

# The Impact of Mandatory Closed Periods on Corporate Insider Trading

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**Abstract:** The Market Abuse Regulation (MAR), implemented in July 2016 across the EU, mandates uniform closed periods, prohibiting insider trading 30 days before earnings announcements. We find a significant reduction in insider trading during these periods in treated countries without prior mandates. Although some trades still occur, they do not appear to be driven by private information. However, treated insiders experience an increase in compensation. Furthermore, information asymmetry rises before earnings announcements, and treated firms experience a decline in institutional ownership. Overall, the study suggests that mandated closed periods do not lead to a wealth transfer from insiders to outsiders, nor do they enhance the information environment. These results underscore the limitations of regulatory one-size-fits-all measures in curbing corporate insider trading.

*JEL classification:* G14, G18, G34, M41, M48

*Keywords:* insider trading, blackout periods, closed periods, information asymmetry

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## 1. Introduction

Insider trading regulation and its enforcement are central components of securities laws globally. Regulating corporate insiders' trading activities is particularly challenging due to their unique role in capital markets. Executives and directors have legitimate reasons to trade, such as meeting liquidity needs or rebalancing their portfolios however their inevitable access to nonpublic material information allows for the potential misuse of this advantage in trading. Typically, insiders are permitted to trade but are required to disclose their transactions ex-post. Another common practice is to prohibit corporate insiders from trading in the weeks or months preceding earnings announcements (Bettis, Coles, and Lemmon, 2000; Roulstone, 2003). The extent and enforcement of these trading restrictions vary significantly across jurisdictions. This variation stems from whether the restrictions are adopted voluntarily or mandated by regulation, from the specific parameters of the restrictions (Chen, Guan, and Ke, 2020; Guay, Kim, and Tsui, 2023), and from the rigor of enforcement (Jagolinzer, Larcker, and Taylor, 2011). Due to this considerable variation and the endogenous evolution of these practices, there is little evidence of the relative effectiveness of different approaches to monitoring corporate insider trading around earnings announcements. This study seeks to fill this gap by examining the capital market consequences of mandated closed periods under the Market Abuse Regulation (MAR) in the European Union (E.U.). Given the newly mandated disclosure of closed periods in the U.S.,<sup>1</sup> this is a timely and globally relevant inquiry.

Effective July 2016, Article 19(11) of MAR requires all E.U.-listed firms to impose a closed period (a.k.a. blackout period) on corporate insider trading over the 30 calendar days preceding an interim or fiscal year-end earnings announcement.<sup>2</sup> Previously, the regulatory

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<sup>1</sup> See Item 408(b) of the Securities and Exchange Commission (SEC) Regulation S-K, available at <https://www.ecfr.gov/current/title-17/chapter-II/part-229>

<sup>2</sup> MAR is a well-suited setting to examine mandated closed periods. While the regulation includes other provisions, they are relatively minor and/or unlikely to affect our inferences. We provide more details on the institutional setting in Section 2. Moreover, in Section 5, we perform country-level cross-sectional tests to account for differences in sanctions and enforcement.

landscape on closed periods varied substantially across E.U. member states. Some jurisdictions mandated the same closed periods for all issuers (e.g., in the U.K.), others recommended but did not mandate closed periods (e.g., France), while others did not stipulate any requirements (e.g., Germany). The passage of MAR raises several questions about the merit of a mandatory regulatory approach to insider trading closed periods. Specifically, using data on open market purchases and sales across E.U. countries over the 2012-2018 period centered around MAR's adoption and entry into force, we test whether mandated closed periods affect corporate insider trading and market liquidity ahead of earnings announcements.

The relative merits of mandatory versus voluntary adoption of closed periods reflect the broader trade-offs in corporate governance and disclosure. Mandatory regimes offer investor protection (Armstrong, Guay, and Weber, 2010), particularly when backed by strict enforcement (Bhattacharya and Daouk, 2002). They also establish minimum standards that enhance uniformity and consistency (Christensen, Hail, and Leuz, 2013) and reduce investors' information acquisition costs. On the other hand, voluntary regimes lower compliance costs, provide greater flexibility (Leuz and Wysocki, 2016), and allow best practices to emerge through market pressures (Coffee, 1991).

To identify the effect of Article 19(11) of MAR, our research design exploits two data dimensions. Cross-sectionally, we differentiate treated from control observations by classifying firms listed in countries whose pre-MAR closed periods regime was looser than MAR (i.e., either because there was no mandated period or a shorter one) as treated and others as controls. In terms of time-series, we slice firm-level observations into 30-day windows and differentiate those immediately preceding earnings announcements from the rest. Hence, the data allow us to use a differences-in-difference (DiD) for treated vs. control observations around the passage of MAR, with firm- and time-fixed effects.

