.012***	0.023***
	(1.07)	(5.07)	(5.93)	(–1.92)	(4.78)	(8.48)
Firm HHI	0.799	1.102	0.985	3.106***	0.173*	0.009
	(1.02)	(0.97)	(0.62)	(5.50)	(1.71)	(0.09)
Industry HHI	–0.224	1.630	1.556	–1.757***	–0.000	0.192**
	(–0.40)	(1.24)	(1.08)	(–3.14)	(–0.00)	(2.32)
ROA synchronicity	0.096***	0.111	–0.022			
	(2.74)	(1.47)	(–0.28)			
Bid–ask spread	–2.195***	2.707***	5.335***			
	(–5.31)	(3.03)	(5.38)			
Return volatility	–1.211					
	(–0.69)					
Beta				0.227***		0.070***
				(12.94)		(11.87)
Ln(Age)				0.052***	–0.013***	–0.023***
				(9.01)	(–9.29)	(–15.17)
Firm size				0.141***	–0.003**	–0.033***
				(18.34)	(–2.30)	(–33.67)
Book–to–market				0.018***	0.000	–0.007***
				(4.40)	(0.05)	(–3.62)
ROA				–0.001***	–0.002***	–0.003***
				(–4.42)	(–25.24)	(–38.98)
Leverage				0.000	0.000***	0.000***
				(0.76)	(5.77)	(5.61)
ROA synchronicity (firm–level)				0.122**	0.020***	0.004
				(2.57)	(3.20)	(0.51)
Bid–ask spread (firm–level)				–0.395***	0.228***	0.733***
				(–2.82)	(6.40)	(23.30)
Return volatility (firm–level)				–1.427***		
				(–4.95)		
Constant	–0.848	–3.800***	–3.228***	–0.450*	0.274***	0.282***
	(–1.78)	(–4.68)	(–4.38)	(–1.87)	(10.20)	(5.40)
Industry FE	No	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,038	1,038	1,038	484,585	484,585	484,585
Adjusted R^2	0.418	0.380	0.435	0.326	0.270	0.489

Table 5

Secrecy, disclosure, and private information

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. *Synchronicity* is the logistic transformation of R^2 from Eq. (1). *Market-specific variation* is the average explained sum of squares of Eq. (1). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). In Panel A (B), *t*-statistics in parentheses are based on standard errors with country (firm) clustering and year cluster bootstrapping with 1,000 replications. The symbols ** and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

	Disclosure	Synchronicity	Market–specific variation	Firm–specific variation	Private information	Synchronicity	Market–specific variation	Firm–specific variation
Panel A: Country-level	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Secrecy	–0.011***				–0.001***			
	(–4.57)				(–2.97)			
Disclosure		–0.064**	–0.021	0.053				
		(–2.71)	(–0.26)	(0.53)				
Private information						–0.826**	0.844	1.745***
						(–2.82)	(1.86)	(3.45)
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	404	404	404	404	1,038	1,038	1,038	1,038
Adjusted R^2	0.796	0.466	0.329	0.332	0.116	0.382	0.361	0.375
	Disclosure	Synchronicity	Systematic risk	Idiosyncratic volatility	Private information	Synchronicity	Systematic risk	Idiosyncratic volatility
Panel B: Firm-level	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Secrecy	–0.009***				–0.001**			
	(–15.67)				(–2.72)			
Disclosure		–0.037**	–0.007***	–0.003				
		(–2.05)	(–3.51)	(–1.07)				
Private information						–0.029***	–0.001	0.003***
						(–3.21)	(–1.07)	(3.24)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	81,552	81,552	81,552	81,552	261,813	261,813	261,813	261,813
Adjusted R2	0.797	0.449	0.321	0.518	0.004	0.318	0.265	0.488

