Summer 2019

Transparency Regulation and Stock Price Informativeness: Evidence from the European Union's Transparency Directive

Olena Watanabe
Iowa State University, watanabe@iastate.edu

Michael J. Imhof
Wichita State University

Semih Tartaroglu
Wichita State University

Transparency Regulation and Stock Price Informativeness: Evidence from the European Union's Transparency Directive

Abstract

We examine changes in stock price informativeness following the European Union's Transparency Directive (TPD). The TPD, implemented by country between 2007 and 2009, enhanced corporate transparency through mandating regular firm financial disclosures and facilitating the dissemination of financial reports. Using stock return synchronicity as a proxy for stock price informativeness, we find that price informativeness improved following implementation of the TPD. This improvement was more pronounced in countries with strong regulatory environments than those with weak regulatory environments. We additionally examine a later amendment to the TPD that eliminated the requirement of quarterly financial disclosures and document an increase in stock return synchronicity following the amendment. Our findings support prior research suggesting that transparency regulations improve financial information.

Keywords

stock return synchronicity, stock price informativeness, transparency regulations

Disciplines

Accounting | Business Analytics | Business Law, Public Responsibility, and Ethics | Corporate Finance | Finance and Financial Management | Strategic Management Policy

Comments

This accepted article is published as Olena V. Watanabe, Michael J Imhof, and Semih Tartaroglu (*2019*) Transparency Regulation and Stock Price Informativeness: Evidence from the European Union's Transparency Directive. *Journal of International Accounting Research*: Summer, Vol. 18, No. 2, pp. 89-113. Doi: 10.2308/jiar-52383. Posted with permission

Transparency Regulation and Stock Price Informativeness: Evidence from the European Union's Transparency Directive

Olena V. Watanabe
Debbie and Jerry Ivy College of Business
Iowa State University
2167 Union Dr., Ames, IA 50011
E-mail: watanabe@iastate.edu
Phone: +1 (515) 294-7908
Fax: +1 (515) 294-3525

Michael J Imhof*, **
Barton School of Accountancy
Wichita State University
1845 Fairmount St., Wichita, KS 67260
E-mail: michael.imhof@wichita.edu
Phone: +1 (316) 978-6021
Fax: +1 (316) 978-3660

Semih Tartaroglu
Barton College of Business
Wichita State University
1845 Fairmount St., Wichita, KS 67260
E-mail: semih.tartaroglu@wichita.edu
Phone: +1 (316) 978-7124
Fax: +1 (316) 978-3660

January 23th, 2018

Journal of International Accounting Research (forthcoming)

Running Head: **Transparency Regulation and Stock Price Informativeness**

**corresponding author*
**We are grateful for the valuable suggestions made by the editor and anonymous reviewers, Jim Cannon, Stephen Ferris, Jere Francis, Giorgio Gotti, Inder Khurana, Sam Lee, Jing Lin, Raynolde Pereira, Sue Ravenscroft, Scott Seavey and Tina Wang. We are also grateful to workshop participants at Ball State University, Iowa State University, State University of New York – Binghamton, University of Illinois – Chicago, University of Missouri – Columbia, University of Utah, Bilkent University, and participants at the 2012 American Accounting Association Annual Meeting, the 2017 American Accounting Association Midwest Region Meeting, the 2018 European Financial Management Association Meeting, and the 2018 American Accounting Association Annual Meeting for their helpful comments. Michael Imhof and Semih Tartaroglu are thankful for funding provided by the Barton School of Business Faculty Research Grant program. Olena Watanabe is grateful for the funding provided by the Ivy College of Business at Iowa State University.

Transparency Regulation and Stock Price Informativeness:
Evidence from the European Union's Transparency Directive

ABSTRACT
We examine changes in stock price informativeness following the European Union's Transparency Directive (TPD). The TPD, implemented by country between 2007 and 2009, enhanced corporate transparency through mandating regular firm financial disclosures and facilitating the dissemination of financial reports. Using stock return synchronicity as a proxy for stock price informativeness, we find that price informativeness improved following implementation of the TPD. This improvement was more pronounced in countries with strong regulatory environments than those with weak regulatory environments. We additionally examine a later amendment to the TPD that eliminated the requirement of quarterly financial disclosures and document an increase in stock return synchronicity following the amendment. Our findings support prior research suggesting that transparency regulations improve financial information.

Keywords: stock return synchronicity; stock price informativeness; transparency regulations.

JEL Classifications: F30; G15; G30; M4.

Data Availability: Data are available from the sources cited in the text.

Transparency Regulation and Stock Price Informativeness:
Evidence from the European Union's Transparency Directive

I. INTRODUCTION

Financial reporting and disclosure mandates have been adopted in countries around the world to "incentivize desirable behaviors and discourage undesirable ones" (Leuz and Wysocki 2016, 527). Those in favor of transparency regulation argue that mandatory financial disclosures can limit market failure by reducing information asymmetry between informed and uninformed investors (e.g., Coffee 1984; Honigsberg, Jackson, and Wong 2015). Their position considers the mandated release of corporate information to be a social good that reduces the costs of financial information production and acquisition (e.g., Coffee 1984; Lambert, Leuz, and Verrecchia 2007; Hart 2009). Opponents of transparency regulation, on the other hand, hold that the forces of competition adequately incentivize managers to disclose all relevant financial information voluntarily (e.g., Grossman and Hart 1980; Milgrom 1981; Easterbrook and Fischel 1984). Disclosure comes with costs, though, which may dissuade some firms from disclosing financial information when left to do so voluntarily (Verrecchia 1983; Admati and Pfleiderer 2000). Consequently, the debate among academics on the benefits of expanding financial reporting and disclosure laws continues (Bushman and Landsman 2010; Lenkey 2014; Leuz and Wysocki 2016).

Our study contributes to this debate by examining changes in stock price informativeness surrounding the European Union's (EU) Transparency Directive (TPD), a key piece of financial reporting legislation passed into law in 2004. The TPD, implemented heterogeneously by EU nations between 2007 and 2009, was a normative initiative aimed at enhancing investor protection and transparency across EU capital markets.[1] To accomplish its goals, the TPD imposed new

[1] Although the TPD was adopted by the European Commission in 2004, it was implemented by the regulatory authorities of EU member countries at various dates between 2007 and 2009. We use the terms *adoption*, *implementation*, and *entry into force* synonymously.

disclosure requirements, harmonized the enforcement of existing disclosure requirements, and facilitated the dissemination of financial reports (Directive 2004/109/EC 2004).

We build on a recent paper by Christensen, Hail, and Leuz (2016), who document an increase in firm liquidity post-TPD. In an environment with high information asymmetry, specialists increase bid-ask spreads to protect themselves from trading with informed investors (Kyle 1985; Glosten and Milgrom 1986). Transparency regulations that facilitate the transfer of private information to less informed investors can reduce information asymmetry, leading to lower bid-ask spreads, increased share demand, and higher liquidity (Diamond and Verrecchia 1991; Healy and Palepu 2001). The question remains, however, as to whether higher liquidity post-TPD is driven by better dissemination of firm information or by greater availability of market information, which can also reduce information asymmetry (Chan and Chan 2014). Our findings suggest the former.

We proxy for changes in stock price informativeness using stock return synchronicity, which captures relative amounts of firm and market information in stock returns. Measures of synchronicity have been widely employed in research examining the role of firm transparency and financial development for stock price informativeness (e.g., Roll 1988; Durnev, Morck, Yeung, and Zarowin 2003; Jin and Myers 2006). The conventional view is that low synchronicity reflects greater amounts of firm-specific information in stock prices. This view is supported by a vast literature investigating how firms' information environments and country-level institutions affect price informativeness (e.g., Morck, Yeung, and Yu 2000; Jin and Myers 2006). However, firms with low information asymmetry may not always exhibit low synchronicity (e.g., Dasgupta, Gan, and Gao 2010; Chan, Hameed, and Kang 2013).[2] For some firms, idiosyncratic information may

[2] Dasgupta et al. (2010) suggest that detailed disclosures preceding events such as seasoned equity offerings (SEOs) and cross-listings can lead, at least temporarily, to higher synchronicity after SEO-related disclosure. They argue that

be indistinguishable from market information. For instance, highly profitable firms may exhibit greater co-movement with the market simply because they drive market returns (Bessembinder 2018).[3] Firms in concentrated industries may also exhibit higher synchronicity, as their profits are often closely linked to those of industry leaders (Piotroski and Roulstone 2004). Therefore, we control for factors shown in prior literature to increase stock return synchronicity, such as firm size, profitability, and industry concentration.

Analyzing 5,205 unique firms from 25 EU countries from 2001 to 2013, we find that synchronicity in EU capital markets declined following implementation of the TPD. Furthermore, we demonstrate that the decrease in synchronicity was most pronounced in countries with strong regulatory environments.[4] Our results are robust to controlling for firm liquidity; to the exclusion of UK firms, which account for the largest number of observations from a single country in our sample; to using a post–International Financial Reporting Standards (IFRS), post–Market Abuse Directive (MAD) period restriction; to including controls for financial reporting opacity (accrual quality), which has been associated with greater stock price informativeness (Hutton, Marcus, and Tehranian 2009); to including industry, quarter-year, and country fixed effects; and to estimating our empirical models with alternative dimensions of standard error clustering.

It is not entirely clear whether less frequent reporting reduces the amount of firm specific-information available to investors (Cuijpers and Peek 2010). Consequently, in an additional test of

such pre-SEO "lumpy" disclosures improve firm transparency and, thus, investors' ability to forecast firm performance. The increase in pre-SEO transparency lowers the likelihood of subsequent firm-specific information "surprises" such that only changes in market-wide information move stock prices, leading to greater co-movement of returns. Chan et al. (2013) also document that in the context of SEO discounts, information asymmetry and synchronicity are negatively related.

[3] Bessembinder (2018) analyzes the lifetime returns of over 25,000 US stocks between 1926 and 2016 and finds that only 4 percent of public companies generate *all* of the $34.8 trillion in shareholder wealth for that period. (See also https://www.kiplinger.com/slideshow/investing/T052-S001-the-50-best-stocks-of-all-time/index.html.)

[4] Institutional factors have been shown to influence the efficacy of securities and financial regulations (La Porta, Lopez-de-Silanes, and Shleifer 2006; Christensen, Hail, and Leuz 2013).

synchronicity, we expand our sample period to 2015 and examine whether a 2013 amendment to the TPD, which removed quarterly reporting requirements, was followed by an increase in synchronicity. We document a significant increase in synchronicity after the amendment, which lends additional evidentiary support to our primary findings and suggests that the decision by the EU to remove quarterly reporting requirements may have been premature from the perspective of public information flow.

We interpret our findings as evidence that stock prices for EU public companies became more informative post-TPD. Our inference draws on the fact that a primary goal of the TPD was to enhance dissemination of firm-specific information. For example, the TPD mandated more frequent financial reporting, called for the creation of an EDGAR®-like portal in each member state through which investors can access financial reports for little or no charge, and allowed reports to be filed in a single common language to facilitate cross-border information flows. We additionally draw on the findings of Christensen et al. (2016), who document improved liquidity post-TPD (suggesting lower information asymmetries), as well as on past research equating low synchronicity with more informative stock prices (e.g., Morck et al. 2000) and on a study by Gassen, Skaife, and Veenman (2016) showing that low synchronicity is a stronger indicator of stock price informativeness in liquid firms.

We contribute to several areas of research. First, our study complements research suggesting that mandatory financial reporting and disclosure laws can improve information efficiency in financial markets (Admanti and Pfleiderer 2000; Bushee and Leuz 2005; Zingales 2009). While some theorists suggest that managers are adequately incentivized to disclose all relevant financial information voluntarily (e.g., Grossman 1981; Milgrom 1981), supporters of mandatory disclosure point out that proprietary costs, information production costs, and agency

conflicts can all limit voluntary disclosure of financial information (e.g., Coffee 1984; Zingales 2009). Furthermore, managers may be motivated by personal gain to limit disclosure of their insider knowledge, and thus disclose financial information strategically (Shin 2003; Goto, Watanabe, and Xu 2009). Knowing this, investors will require higher rates of return to compensate for moral hazard and adverse selection risks, which can lead to less efficient capital allocation (Healy and Palepu 2001). Consequently, some researchers argue, financial markets will not operate efficiently without effective transparency regulations (Hart 2009; Honigsberg et al. 2015).[5]

In examining whether the TPD resulted in lower synchronicity, our study contributes to the scant research on the informational benefits of mandatory disclosure laws. Coffee (1984) considers empirical evidence in this area to be "virtually non-existent" and calls on academic researchers to study the costs and benefits of transparency regulations as they arise. At the beginning of the twenty-first century, only a handful of studies provided empirical evidence of the consequences of transparency regulations, leading Brown (2011) to conclude that the evidence for net benefits to transparency regulations is "far from complete." While recent advances in the literature provide further evidence of information benefits to transparency regulation (e.g., Shi, Pukthuanthong, and Walker 2012; Cho 2015; Christensen et al. 2016; Ertan, Loumioti, and Wittenberg-Moerman 2016), the passage of new regulations warrants additional research. Our study thus expands this line of inquiry.