We first test whether insider trading activity in the 30-day window preceding earnings announcements decreases after MAR and examine the likelihood and amount (i.e., dollar value) of insider trading during 30-day windows up to 90 days before and after earnings announcements. Prior to MAR, we find a significantly lower incidence of trades in the 30-day window prior to earnings announcements in control countries (as expected) and treated ones, relative to other 30-day windows. We also find a decrease in the incidence of reported insider trades in the 30-day window preceding earnings announcements for treated firms after MAR. Economically, the magnitude represents a 48% decrease relative to the incidence of trades during the 30-day window of interest.

The low incidence of trades before MAR in the 30-day window preceding earnings announcements is consistent with firms voluntarily adopting closed periods in treated countries, similar to the U.S. (Guay, Kim, and Tsui, 2023). Such firms add noise to our country-level treatment assignment. Accordingly, we extend our analyses by filtering out potential voluntary adopters using two proxies: one based on disclosure in annual reports (Jagolinzer, Larcker, and Taylor, 2011) and the other on trading patterns (Roulstone, 2003).<sup>3</sup> Using either measure, we find a statistically significant decrease in the incidence and amount of insider trades in the 30-day window preceding earnings announcements after MAR for non-voluntary adopters, but not for voluntary adopters. Within treated countries, non-voluntary adopters converge with voluntary adopters in terms of insider trading prior to earnings announcements. Importantly, though, some trades still take place, suggesting either that enforcement remains lax, or that insiders get clearance for trades that are not based on private information.<sup>4</sup>

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<sup>3</sup> One major challenge with archival research on corporate policies restricting insider trades is the lack of systematic disclosure of such policies (Kepler et al., 2020), although a new rule may address this issue: <https://www.sec.gov/investment/insider-trading-arrangements-and-related-disclosures>. Therefore, researchers thus far have either relied on surveys (Bettis, Coles, and Lemmon, 2000), firms' voluntary disclosures (Jagolinzer, Larcker, and Taylor, 2011), or inferred the existence of a policy from the distribution of trades (Roulstone, 2003; Lee et al. 2014; Guay, Kim, and Tsui, 2023). This challenge is exacerbated in non-U.S. jurisdictions, where insider trades are less frequent and make such inferences noisier.

<sup>4</sup> There are 131 trades during closed periods, representing less than 0.4% of all trades, spread across the sample countries. Of these, 93 (71%) are classified as either "sell" or "sell post-exercise," for which obtaining clearance

Prior literature shows that insiders trade profitably ahead of earnings announcements in the U.S. (Jagolinzer, Larcker, and Taylor, 2011), in the U.K. (Hillier and Marshall, 2002), and in Germany (Betzer and Theissen, 2009). Therefore, since we still observe some insider trades during closed periods after MAR, we next examine whether insider trading profitability decreases after the passage of MAR in treated countries and firms. We find that insiders from treated countries earn lower 20-day abnormal returns and profits on their closed-period trades after the passage of MAR. However, there is no evidence that their trades were more profitable before MAR. In additional analyses, we find a significant relative increase in compensation for executives of treated firms, suggesting that boards offset executives' potential loss in implicit compensation due to the external restriction on their ability to trade. Thus, overall, there is no wealth transfer from insiders to outsiders in relation to mandated closed periods.

Ostensibly, the objective of MAR is to increase market participants' confidence in the integrity of E.U. financial markets by harmonizing the regulation of insider trading and market abuse towards 'best practices'. Although MAR is broader in scope than Article 19(11), mandatory closed periods uniquely affect 30-day windows ahead of earnings announcements. Prior research indicates that voluntarily adopted closed periods are associated with lower bid-ask spreads (Bettis, Cole, and Lemmon, 2000), consistent with market participants facing lower information asymmetry when corporate insiders cannot trade. On the other hand, insiders themselves are liquidity providers and restrictions on their trading activity can reduce liquidity (Kabir and Vermaelen 1996). Mandated closed periods can theoretically exacerbate either phenomenon, depending on how market participants (i.e., market makers, information intermediaries, liquidity traders, and informed traders) respond to the forced withdrawal of corporate insiders. Therefore, whether information asymmetry and liquidity ahead of earnings

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to trade is possible in exceptional circumstances, such as addressing liquidity needs to pay tax liabilities (Kallunki et al., 2009). Exemptions can also apply to purchases, for example, under executive share-saving schemes.

announcements decrease after the passage of MAR is an empirical question. We find a significant increase in information asymmetry and illiquidity when closed periods become mandatory. The effect is statistically significant when treatment is measured at the country-level or using trading patterns to infer treatment at the firm-level.

The capital market results indicate a worsened information environment during mandated closed periods. We conduct additional tests to explore potential mechanisms. If markets rely on insider trade disclosures to infer private information (Huddart et al., 2001; Brochet, 2010; Veenman, 2012), mandated closed periods may lead to a net loss of information. Consistent with this, we find that the increase in information asymmetry is driven by firms without insider trading disclosures. Second, if managers have stronger incentives to maintain transparency, the effect on information asymmetry should be weaker. Indeed, we observe no increase in information asymmetry for firms with more dispersed ownership. Additionally, institutional ownership significantly declines for treated firms after MAR. These findings suggest that information asymmetry rises because (i) insider trade disclosures are absent during closed periods and (ii) insiders lack incentives to offset the information loss.