Table 6

Orthogonality

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. *Synchronicity* is the logistic transformation of R^2 from Eq. (1). *Market-specific variation* is the average explained sum of squares of Eq. (1). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). In models 1 to 3 (both panels), *Secrecy (orthogonal)* is measured using the residuals from regressing *Secrecy* on *Disclosure*. In models 4 to 6 (both panels), *Secrecy (orthogonal)* is measured using the residuals from regressing *Secrecy* on *Private information*. Panel A (B) reports regressions at the country-level (firm-level). In Panel A (B), *t*-statistics in parentheses are based on standard errors with country (firm) clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	Synchronicity	Market–specific variation	Firm–specific variation	Synchronicity	Market–specific variation	Firm–specific variation
Panel A: Country-level	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy (orthogonal)	0.002**	0.002*	–0.007***	0.002***	–0.002*	–0.004***
	(2.10)	(1.92)	(–3.25)	(3.50)	(–1.83)	(–2.84)
Disclosure	–0.069***	–0.045	0.071			
	(–2.45)	(–1.30)	(0.85)			
Private information				–0.894***	0.992*	2.015***
				(–3.11)	(1.95)	(3.67)
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	404	404	404	1,012	1,038	1,038
Adjusted R^2	0.505	0.402	0.476	0.421	0.381	0.438
	Synchronicity	Systematic risk	Idiosyncratic volatility	Synchronicity	Systematic risk	Idiosyncratic volatility
Panel B: Firm-level	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy (orthogonal)	0.004***	0.000	–0.001***	0.004***	0.000	–0.001***
	(5.81)	(1.15)	(–4.23)	(13.13)	(0.44)	(–25.77)
Disclosure	–0.040**	–0.007***	–0.002			
	(–2.30)	(–4.04)	(–0.86)			
Private information				–0.020***	–0.001	0.002**
				(–3.19)	(–1.04)	(2.03)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	81,552	81,552	81,552	261,813	261,813	261,813
Adjusted R^2	0.408	0.323	0.520	0.350	0.266	0.495

Table 7

PSM regressions

This table presents the PSM-matched regression results. In Panel A (B), we match a non-U.S. firm (a firm from an above median *Secrecy* country) with a similar U.S. firm (with a similar firm from a below median *Secrecy* country), using the nearest neighbor matching approach with replacement. We run a logit regression model every year and for every industry group using the following variables: (1) *Firm-size*, (2) *Book-to-market*, (3*) Ln(Age)*, and (4) *Bid-ask spread*. *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). All dependent and independent variables are measured as the difference in values between the non-U.S. (high *Secrecy*) firm and its U.S. (low *Secrecy*) matched firm. *Ln(ΔR²)*, *ln(ΔSyst)*, and *ln(ΔIVol)* measure log differences in R^2, systematic risk, and idiosyncratic volatility, respectively. All independent variables are standardized. In all models, *t*-statistics in parentheses are based on standard errors with firm clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	$\ln(\Delta R^2)$	ln(ΔSyst)	ln(ΔIVol)	$\ln(\Delta R^2)$	ln(ΔSyst)	ln(ΔIVol)	$\ln(\Delta R^2)$	ln(ΔSyst)	ln(ΔIVol)
Panel A: Non-U.S. vs. U.S.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Secrecy	0.048***	0.007	–0.036***						
	(5.07)	(0.51)	(–3.39)						
Disclosure				–0.032*	–0.062**	–0.034*			
				(–2.18)	(–2.64)	(–2.06)			
Private information							–0.004**	–0.001	0.003**
							(–2.16)	(–0.47)	(2.05)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	392,222	392,222	392,222	36,495	36,495	36,495	118,716	118,716	118,716
Adjusted R^2	0.142	0.253	0.290	0.213	0.313	0.254	0.165	0.288	0.281
	$\ln(\Delta R^2)$	ln(ΔSyst)	ln(ΔIVol)	$\ln(\Delta R^2)$	ln(ΔSyst)	ln(ΔIVol)	$\ln(\Delta R^2)$	ln(ΔSyst)	ln(ΔIVol)
Panel B: High vs. low Secrecy	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Secrecy	0.075***	0.016	–0.039***						
	(7.11)	(1.26)	(–3.65)						
Disclosure				–0.002	–0.051	–0.028			
				(–0.12)	(–1.66)	(–1.50)			
Private information							–0.008***	–0.001	0.005**
							(–3.52)	(–0.65)	(2.40)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	243,449	243,449	243,449	38,821	38,821	38,821	74,512	74,512	74,512
Adjusted R^2	0.183	0.249	0.339	0.172	0.075	0.314	0.200	0.265	0.338