Leuz and Wysocki (2016) argue that a potential shortcoming of studies examining the information effects of transparency regulations is the difficulty in ascribing changes in firms'

[5] Disclosure theory suggests that there is a firm-specific optimal level of voluntary disclosure relative to the costs of information production and dissemination (Admati and Pfleiderer 2000), as well as the risks of revealing information to competitors (Verrecchia 1983). Managers may also limit voluntary disclosure to conceal consumption of firm resources (Hope and Thomas 2008). Voluntary disclosure can be opportunistic and biased (Gibbins, Richardson, and Waterhouse 1990; Goto et al. 2009). Accordingly, voluntary disclosure does not maintain a level of credibility comparable to mandatory disclosure (Verrecchia 2001; Gigler, Kanodia, Sapra, and Venugopalan 2014).

information environments to regulations of interest, given that concurrent regulations or other institutional or economic developments may confound causal inferences (Daske, Hail, Leuz, and Verdi 2008; Ball, Li, and Shivakumar 2015; Christensen et al. 2016). The TPD's provisions, enacted several years before its adoption, were implemented heterogeneously, on a country-by-country basis, as each country undertook its legislative processes to ensure effective application (Christensen et al. 2016). Because of this staggered adoption, changes in synchronicity surrounding the TPD are not likely to have resulted from unrelated shocks to capital markets. Consequently, the TPD creates a unique setting in which to examine the informational efficacy of broad transparency regulations.

Second, we contribute to empirical research highlighting a negative association between improvements in accounting standards and synchronicity. Kim and Shi (2012) and Barth, Landsman, Lang, and Williams (2013), for example, document decreased synchronicity after the voluntary adoption of IFRS. However, their findings may not generalize to scenarios where transparency regulations are mandated, since the voluntary adoption of IFRS can be viewed as a strategic decision by management wanting to improve firm transparency (Kim and Shi 2012). Wang and Yu (2015) investigate the relation between both voluntary and mandatory adoption of IFRS and synchronicity, and find that synchronicity generally improves post-adoption, but only in countries with strong legal environments. Beuselinck, Joos, Khurana, and Van der Meulen (2009) document an initial decrease in synchronicity after adoption of IFRS and a subsequent increase in synchronicity in later years, findings they interpret as indicating that IFRS reduced uncertainty surrounding future disclosures.

The remainder of the paper proceeds as follows. In the next section, we discuss specific elements of the TPD, briefly expand on our discussion of prior research identifying regulatory

determinants of stock price informativeness, and develop our testable hypotheses. In Section III, we describe our data sources and sample construction. In Section IV, we outline our research design and empirical models. In Section V, we discuss our main results and additional tests. Section VI concludes.

II. BACKGROUND AND HYPOTHESES DEVELOPMENT

Transparency Regulation, Financial Reporting, and Stock Price Informativeness

Past research links transparency regulations to improved market efficiency (e.g., Jarrell 1981; Chow 1983; Simon 1989). For example, several studies document a decline in bid-ask spreads and increased investor trading following implementation of Reg FD, which prohibited selective dissemination of financial information in the US (e.g., Bushee, Matsumoto, and Miller 2004; Eleswarapu, Thompson, and Venkataraman 2004). Other studies document a decline in earnings management and an increase in accounting conservatism following adoption of the Sarbanes-Oxley Act in 2002 (Lobo and Zhou 2006; Cohen, Dey, and Lys 2008).[6] Outside the US, a handful of studies examine how the adoption of IFRS affected information-related firm attributes, such as cost of capital and liquidity (e.g., Li 2010; Christensen et al. 2013). Christensen et al. (2016) examine the effects of the TPD on liquidity but do not differentiate liquidity driven by market information from liquidity driven by firm-specific information.

Prior research also suggests that transparency regulations may affect the co-movement of stock returns. Grossman and Stiglitz (1980) present a theory of imperfect markets and argue that when the costs of *acquiring* information are high, stock prices may not reflect all relevant information, unless there are regulations mandating disclosure. Similarly, when the costs of

[6] The US is generally viewed as having a nearly frictionless financial market, with relatively higher quality financial disclosures; therefore, it is not clear if the findings of research using only US data extrapolate to countries with different regulatory and legal systems.

producing financial information are high, the availability of corporate information will also be limited (Coffee 1984). One reason is that, in a limited-disclosure environment, analysts will not realize the "full economic value" of their research because it will eventually be leaked to non-paying investors (Coffee 1984). Facing this "free-rider" problem, analysts will produce reports based primarily on market information, which is less costly to acquire, thus leading to greater co-movement of stock prices (Veldkamp 2006). Transparency laws that force all firms to disclose financial information, assuming it is credible, incentivize analysts to provide firm-specific information to investors (Veldkamp 2006; Beuselinck, Joos, Khurana, and Van der Meulen 2017).

Transparency Directive of the European Union

Following the Financial Services Action Plan of 1999 and the implementation of the Lamfalussy process, which oversees the formation of securities laws in the EU, the TPD is one of four core directives aimed at enhancing financial transparency across European financial markets. Adopted in May of 2004, the TPD revises and replaces Directive 2000/34/EC, which governed the admission of securities to official stock exchange listings.[7] One of the objectives of the TPD was to clarify and facilitate enforcement of existing requirements for the disclosure of periodic and ongoing information by public companies trading on EU exchanges. In the view of the European Commission:

> The disclosure of accurate, comprehensive and *timely* information about security issuers builds sustained investor confidence and allows an informed assessment of their business performance and assets. This enhances both investor protection and market efficiency[.] . . . To that end, security issuers should ensure appropriate

[7] Three other regulations were passed in the EU following the initiation of the Financial Services Action Plan of 1999 and became the core Lamfalussy directives related to securities regulation (see Commission of the European Communities 1999). The MAD deals with insider trading and market manipulations. We control for the MAD in our multivariate analyses. The Prospectus Directive (PD) was adopted in 2005 and concerns issues of securities. Member states of the EU had to implement the PD nationally by July 1, 2005. As a sensitivity test, we examine the effect of the TPD on stock return synchronicity in the period from 2006 to 2010, effectively excluding the pre-PD period. Our results are not affected by this alternative sample. Finally, the Markets in Financial Instruments Directive was passed in 2007 with the purpose of increasing competition and consumer protection in the investment services industry. This regulation seems of little relevance to the firms in our study, as we remove financial-industry firms from our sample.

> transparency for investors through a *regular* flow of information. (Directive 2004/109/EC 2004, paras. 1, 2, *emphasis added*)

To accomplish its goals, the TPD instituted more comprehensive annual reporting requirements by introducing additional quarterly disclosures in the form of an interim management statement to complement semi-annual and annual financial reports (Directive 2004/109/EC 2004). The interim reports, to be issued within six weeks of the end of the first and third fiscal quarters, must explain "material events and transactions that have taken place during the relevant period and their impact on the financial position of the issuer" as well as "a general description of the financial position and performance by the issuer . . . during the relevant period" (Directive 2004/109/EC 2004, Article 6.1). Importantly, for annual and semi-annual reporting, the TPD requires that "persons responsible" must make a statement that financial reports "give a true and fair view of the assets, liabilities, financial position and profit or loss of the issuer . . . together with a description of principal risks and uncertainties that they face" (Directive 2004/109/EC 2004, Articles 4[c] and 5[c]). These assessments are reminiscent of similar requirements for US firms required by the Sarbanes-Oxley Act.

The TPD also revised disclosure requirements for the release of information on major holdings of voting rights. Additionally, the TPD harmonized enforcement of financial reporting and disclosures by specifying that a competent and independent authority be created in each country to supervise compliance with the directive's provisions (Directive 2004/109/EC 2004). To aid in the dissemination of corporate financial information, the TPD asked that each member state develop and maintain an EDGAR®-like portal through which investors can easily access financial reports, particularly those "investors who are not situated in the issuer's home Member State" (Directive 2004/109/EC 2004, para. 25). The TPD also allows companies to issue financial reports and disclosures in a single language, as is "customary in the sphere of international finance," rather

than the more costly alternative of reporting in the multiple languages of the EU (Directive 2004/109/EC 2004). Overall, the TPD represents a significant shift in the financial reporting requirements for EU public companies that was enacted independently in member countries across a two-year period.

Hypotheses

Improvements in firm transparency can increase stock price informativeness (Kim, Zhang, Li, and Tian 2014). Given that one of the primary goals of the TPD is to improve transparency through better dissemination of firm-specific information, we expect that return synchronicity (as a proxy for stock price informativeness) will be significantly lower for EU public companies post-TPD. We present our first hypothesis, in alternative form:

> **H1:** Stock return synchronicity will be significantly lower in EU financial markets following implementation of the Transparency Directive.

Effective transparency regulations involve both the imposition of mandatory disclosure and effective enforcement (Bushee and Leuz 2005; Zingales 2009). Prior studies suggest that institutional factors, such as the degree to which legal systems protect minority shareholders (Ball, Kothari, and Robin 2000; Morck et al. 2000; La Porta et al. 2006) and the strength of existing securities laws (Bhattacharya and Daouk 2009; Li 2010; Hail and Leuz 2006), facilitate implementation of transparency initiatives. We, therefore, consider the strength of each member state's regulatory environment in determining the information effects of the TPD. We expect that decreases in synchronicity post-TPD will be more pronounced in countries with strong regulatory environments. We present our second hypothesis, in alternative form:

> **H2:** The effect of the Transparency Directive implementation in reducing stock return synchronicity will be more pronounced in countries with strong regulatory environments, than in countries with weak regulatory environments.

III. SAMPLE

Our sample spans the years 2001–2013 and consists of all EU firms for which synchronicity can be computed using quarterly stock return data from the Compustat Global Daily Security files.[8] We merge data necessary for calculating synchronicity with firms in the Compustat Global Annual file that have non-missing and positive data for assets, revenues, and owners' equity. We extract analysts' forecast data from I/B/E/S and macroeconomic data from the World Bank.[9]

Similar to prior studies, we exclude firms with market values of equity less than USD $1 million (e.g., Fernandes and Ferreira 2009; Christensen et al. 2016).[10] Further, we delete observations with missing control variables and firm-quarter observations from financial industries (i.e., SIC 6000 to 6999). Because they are subject to stringent reporting requirements in the US, we follow prior research and remove firms that issue American Depositary Receipts (ADRs) (see Coffee 2002; Karolyi 2006; Jin and Myers 2006).[11] We require at least four observations per firm, similar to Christensen et al. (2016). Our final sample consists of 131,641 firm-quarter observations relating to 5,205 unique firms from 25 EU countries during the 2001–2013 period. In an additional test, we use a sub-period of years, 2014–2015, to examine the effects of an amendment to the TPD that, starting in 2014, no longer required firms to file quarterly management reports (see Directive 2013/50/EU 2013).

Table 1, Panel A reports our sample composition by country, including country-specific entry-into-force dates. The number of firm-quarter observations in the final dataset ranges from 39

[8] Our sample includes Iceland and Norway, which are not EU countries but which have agreed to adopt the TPD to gain access to the European Single Market.
[9] Various economic indicators are publicly available at http://data.worldbank.org/topic.
[10] Size restriction helps reduce the likelihood that smaller firms trading on unregulated markets affect our results. Christensen et al. (2016) remove firms with a market value of equity less than USD $5 million. Our results are not affected by this alternative restriction.
[11] We collect ADR firms from the BNY Mellon Depositary Receipts public database. This database provides ADR records from BNY Mellon, Citibank, Computershare Trust Co., and J.P. Morgan Chase at https://www.adrbnymellon.com/directory/dr-directory.

in the Czech Republic to 38,385 in the UK. The number of firms by quarter is also relatively consistent. Firms from the Czech Republic, Estonia, and Iceland have the smallest representation, while firms from the UK, France, and Germany have the largest. Table 1, Panel B shows that, although there is a slightly higher coverage of firms in the sub-sample period 2007–2013, the number of firms by year is generally consistent over the full 2001–2013 test period.

[Insert Table 1 here]

IV. RESEARCH DESIGN

Empirical Models for Tests of H1 and H2

To examine the relation between the implementation of the TPD and stock return synchronicity (H1), we estimate the following OLS model:

$$Synch = \beta_0 + \beta_1 TPD + \sum \beta_j Controls_j + \sum \beta_k Fixed\ Effects_i + \varepsilon \quad (1)$$

In Equation (1), the dependent variable *Synch* is based on the R^2 from a market model of firm returns on industry and market returns, discussed in the next section. *TPD* is an indicator variable for each country's TPD adoption date, defined below. $Controls_j$ is a vector of control variables, discussed below. $Fixed\ Effects_i$ represents country, industry, and quarter-year fixed effects, which capture time-invariant heterogeneity across countries and industries and control for economic shocks that may confound our causal inferences. Fixed effects also control for correlated omitted variables, which do not vary across countries, industries, or time. In all regressions, we report robust standard errors clustered at the firm level, to account for the correlation of residuals across firm quarter-years (see Petersen 2009).[12] H1 predicts that stock price informativeness will

[12] Although there may be a time effect in our dataset, Petersen (2009, 460) states that the consistency of the clustered standard error depends on having a sufficient number of clusters: "When there are only a few clusters in one dimension, clustering by the more frequent cluster yields results that are almost identical to clustering by both firm and time." Similar reasoning applies to our preference for clustering on the firm level instead of the country level. Nevertheless, in untabulated tests we re-estimate our OLS models using alternative country-level clustering, and several two-way clusters. We describe these tests in Section V, in the subsection titled "Robustness Tests," and note that our inferences remain unchanged.

be significantly higher following implementation of the TPD. Thus, we expect β_1 in Equation (1) to be statistically significant and less than zero.

To examine the relation between the implementation of the TPD and stock price informativeness conditional on the strength of each EU member state's regulatory environment (H2), we estimate Equation (2):

$$Synch = \beta_0 + \beta_1 TPD + \beta_2 RRSI + \beta_3 TPD \times RRSI + \sum \beta_j Controls_j + \\ + \sum \beta_k Fixed\ Effects_i + \omega \quad (2)$$

RRSI represents proxies for the strength of each country's regulatory environment, relative to other EU countries (detailed below in the subsection titled "Regulatory Strength Variables"). H2 predicts that stock price informativeness will be highest post-TPD for firms trading in countries with strong regulatory environments. Thus, we expect β_3 to be statistically significant and less than zero.