Despite the E.U.'s uniform rulemaking under MAR and its goal of harmonization, significant differences persist among member countries in capital market development, governance, and enforcement (Christensen, Hail, and Leuz, 2016). To examine whether our results vary with country-level enforcement, we analyze sanctions and enforcement activity against market abuse and insider trading for pre-MAR (2008–2010) and post-MAR (2019–2021) periods.

We find two key results. First, the decrease in insider trading profitability during closed periods is driven by countries with stronger pre-MAR enforcement, suggesting insiders respond to enforcement risk (Davidson and Pirinsky, 2022). Second, the decline in market liquidity during closed periods is associated with stronger post-MAR enforcement. While

stricter enforcement likely reflects regulatory responses to illegal market behavior rather than causing higher information asymmetry, the findings indicate that countries with stronger enforcement do not achieve greater capital market benefits under MAR's mandatory closed periods.

This paper explores whether corporate insiders should be prohibited from trading ahead of earnings announcements and whether this decision is best made by firms or regulators. While prior research focuses on U.S. firms with voluntary closed periods (e.g., Bettis et al., 2000; Jagolinzer et al., 2011; Guay et al., 2023), our study examines the E.U., where mandatory closed periods offer a distinct context for analysis.

We extend limited research on mandatory closed periods in other jurisdictions, such as Kabir and Vermaelen (1996), who find reduced liquidity in the Netherlands, and Chen et al. (2020), who report positive market reactions to the reversal of a proposed extension in Hong Kong. Leveraging the E.U.'s institutional setting, we differentiate treated and control observations at the country and firm levels, showing that market consequences of mandated closed periods vary with firm-level transparency and country-level enforcement.

This study is the first to analyze the capital market effects of MAR, one of the E.U.'s most comprehensive securities regulations in recent years, alongside MAD and MiFID II. We contribute to research on insider trading regulation and law harmonization. While prior studies (e.g., Bhattacharya and Daouk, 2002; Fernandes and Ferreira, 2009; Jayaraman, 2012) suggest that enforcement enhances capital market outcomes, we find no such association with MAR and closed periods. Instead, our findings highlight the negative consequences of a one-size-fits-all approach, where mandatory closed periods eliminate firms' ability to differentiate via voluntary adoption. Overall, our results underscore the limitations of strict rules-based insider trading regulation and suggest a need for "softer" regulatory approaches, such as the U.S.'s recent mandate for disclosing voluntary closed periods.

## **2. Institutional Background**

On July 3, 2016, the European Union introduced the Market Abuse Regulation (MAR) (No 596/2014/EU) to strengthen regulatory efforts against insider trading and market manipulation, replacing the earlier Market Abuse Directive (MAD). This updated framework, mandatory across all E.U. member states, seeks to enhance fairness and efficiency in the financial markets. MAR's key provisions include unifying insider trading restrictions, introducing stricter definitions of insider information, and broadening controls over access to sensitive, non-public information. Additionally, the regulation permits issuers to delay public announcements of sensitive information under specific conditions, and it expands coverage to non-E.U. participants trading on E.U. platforms. MAR applies to financial instruments on both regulated and non-exchange venues, thereby extending regulatory scope beyond equities. Attempts at market abuse, such as canceled orders, are also punishable, with standardized fines and sanctions implemented across the E.U. for insider trading and market manipulation.

One of MAR's most significant changes is the establishment of mandatory closed periods prohibiting corporate insiders from trading in their firm's stock 30 days before earnings announcements. This mandate replaces the earlier patchwork approach, where closed periods varied by country. Out of the 28 E.U. member countries, 15 had no such restrictions, while three (Finland, France, Italy) recommended closed periods without mandating them, and ten enforced them (e.g., Denmark, Ireland, U.K.). The duration of pre-MAR closed periods also varied, with many countries imposing longer bans before annual earnings (up to 60 days) and shorter periods (15–30 days) before interim announcements. Ireland, for example, had stringent bans (60 days for annual and semi-annual, 30 days for quarterly announcements), while France had one of the shortest, recommending 15-day periods. This heterogeneity is illustrated in Table 1, which shows pre-MAR closed periods by country. Figure 1 further visualizes these differences, categorizing countries with pre-existing regulations that were more or less

stringent than MAR's uniform 30-day period. Green reflects countries with restrictions at least as stringent as the restrictions implemented by MAR, orange reflects countries with restrictions more lenient or only recommended but not mandated, and red denotes countries that did not have any trading restrictions before earnings announcements.

[Figure 1 about here]

[Table 1 about here]

Beyond closed periods, MAR redefines key terms like "inside information," which refers to non-public, price-sensitive information about an issuer or its securities. While E.U. rules have long required prompt disclosure, MAR allows issuers to delay this disclosure if it protects a legitimate interest, maintains confidentiality, and does not risk market manipulation. Issuers delaying information must notify relevant national authorities and justify their decision under MAR's criteria. This provision gives issuers flexibility, balancing market transparency with the protection of business interests.