Table 8

Idiosyncratic volatility, private information and information asymmetry

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. Models 1 and 2 replicate column 8 of Table 5 for two different subsamples using as a cut-off point the median value of *Information asymmetry*, which is defined as the first principal component of *Firm size* and *Bid-ask spread*. The dependent variable in both models is *Idiosyncratic volatility*, which is defined as the annualized standard deviation of the residuals of Eq. (1). *Private information* is the measure of Llorente et al. (2002). Column 3 presents the difference in coefficients between model 1 and 2. In models 1 and 2, *t*–statistics in parentheses are based on standard errors with firm clustering and year cluster bootstrapping with 1,000 replications. The symbol ** denotes statistical significance at the 5% level, using a 2-tail test.

	High information asymmetry	Low information asymmetry	Difference
	(1)	(2)	(1) – (2)
Private information	0.003**	0.002**	0.001
	(2.24)	(2.31)	(0.84)
Firm controls	Yes	Yes	
Country controls	Yes	Yes	
Industry FE	Yes	Yes	
Year FE	Yes	Yes	
N	129,919	129,563	
Adjusted R2	0.443	0.395	

Table 9

IVROE

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. Panel A presents regressions where IVROE is at the same level of analysis as the dependent variable. *IVROE* is computed as the annualized standard deviation of the residuals of Eq. (7). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). *Ln(ΔIVol)* measures log differences in idiosyncratic volatility between firms from above median *Secrecy* countries and their below median matches. *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Private information* is the measure of Llorente et al. (2002). Models 1 and 4 present country–level regressions, where the *Firm–specific variation* is the dependent variable. Models 2 and 5 present firm–level regressions, where the *Idiosyncratic volatility* is the dependent variable. Models 1 and 4 present regressions on the PSM–matched sample, where the *Ln(ΔIVol)* is the dependent variable. The PSM-matched sample is the one of Panel B, Table 7. In models 1 and 4, *t*–statistics (in parentheses) are based on standard errors with country clustering and year cluster bootstrapping with 1,000 replications. In models 2, 3, 5, and 6 *t*–statistics (in parentheses) are based on standard errors with firm clustering and year cluster bootstrapping with 1,000 replications. Panel B presents country-regressions, where *Firm–specific variation* is the dependent variable. *Global IVROE* is a value-weighted *IVROE* of all countries. In both models, *t*–statistics in parentheses are based on standard errors with country clustering and year cluster bootstrapping with 1,000 replications. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

	Firm–specific variation	Idiosyncratic volatility	ln(ΔIVol)	Firm–specific variation	Idiosyncratic volatility	ln(ΔIVol)
Panel A: IVROE	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy	–0.003**	–0.001***	–0.029***			
	(–2.35)	(–6.37)	(–2.89)			
Private information				0.001**	0.002**	0.006**
				(2.03)	(2.45)	(2.22)
IVROE	0.918***	0.080***	0.093***	1.267***	0.081***	0.093***
	(3.39)	(33.98)	(29.89)	(4.12)	(50.48)	(22.47)
Firm controls	No	Yes	Yes	No	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	989	427,604	193,446	989	234,049	63,028
Adjusted R^2	0.450	0.439	0.329	0.413	0.428	0.333

	Firm–specific variation	Firm–specific variation
Panel B: Global IVROE	(1)	(2)
Secrecy	–0.004***	
	(–2.98)	
Private information		0.001**
		(2.38)
Global IVROE	2.262***	2.020***
	(4.26)	(3.64)
Country controls	Yes	Yes
N	989	989
Adjusted R^2	0.429	0.366