Synchronicity Measures

To measure stock return synchronicity, we follow previous studies (e.g., Durnev et al. 2003; Hutton et al. 2009) and use two specifications, both calculated by quarter-year. First, we regress daily firm returns on the current and lagged value-weighted daily market return as follows:

$$Ret_{i,t} = \alpha_0 + \alpha_1 Mkt\_Ret_t + \alpha_2 Mkt\_Ret_{t-1} + \varphi \quad (3)$$

In Equation (3), t refers to trading day, and $Ret_{i,t}$ is the daily return for firm i, adjusted for cash distributions and reinvestment of dividends. For each firm i, we require at least 20 daily returns per quarter. Mkt_Ret_t is the daily value-weighted market return, computed using all firms in the market, excluding firm i. For our second measure, we expand Equation (3) to include industry returns:

$$Ret_{i,t} = \alpha_0 + \alpha_1 Mkt\_Ret_t + \alpha_2 Mkt\_Ret_{t-1} + \alpha_3 Ind\_Ret_t + \alpha_4 Ind\_Ret_{t-1} + \phi \quad (4)$$

In Equation (4), Ind_Ret_t is the daily value-weighted industry return, calculated for all firms in firm *i*'s SIC two-digit industry, excluding firm *i*.[13]

Stock return synchronicity is represented by the coefficients of determination R^2_1 (*Rsq1*) and R^2_2 (*Rsq2*), obtained by estimating Equations (3) and (4), respectively. Following prior studies, we calculate *Synch1* and *Synch2* as $ln\left(\frac{Rsq1}{1-Rsq1}\right)$ and $ln\left(\frac{Rsq2}{1-Rsq2}\right)$. Natural logarithm transformation changes the measures, which are bounded between zero and one, into continuous and more normally distributed variables (Morck et al. 2000). Higher values of *Synch1* and *Synch2* imply less informative stock prices.

In Table 2, we report average values of *Synch1*, *Synch2*, *Rsq1*, and *Rsq2*, by country. Focusing on *Rsq2* and *Synch2*, we find that values of *Rsq2* are generally consistent with prior literature (e.g., Durnev, Morck, and Yeung 2004). For instance, the highest mean values of *Rsq2* are exhibited by Iceland (0.34), the Czech Republic (0.33), and Luxembourg (0.28), while the lowest mean values of *Rsq2* are exhibited by Germany and the UK (both 0.12), followed by France and Ireland (both 0.13). Mean *Synch2* values range from a high of –0.75 in the Czech Republic to a low of –2.44 in Germany. Of note, overall, mean (median) values of *Synch1* and *Synch2* are close, suggesting a small degree of skewness in our dependent variables.

[Insert Table 2 here]

TPD Test Variable

TPD is a binary indicator variable coded one if the fiscal year end (FYE) date for a firm *i* is on or after the quarter during which the TPD comes into force in its country, zero otherwise. While the TPD was adopted in 2004, its implementation dates were staggered across EU member

[13] The exclusion of firm *i* prevents spurious correlations between firm returns and market or industry returns (Durnev et al. 2003). We include lagged *Mkt_Ret* and *Ind_Ret* following Piotroski and Roulstone (2004), who argue that firm information may be incorporated into prices with a delay.

states. The dates vary from January 2007 (Germany, Bulgaria, Romania, and the UK) to August 2009 (Italy and the Czech Republic). Table 1, Panel C reports frequencies of quarterly adoption dates during the TPD implementation phase. Nearly half of adoptions took place within the first quarter of 2007, while the remaining adoptions spanned the rest of 2007, 2008, and 2009.

Differences in implementation dates allow us to isolate the TPD's effect from other regulations with a common adoption date; they also help control for economic events affecting all or most EU member countries simultaneously, such as the financial crisis of 2008. We obtain TPD entry-into-force dates from Christensen et al. (2016) and use the firm FYE date as a cutoff, as quarterly reporting in the EU was not mandatory before the TPD. This approach allows sufficient time for changes in firm information to be reflected in financial reports.[14] Figure 1 provides an example of *TPD* coding for German companies. Depending on a given firm's FYE, the *TPD* indicator is assigned a value of one on and after March 30th, June 30th, or December 31st of 2007.

[Insert Figure 1 here]

Regulatory Strength Variables

To test H2, we use four measures to estimate regulatory strength. The first measure, *Common*, is an indicator variable coded one for countries whose legal systems are based on common law, zero for countries whose legal systems are based on code law. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) argue that commercial laws in countries whose legal systems originate from a common law tradition provide shareholders with greater legal protections than do countries whose legal systems originate from a code law tradition. Our second measure (*Regulatory_quality*) is the regulatory quality index from Kaufmann, Kraay, and Mastruzzi (2009, 6), who contend that regulatory quality measures the "ability of the government to formulate and

[14] In untabulated tests, we re-estimate the effect of the TPD on synchronicity using an alternative specification of *TPD*, which is coded one starting at the end of the calendar quarter that the directive goes into effect. Our results are similar to those reported in Section V.

implement sound policies and regulations that permit and promote private sector development." Our third measure of regulatory strength is *Supervisory_staff*, which captures the number of full-time employees working for the supervisory authority in charge of securities regulation, scaled by the number of listed companies in a given country (Christensen et al. 2016).[15] Jackson and Roe (2009, 210) argue that "greater staffing allows the regulator to examine the allegations of wrongdoing, to write its rules carefully, to conduct market surveillance and review filings, and to act more often to remedy, prevent, and punish wrongdoing." Thus, a larger supervisory staff implies a stronger intensity of public enforcement of securities regulation. Our fourth measure, *Staff_growth*, is the percentage change in full-time employees working for the country's securities regulator from 2004 to 2009 (see Christensen et al. 2016). *Regulatory_quality*, *Supervisory_staff*, and *Staff_growth* are indicator variables coded one if the country is above the full sample median, zero otherwise. Table 1, Panel A lists values of the regulatory quality variables, by country.

Control Variables

We include an extensive set of control variables shown in prior literature to explain the co-movement of stock returns. Following Chan and Hameed (2006), we control for firm size (*ln_Mkt_value*), calculated as the natural logarithm of price per share in US dollars, multiplied by the number of shares outstanding at the end of the given firm-quarter. Because market-wide returns are value-weighted, the market capitalization of a company determines its weight in the market index. For countries with a lower number of stocks, large companies will dominate market movements. Therefore, we expect a positive coefficient on *ln_Mkt_value*.

Actively traded stocks experience faster price adjustment and thus may have higher stock price synchronicity (Chan and Hameed 2006). To control for the effect of trading activity on

[15] Dubois, Fresard, and Dumontier (2014) utilize a similar measure of regulation in their investigation of analyst recommendations surrounding the implementation of the MAD.

synchronicity, we include quarterly share turnover (*Turnover*), as a proxy for liquidity.[16] Firm-quarter turnover is calculated as the natural logarithm of the median daily trading volume over the quarter, scaled by total common shares outstanding. In concentrated industries, firms' returns are more likely to be interdependent, leading to higher synchronicity (Piotroski and Roulstone 2004). To control for industry concentration, we include the Herfindahl index (*Herfindahl_index*), measured annually by two-digit SIC industry, based on firms' sales. We expect the coefficient on *Herfindahl_index* to be positive.

Financial analysts produce industry-specific information through intra-industry transfers (Piotroski and Roulstone 2004). Following Chan and Hameed (2006), we include the number of analysts (*Analysts*) preparing annual earnings forecasts for firm *i* during the year. We depend on I/B/E/S for analyst data. Since a firm's absence from I/B/E/S may imply that the firm has either zero analyst coverage, or is not covered by I/B/E/S, we include an indicator variable *Analysts_dummy*, which is coded one if the firm is missing from I/B/E/S/, zero otherwise. We anticipate a positive and significant coefficient on *Analysts* but do not predict a sign for the coefficient on *Analysts_dummy*.

Dasgupta et al. (2010) argue that because the market learns more about a firm as it becomes older, age should be positively related to synchronicity. Therefore, we use the first year that a firm is covered in Compustat Global to calculate firm age and include it as a control (*Age*). Following Hutton et al. (2009) and Ferreira and Laux (2007), we control for leverage (*Leverage*) as the ratio of total liabilities to total assets, and the ratio of the market value of equity to the book value of equity (*MTB*). Because such firms may have higher inherent risk, we expect a negative coefficient on both *Leverage* and *MTB*. Following Hutton et al. (2009) and Fernandes and Ferreira (2008), we

[16] Gassen et al. (2016) indicate that tests of stock price informativeness using synchronicity can produce spurious results when liquidity is low. Thus, it is important to control for this characteristic.

include a control for return on equity (*ROE*), as high-performance firms may drive market returns and thus exhibit higher synchronicity (Bessembinder 2018). Additionally, we control for the variance of residuals (*Residuals_var*) from the market model (Equation [4]), as recommended by Li, Rajgopal, and Vekatachalam (2014).[17]

We follow Jin and Myers (2006) and Hutton et al. (2009) and include quarterly measures of kurtosis (*Kurtosis*) and skewness (*Skewness*) of the daily returns used to calculate synchronicity. Jin and Myers (2006) note that lower skewness means there are a large number of negative outliers in the distribution of returns, and show that skewness negatively relates to synchronicity. We expect a negative coefficient on *Skewness*. Higher kurtosis can be interpreted as being the result of infrequent extreme deviations. Hutton et al. (2009, 79) argue that such "jump events would tend to weaken the link between firm returns and market returns," leading to a positive relation between kurtosis and stock price informativeness and, therefore, a negative relation between kurtosis and synchronicity. However, in replicating Hutton et al.'s (2009) results, Li et al. (2014) document an insignificant relation between kurtosis and synchronicity. Therefore, we do not predict the sign of the coefficient on *Kurtosis*.

To account for differences in country sample sizes, we also control for the number of listed firms by country-year (*Num_firm_state*), as well as the number of firms in each SIC two-digit industry (*Num_firm_industry*). Prior literature argues that insider trading may affect the collection of private information by outsiders (Fishman and Hagerty 1989; Carlton and Fischel 2007), and Fernandes and Ferreira (2009) find that first-time implementation of insider trading regulation reduces stock price synchronicity. Therefore, we control for the MAD, which was adopted in the EU in 2003 to restrict insider dealings and market abuse (Directive 2003/6/EC 2003). Specifically,

[17] Our inferences remain unchanged if we use the variance of residuals from the market model estimated using Equation (3).

we include an indicator variable *MAD*, coded one if a firm's FYE falls in or after the quarter in which the MAD was implemented, zero otherwise.

Immediately following the financial crisis of 2008, the Eurozone experienced significant credit shortage, bank deleveraging, and the threat of a European sovereign debt crisis.[18] To control for these developments, we include an indicator variable *Euro*, set to one if a firm reports in the euro (€), zero otherwise. Finally, we add the log of GDP in USD ($) billions (*ln_GDP*), percent GDP per capita growth (*GDP_growth*), and percentage inflation (*Inflation*), to capture macroeconomic conditions not controlled for by country or quarter-year fixed effects.[19]

V. EMPIRICAL RESULTS

Descriptive Statistics

Table 3 presents descriptive statistics for all regression variables. Continuous variables are winsorized at 1 percent and 99 percent. Mean and median values of *Synch1* (*Rsq1*) are lower than the mean and median values of *Synch2* (*Rsq2*), suggesting that industry-adjusted models explain more variation in firm returns. Summary statistics for *Synch1* and *Synch2* are similar to those reported in prior studies (e.g., Piotroski and Roulstone 2004; Beuselinck et al. 2009). The mean value of *TPD* indicates that 54 percent of firm-quarters belong to the post-TPD period.

[18] The euro (€) is the official currency of 19 member states of the EU. Known as the Eurozone, this group consists of Austria, Belgium, Cyprus, Estonia (adopted the euro in 2011), Finland, France, Germany, Greece, Ireland, Italy, Latvia (adopted the euro in 2014), Lithuania (adopted the euro in 2015), Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain. See https://ec.europa.eu/info/business-economy-euro/euro-area/euro/eu-countries-and-euro_en.

[19] One caveat to our sample is that the immediate post-TPD period coincides with the recent financial crisis. It is possible that a negative coefficient on *TPD* would be driven by the crisis period, when stocks reflected lower synchronicity due to noise. However, Brockman, Liebenberg, and Schutte (2010) find that stock co-movement is counter-cyclical in relation to the business cycle; that is, when aggregate economic activity is low, co-movement is high. Therefore, our results are unlikely to be driven by the recent financial crisis. Nonetheless, we control for GDP per capita growth to control for fluctuations in stock price co-movements potentially caused by bad economic conditions.

Firms in our final sample have mean and median market values of USD $424.22 and $64.95 million, respectively. These values, lower than those reported by Christensen et al. (2016), are likely driven by the exclusion of ADR firms.[20] Mean and median *ln_Mkt_value* are 18.07 and 18.05, respectively. Share turnover, de-logged, has a mean and median value of zero (up to three decimals). The mean (median) value of the Herfindahl index is 0.34 (0.28). These values are comparable to those reported by Beuselinck et al. (2009) for a similar EU sample.