In scenarios like market soundings, MAR also permits issuers to share inside information selectively with potential investors, subject to strict record-keeping and disclosure requirements. Recipients must consent to receive such information, and issuers must inform them about insider trading rules and confidentiality obligations.

MAR defines "corporate insiders" as persons with access to inside information who hold managerial, supervisory, or administrative roles in a firm (PDMRs) and their associates. Companies must maintain updated lists of these insiders, including PDMRs, who must confirm their regulatory obligations in writing. This stricter approach ensures that insiders are aware of their responsibilities under MAR and that records are available for regulatory scrutiny.

Insider trades must be reported publicly within three business days, reducing the timeline for most member states by two days. Member states may set transaction thresholds—typically EUR 5,000 per year—below which reporting is not required. For instance, Denmark

has a two-business-day reporting deadline for trades exceeding EUR 20,000, while the U.K. requires all trades to be reported regardless of value.

MAR also allows insiders to trade during closed periods under specific, exceptional conditions, such as financial hardship or employee share transactions, provided no inside information is involved. Such trades require issuer permission on a case-by-case basis.

Lastly, MAR standardizes criminal and administrative sanctions across the E.U., previously handled by individual member states. National authorities can impose financial penalties of up to EUR 500,000 for individuals and EUR 1,000,000 for entities, as well as other sanctions such as warnings, profit disgorgement, and public naming of offenders. These sanctions represent minimum requirements, allowing member states to grant their authorities additional powers and impose higher penalties if desired. MAR mandates that authorities publish details of sanctions on their websites for at least five years, promoting transparency.

Overall, the uniform mandate of closed periods is the clearest and most salient change in insider trading regulation as per MAR. The heterogeneity in pre-MAR closed period regulation allows us to perform comprehensive empirical tests of the impact of mandated closed periods employing a difference-in-difference methodology. While other insider trading regulations (definition, scope, disclosure requirements) are much more homogenous, differences remain, e.g., in terms of sanctions. We also exploit cross-country variation in those characteristics in our analyses.

### **3. Data and Sample Selection**

#### **Sample Selection**

Our sample includes firms incorporated and listed on stock exchanges in the E.U. The sample period is from 2012 to 2018, spanning three periods before MAR's adoption (April 2014), between its adoption and implementation (July 2016) and after its implementation. We focus on E.U. countries because they are all affected by the regulation establishing closed periods

and share similar insider trading reporting rules implemented with MAD. Insider trading data come from Smart Insider (formerly Directors Deal), which compiles a comprehensive dataset of global insider transactions.<sup>5</sup> Our analyses only include open market purchases and sales, including those following option exercises. We restrict our sample to countries with insider trading data, earnings announcement dates from Bloomberg, financial accounting information from Worldscope, and price data from Datastream. We winsorize all continuous variables at the 1% and 99% levels to reduce the influence of outliers. Table 2 provides details on sample construction and data availability by country.

[Table 2 about here]

There were 28 E.U. member countries during our sample period, but our final sample only includes 20 due to earnings announcement, accounting, and price data availability. The excluded countries are recent E.U. entrants with small numbers of listed companies and relatively small capital markets. Our treated sample consists of 12 countries that implemented closed periods following MAR, while the control sample includes eight countries that had already adopted closed periods before MAR. Both samples feature a mix of old E.U. members with established capital markets and regulatory frameworks as well as newer members that joined from 2004 onwards after the collapse of the Eastern Bloc. These newer member countries were aligned with the E.U. regulatory requirements from the start but have relatively emerging capital markets and newly developed regulatory structures.

To test the effectiveness and market implications of closed periods, we first match earnings announcement dates with insider trading, accounting, and market data. Our final sample includes 16,341 earnings announcements. We focus on annual and semi-annual announcements because the E.U. abolished mandatory quarterly reporting in 2013 (EU 2013).<sup>6</sup>

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<sup>5</sup> Prior studies on insider trading in Europe (Fidrmuc, Korczak and Korczak, 2013 and Gebka et al., 2017) employ the same data.

<sup>6</sup> In our sample, 18% of firms are cross-listed in the U.S. and, therefore, must report quarterly financials.

Annual and interim results are announced, on average, 62 and 41 days after the fiscal period end, respectively. On average, 19% of earnings announcements occur within a month of the fiscal period end, while 60% occur after 45 days.<sup>7</sup> The number of observations in the treated and control sample are relatively balanced (8,931 vs. 7,410). Our unit of observation is a firm-month,<sup>8</sup> reflecting the 30-day length of closed periods. This design allows us to examine changes in insider trading and information asymmetry in the month preceding earnings announcements compared to other months. In total, our sample includes 58,035 firm-month observations, with 32,019 in the treated sample and 26,016 in the control sample.