Table 10

Enforcement of insider trading laws in secretive societies

This table presents the Average Treatment Effect on the Treated (ATT) between firms in countries where insider trading laws where enforced and firms in countries were insider trading laws were either not passed, or even if they passed, there were not enforced. The sample is limited to countries with above-median values in Secrecy. The ATTs were computed using a propensity score matching approach (using the nearest neighbor matching approach with replacement). To compute the propensity scores, we a logit regression model every year and for every industry group using the following four variables: (1) *Firm-size*, (2) *Book-to-market*, (3) *Ln(Age)*, and (4) *Bid-ask spread*. The dependent variable in these logit regressions is a dummy variable which equals 1 after the first prosecution (enforcement of insider trading) year, and 0 otherwise. Standard errors for the ATTs are the heteroskedasticity-consistent standard errors outlined in Abadie and Imbens (2006). The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

Insider trading laws	Synchronicity	Systematic risk	Idiosyncratic volatility	Disclosure	Private information
Enforced (1)	–0.855	0.236	0.353	–1.021	–0.026
Not enforced (2)	–0.878	0.247	0.370	–3.472	–0.017
ATT (2) – (1)	–0.023*	0.011***	0.017***	–2.451***	0.009**
t–statistic	(–1.89)	(7.69)	(5.46)	(–9.15)	(2.01)

Table 11

Endogeneity controls

This table presents 2SLS IV regressions for a sample of 49 countries over the period 1990 to 2019. Panel A reports results at the country-level. Panel B reports results at the firm-level. *Synchronicity* is the logistic transformation of R^2 from Eq. (1). *Market-specific variation* is the average explained sum of squares of Eq. (1). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). In the first stage regressions (1, and 5), the dependent variable is *Secrecy.* The instrument is *Ethnic fractionalization*, which is the ethnolinguistic fractionalization index from La Porta et al. (1999). In the second stage regressions, the dependent variable is *Synchronicity* (models 2 and 6), *Market-specific variation* or *Systematic risk* (models 3 and 7) and *Firm-specific variation* or *Idiosyncratic volatility* (models 4 and 8). All independent variables are defined at Table A1 in the Appendices. The underidentification test is the Kleibergen-Paap rk LM statistic. The weak identification test is the Kleibergen-Paap Wald F statistic. All continuous variables are winsorized at 1% and 99% level. In models 1 to 4 (5 to 8), *t*-statistics in parentheses are based on standard errors with country (firm) clustering and year cluster bootstrapping with 1,000 replications. The symbol *** denotes statistical significance at the 1% level, using a 2-tail test.

	Secrecy	Synchronicity	Market-specific variation	Firm-specific variation	Secrecy	Synchronicity	Systematic risk	Idiosyncratic volatility
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ethnic fractionalization	–0.728***				–1.246***			
	(–2.49)				(–29.70)			
Secrecy (instrumented)		0.004***	–0.014***	–0.020***		0.007***	0.000	–0.001***
		(2.75)	(–5.57)	(–7.72)		(13.00)	(0.09)	(–7.12)
Firm controls	No	No	No	No	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Underidentification test	94.92				18.64			
Weak identification test	132.89				882.08			
N	954	954	954	954	485,071	485,071	485,071	485,071
Adjusted R^2	0.524	0.388	0.520	0.635	0.672	0.331	0.303	0.506

Table 12

Comparison of OLS and IV estimates

This table presents the comparison of the OLS and IV estimates. In panel A, δ stands for the coefficient of proportionality, whereas coefficient represents the corresponding OLS coefficient for *Secrecy*. In panel B, we present the coefficient of secrecy using the OLS, and the IV approach, respectively. Furthermore, δ represents the value of the coefficient of proportionality that makes the coefficient of the OLS model equal to the coefficient of the IV model.