[Insert Table 3 here]

The mean (median) number of analysts issuing one-year-ahead earnings per share forecasts is 1.04 (0.00). The low value is due to incomplete coverage of sample firms in I/B/E/S, as well as the exclusion of ADR firms, which have higher analyst coverage. For example, based on the mean value of *Analysts_dummy*, 70 percent of our firm-quarter observations are not covered by I/B/E/S. We note, however, that for firms followed by at least one analyst, mean analyst coverage is 3.44, with a range of 1 to 17 analysts (untabulated). The mean (median) age of firms in our sample is 10.57 (10.00) years, with 5 percent of firms younger than 4 years and 5 percent of firms older than 21 years.[21] Mean (median) leverage is 0.18 (0.16), and the mean (median) market-to-book ratio is 1.53 (0.81). On average, firms have a negative *ROE*; however, this value may be driven by outliers, as the median *ROE* is 3 percent. Mean and median values of residual return variability are reported as log values of –3.86 and –3.84, respectively. After reversing the log, we observe that mean and median values are both 0.021. In each quarter, there are approximately 873 firms per country, but

[20] Mean (median) market capitalization for ADR firms during our sample period is USD $3,847 ($1,641) million.
[21] In untabulated tests, we estimate Equation (1) with a requirement that every firm has at least 20 consecutive firm-quarter observations. Our results are not affected by this restriction.

the *Num_firm_state* variable is skewed, as is evident from its standard deviation of 695. There are approximately 39 firms in each two-digit SIC industry (*Num_firm_industry*).[22]

Table 3 also includes summary statistics for our country-level macroeconomic variables. The average GDP is USD $1,771 billion; the average annual GDP per capita growth is just under 1 percent; and mean inflation is 2.12 percent. Mean *Euro* is 0.51, indicating that just over half of our sample belongs to the Eurozone.

Correlations

Table 4 presents Pearson pairwise correlations for all regression variables. *Synch1* and *Synch2* are correlated at 65 percent, suggesting that about 35 percent of the unexplained relationship relates to industry-specific returns. *Synch1* and *Synch2* are negatively correlated with *TPD* at –0.04 and –0.05, respectively, providing some support for H1. Consistent with prior research, *Synch1* and *Synch2* are positively correlated with size, the Herfindahl index, analyst coverage, and share turnover (e.g., Chan and Hameed 2006; Dasgupta et al. 2010). The number of firms listed in a country exhibits a negative correlation with *Synch1* (*Synch2*) of –0.13 (–0.17), indicating that in more concentrated markets, prices exhibit greater co-movement. The growth in GDP per capita has a strong negative correlation (–0.38) with *TPD*. This correlation is likely due to an economic downturn in the EU immediately following the TPD. *Synch1* and *Synch2* are positively correlated with growth in GDP per capita, counter to Brockman et al. (2010), who show that synchronicity increases during economic downturns.[23] We also note that levels of GDP

[22] In untabulated tests, we estimate Equation (1) with a restriction of at least 5 (and at least 10) firms per industry. The results are qualitatively similar to those reported in Section V, for both restrictions.

[23] This positive correlation could be driven by less developed countries with lower GDP yet higher levels of GDP growth (in accordance with Morck et al. [2000], who show that developing countries have more synchronous stock price movements) or by countries that experienced GDP decline during the sample period (in which case a negative correlation conforms with the findings of Brockman et al. [2010]). In untabulated analysis, we observe that seven countries (Estonia, Lithuania, Latvia, Hungary, Poland, the Czech Republic, and Slovenia) have median GDP growth rates ranging from 2.78 to 8 percent, which is above the 75th percentile of GDP growth for our sample. At the same time, these countries have a median *ln_GDP* ranging from 2.98 to 6.17, which is at or below the bottom 25th percentile

(*ln_GDP*) are negatively correlated with *Synch1* and *Synch2* (–0.12 and –0.19), consistent with Morck et al. (2000), who observe a negative relation between synchronicity and per capita GDP.

[Insert Table 4 here]

Multivariate Tests of H1

In Table 5, Panels A and B, we report regression results for Equation (1), where *Synch1* and *Synch2* are the dependent variables, respectively. The first column presents the basic model. In the second column, we include the *MAD* indicator variable. In the third column, we add macroeconomic controls. In all columns of Panels A and B, the adjusted R^2 is 0.30, indicating that Equation (1) explains at least 30 percent of the variation in synchronicity for our sample.[24]

Results and inferences between Panels A and B are similar. For parsimony, we discuss only the results in Panel B, where *Synch2* is the dependent variable. As expected, the coefficient on *TPD* is negative and statistically significant in all three models, ranging from –0.161 (*t*-stat –6.48) in columns I and II to –0.187 (*t*-stat –7.43) in column III. Consistent with H1, these results suggest that after the adoption of the TPD, return synchronicity decreased for the average EU public company. The effects are economically significant as well. For instance, the coefficient on *TPD* in column III indicates a decline in synchronicity of nearly 19 percent after implementation.

The coefficients on most control variables, in both Panels A and B, are statistically significant and in the direction predicted. For instance, larger firms and firms in more concentrated industries tend to exhibit higher synchronicity. Turnover is positively related to synchronicity, both supporting the findings of prior studies (e.g., Kelly 2014) and underscoring the need to control for

---

of our sample. In addition, two countries, Greece and Cyprus, report negative median GDP growth of –0.60 and –1.30, respectively. When we remove these nine countries from our sample and re-estimate correlation coefficients, the correlation coefficients between GDP per capita growth and our synchronicity variables are statistically insignificant.

[24] Normally, adding controls to an OLS regression model will increase R^2. However, the inclusion of country and quarter-year fixed effects in Equation (1) subsumes the incremental explanatory power of the *MAD* indicator and the macroeconomic controls. If we remove country and quarter-year fixed effects, the additional controls increase R^2 by approximately 2 percent.

this important firm characteristic. The variance of the return residuals is negatively associated with synchronicity, consistent with Li et al. (2014).

Synchronicity is also higher for firms with higher analyst coverage. When *Synch2* is the dependent variable, kurtosis is positively related to synchronicity, consistent with Li et al. (2014). Skewness is negatively related to synchronicity, consistent with Jin and Myers (2006) and Hutton et al. (2009). In columns II and III of Panel A, the coefficient on the *MAD* indicator variable is negative and statistically significant (two-tailed test), in line with literature suggesting that anti–insider trading regulation reduces stock return synchronicity (e.g., Fernandes and Ferreira 2009). Overall, the results reported in Table 5 indicate that implementation of the TPD resulted in a significant increase in stock price informativeness in EU capital markets.

[Insert Table 5 here]

Multivariate Tests of H2

In Table 6, Panels A and B, we report regression results from estimation of Equation (2). Again, we focus the discussion of results on Panel B, where the dependent variable is *Synch2*. The coefficient on *TPD* in columns I, II, and IV is negative and statistically significant (column I, –0.170, *t*-stat –5.65; column II, –0.051, *t*-stat –1.67; column IV, –0.081, *t*-stat –2.22), suggesting a negative relation between TPD implementation and synchronicity in countries with weaker regulatory environments. Coefficients on the simple effects of *Common*, *Regulatory_quality*, and *Supervisory_staff* indicate that, in general, a stronger regulatory environment is associated with lower synchronicity. In columns I, II, and IV, the coefficients on the interaction term *TPD*×*RRSI* are negative and statistically significant (column I, –0.099, *t*-stat –3.41; column II, –0.058, *t*-stat –2.01; column IV, –0.052, *t*-stat –1.70), indicating that the decline in synchronicity post-TPD is more pronounced in countries with strong regulatory environments. *F*-tests for the sum of the coefficients *RRSI* and *TPD*×*RRSI* are significant in all columns, I–IV, and in both Panels A and

B. These results are consistent with prior research associating lower synchronicity with strong financial regulations (e.g., Morck et al. 2000). Coefficients on control variables are similar to those reported in Table 5. Overall, tests of H2 complement prior evidence indicating that transparency laws are more effective in countries better equipped, both legally and resource-wise, to implement and enforce new directives (e.g., Christensen et al. 2013, 2016; Wang and Yu 2015).

[Insert Table 6 here]

Robustness Tests

We report the results of several robustness tests in Table 7. For each of these tests, we estimate Equation (1) with all control variables and fixed effects (as in column III of Table 5) but report only the coefficient on *TPD*, for brevity. First, to isolate better the effects of the TPD, we estimate Equation (1) for the sub-period 2006–2013. This shorter period begins after the Prospectus Directive and mandatory IFRS adoption. Additionally, all of the countries in our sample adopted the MAD by the end of 2006. Our results are robust to using the restricted sample period, although the magnitude of the coefficient on *TPD* declines somewhat to –0.139 (*t*-stat –5.36) (*Synch2*). In a second test, we re-estimate Equation (1) without UK firms, as they constitute a significant portion of our sample and may bias the generalizability of our results. Our inferences remain unchanged under this restriction. Third, because we code the *TPD* indicator one, relative to the entry-into-force quarter-year, firms with earlier FYEs relative to the calendar year-end receive a coding of one relatively sooner. Therefore, we re-estimate Equation (1), retaining only firms with December 31st FYEs. Our results hold for this restriction as well, but, notably, we obtain the highest magnitude coefficient on *TPD* (–0.217, *t*-stat –5.85) when *Synch2* is the dependent variable.

We also estimate Equation (1) using one-digit SIC industry fixed effects, and separately

with firm fixed effects. Again, our inferences are unchanged. Although we winsorize our sample at 1 percent and 99 percent, we perform an additional test to check that outliers do not drive our results. Specifically, we remove studentized residuals less than –3 and greater than 3, and re-estimate Equation (1). Though we lose approximately 1 percent of observations, the relationship between synchronicity and *TPD* remains significantly negative at the 1 percent level. Additionally, we test the sensitivity of our results to clustering choice; in untabulated tests, we cluster alternatively by country, by country and year, by country and quarter-year, and by firm and quarter-year. Our inferences remain unchanged, regardless of choice of cluster.

In small firms, which are generally less liquid, low synchronicity may represent noise, biasing our tests of H1. Large firms may drive market returns and thus exhibit high synchronicity, even if their prices are comparatively informative. In an alternative outlier adjustment (untabulated), we truncate the top and bottom 5 percent of firms based on market value of equity, and re-estimate Equation (1).[25] OLS results for the truncated sample are virtually identical to our full-sample estimations. We also re-estimate Equation (1), controlling for accrual quality, as accrual quality may indicate the extent to which firms manage earnings and, thus, affect the pricing of firm-specific information (Hutton et al., 2009). We include discretionary accruals, calculated using the method outlined in Francis and Wang (2008), as an additional control variable. However, since we cannot reliably estimate quarterly discretionary accruals (most firms reported only semi-annually before the TPD), we use annual discretionary accruals. Controlling for annual accrual quality does not alter our results. Notably, if we also include squared discretionary accruals in the

[25] Though we remove each firm *i* from the right-hand side of our synchronicity estimations (i.e., Equations [2] and [3]), it is likely that industry and market returns still embed firm *i*'s information and thus exhibit co-movement, as market returns are generally driven by a handful of, generally large, market makers (see Bessembinder 2018). We recognize that the removal of ADR firms from our primary test sample may accomplish a similar task. However, ADR firms are not necessarily the largest; thus, full truncation provides the more restrictive condition.

model, we observe the same non-linearity (untabulated) in the discretionary accruals–synchronicity relation as documented by Hutton et al. (2009). Overall, our robustness tests provide strong evidence that synchronicity significantly declined across EU financial markets following the TPD.

Amendment of the Transparency Directive

We initially limit our sample period to 2013 because the EU amended the TPD's quarterly reporting requirements in that year, effective 2014. In an additional test, we estimate the impact of the amendment over the sub-period 2012–2015. In October 2013, the TPD was amended, such that listed companies no longer had to report quarterly financial information (see Directive 2013/50/EU 2013).[26] The modification was intended to reduce administrative burden, specifically for small- and medium-sized firms, and to limit managers' focus on short-term results. The EU's decision aligns with theoretical arguments by Gigler et al. (2014) that shareholder impatience, coupled with frequent reporting, can amplify managers' desire to focus on "quick bottom line results." However, Gigler et al. also recognize that there are multiple benefits, and few costs, to frequent reporting because it disciplines managers against investing in negative net-present-value projects. We estimate Equation (1) over the 2012–2015 period and include a post-amendment indicator, *Post_amend*, coded one for years 2014–2015, zero for years 2012–2013. We report the results in Table 8. Notably, the coefficient on *Post_amend* is positive and statistically significant for both measures of synchronicity (*Synch1*, 0.232, *t*-stat 10.65; *Synch2*, 0.144, *t*-stat 7.10), suggesting that stock return synchronicity significantly increased after the TPD amendment.

[Insert Table 8 here]

[26] The official entry into force of the amendment was November 6, 2013, when the amendment was published in the *Official Journal of the European Union*.

VI. CONCLUSION

We examine stock return synchronicity in the context of the EU's recently implemented TPD, which governs financial reporting requirements for issuers of public securities in the EU. We predict that the TPD's provisions, which improved enforcement of existing reporting and disclosure requirements, and included new reporting and disclosure requirements aimed at increasing the flow of firm-specific information across EU capital markets, resulted in more informative stock prices post-TPD. Using a sample of 5,205 unique firms from 25 EU countries, between 2001 and 2013, we find that stock return synchronicity declined following the implementation of the TPD, and more so in countries with strong regulatory environments. Our estimations are robust to the addition of macroeconomic controls and the inclusion of industry, quarter-year and country fixed effects.

We conduct several sensitivity tests to validate our findings. Specifically, we exclude UK firms from our test sample, use alternative definitions of outliers, include a control for accrual quality in our empirical models, and employ alternative firm, country, and year clustering restrictions. Our inferences hold for all sensitivity tests. Further, we explore a recent amendment to the TPD, which removed quarterly reporting requirements after 2013, and find that synchronicity increased post-amendment.