### Cross-Country Characteristics

Table 3 shows country-level descriptive statistics. On average, the probability of insider trading is higher in the control group (firms in countries with pre-existing closed periods) than in treated firms, though the value of insider trades is higher in treated firms. In the control group, insider trading occurs in 18% of firm-months, compared to 14% in the treated group. The probability of insider trading is consistent across most countries in the control group, being higher in Hungary and Sweden. The average value of trades per firm-month is about 3.4 times higher in treated countries than in control countries (\$1,655,900 vs. \$482,915), largely due to high trade values in Spain, France, and Italy.

[Table 3 about here]

Our analysis considers the heterogeneity of closed period policies before their harmonization across all E.U. countries (*Pre-MAR Closed Periods*). By definition, all countries in the control sample had at least as stringent closed periods as those introduced with MAR, with some countries having more restrictive bans on trading. Within the treated sample, countries with an index value of 1 did not have any trading bans pre-MAR, and countries with

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<sup>7</sup> The timing of the earnings announcements has no effect on our results.

<sup>8</sup> For simplicity, we use the term “month” instead of 30-day window. However, “months” in our analyses are not calendar months. Rather, they are 30-day windows defined relative to earnings announcement dates.

an index value of 0 are countries with trading bans recommended but not mandated.<sup>9</sup> Finally, we also consider the heterogeneity in country-level sanctions against insider trading. We use reports from the European Securities and Markets Authority (ESMA) to compare country-level insider trading sanctions under the Market Abuse Directive (MAR), i.e., before MAR, and after MAR. We code countries as having an increase in sanctions regarding insider dealings and market manipulation if the number of administrative or pecuniary sanctions (fines or disgorged profits or losses avoided) increases post-MAR relative to pre-MAR. Importantly, the fact that we observe variation within the treated group across those dimensions allows us to test whether the effect of mandating closed periods, if any, depends on other countries' characteristics.

#### **4. Research Design**

##### **Incidence and Profitability of Insider Trading**

MAR introduced a unified trading ban 30 days before earnings announcement in the E.U. We first test whether the adoption of MAR is associated with a decrease in the probability and value of insider trading around earnings announcements. We focus on the 30-calendar day period before earnings announcements that is equivalent to the closed periods. We test whether insiders of treated firms where the trading ban was introduced after MAR are less likely to engage in insider trading in the pre-earnings announcement period.

We estimate the following difference-in-difference design model to test for changes in the likelihood and value of insider trading following MAR adoption:

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<sup>9</sup> In untabulated analyses, we find a similar decrease in the incidence of insider trades for countries that recommended a trading ban and those that did not before adoption of MAR.

$$Insider\ Trading_{it} \quad (1)$$

$$\begin{aligned}
&= \beta_1 Treatment_i + \beta_2 Post_{it} + \beta_3 Post_{it} \times Treatment_i \\
&+ \delta_1 Pre\_30_{it} \times Treatment_i + \delta_2 Pre\_30_{it} \times Post_{it} \\
&+ \delta_3 Pre\_30_{it} \times Post_{it} \times Treatment_i + \delta_4 Pre\_30_{it} \\
&+ \sum \gamma_m Controls_{it} + \alpha_c + \alpha_y + \varepsilon_{it},
\end{aligned}$$

where  $Insider\ Trading_{it}$  is one of the proxies for insider trading in company  $i$  in month  $t$ . The first proxy is the likelihood of insider trading.  $Probability_{it}$  equals one if there are any insider purchases or sales in the month and zero otherwise.  $Ln\_trade\_value_{it}$  is the natural logarithm of one plus the total USD value of purchases and sales in a firm-month.<sup>10</sup>

We assign firms to the  $Treatment$  group using three different approaches. First, we include all firms incorporated in countries that adopted closed periods for the first time after the entry into force of MAR in July of 2016. Even if a firm voluntarily adopted a closed period before MAR, it is considered “treated” once the regulation mandates it and enforcement shifts to the regulator. Alternatively, we define  $Treatment$  at the firm-level by excluding potential voluntary adopters in treated countries. We use two proxies. First, we flag companies whose annual reports—obtained from Bureau van Dijk’s Osiris—contain keywords related to insider trading and closed periods (see Appendix for details). Second, we identify firms with no insider trade during the 30-day window preceding earnings announcement between 2005 and 2012. The two methods emulate prior research that infers insider trading policies from firm disclosures (Jagolinzer, Larcker, and Taylor, 2011) or insider trading patterns (Roulstone, 2003).  $Post_{it}$  is an indicator variable that takes the value of one for insider trading taking place after MAR took effect, i.e., from July 3<sup>rd</sup>, 2016.  $Pre30_{it}$  is an indicator variable that equals one for the 30 days before an earnings announcement and zero otherwise.

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<sup>10</sup> Our results are robust in terms of significance and coefficient magnitude when estimating a probit model with year fixed effects (not tabulated).