Panel A: Different values of δ	
δ	*Coefficient*
–0.5	0.0019
–1	0.0022
–2	0.0029
–3	0.0035
–4	0.0043
–5	0.0051
–10	0.0101
–20	0.0129
–50	0.0143
–100	0.0147
–1000	0.0150
Panel B: Coefficient of proportionality	
Technique	*Coefficient*
OLS	0.002
IV	0.004
δ	–3.183

Appendix

I. Definition of variables

Table A1 - Description of variables used in the analysis

Variables	Description
R^2	The R^2 obtained by Eq. (1)
Synchronicity	The logistic transformation of R^2.
Market-specific variation	The average explained sum of squares of Eq. (1).
Firm-specific variation	The average residual sum of squares of Eq. (1).
Idiosyncratic volatility	The annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1)
Systematic risk	The annualized standard deviation of the residuals of Eq. (1).
Secrecy	Measure of the culture of secrecy based on Hope et al. (2008). This is defined as the summation of uncertainty avoidance (UA) and power distance (PD) scores less the individualism (IND) score from Hofstede's framework.
Good government	The sum of two indices (percentile ranks) from the World Bank's Worldwide Governance Indicators (WGI) Project: (i) government effectiveness, and (ii) control of corruption.
Accounting standards	An indicator of each country's strength of accounting and auditing standards. It is based on the answers to the following survey question: "In your country, how strong are financial auditing and reporting standards?" [1 = extremely weak; 7 = extremely strong]. Aggregated at the country-level by the World Economic Forum. Data are from the World Economic Forum's Executive Opinion Survey.
Lack of free press	An inverse indicator of each country's freedom of press, based on the Freedom House annual Freedom of the Press Survey.
Analyst diversity	Country average diversity as the average analyst diversity of each firm in the country on an annual basis. Firm's analyst diversity is measured as the standard deviation of the analysts' forecasts of the firm's earnings, normalized by the absolute value of mean forecast, and the divided by the square root of the number of analysts following the firm. Data on analysts' forecasts are collected from I/B/E/S.
Timeliness of reporting	A measure of timeliness of financial reporting from Bushman et al. (2004), that considers the answers to the following interim reporting questions: (i) frequency of reports, (ii) count of disclosed times, and (iii) consolidation of interim reports. The indicator of timeliness is the average percentile rank within the sample of countries across these categories.
Disclosure	The first principal component of *Good government index*, *Accounting disclosure*, *Freedom of press*, *Analysts' diversity*, and *Timeliness of reporting*.
Private information (θ)	The measure of private information acquisition of Llorente et al. (2002). It is computed as the coefficient of the interaction term from eq. (4).
Std. dev (GDP growth)	The standard deviation of the country's GDP growth for the period 1990-2019.
Ln(GDP per capita)	The natural logarithm of the GDP per capita on an annual basis.
Ln(size)	The natural logarithm of each country's geographical size in square kilometers.
Ln(number of stocks)	The natural logarithm of the number of listed stocks in each country on an annual basis.
Firm HHI	Firm concentration ratio, as measured by the firm Herfindahl index on an annual basis.
Industry HHI	Industry concentration ratio, as measured by the industry Herfindahl index on an annual basis.
ROA R^2	Each country's earnings comovement index is measured by the average R^2 of each firm in the country on annual basis.
ROA synchronicity	The logistic transformation of ROA R^2.
Bid-ask spread	Bid-ask spread is calculated as the annual mean of the daily bid-ask spread measure of Chung and Zhang (2014).
Return volatility	The volatility of weekly returns on an annual basis.
Beta	The firm's beta obtained by eq. (1).
Ln(Age)	The natural logarithm of the firm's age.
Firm size	The natural logarithm of the firm's market value of equity.
Book-to-market	The ratio of the firm's book value of equity to market value of equity.
ROA	The ratio of the firm's net income to the book value of assets.
Leverage	The ratio of the firm's book value of debt to the book value of assets.
IVROE	The annualized standard deviation of the residuals of Eq. (7).
Ethnolinguistic fractionalization	The ethnolinguistic fractionalization index from La Porta et al. (1999)