Our study complements and extends prior research examining the information benefits of transparency regulations (e.g., Bushee and Leuz 2005; Wang and Yu 2015). We contribute evidence to calls for expanding mandatory financial reporting and disclosure requirements (Hart 2009) and to calls for more empirical research on the efficacy of broad disclosure regulations (Coffee 1984; Brown 2011). We complement a recent study by Christensen et al. (2016), who document increased liquidity for EU public companies post-TPD. Given that one of the primary

goals of the TPD was to disseminate financial information more effectively, it is possible that the capital-market effects documented in their study relate to improvements in stock price informativeness that lower the costs of private information acquisition by market participants. Our tests and inferences should be viewed in conjunction with Christensen et al. (2016), as they suggest that low synchronicity post-TPD corresponds with more informative stock prices. To our knowledge, we also present the first evidence that stock price informativeness decreased following the 2013 amendment to the TPD, which removed quarterly reporting requirements. While many European policymakers argued that semi-annual reporting is sufficient to keep investors informed, our finding suggests that the removal of quarterly management reports may have been ill advised.

We recognize that our study is not without its limitations. Despite the widespread use of synchronicity as a measure of stock price informativeness, other studies find that low synchronicity is associated with firm characteristics indicative of a weak information environment (e.g., Li et al. 2014; Kelly 2014). Thus, there is a lack of consensus among academic researchers on the appropriateness of relating R^2-based measures of synchronicity to stock price informativeness (Gassen et al. 2016). While we attempt to control for factors that can lead to a positive association between R^2 and stock price informativeness, we acknowledge that changes in stock price synchronicity may not be an ideal proxy for changes in firms' information environments. Thus, we implore other researchers to validate and extend our findings by using alternative means for measuring changes to firms' information environments following expanded transparency regulations. For instance, Zhong (2018) shows that transparency promotes firms' innovative efforts and efficiency by tempering managers' career concerns and facilitating efficient allocation of R&D capital. Brown and Martinsson (2018) document an increase in R&D intensity following the implementation of EU transparency directives (including the TPD). As a valuable extension to

our study, future research may examine whether the subsequent repeal of the TPD's quarterly reporting requirements had an impact on the innovation and efficiency of EU firms.

REFERENCES

Admati, A., and P. Pfleiderer. 2000. Forcing firms to talk: Financial disclosure regulation and externalities. *Review of Financial Studies* 13 (3): 479–519.

Ball, R., S. P. Kothari, and A. Robin. 2000. The effect of international institutional factors on properties of accounting earnings. *Journal of Accounting and Economics* 29 (1): 1–51.

Ball, R., X. Li, and L. Shivakumar. 2015. Contractibility and transparency of financial statement information prepared under IFRS: Evidence from debt contracts around IFRS adoption. *Journal of Accounting Research* 53 (5): 915–963.

Barth, M. E., W. R. Landsman, M. H. Lang, and C. D. Williams. 2013. *Effects on Comparability and Capital Market Benefits of Voluntary Adoption of IFRS by US Firms: Insights from Voluntary Adoption of IFRS by Non-US Firms*. Rock Center for Corporate Governance at Stanford University Working Paper No. 133. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2196247.

Bessembinder, H. 2018. Do stocks outperform treasury bills? *Journal of Financial Economics* 129 (3): 440–457.

Beuselinck, C., P. Joos, I. K. Khurana, and S. Van der Meulen. 2009. *Mandatory IFRS Reporting and Stock Price Informativeness*. Working paper, Tilburg University and University of Missouri–Columbia. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1381242.

Beuselinck, C., P. Joos, I. K. Khurana, and S. Van der Meulen. 2017. Which analysts benefited most from mandatory IFRS adoption in Europe? *Journal of International Accounting Research* 16 (3): 171–190.

Bhattacharya, U., and H. Daouk. 2009. When no law is better than a good law. *Review of Finance* 13 (4): 577–627.

Brockman, P., I. Liebenberg, and M. Schutte. 2010. Comovement, information production, and the business cycle. *Journal of Financial Economics* 97 (1): 107–129.

Brown, J., and G. Martinsson. 2018. Does transparency stifle or facilitate innovation? *Management Science* (forthcoming): https://doi.org/10.1287/mnsc.2017.3002

Brown, P. 2011. International Financial Reporting Standards: What are the benefits? *Accounting and Business Research* 41 (3): 269–285.

Bushee, B. J., and C. Leuz. 2005. Economic consequences of SEC disclosure regulation: Evidence from the OTC bulletin board. *Journal of Accounting and Economics* 39 (2): 233–264.

Bushee, B. J., Matsumoto, D. A., and G. S. Miller. 2004. Managerial and investor responses to disclosure regulation: The case of Reg FD and conference calls. *The Accounting Review* 79 (3): 617–643.

Bushman, R., and W. R. Landsman. 2010. The pros and cons of regulating corporate reporting: A critical review of the arguments. *Accounting and Business Research* 40 (3): 259–273.

Carlton, D. W., and D. R. Fischel. 2007. The regulation of insider trading. In *Economic Analysis of the Law*, edited by D. A. Wittman, 201–211. Malden, MA: Blackwell Publishing.

Chan, K., and Y. C. Chan. 2014. Price informativeness and stock return synchronicity: Evidence from the pricing of seasoned equity offerings. *Journal of Financial Economics* 114 (1): 36–53.

Chan, K., and A. Hameed. 2006. Stock price synchronicity and analyst coverage in emerging markets. *Journal of Financial Economics* 80 (1): 115–147.

Chan, K., Hameed, A., and T. Kang. 2013. Stock price synchronicity and liquidity. *Journal of Financial* Markets 16 (3): 414–438.

Cho, Y. 2015. Segment disclosure transparency and internal capital market efficiency: Evidence from SFAS no. 131. *Journal of Accounting Research* 53 (4): 669–723.

Chow, C. 1983. The impacts of accounting regulation on bondholder and shareholder wealth: The case of the Securities Acts. *The Accounting Review* 58 (3): 233–267.

Christensen, H. B., L. Hail, and C. Leuz. 2013. Mandatory IFRS reporting and changes in enforcement. *Journal of Accounting and Economics* 56 (2–3, Supplement 1): 147–177.

Christensen, H. B., L. Hail, and C. Leuz. 2016. Capital-market effects of securities regulation: Prior conditions, implementation, and enforcement. *Review of Financial Studies* 29 (11): 2885–2924.

Coffee, J. 1984. Market failure and the economic case for a mandatory disclosure system. *Virginia Law Review* 70 (4): 717–753.

Coffee, J. 2002. Racing towards the top? The impact of cross-listings and stock market competition on international corporate governance. *Columbia Law Review* 102 (7): 1757–1831.

Cohen, D. A., A. Dey, and T. Z. Lys. 2008. Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. *The Accounting Review* 83 (3): 757–787.

Commission of the European Communities. 1999. *Implementing the Frameworks for Financial Markets: Action Plan*. Available at: http://aei.pitt.edu/3572/1/3572.pdf

Cuijpers, R., and E. Peek. 2010. Reporting frequency, information precision and private information acquisition. *Journal of Business Finance and Accounting* 37 (1–2): 27–59.

Dasgupta, S., J. Gan, and N. Gao. 2010. Transparency, price informativeness, and stock return synchronicity: Theory and evidence. *Journal of Financial and Quantitative Analysis* 45 (5): 1189–1220.

Daske, H., L. Hail, C. Leuz, and R. Verdi. 2008. Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of Accounting Research* 46 (5): 1085–1142.

Diamond, D., and R. Verrecchia. 1991. Disclosure, liquidity, and the cost of capital. *Journal of Finance* 46 (4): 1325–1355.

Directive 2003/6/EC. 2003. *Official Journal of the European Union*: 16–25.

Directive 2004/109/EC. 2004. *Official Journal of the European Union*: 38–57.

Directive 2013/50/EU. 2013. *Official Journal of the European Union*: L294/13.

Dubois, M., L. Fresard, and P. Dumontier. 2014. Regulating conflicts of interest: The effect of sanctions and enforcement. *Review of Finance* 18 (2): 489–526.

Durnev, A., R. Morck, and B. Yeung. 2004. Value-enhancing capital budgeting and firm-specific stock return variation. *Journal of Finance* 59 (1): 65–105.

Durnev, A., R. Morck, B. Yeung, and P. Zarowin. 2003. Does greater firm-specific return variation mean more or less informed stock pricing? *Journal of Accounting Research* 41 (5): 797–836.

Easterbrook, F., and D. Fischel. 1984. Mandatory disclosure and the protection of investors. *Virginia Law Review* 70: 669–715.

Eleswarapu, V. R., R. Thompson, and K. Venkataraman. 2004. The impact of regulation fair disclosure: Trading costs and information asymmetry. *Journal of Financial and Quantitative Analysis* 39 (2): 209–225.

Ertan, A., M. Loumioti, and R. Wittenberg-Moerman. 2016. Enhancing loan quality through transparency: Evidence from the European Central Bank loan level reporting initiative. *Journal of Accounting Research* 55 (4): 877–918.

Fernandes, N., and M. A. Ferreira. 2008. Does international cross-listing improve the information environment? *Journal of Financial Economics* 88 (2): 216–244.

Fernandes, N., and M. A. Ferreira. 2009. Insider trading laws and stock price informativeness. *Review of Financial Studies* 22 (5): 1845–1887.

Ferreira, M. A., and P. A. Laux. 2007. Corporate governance, idiosyncratic risk, and information flow. *Journal of Finance* 62 (2): 951–989.

Fishman, M. J., and K. M. Hagerty. 1989. Disclosure decisions by firms and the competition for price efficiency. *Journal of Finance* 44 (3): 633–646.

Francis, J. R., and D. Wang. 2008. The joint effect of investor protection and Big 4 audits on earnings quality around the world. *Contemporary Accounting Research* 25 (1): 157–191.

Gassen, J., H. Skaife, and D. Veenman. 2016. *Illiquidity and the Measurement of Stock Price Synchronicity*. Working paper, Humboldt University–Berlin, University of California–Davis, and Erasmus University–Rotterdam. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2405465

Gibbins, M., A. Richardson, and J. Waterhouse. 1990. The management of corporate financial disclosure: Opportunism, ritualism, polices, and processes. *Journal of Accounting Research* 28 (1): 121–143.

Gigler, F., C. Kanodia, H. Sapra, and R. Venugopalan. 2014. How frequent financial reporting can cause managerial short-termism: An analysis of the costs and benefits of increasing reporting frequency. *Journal of Accounting Research* 52 (2): 357–387.

Glosten, L., and P. Milgrom. 1985. Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14 (1): 71–100.

Goto, S., M. Watanabe, and Y. Xu. 2009. Strategic disclosure and stock returns: Theory and evidence from U.S. cross-listing. *Review of Financial Studies* 22 (4): 1585–1620.

Grossman, S. J. 1981. The informational role of warranties and private disclosure about product quality. *Journal of Law and Economics* 24 (3): 461–483.

Grossman, S. J., and O. Hart. 1980. Takeover bids, the free-rider problem, and the theory of the corporation. *Bell Journal of Economics* 11 (1): 42–64.

Grossman, S. J., and J. E. Stiglitz. 1980. On the impossibility of informationally efficient markets. *American Economic Review* 70 (3): 393–408.

Hart, O. 2009. Regulation and Sarbanes-Oxley. *Journal of Accounting Research* 47 (2): 437–445.

Hail, L., and C. Leuz. 2006. International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research* 44 (3): 485–531.

Healy, P., and K. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31 (1–3): 405–440.

Honigsberg, C., R. J. Jackson, and Y. F. Wong. 2015. Mandatory disclosure and individual investors: Evidence from the Jobs Act. *Washington University Law Review* 93 (2): 293–334.

Hope, O.-K., and W. B. Thomas. 2008. Managerial empire building and firm disclosure. *Journal of Accounting Research* 46 (3): 591–626.

Hutton, A. P., A. J. Marcus, and H. Tehranian. 2009. Opaque financial reports, R^2, and crash risk. *Journal of Financial Economics* 94 (1): 67–86.

Jackson, H. E., and M. J. Roe. 2009. Public and private enforcement of securities laws: Resource-based evidence. *Journal of Financial Economics* 93 (2): 207–238.

Jarrell, G. A. 1981. The economic effects of federal regulation of the market for new security issues. *Journal of Law and Economics* 24 (3): 613–676.

Jin, L., and S. C. Myers. 2006. R^2 around the world: New theory and new tests. *Journal of Financial Economics* 79 (2): 257–292.

Karolyi, G. A. 2006. The world of cross-listings and cross-listings of the world: Challenging conventional wisdom. *Review of Finance* 10 (1): 73–115.

Kaufmann, D., A. Kraay, and M. Mastruzzi. 2009. *Governance Matters VIII: Aggregate and Individual Governance Indicators, 1996−2008*. World Bank Policy Research Working Paper No. 4978. Available at: http://documents.worldbank.org/curated/en/598851468149673121/pdf/WPS4978.pdf

Kelly, P. 2014. Information efficiency and firm-specific return variation. *Quarterly Journal of Finance* 4 (4): 1450018.

Kim, J., and H. Shi. 2012. IFRS reporting, firm-specific information flows, and institutional environments: International evidence. *Review of Accounting Studies* 17 (3): 474–517.

Kim, J., H. Zhang, L. Li, and G. Tian. 2014. Press freedom, externally-generated transparency, and stock price informativeness: International evidence. *Journal of Banking and Finance* 46 (September): 299–310.

Kyle, A. 1985. Continuous auctions and insider trading. *Econometrica* 53 (6): 1315–1335.

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer. 2006. What works in securities laws? *Journal of Finance* 61 (1): 1–32.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny. 1998. Law and finance. *Journal of Political Economy* 106 (6): 1113–1155.

Lambert, R., C. Leuz, and R. Verrecchia. 2007. Accounting information, disclosure, and cost of capital. *Journal of Accounting Research* 45 (2): 385–420.