$Controls_{it}$  is a set of firm ( $i$ )-level control variables described below.  $Pre30_{it} \times Post_{it} \times Treatment_i$  is our main variable of interest and captures the differential effect of closed periods after MAR in countries without closed periods relative to countries that already had closed periods.  $\alpha_c$  corresponds to firm fixed effects.  $\alpha_y$  corresponds to calendar year or year-month fixed effects depending on the specification. These fixed effects account for macroeconomic and country-specific factors that may affect insider trading. Firm fixed effects control for firm-specific time-invariant unobserved factors. We cluster standard errors at the firm and month-year level in our tabulated analyses but also perform untabulated robustness checks using country-level clustering.<sup>11</sup>

We include a set of control variables measured at the beginning of the fiscal year. *Size* is the natural logarithm of total assets in thousands of U.S. dollars. *Book-to-Market* is the ratio of the book-to-market value of common equity. *Return FYE* is the buy-and-hold return for the fiscal year. *Negative Earnings* is an indicator variable that equals one when the earnings announcement is negative and zero otherwise. *Fiscal Year End* is a dummy that equals one if the earnings announcements correspond to the fiscal year-end and zero otherwise. *GDP* is the real domestic product and *GDP Growth* the growth thereof relative to the previous year. Detailed definitions of the variables are provided in the Appendix.

We next focus on the profitability of insider trading. If closed periods mandated by MAR effectively reduce insider opportunistic behavior, trades during closed periods should be executed only in exceptional circumstances in the absence of information advantage. Therefore, we should observe a decrease in profitability in the closed periods for the treated sample and no change in the control sample, provided pre-MAR trades were profitable in the

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<sup>11</sup> One caveat is that our sample contains few clusters and the number of observations per cluster varies significantly (from 26 earnings announcements in Cyprus to 2,867 in the U.K.) Recent advances in econometrics suggest that the minimum required number of clusters to obtain asymptotic results significantly increases when there is an imbalance of observations within clusters (Imbens and Kolesár 2016; Carter, Schnepel, and Steigerwald 2017), and 20 may be considered as “too few”, although there is no agreement upon threshold.

treated group. We again employ the model in equation (1). Our first measure of insider trading profitability is the monthly average 20-day return for all transactions in the 30-calendar day window preceding an earnings announcement (*Average Abnormal 20-day return*). The return is calculated as the 20-trading day buy-and-hold market-adjusted return for each transaction. Our second measure (*20-day Value Profit*) multiplies the returns by the insider's trade value scaled by market capitalization to capture trading profits (or losses avoided for sales, where the return is multiplied by -1) following Skaife, Veenman, and Wangerin (2013). Control variables are based on prior research, such as Lakonishok and Lee (2001). We include *Size* because profitability of insider trading tends to be higher for smaller firms, growth opportunities (*Book-to-Market*), and past returns (*Return FYE*) to control for insiders' contrarian behavior (Piotroski and Roulstone, 2005). We also control for calendar year-month and firm-fixed effects.

### **Information Asymmetry**

We also test whether mandated closed periods are associated with changes in market liquidity ahead of earnings announcements. We estimate Model (1) using measures of market liquidity and information asymmetry as our dependent variables. Our first measure is  $\ln(\text{Depth}_{it})$ , which is the natural logarithm of the mean of the daily trading volume divided by the number of shares outstanding during month  $t$ . The second measure,  $\ln(\text{Spread}_{it})$ , is the natural logarithm of the monthly mean daily bid-ask spread, measured as difference between the ask and the bid scaled by the midpoint. The third measure,  $\text{LDV Cost}_{it}$ , is an estimate of total round trip transaction costs based on a monthly time-series regression of daily stock returns on aggregate country-level market returns (Lesmond et al. 1999). The fourth measure is  $\text{Zero Returns}_{it}$ , which is the percentage of days with zero returns. For these tests, in addition to all controls included in the first set of tests, we include controls for the information environment. We include *Volatility* defined as the standard deviation of daily returns during the 30-day window. *Price* is stock price in U.S. dollars at the end of the fiscal year and is included

to control for order processing costs.  $\ln(\text{Analysts})$  is the natural log of one plus the number of analysts, corresponding to the number of analysts providing a forecast for the fiscal quarter before the earnings announcement.  $\text{Guidance}$  is an indicator variable equal to 1 if the firm issued earnings guidance during the fiscal year and zero otherwise. Both analyst coverage and guidance issuance can reduce insiders' information advantage (Frankel and Li, 2004; Ellul and Panayides, 2018). Finally, we include  $\ln(\text{DisclosureDates})$ , which is the natural logarithm of the number of insider trading disclosure dates in that period.

### **Executive Compensation and Institutional Ownership**

We supplement our main analyses focused on closed periods with firm-year level tests of executive compensation and institutional ownership. Both allow us to examine more comprehensively potential wealth transfers between insiders and outsiders and shifting information dynamics around MAR. Specifically, we estimate the following model:

$$\begin{aligned} & \text{Compensation}_{eit} \text{ or } \text{Institutional Ownership}_{it} && (2) \\ & = \beta_1 \text{Treatment}_i + \beta_2 \text{Post}_{it} + \beta_3 \text{Post}_{it} \times \text{Treatment}_i \\ & + \sum \gamma_m \text{Controls}_{it} + \alpha_c + \alpha_y + \varepsilon_{it}, \end{aligned}$$

$\text{Compensation}_{i,t}$  is the natural logarithm of either total or non-cash compensation firm  $i$  executive  $e$ , with data available in Capital IQ for year  $t$ . Prior research documents that restrictions on insider trading are associated with higher (equity-based) executive compensation, both at firm-level (Roulstone, 2003) and country-level (Denis and Xu, 2013). If MAR reduces insiders' expected trading profits—and thus implicit compensation—by forcing firms to adopt closed periods, then its passage may prompt renegotiations between boards and executives to compensate for this expected loss (Baiman and Verrecchia, 1995). If so, then  $\beta_3$  will be positive.