II. Additional empirical results

Table A2

Disclosure and culture of secrecy

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. The sample consists of country-year observations. The dependent variable in models 1 is the good government index, in model 2 the measure of audit quality, in model 3 the countries' rating on freedom of press, in model 4 the analysts' diversity, and in model 5 the timeliness of reporting. *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). All independent variables are defined at Table A1 in the Appendix. All continuous variables are winsorized at 1% and 99% level. *T*-statistics in parentheses are based on standard errors with country clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	Good government	Accounting standards	Lack of free press	Analyst diversity	Timeliness of reporting
Variables	(1)	(2)	(3)	(4)	(5)
Secrecy	-0.002***	-0.005***	0.004**	0.001**	-0.059*
	(–3.71)	(–3.08)	(2.09)	(2.02)	(–1.90)
Country controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	1,012	643	695	1,029	852
Adjusted R^2	0.871	0.540	0.530	0.149	0.362

Table A3

Disclosure and synchronicity

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. The dependent variable in all models is S*ynchronicity*, which is computed as the logistic transformation of R^2 from Eq. (1). All independent variables are defined at Table A1 in the Appendices. All continuous variables are winsorized at 1% and 99% level. *T*-statistics in parentheses are based on standard errors with country clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	Country-level					Firm-level				
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Good government	–0.184*					–0.283***				
	(–1.76)					(–4.06)				
Accounting standards		–0.087***					–0.110**			
		(–2.84)					(–2.82)			
Lack of free press			0.100**					0.017		
			(2.36)					(0.67)		
Analyst diversity				0.256**					0.033	
				(2.00)					(1.61)	
Timeliness of reporting					–0.001					–0.002***
					(–0.80)					(–4.20)
Firm controls	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,038	643	695	1,029	852	486,968	355,382	363,996	184,597	440,875
Adjusted R^2	0.391	0.446	0.396	0.385	0.402	0.304	0.303	0.307	0.392	0.292

Table A4

Disclosure and market-specific variation (systematic risk)

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. The dependent variable in models 1 to 5 (6 to 10) is *Market-specific variation* (*Systematic risk*). *Market-specific variation* is the average explained sum of squares of Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). All independent variables are defined at Table A1 in the Appendices. All continuous variables are winsorized at 1% and 99% level. *T*-statistics in parentheses are based on standard errors with country clustering and year cluster bootstrapping with 1,000 replications. The symbols ** and *** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

	Country-level					Firm-level				
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Good government	–0.102					–0.025**				
	(–0.82)					(–2.47)				
Accounting standards		–0.080**					–0.012**			
		(–2.47)					(–2.67)			
Lack of free press			–0.103					0.009		
			(–1.35)					(1.18)		
Analyst diversity				0.975***					0.058***	
				(4.39)					(9.94)	
Timeliness of reporting					–0.006**					–0.000***
					(–2.20)					(–4.03)
Firm controls	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,038	643	695	1,029	852	486,968	355,382	363,996	184,597	440,875
Adjusted R^2	0.779	0.779	0.323	0.393	0.389	0.267	0.270	0.256	0.331	0.284

Table A5

Disclosure and firm-specific variation (idiosyncratic volatility)

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. The dependent variable in models 1 to 5 (6 to 10) is *Firm-specific variation* (*Idiosyncratic volatility*). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). All independent variables are defined at Table A1 in the Appendices. All continuous variables are winsorized at 1% and 99% level. *T*-statistics in parentheses are based on standard errors with country clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	Country-level					Firm-level				
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Good government	0.075					–0.009				
	(0.63)					(–0.70)				
Accounting standards		0.022					–0.003			
		(0.62)					(–0.47)			
Lack of free press			–0.232***					–0.003		
			(–2.93)					(–0.51)		
Analyst diversity				0.579**					0.058***	
				(2.39)					(11.41)	
Timeliness of reporting					–0.006*					–0.000***
					(–1.88)					(–4.04)
Firm controls	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,038	643	695	1,029	852	486,968	355,382	363,996	184,597	440,875
Adjusted R^2	0.901	0.906	0.385	0.383	0.381	0.481	0.483	0.494	0.529	0.502