Lenkey, S. 2014. Advanced disclosure of insider trading. *Review of Financial Studies* 27 (8): 2504–2537.

Leuz, C., and P. D. Wysocki. 2016. The economic consequences of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research* 54 (2): 525–622.

Li, B., S. Rajgopal, and M. Venkatachalam. 2014. R^2 and idiosyncratic risk are not interchangeable. *The Accounting Review* 89 (6): 2261–2295.

Li, S. 2010. Does mandatory adoption of International Financial Reporting Standards in the European Union reduce the cost of equity capital? *The Accounting Review* 85 (2): 607–636.

Lobo, G. J., and J. Zhou. 2006. Did conservatism in financial reporting increase after the Sarbanes-Oxley Act? Initial evidence. *Accounting Horizons* 20 (1): 57–73.

Milgrom, P. 1981. Good news and bad news: Representation theorems and applications. *Bell Journal of Economics* 12 (2): 380–391.

Morck, R., B. Yeung, and W. Yu. 2000. The information content of stock markets: Why do emerging markets have synchronous stock price movements? *Journal of Financial Economics* 58 (1–2): 215–260.

Petersen, M. 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies* 22 (1): 435–480.

Piotroski, J. D., and B. T. Roulstone. 2004. The influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices. *The Accounting Review* 79 (4): 1119–1151.

Roll, R. 1988. R^2. *Journal of Finance* 43 (3): 541–566.

Shi, C., K. Pukthuanthong, and T. Walker. 2012. Does disclosure regulation work? Evidence from international IPO markets. *Contemporary Accounting Research* 30 (1): 356–387.

Shin, H. 2003. Disclosures and asset returns. *Econometrica* 71 (1): 105–133.

Simon, C. J. 1989. The effect of the 1933 Securities Act on investor information and the performance of new issues. *American Economic Review* 79 (3): 295–318.

Veldkamp, L. L. 2006. Information markets and the comovement of asset prices. *Review of Economic Studies* 73 (3): 823–845.

Verrecchia, R. E. 1983. Discretionary disclosure. *Journal of Accounting and Economics* 5: 179–194.

Verrecchia, R. 2001. Essays on disclosure. *Journal of Accounting and Economics* 32 (1–3): 97–180.

Wang, J. W., and W. W. Yu. 2015. The information content of stock prices, legal environments, and accounting standards: International evidence. *European Accounting Review* 24 (3): 471–493.

Zhong, R. 2018. Transparency and firm innovation. *Journal of Accounting and Economics* 66 (1): 67–93.

Zingales, L. 2009. The future of securities regulation. *Journal of Accounting Research* 47 (2): 391–425.

APPENDIX A

Variable definitions

Variable	Description
Rsq1	*R*-squared from regressing quarterly firm returns on quarterly market returns
Rsq2	*R*-squared from regressing quarterly firm returns on quarterly market and industry returns
Synch1	Synchronicity measure calculated using *Rsq1*, *ln*(*Rsq1* / (1–*Rsq1*))
Synch2	Synchronicity measure calculated using *Rsq2*, *ln*(*Rsq2* / (1–*Rsq2*))
TPD	An indicator variable for Transparency Directive implementation, coded one if quarter-year falls after TPD entry-into-force date, zero otherwise
Common	An indicator variable, coded one if the country follows common law, zero if the country follows code law
Regulatory_quality	An indicator variable for the regulatory quality index from Kaufmann et al. (2009), coded one if value is above full-sample median, zero otherwise
Supervisory_staff	An indicator variable for the number of full-time employees working for a country's supervisory authority in 2003, coded one if value is above full-sample median, zero otherwise
Staff_growth	An indicator variable for percentage change in full-time employees working for a country's securities regulator, 2004–09, coded one if value is above full-sample median, zero otherwise
ln_Mkt_value	Natural logarithm of the market value of equity in USD$, *ln*(*PRCCD* × *CSHOC*)
Turnover	Natural logarithm of the median of daily trading volume to common shares outstanding, *ln*(*CSHTRD* / *CSHOC*)
Herfindahl_index	Sales-based Herfindahl index calculated for each two-digit SIC industry, $\sum_{i=1}^{n}\left(\frac{SALE_i}{\sum_{i=1}^{n} SALE_i}\right)^2$
Num_analysts	Average number of analysts providing forecasts for a firm during the year
Analysts_dummy	Indicator variable coded one if analyst information is missing in I/B/E/S for a given firm in the sample, zero otherwise
Age	Age of the firm at the end of the year
MTB	The ratio of market value of assets to book value of assets, lagged by year, (AT + CSHOC × PRCCD – CEQ – TXDB) / AT
ROE	Return on equity, IB / (AT – DLC – DLTT)
Residuals_var	Natural logarithm of the variance of the residuals from the market return estimation
Leverage	Ratio of total assets to total liabilities, (DLT + DLCC) / AT
Kurtosis	Firm-quarter kurtosis of the daily returns distribution used to calculate synchronicity measures
Skewness	Firm-quarter skewness of the daily returns distribution used to calculate synchronicity measures
Num_firm_state	Number of firms listed in a given EU country
Num_firm_industry	Number of firms per SIC two-digit industry-quarter used to calculate *Synch2*

MAD	An indicator variable for Market Abuse Directive implementation, coded one if quarter-year falls after MAD entry-into-force date, zero otherwise
GDP_growth	GDP per capita growth, %, from World Bank economic indicators, USD$
ln_GDP	Logarithm of GDP, USD$
Inflation	Annual inflation rate, %, from World Bank economic indicators
Euro	Indicator variable coded one if firm reports in the euro (€), zero otherwise
Post_amend	Indicator variable coded one if the year is 2014 or 2015, zero if the year is 2012 or 2013

FIGURE 1
Timeline for Defining Pre- vs. Post-TPD Implementation

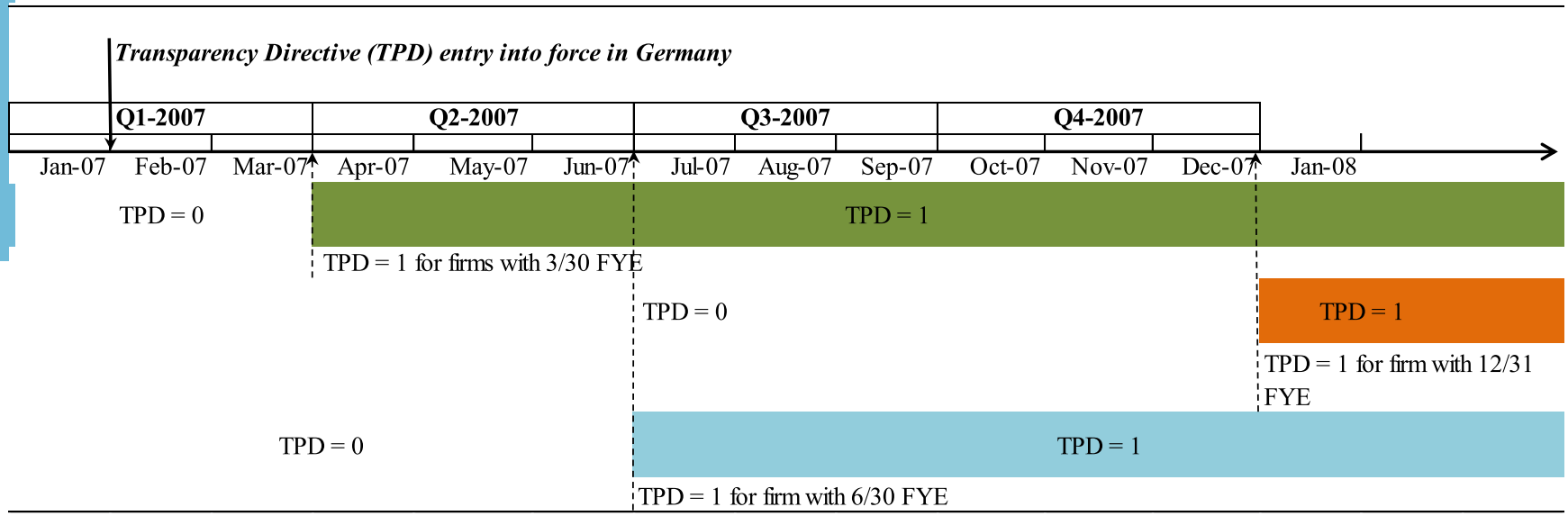

TABLE 1
Sample Composition and Summary Statistics by Country

Panel A: Sample Composition, Entry-into-force Dates, and Institutional Variables

				Financial Regulatory Strength			
Country	***N***	*TPD entry-into-force date*	*TPD quarter date*	*Common*	*Regulatory quality*	*Supervisory staff*	*Supervisory staff growth*
Austria	1,392	7-Apr	6/30/2007	0	1	0	1
Belgium	2,467	8-Aug	9/30/2008	0	1	0	0
Cyprus	862	8-Mar	3/31/2008	0	0	0	0
Czech Republic	39	9-Aug	9/30/2009	0	0	1	1
Denmark	2,737	7-Jun	6/30/2007	0	1	0	0
Estonia	147	7-Dec	12/31/2007	0	1	1	0
Finland	3,200	7-Feb	3/31/2007	0	1	0	0
France	18,505	7-Dec	12/31/2007	0	0	1	0
Germany	19,830	7-Jan	3/31/2007	0	1	1	1
Greece	6,826	7-Jul	9/30/2007	0	0	1	0
Hungary	415	7-Dec	12/31/2007	0	0	1	0
Iceland	116	7-Nov	12/31/2007	0	1	0	1
Ireland	980	7-Jun	6/30/2007	1	1	1	1
Italy	6,493	9-Aug	9/30/2009	0	0	1	1
Latvia	272	7-Apr	6/30/2007	0	0	0	1
Lithuania	682	7-Feb	3/31/2007	0	0	1	0
Luxembourg	426	8-Jan	3/31/2008	0	1	1	1
Netherlands	3,689	9-Jan	3/31/2009	0	1	1	1
Norway	3,905	8-Jan	3/31/2008	0	1	0	1
Poland	7,156	9-Mar	3/31/2009	0	0	1	1
Portugal	810	7-Nov	12/31/2007	0	0	1	0
Slovenia	261	7-Sep	9/30/2007	0	0	0	1
Spain	2,970	7-Dec	12/31/2007	0	1	0	1
Sweden	9,076	7-Jul	9/30/2007	0	1	0	1
UK	38,385	7-Jan	3/31/2007	1	1	1	1

TABLE 1 (continued)

Panel B: Sample Composition by Year and Calendar Quarter

Year	N	%	Quarter	N	%
2001	8,164	6.2%	**I**	31,862	24.2%
2002	9,257	7.0%	**II**	32,679	24.8%
2003	9,065	6.9%	**III**	33,345	25.3%
2004	9,297	7.1%	**IV**	33,755	25.6%
2005	9,584	7.3%	Total	131,641	100.00%
2006	10,177	7.7%			
2007	10,823	8.2%			
2008	10,906	8.3%			
2009	10,631	8.1%			
2010	11,271	8.6%			
2011	11,057	8.4%			
2012	10,766	8.2%			
2013	10,643	8.1%			
Total	131,641	100.0%			

Panel C: Frequency of Quarterly Adoption Dates in the Sample

TPD quarter date	N	%
3/31/2007	62,097	47.2%
6/30/2007	5,381	4.1%
9/30/2007	16,163	12.3%
12/31/2007	22,963	17.4%
3/31/2008	5,193	3.9%
9/30/2008	2,467	1.9%
3/31/2009	10,845	8.2%
9/30/2009	6,532	5.0%
Total	131,641	100.0%

TABLE 2
Synchronicity and R^2 by Country

		Synch1		*Synch2*		*Rsq1*		*Rsq2*	
Country	**N**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
Austria	1,392	–3.27	–3.14	–2.00	–2.29	0.07	0.04	0.17	0.09
Belgium	2,467	–3.08	–2.96	–2.03	–2.24	0.08	0.05	0.16	0.10
Cyprus	862	–3.32	–3.20	–1.97	–2.26	0.07	0.04	0.17	0.09
Czech Republic	39	–1.98	–1.45	–0.85	–0.75	0.19	0.19	0.33	0.32
Denmark	2,737	–2.97	–2.83	–1.95	–2.14	0.09	0.06	0.17	0.11
Estonia	147	–2.90	–2.84	–1.73	–1.82	0.10	0.05	0.19	0.14
Finland	3,200	–2.64	–2.46	–1.60	–1.85	0.12	0.08	0.21	0.14
France	18,505	–3.04	–2.93	–2.26	–2.29	0.09	0.05	0.13	0.09
Germany	19,830	–3.27	–3.16	–2.40	–2.44	0.07	0.04	0.12	0.08
Greece	6,826	–2.04	–1.84	–1.38	–1.45	0.19	0.14	0.25	0.19
Hungary	415	–2.67	–2.57	–1.88	–1.85	0.11	0.07	0.18	0.14
Iceland	116	–2.57	–2.59	–0.56	–1.48	0.12	0.07	0.34	0.18
Ireland	980	–3.34	–3.22	–2.29	–2.34	0.06	0.04	0.13	0.09
Italy	6,493	–2.33	–2.16	–1.68	–1.73	0.14	0.10	0.20	0.15
Latvia	272	–3.75	–3.56	–2.11	–2.42	0.05	0.03	0.17	0.08
Lithuania	682	–2.81	–2.76	–1.53	–1.80	0.10	0.06	0.22	0.14
Luxembourg	426	–3.34	–3.26	–1.18	–2.01	0.06	0.04	0.28	0.12
Netherlands	3,689	–2.59	–2.46	–1.75	–1.90	0.13	0.08	0.20	0.13
Norway	3,905	–2.61	–2.48	–1.57	–1.79	0.12	0.08	0.22	0.14
Poland	7,156	–2.71	–2.56	–1.96	–2.04	0.11	0.07	0.17	0.12
Portugal	810	–2.85	–2.70	–1.72	–1.91	0.11	0.06	0.20	0.13
Slovenia	261	–2.68	–2.68	–1.39	–2.00	0.14	0.06	0.26	0.12
Spain	2,970	–2.45	–2.30	–1.41	–1.69	0.14	0.09	0.24	0.16
Sweden	9,076	–2.79	–2.64	–2.00	–2.06	0.11	0.07	0.16	0.11
United Kingdom	38,385	–3.19	–3.07	–2.37	–2.36	0.08	0.04	0.12	0.09
Total	131,641	NA	NA	NA	NA	NA	NA	NA	NA

This table presents mean and median values of synchronicity and related *R*-squared measures by country. All variables are defined in Appendix A.