$Institutional\ Ownership_{i,t}$  is the percentage of shares outstanding held by institutions. Although prior research suggests that institutional ownership is associated with the voluntary adoption of closed periods (Dai et al., 2016; Hillegeist and Weng, 2021), it is not clear whether closed periods attract greater institutional ownership, especially if mandated. However, since MAR's stated goal is to enhance the attractiveness of E.U. capital markets, we test whether institutional ownership increases for treated firms.

In this model, we use a parsimonious set of control variables (firm size, book-to-market ratio, past annual returns, an indicator for negative earnings, gross domestic product, and growth thereof) along with firm and year fixed effects.

## 5. Empirical Results

Table 4 presents descriptive statistics for all variables used in the regression analyses. We have 58,035 observations for the main analysis of the association between insider trading and closed period implementation. Notably, there are fewer observations (7,278) for the insider trading profitability tests, which are conditioned on at least one trade during the 30-day window. Sample size decreases for the market liquidity tests due to market data availability.

[Table 4 about here]

### Insider Trading Activity

Our first set of regression analyses examines the association between the incidence and value of insider trading and the introduction of the new regulations specified in model (1). We use two dependent variables: the probability (incidence) and value of trades. We expect that the new regulations will result in a decrease in insider trading activity during the 30-day window preceding earnings announcements in treated countries after MAR. Outside the closed periods, we do not expect significant changes in insider trading behavior, unless insiders shift their trades to adjacent windows.

[Table 5 about here]

Table 5 Panel A reports the results for the full sample. Across all specifications, the coefficient on our main variable of interest ( $Pre30 \times Post \times Treatment$ ) is negative and statistically significant. That is, we find a significant reduction in the probability and value of insider trading during the 30 days before earnings announcements in firms from countries that introduced closed periods under MAR. However, the coefficient's magnitude is only about 31% of that on  $Pre30 \times Treatment$  (e.g., -0.460 relative to 1.506 in column 4), suggesting that mandatory closed periods narrow but do not eliminate the gap between treated and control countries in insider trading during closed periods.

Panel B presents the results excluding firms that are likely to have voluntarily adopted closed periods. Columns (1) and (2) define voluntary adopters by past insider trades. Column (3) and (4) use annual reports disclosures. The coefficients on  $Pre30 \times Post \times Treatment$  are negative and significant at the 1% level. These results are statistically and economically stronger than for the full sample, where voluntary adopters add noise to the treatment classification. Overall, the findings show that mandated closed periods effectively reduce – though not entirely – corporate insider trading in countries without prior mandates.

Prior to MAR, there was significantly lower insider trading activity in the 30 days before earnings announcements in the control sample, as per the significantly negative coefficients on  $Pre30$ , consistent with those countries already having a mandated closed period in place. In contrast, firms in treated countries had relatively more insider trading right before earnings announcements, consistent with the absence of a mandated closed period. We also note that there is no significant shift of insider trading during less information sensitive windows in treated countries, as per the insignificant coefficients on  $Post \times Treatment$ . In terms of control variables, we observe a lower overall incidence and value of insider trading in companies with lower growth opportunities (*Book-to-Market*) and lower stock returns (*Return FYE*).

We next perform a within country analysis. In this test we only include treated countries and use the (likely) voluntary adopters as a control group. This allows us to better disentangle the effect of closed periods from that of shifting enforcement from the firm to the country on insider trading behavior, holding the country constant. The results are presented in Table 5 Panel C. The coefficients on  $Pre30 \times Post \times Treatment$  are negative in all columns but only significant when using the voluntary adopters definition based on trades (columns (1) and (2)). Hence, there is mixed evidence that mandated closed periods significantly narrow the gap between voluntary and forced adopters, likely in part due to the noise inherent to our proxies for voluntary adoption.

Finally, we check whether voluntary adopters experienced any significant change in insider trading. We do this by defining the voluntary adopters as the treatment sample and firms in non-treated countries as the control sample. In this case, the “treatment” effect only consists of mandating closed periods, i.e., shifting the enforcement from the firm to the country. Table 5, Panel D reports the results. We find no significant change in insider trading after the adoption of MAR for treated firms, as per the insignificant coefficient on  $Pre30 \times Post \times Treatment$ . We note that the coefficient on  $Pre30 \times Treatment$  is significantly positive, suggesting two non-mutually exclusive explanations: (i) our sample of voluntary adopters still likely contains misclassified nonvoluntary adopters and (ii) voluntary adopters in treated countries had loose enforcement.