Table A6

Secrecy, disclosure, and private information (simultaneous)

This table presents panel regression results for a sample of 49 countries over the period 1990 to 2019. Panel A (B) reports regressions at the country-level (firm-level). *Synchronicity* is the logistic transformation of R^2 from Eq. (1). *Market-specific variation* is the average explained sum of squares of Eq. (1). *Firm-specific variation* is the average residual sum of squares of Eq. (1). *Systematic risk* is the annualized square root of the difference between weekly return variance and variance from residuals of Eq. (1). *Idiosyncratic volatility* is the annualized standard deviation of the residuals of Eq. (1). *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). In Panel A (B), *t*-statistics in parentheses are based on standard errors with country (firm) clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	Synchronicity	Market–specific variation	Firm–specific variation	Synchronicity	Market–specific variation	Firm–specific variation
Panel A: Country-level	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy	0.002**	–0.005**	–0.007***	0.002***	–0.002*	–0.004***
	(2.09)	(–2.45)	(–3.25)	(4.03)	(–1.83)	(2.84)
Disclosure	–0.026	–0.124	–0.100			
	(–0.74)	(–1.40)	(–0.95)			
Private information				–0.581**	0.496	1.112**
				(–2.02)	(1.20)	(2.54)
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	404	404	404	1,038	1,038	1,038
Adjusted R^2	0.505	0.402	0.476	0.421	0.381	0.438
	Synchronicity	Systematic risk	Idiosyncratic volatility	Synchronicity	Systematic risk	Idiosyncratic volatility
Panel B: Firm-level	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy	0.004***	0.000	–0.001***	0.004***	0.000	–0.000***
	(5.81)	(1.15)	(–4.23)	(13.13)	(0.44)	(–25.77)
Disclosure	0.043	–0.005	–0.007**			
	(1.65)	(–1.52)	(–2.41)			
Private information				–0.020***	–0.001	0.002**
				(–3.20)	(–1.04)	(2.03)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	81,552	81,552	81,552	261,813	261,813	261,813
Adjusted R^2	0.408	0.323	0.520	0.350	0.266	0.495

Table A7

PSM regressions (with analysts' dispersion)

This table presents the PSM-matched regression results. In Panel A (B), we match a non-U.S. firm (a firm from an above median *Secrecy* country) with a similar U.S. firm (with a similar firm from a below median *Secrecy* country), using the nearest neighbor matching approach with replacement. We run a logit regression model every year and for every industry group using the following variables: (1) *Firm-size*, (2) *Book-to-market*, (3*) Ln(Age)*, (4) *Bid-ask spread*. and (5) *Analyst diversity. Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). All dependent and independent variables are measured as the difference in values between the non-U.S. (high *Secrecy*) firm and its U.S. (low *Secrecy*) matched firm. *Ln(ΔR²)*, *ln(ΔSyst)*, and *ln(ΔIVol)* measure log differences in R^2, systematic risk, and idiosyncratic volatility, respectively. All independent variables are standardized. *T*-statistics in parentheses are based on standard errors with firm clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	ln(ΔR²)	ln(ΔSyst)	ln(ΔIVol)	ln(ΔR²)	ln(ΔSyst)	ln(ΔIVol)	ln(ΔR²)	ln(ΔSyst)	ln(ΔIVol)
Panel A: Non-U.S. vs. U.S.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Secrecy	0.051***	0.026*	–0.012***						
	(4.58)	(1.93)	(–6.23)						
Disclosure				0.015	–0.031*	–0.036*			
				(0.63)	(–2.20)	(–2.20)			
Private information							–0.010**	0.006	0.005**
							(–2.48)	(0.67)	(2.26)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	109,106	109,106	109,106	45,331	45,331	45,331	35,544	35,544	35,135
Adjusted R^2	0.260	0.141	0.322	0.307	0.147	0.313	0.289	0.145	0.391
	ln(ΔR²)	ln(ΔSyst)	ln(ΔIVol)	ln(ΔR²)	ln(ΔSyst)	ln(ΔIVol)	ln(ΔR²)	ln(ΔSyst)	ln(ΔIVol)
Panel B: High vs. low Secrecy	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Secrecy	0.038***	–0.014	–0.045***						
	(4.23)	(–1.40)	(–22.73)						
Disclosure				0.043	–0.018	–0.035*			
				(1.76)	(–0.87)	(–2.19)			
Private information							–0.006*	–0.001	0.007***
							(–1.70)	(–0.51)	(2.84)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	94,884	94,884	94,884	14,810	14,810	14,810	34,134	34,134	34,134
Adjusted R^2	0.220	0.111	0.286	0.244	0.105	0.352	0.191	0.071	0.330