TABLE 3
Descriptive Statistics

Variable	Mean	STD	5%	25%	Median	75%	95%
Synchronicity Variables							
Synch1	–2.95	1.52	–5.60	–3.84	–2.84	–1.93	–0.66
Synch2	–2.10	1.36	–3.98	–2.89	–2.19	–1.48	–0.14
Rsq1	0.10	0.11	0.00	0.02	0.05	0.13	0.34
Rsq2	0.15	0.17	0.02	0.05	0.10	0.19	0.46
Explanatory Variable							
TPD	0.54	0.50	0.00	0.00	1.00	1.00	1.00
Financial Regulatory Strength Variables							
Common	0.30	0.46	0.00	0.00	0.00	1.00	1.00
Regulatory_quality	0.68	0.47	0.00	0.00	1.00	1.00	1.00
Supervisory_staff	0.79	0.41	0.00	1.00	1.00	1.00	1.00
Staff_growh	0.72	0.45	0.00	0.00	1.00	1.00	1.00
Main Control Variables							
$ln\_Mkt\_value_{t-4}$	18.07	1.89	14.98	16.84	18.05	19.31	21.17
Market value, millions $	424.22	2,817.18	4.96	21.96	64.95	219.32	1,406.01
Turnover	–7.74	1.54	–10.47	–8.62	–7.66	–6.72	–5.39
Herfindahl_index	0.34	0.25	0.05	0.16	0.28	0.47	0.89
Analysts	1.04	2.59	0.00	0.00	0.00	1.00	6.00
Analysts_dummy	0.70	0.46	0.00	0.00	1.00	1.00	1.00
Age	10.57	4.95	4.00	7.00	10.00	14.00	20.00
$Leverage_{t-4}$	0.18	0.17	0.00	0.02	0.16	0.30	0.51
MTB_{t-4}	1.53	12.71	0.17	0.46	0.81	1.45	3.90
ROE	–0.05	0.41	–0.51	–0.05	0.03	0.07	0.16
Residuals_var	–3.86	0.60	–4.77	–4.18	–3.84	–3.48	–2.98
Kurtosis	0.08	0.14	0.01	0.02	0.04	0.08	0.28
Skewness	0.47	1.49	–1.85	–0.16	0.40	1.09	2.99
Num_firm_state	873.30	695.46	110.00	260.00	745.00	1574.00	2104.00
Num_firm_industry	38.63	54.96	2.00	6.00	15.00	44.00	174.00
MAD	0.71	0.46	0.00	0.00	1.00	1.00	1.00
Macroeconomic Control Variables							
GDP, billions $	1,771.24	1,139.27	201.92	488.38	2,072.82	2,678.28	3,439.95
ln_GDP	7.08	1.09	5.31	6.19	7.64	7.89	8.14
GDP_growth	0.86	2.62	–5.05	–0.17	1.30	2.21	4.24
Inflation	2.12	1.14	0.31	1.36	2.08	2.74	4.16
Euro	0.51	0.50	0.00	0.00	1.00	1.00	1.00

This table presents descriptive statistics for variables used in OLS models. N = 131,641 firm-quarter observations. All variables are defined in Appendix A.

TABLE 4
Correlations

Panel A: Correlations between Dependent Variables, Test Variables, and All Main Control Variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	*Synch1*	1.00																					
2	*Synch2*	**0.65**	1.00																				
3	*TPD*	**–0.04**	**–0.05**	1.00																			
4	*ln_Mkt_value*	**0.25**	**0.18**	**–0.08**	1.00																		
5	*Turnover*	**0.28**	**0.20**	**–0.15**	**0.07**	1.00																	
6	*Herfindahl_index*	**0.03**	**0.25**	**0.01**	**–0.02**	**–0.07**	1.00																
7	*Analysts*	**0.17**	**0.13**	**0.13**	**0.36**	**0.16**	0.00	1.00															
8	*Analysts_dummy*	**–0.03**	0.00	**–0.22**	**–0.22**	**–0.06**	**0.05**	**–0.61**	1.00														
9	*Age*	0.00	0.00	**0.33**	**0.25**	**–0.11**	**0.07**	**0.16**	**–0.15**	1.00													
10	*Leverage*	**0.07**	**0.10**	**–0.01**	**0.10**	**–0.05**	**0.18**	**0.05**	0.00	**0.07**	1.00												
11	*MTB*	**0.03**	**0.03**	**–0.02**	**0.03**	**0.03**	**0.01**	**–0.01**	**0.01**	**–0.04**	0.00	1.00											
12	*ROE*	**0.05**	**0.05**	**–0.01**	**0.16**	**–0.09**	**0.03**	**0.06**	**–0.05**	**0.12**	**0.05**	**–0.01**	1.00										
13	*Residuals_var*	**–0.05**	**–0.30**	**0.06**	**–0.33**	**0.14**	**–0.16**	**–0.11**	**0.09**	**–0.20**	**–0.05**	0.00	**–0.20**	1.00									
14	*Kurtosis*	**–0.05**	**–0.03**	**0.07**	**–0.27**	**0.11**	**–0.01**	**–0.08**	**0.09**	**–0.14**	**–0.02**	0.00	**–0.23**	**0.60**	1.00								
15	*Skewness*	**–0.07**	**–0.06**	**0.01**	**–0.08**	**0.08**	0.00	**–0.02**	0.00	**–0.01**	**–0.02**	**–0.01**	**–0.01**	**0.11**	**0.18**	1.00							
16	*Num_firm_state*	**–0.13**	**–0.17**	**–0.04**	**0.14**	**0.13**	**–0.40**	**0.04**	**–0.14**	**0.04**	**–0.21**	**–0.01**	**–0.08**	**–0.06**	**0.01**	0.00	1.00						
17	*Num_firm_industry*	**–0.07**	**–0.12**	**0.03**	**–0.03**	**0.09**	**–0.54**	**–0.01**	**–0.06**	**–0.10**	**–0.26**	0.00	**–0.08**	**0.05**	**0.05**	**0.02**	**0.44**	1.00					
18	*MAD*	**–0.01**	**–0.02**	**0.70**	0.00	**–0.06**	**0.01**	**0.05**	**–0.09**	**0.30**	**–0.01**	**–0.01**	**0.03**	**–0.02**	0.00	**0.01**	**–0.07**	**0.01**	1.00				
19	*ln_GDP*	**–0.12**	**–0.19**	**0.09**	**0.25**	**0.06**	**–0.35**	**0.07**	**–0.14**	**0.17**	**–0.17**	**–0.05**	**–0.03**	**–0.08**	**–0.02**	**0.03**	**0.64**	**0.36**	**0.08**	1.00			
20	*GDP_growth*	**0.03**	**0.03**	**–0.38**	0.00	**0.12**	**–0.02**	**–0.11**	**0.16**	**–0.12**	**–0.08**	**0.03**	**0.05**	**–0.15**	**–0.11**	**–0.02**	**0.04**	**0.01**	**–0.21**	**–0.07**	1.00		
21	*Inflation*	**0.10**	**0.08**	**0.14**	**0.03**	**–0.01**	**–0.02**	**–0.04**	**0.07**	**–0.03**	0.00	**0.04**	**0.01**	**–0.01**	**–0.03**	**–0.04**	**0.02**	**–0.01**	**0.15**	**–0.13**	**0.13**	1.00	
22	*Euro*	**0.05**	**0.05**	**–0.02**	**0.27**	**–0.17**	**0.14**	**0.03**	**0.05**	**0.04**	**0.17**	**–0.01**	**0.08**	**–0.01**	**–0.04**	0.00	**–0.49**	**–0.16**	**0.01**	**0.08**	**–0.16**	**–0.13**	1.00

TABLE 4 (continued)

Panel B: Correlations between Dependent Variables, Test Variable, and Regulatory Strength Dummies

		1	2	3	4	5	6	7
1	***Synch1***	1.00						
2	***Synch2***	**0.65**	1.00					
3	***TPD***	**–0.04**	**–0.05**	1.00				
4	***Common***	**–0.11**	**–0.13**	**–0.03**	1.00			
5	***Regulatory_quality***	**–0.06**	**–0.07**	**–0.03**	**0.41**	1.00		
6	***Supervisory_staff***	**–0.05**	**–0.11**	**–0.04**	**0.33**	**0.09**	1.00	
7	***Staff_growth***	**–0.06**	**–0.07**	**–0.03**	**0.41**	**0.99**	**0.07**	1.00

Panels A and B present Pearson correlation coefficients. Bolded numbers indicate a correlation with a *p*-value of 10% or less. All variables are defined in Appendix A.

TABLE 5
The Effect of the TPD on Stock Price Informativeness

Panel A: Estimation of Equation (1); Dependent Variable = *Synch1*

Dep. var. = Synch1 Variable	**Pred. sign**	**I**			**II**			**III**		
		Coef.	***t*-stat**		**Coef.**	***t*-stat**		**Coef.**	***t*-stat**	
Intercept	+/–	–4.944	–32.83	***	–4.822	–31.31	***	–4.240	–7.75	***
TPD	–	–0.175	–7.46	***	–0.176	–7.51	***	–0.185	–7.70	***
$ln\_Mkt\_value_{t-4}$	+	0.218	42.72	***	0.218	42.69	***	0.220	43.43	***
Turnover	+	0.281	57.08	***	0.281	57.10	***	0.280	57.10	***
Herfindahl_index	+	–0.013	–0.35		–0.012	–0.33		–0.007	–0.19	
Analysts	+	0.039	12.56	***	0.039	12.56	***	0.039	12.47	***
Analysts_dummy	+/–	0.116	8.07	***	0.118	8.18	***	0.121	8.39	***
Age	+	0.007	4.48	***	0.007	4.47	***	0.007	4.45	***
$Leverage_{t-4}$	+/–	0.093	2.49	**	0.093	2.47	**	0.098	2.62	***
MTB_{t-4}	–	0.001	2.04	**	0.001	2.03	**	0.000	1.83	*
ROE	+	0.050	4.62	***	0.050	4.63	***	0.048	4.48	***
Residuals_var	–	–0.149	–13.54	***	–0.149	–13.51	***	–0.144	–13.25	***
Kurtosis	+/–	0.041	1.19		0.039	1.15		0.047	1.36	
Skewness	–	–0.024	–8.78	***	–0.024	–8.78	***	–0.025	–8.97	***
Num_firm_state	–	0.000	3.41	***	0.000	3.27	***	0.000	4.38	***
MAD	–				–0.117	–3.66	***	–0.111	–3.49	***
ln_GDP	–							–0.104	–1.22	
GDP_growth	–							0.016	4.47	***
Inflation	+/–							0.023	3.45	***
Euro	+/–							–0.228	–4.25	***
Adj. R^2		0.30			0.30			0.30		
N		131,641			131,641			131,641		
Industry fixed effects		Yes			Yes			Yes		
Quarter-year fixed effects		Yes			Yes			Yes		
Country fixed effects		Yes			Yes			Yes		
Cluster by firm (5,205)		Yes			Yes			Yes		

TABLE 5 (continued)

Panel B: Estimation of Equation (1); Dependent Variable = *Synch2*

Dep. var.* = *Synch2	**Pred.**	**I**			**II**			**III**		
Variable	**sign**	**Coef.**	***t*-stat**		**Coef.**	***t*-stat**		**Coef.**	***t*-stat**	
Intercept	+/–	–6.093	–28.61	***	–6.055	–27.95	***	–4.473	–6.68	***
TPD	–	–0.161	–6.48	***	–0.161	–6.48	***	–0.187	–7.43	***
$ln\_Mkt\_value_{t-4}$	+	0.085	13.22	***	0.085	13.22	***	0.087	13.47	***
$Turnover_{t-4}$	+	0.225	39.83	***	0.225	39.82	***	0.226	39.57	***
Herfindahl_index	+	1.026	14.77	***	1.026	14.77	***	1.026	14.75	***
Analysts	+	0.037	10.70	***	0.037	10.70	***	0.036	10.52	***
Analysts_dummy	+/–	0.142	8.65	***	0.143	8.67	***	0.144	8.76	***
Age	+	0.001	0.50		0.001	0.49		0.001	0.48	
$Leverage_{t-4}$	+/–	0.198	3.99	***	0.198	3.99	***	0.201	4.06	***
MTB_{t-4}	–	0.000	0.65		0.000	0.65		0.000	0.48	
ROE	+	–0.027	–2.08	**	–0.027	–2.08	**	–0.028	–2.16	**
Residuals_var	–	–0.901	–21.96	***	–0.901	–21.96	***	–0.901	–21.88	***
Kurtosis	+/–	1.272	10.78	***	1.272	10.78	***	1.273	10.80	***
Skewness	–	–0.017	–6.75	***	–0.017	–6.75	***	–0.017	–6.79	***
Num_firm_state	–	0.000	4.48	***	0.000	4.43	***	0.000	6.42	***
Num_firm_industry	+/–	0.002	9.08	***	0.002	9.08	***	0.002	9.04	***
MAD	–				–0.037	–1.14		–0.038	–1.15	
Ln_GDP	–							–0.263	–2.54	**
GDP_growth	–							–0.001	–0.27	
Inflation	+/–							0.025	3.57	***
Euro	+/–							–0.095	–1.36	
Adj. R^2		0.37			0.37			0.38		
N		131,641			131,641			131,641		
Industry fixed effects		Yes			Yes			Yes		
Quarter-year fixed effects		Yes			Yes			Yes		
Country fixed effects		Yes			Yes			Yes		
Cluster by firm (5,205)		Yes			Yes			Yes		

***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

P-values are based on robust standard errors clustered at the firm level. *Synch1* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market returns. *Synch2* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market-wide and industry-wide returns. *TPD* is an indicator variable coded one for firm-quarters after TPD implementation, zero otherwise. All variables are defined in Appendix A.