Table A8

Channel analysis

This table presents two-stage PSM regressions. In Panel A (B), we match a non-U.S. firm (a firm from an above median *Secrecy* country) with a similar U.S. firm (with a similar firm from a below median *Secrecy* country), using the nearest neighbor matching approach with replacement. We run a logit regression model every year and for every industry group using the following variables: (1) *Firm-size*, (2) *Book-to-market*, (3) *Ln(Age)*, and (4) *Bid-ask spread*. *Secrecy* is our measure for the secretiveness culture based on Hope et al. (2008). *Disclosure* is the first principal component of *Good government index*, *Accounting disclosure*, *Lack of freedom of press*, *Analysts diversity*, and *Timeliness of reporting*. *Private information* is the measure of Llorente et al. (2002). In the first-stage regressions (models 1 and 5 in both panels), we regress either *Disclosure* or *Private information* on Secrecy. In the second-stage (models 2, 3, 4, 6, 7, and 8), we use the predicted values from the first-stage as our main explanatory variable. All dependent and independent variables are measured as the difference in values between the non-U.S. (high *Secrecy*) firm and its U.S. (low *Secrecy*) matched firm. ln(ΔR^2), ln(ΔSyst), and ln(ΔIVol) measure log differences in R^2, systematic risk, and idiosyncratic volatility, respectively. All independent variables are standardized. *T*-statistics in parentheses are based on standard errors with firm clustering and year cluster bootstrapping with 1,000 replications. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a 2-tail test.

	Disclosure	ln(ΔR^2)	ln(ΔSyst)	ln(ΔIVol)	Private information	ln(ΔR^2)	ln(ΔSyst)	ln(ΔIVol)
Panel A: Non-U.S. vs. U.S.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Secrecy	–0.515***				–0.004**			
	(–21.80)				(–2.27)			
$\widehat{\text{Disclosure}}$		–0.087***	–0.089***	–0.008				
		(–3.91)	(–4.51)	(–0.42)				
$\widehat{\text{Private information}}$						–0.145***	0.005	0.127***
						(–5.27)	(0.12)	(4.47)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,495	36,495	36,495	36,495	118,716	118,716	118,716	118,716
Adjusted R^2	0.781	0.226	0.316	0.253	0.009	0.172	0.288	0.286
	Disclosure	ln(ΔR^2)	ln(ΔSyst)	ln(ΔIVol)	Private information	ln(ΔR^2)	ln(ΔSyst)	ln(ΔIVol)
Panel B: High vs. low Secrecy	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Secrecy	–0.717***				–0.006**			
	(–25.60)				(–2.37)			
$\widehat{\text{Disclosure}}$		–0.096***	–0.048*	0.037**				
		(–3.64)	(–1.84)	(2.75)				
$\widehat{\text{Private information}}$						–0.158***	–0.045*	0.075***
						(–7.51)	(–1.97)	(4.22)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	38,821	38,821	38,821	38,821	74,512	74,512	74,512	74,512
Adjusted R^2	0.781	0.226	0.316	0.253	0.009	0.172	0.288	0.286