TABLE 6
The Effect of the TPD on Stock Price Informativeness, Controlling for Prior Regulatory Strength and Resources

Panel A: Estimation of Equation (2); Dependent Variable = *Synch1*

		Regulation and Resources Strength Indicator (RRSI)											
Dep. var. = Synch1		*Common Law*			*Regulatory Quality*			*Supervisory Staff 2003*			*Supervisory Staff Growth 2004 to 2009*		
	Pred.	**I**			**II**			**III**			**IV**		
Variable	**sign**	**Coef.**	***t*-stat**		**Coef.**	***t*-stat**		**Coef.**	***t*-stat**		**Coef.**	***t*-stat**	
Intercept	+/–	–3.510	–16.87	***	–3.503	–17.43	***	–3.572	–17.20	***	–3.674	–17.81	***
TPD	–	–0.141	–5.33	***	–0.002	–0.07		0.005	0.13		–0.013	–0.40	
RRSI	–	–0.544	–9.93	***	–0.325	–13.50	***	0.349	10.24	***	–0.098	–3.80	***
TPD×RRSI	–	–0.217	–8.12	***	–0.077	–3.06	***	–0.070	–2.45	**	–0.170	–6.36	***
$ln\_Mkt\_value_{t-4}$	+	0.199	36.82	***	0.193	38.03	***	0.187	35.25	***	0.190	36.42	***
Turnover	+	0.293	56.14	***	0.293	57.78	***	0.291	55.49	***	0.291	56.22	***
Herfindahl_index	+	–0.236	–5.58	***	–0.171	–4.17	***	–0.248	–5.75	***	–0.281	–6.62	***
Analysts	+	0.038	10.91	***	0.040	12.11	***	0.041	11.88	***	0.041	11.62	***
Analysts_dummy	+/–	0.120	7.53	***	0.140	9.08	***	0.131	8.21	***	0.144	8.93	***
Age	+	0.000	0.13		0.004	2.42	**	0.002	1.01		–0.001	–0.70	
$Leverage_{t-4}$	+/–	0.171	3.95	***	0.142	3.37	***	0.185	4.26	***	0.173	3.97	***
MTB_{t-4}	–	0.001	2.61	***	0.001	3.23	***	0.001	3.25	***	0.001	3.36	***
ROE	+	0.055	5.00	***	0.055	4.91	***	0.060	5.18	***	0.066	5.53	***
Residuals_var	–	–0.189	–14.67	***	–0.161	–13.00	***	–0.187	–14.60	***	–0.165	–12.87	***
Kurtosis	–	–0.006	–0.17		0.023	0.64		–0.012	–0.33		–0.008	–0.21	
Skewness	–	–0.025	–8.77	***	–0.027	–9.76	***	–0.026	–9.17	***	–0.027	–9.43	***
Num_firm_state	–	0.000	–0.65		0.000	–14.44	***	–0.001	–21.49	***	0.000	–18.87	***
MAD	–	–0.017	–0.53		–0.046	–1.40		–0.037	–1.09		–0.023	–0.68	
Ln_GDP	–	–0.157	–8.37	***	–0.101	–6.46	***	–0.133	–7.95	***	–0.060	–3.73	***
GDP_growth	–	–0.005	–1.55		0.005	1.35		–0.001	–0.17		0.012	3.45	***
Inflation	+/–	0.071	10.49	***	0.001	0.17		–0.007	–1.00		0.030	4.64	***
Euro	+/–	–0.291	–10.34	***	–0.292	–10.89	***	–0.299	–10.68	***	–0.304	–9.96	***
Adj. R^2		0.26			0.28			0.27			0.27		
N		131,641			131,641			131,641			131,641		
F-test: RRSI+TPD×RRSI = 0		*293.86***			*396.00***			*74.54***			*130.06***		
Industry fixed effects		Yes			Yes			Yes			Yes		
Quarter-year fixed effects		Yes			Yes			Yes			Yes		
Country fixed effects		No			No			No			No		
Cluster by firm (5,205)		Yes			Yes			Yes			Yes		

TABLE 6 (continued)

Panel B: Estimation of Equation (2); Dependent Variable = *Synch2*

		Regulation and Resources Strength Indicator (RRSI)											
Dep. var. = Synch2		*Common Law*			*Regulatory Quality*			*Supervisory Staff 2003*			*Supervisory Staff Growth 2004 to 2009*		
	Pred.	**I**			**II**			**III**			**IV**		
Variable	**Sign**	**Coef.**	***t*-stat**		**Coef.**	***t*-stat**		**Coef.**	***t*-stat**		**Coef.**	***t*-stat**	
Intercept	+/–	–4.347	–17.49	***	–4.429	–17.78	***	–4.439	–17.71	***	–4.449	–17.71	***
TPD	–	–0.170	–5.65	***	–0.051	–1.67	*	–0.067	–1.54		–0.081	–2.22	**
RRSI	–	–0.626	–9.32	***	–0.127	–4.17	***	0.200	4.38	***	–0.005	–0.15	
TPD×RRSI	–	–0.099	–3.41	***	–0.058	–2.01	**	–0.008	–0.22		–0.052	–1.70	*
$ln\_Mkt\_value_{t-4}$	+	0.090	14.16	***	0.080	12.59	***	0.077	12.14	***	0.078	12.23	***
Turnover	+	0.229	38.99	***	0.225	37.90	***	0.224	37.85	***	0.222	37.29	***
Herfindahl_index	+	0.928	12.46	***	0.917	12.55	***	0.894	12.04	***	0.862	11.67	***
Analysts	+	0.035	9.44	***	0.038	10.58	***	0.039	10.58	***	0.039	10.59	***
Analysts_dummy	+/–	0.160	9.01	***	0.176	9.91	***	0.172	9.66	***	0.176	9.83	***
Age	+	–0.004	–1.97	**	–0.003	–1.40		–0.003	–1.66	*	–0.005	–2.44	**
$Leverage_{t-4}$	+/–	0.249	4.67	***	0.237	4.42	***	0.257	4.78	***	0.255	4.73	***
MTB_{t-4}	–	0.000	0.62		0.000	1.50		0.000	1.45		0.000	1.35	
ROE	+	–0.022	–1.67	*	–0.015	–1.22		–0.015	–1.17		–0.011	–0.88	
Residuals_var	–	–0.849	–21.72	***	–0.828	–21.05	***	–0.842	–21.58	***	–0.832	–21.24	***
Kurtosis	–	1.097	10.00	***	1.104	10.02	***	1.093	10.08	***	1.086	10.03	***
Skewness	–	–0.018	–7.19	***	–0.020	–7.83	***	–0.019	–7.58	***	–0.019	–7.63	***
Num_firm_state	–	0.000	3.85	***	0.000	–5.87	***	0.000	–8.31	***	0.000	–6.81	***
Num_firm_industry	+/–	0.002	9.45	***	0.003	9.99	***	0.002	9.69	***	0.003	9.91	***
MAD	–	0.016	0.43		0.013	0.36		0.014	0.37		0.020	0.55	
Ln_GDP	–	–0.223	–9.98	***	–0.160	–8.01	***	–0.181	–8.88	***	–0.156	–7.30	***
GDP_growth	–	–0.009	–2.28	**	0.001	0.32		–0.003	–0.69		0.003	0.86	
Inflation	+/–	0.059	7.56	***	0.011	1.46		0.000	0.02		0.021	2.76	***
Euro	+/–	–0.076	–2.16	**	–0.026	–0.73		–0.050	–1.35		–0.002	–0.05	
Adj. R^2		0.34			0.33			0.33			0.33		
N		131,641			131,641			131,641			131,641		
F-test: RRSI+TPD×RRSI = 0		*162.26***			*51.45***			*18.79***			*3.83***		
Industry fixed effects		Yes			Yes			Yes			Yes		
Quarter-year fixed effects		Yes			Yes			Yes			Yes		
Country fixed effects		No			No			No			No		
Cluster by firm (5,205)		Yes			Yes			Yes			Yes		

***, **, and * denote significance at the 1%, 5% and 10% levels (two-tailed), respectively.

P-values are based on robust standard errors clustered at the firm level. *Synch1* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market returns. *Synch2* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market-wide and industry-wide returns. *TPD* is an indicator variable coded one for firm-quarters after TPD implementation, zero otherwise. *RSSI* is one of a set of indicator variables that capture the strength of the regulatory environment and resources dedicated to regulatory bodies: i.e., either *Common*, *Regulatory_quality*, *Supervisory_staff*, or *Staff_growth*. All variables are defined in Appendix A.

TABLE 7
Sensitivity Analysis

Variable	*Dep. var. = Synch1* Coef.	*t*-stat		*Dep. var. = Synch2* Coef.	*t*-stat	
1) Years 2006–13 (post-IFRS)						
TPD	–0.138	–5.63	***	–0.139	–5.36	***
Adj. R^2	0.34			0.41		
N	86,274			86,274		
2) Exclude UK firms						
TPD	–0.167	–6.10	***	–0.196	–6.58	***
Adj. R^2	0.33			0.43		
N	93,256			93,256		
3) Retain firms with 12/31 FYE only						
TPD	–0.181	–6.39	***	–0.227	–7.18	***
Adj. R^2	0.32			0.41		
N	98,135			98,135		
4) SIC1 industry fixed effects						
TPD	–0.178	–7.40	***	–0.180	–7.09	***
Adj. R^2	0.30			0.36		
N	131,641			131,641		
5) Firm fixed effects						
TPD	–0.177	–7.12	***	–0.143	–5.80	***
Adj. R^2	0.34			0.53		
N	131,641			131,641		
6) Studentized residuals between –3 and 3						
TPD	–0.144	–6.63	***	–0.167	–7.96	***
R^2	0.33			0.37		
N	130,134			129,711		
7) Control for accrual quality						
TPD	–0.178	–6.93	***	–0.169	–6.31	***
Adj. R^2	0.30			0.38		
N	112,384			112,384		

***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All models, except firm fixed effects, include country, quarter-year and industry fixed effects. *P*-values are based on robust standard errors clustered at the firm level. All control variables are included in the analysis but omitted for brevity. *Synch1* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market returns. *Synch2* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market-wide and industry-wide returns. *TPD* is an indicator variable coded one for firm-quarters after the TPD implementation, zero otherwise. All variables are defined in Appendix A.

TABLE 8
The Impact of the 2013 TPD Quarterly Reporting Amendment on Stock Price Informativeness

		Years 2012, 2013 vs. 2014, 2015					
		Dep. var. = Synch 1			*Dep. var. = Synch 2*		
	Pred.	**I**			**II**		
Variable	**Sign**	**Coef.**	***t*-stat**		**Coef.**	***t*-stat**	
Intercept	+/-	–1.043	–1.40		–2.405	–3.28	***
Post_amend	+	0.232	10.65	***	0.144	7.10	***
ln_Mkt_value$_{t-4}$	+	0.216	26.27	***	0.069	6.13	***
Turnover	+	0.232	31.70	***	0.192	22.14	***
Herfindahl_index	+	–0.050	–0.87		1.362	10.90	***
Analysts	+	0.054	9.90	***	0.044	7.37	***
Analysts_dummy	+/-	0.038	1.68	*	0.083	2.90	***
Age	+	0.008	4.31	***	0.002	0.71	
Leverage$_{t-4}$	+/-	0.223	3.55	***	0.302	3.34	***
MTB$_{t-4}$	-	–0.004	–3.01	***	–0.007	–2.83	***
ROE	+	0.014	0.85		–0.043	–1.82	*
Residuals_var	-	–0.103	–6.69	***	–0.777	–15.40	***
Kurtosis	-	0.036	1.75	*	0.205	2.02	**
Skewness	-	–0.025	–5.95	***	–0.004	–0.85	
Num_firm_state	-	0.001	1.81	*	0.000	0.87	
Num_firm_industry	+/-				0.005	8.60	***
Ln_GDP	-	–0.633	–5.76	***	–0.474	–4.65	***
GDP_growth	-	–0.003	–0.63		–0.004	–0.65	
Inflation	+/-	0.066	6.78	***	0.028	3.08	***
Euro	+/-	–0.112	–1.61		0.170	1.58	
Adj. R^2		0.21			0.35		
N		41,736			41,736		
Industry fixed effects		Yes			Yes		
Quarter-year fixed effects		No			No		
Country fixed effects		Yes			Yes		
Cluster by firm (3,200)		Yes			Yes		

***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.
P-values are based on robust standard errors clustered at the firm level. *Synch1* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market returns. *Synch2* is a synchronicity measure represented by a natural logarithm of R^2 from the regression of daily returns on market-wide and industry-wide returns. *Post_amend* is coded one if year is 2014 or 2015 or zero if year is 2012 or 2013. All variables are defined in Appendix A.