### **Insider Trading Profitability**

While insiders trade less during closed periods after MAR, they could still trade profitably. The literature on insider trading indicates that significant abnormal profits made by insiders trading their companies’ shares are associated with trading on private information that, if made public, would move stock prices (e.g., Seyhun, 1998; Jeng, Metrick and Zeckhauser, 2003 Fidrmuc, Korczak and Korczak, 2013). Such behavior is also known in the literature as opportunistic

trading at the expense of less informed outside investors, where gains made by insiders are dollar-for-dollar losses made by the outside investors.

The closed periods introduced by MAR aim to level the playing field for all market participants and prevent corporate insiders from using privileged information and the foreknowledge of upcoming results from trading for their own benefit. If the introduction of closed periods via MAR is effective, we should not only observe a reduction in insider trading activities as in the previous analysis but also a reduction in profitability, which is related to trading on private information, such as the upcoming accounting results and companies' prospects. To analyze the association between the profitability of insider trading and the introduction of MAR, particularly the closed periods, we use equation (1) with *Average 20-day return* and *20-day Value Profits* as the dependent variable and as measures of insider trading profitability.<sup>12</sup>

[Table 6 about here]

Table 6 reports the results. In this table, treatment is defined at the country-level. When using *Average Abnormal 20-day return* as the dependent variable, we find that the coefficients on *Pre30 × Post × Treatment* are negative and significant, as per columns (1), (2), and (3). The coefficient magnitudes suggest that insiders of treated firms earn about 1.75 to 2.05 fewer basis points on their trades placed within 30 days before earnings announcements after MAR. With *20-day Value Profit* as the dependent variable, the coefficients on *Pre30 × Post × Treatment* are also negative, although significant at conventional levels only in columns (4) and (5).<sup>13</sup> Roughly speaking, the coefficient magnitudes suggest that insiders' profits drop by

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<sup>12</sup> Insider trading research examines a variety of windows from a few days to several months to gauge trade profitability. Longer windows account for the possibility that insiders' private information will be revealed later (e.g., to minimize litigation risk; see Ke et al., 2003). However, our primary interest is to test insider-outsider information asymmetry during the 30-day window prior to earnings announcements. Hence, our choice of 20 trading days as the default window of measurement. We also note that, unlike the U.S., the E.U. does not explicitly require insiders to disburse trading profits on round-trip transactions within six months.

<sup>13</sup> When looking at non-voluntary adopters based on trading, we find more statistically significant results. When looking at non-voluntary adopters based on annual report disclosures, the coefficients on *Pre30 × Post × Treatment* are negative but insignificant (not tabulated).

about one percent of the firm's market capitalization. Therefore, there is some evidence that profits are lower after MAR for firms in treated countries. However, while positive, the coefficients on  $Pre30 \times Treatment$  are insignificant, suggesting that trades made prior to MAR were no more profitable for treated countries.

### **Information Asymmetry**

MAR aims to improve shareholder protection and increase the attractiveness of the E.U. capital markets. Therefore, we analyze the market consequences of MAR beyond corporate insider trading. Specifically, we test whether market liquidity and information asymmetry (proxied by depth, bid-ask spread, percentage of zero returns, transaction costs, and the first component of a principal component analysis of those four proxies)<sup>14</sup> changes after MAR during the 30-day window preceding earnings announcements, using Model (1).

[Table 7 about here]

Table 7 presents the results. In Panel A, we report the results for the full sample (i.e., treatment is defined at the country level) using each liquidity proxy as the dependent variable (as indicated in the header for each column). The coefficient on  $Pre30 \times Post \times Treatment$  is negative for trading volume (column 1) and positive for the other measures, although statistically significant only for bid-ask spread, transaction costs, and the principal component *Illiquidity* (columns 4 and 5). Thus, the results indicate a relative increase in illiquidity and information asymmetry during mandated closed periods. In Panel B, we refine our analyses by considering potential voluntary adopters in the treated sample. For brevity, we only report results where the dependent variable is *Illiquidity*. In columns 1 and 2, we exclude voluntary adopters as identified by trading patterns and annual report disclosures, respectively. In both columns, the coefficient on  $Pre30 \times Post \times Treatment$  is significantly positive. In columns 3

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<sup>14</sup> As expected, the first component loads negatively on depth, and positively on spread, percentage of zero returns, and transaction costs – consistent with lower liquidity and higher information asymmetry). We do not tabulate the principal component analysis for brevity.

and 4, we compare non-voluntary (treatment) and voluntary adopters (control) within treated countries. The coefficient on  $Pre\ 30 \times Post \times Treatment$  is positive but insignificant. Overall, the results indicate an increase in pre-earnings announcement information asymmetry in countries that are mandated to adopt closed periods as per MAR. Control variables load consistently with prior research. Of note, information asymmetry is higher, on average, during the 30-day window prior to earnings announcements (as per the significantly positive coefficient on  $Pre\ 30$ ) relative to other 30-day windows. In contrast, information asymmetry is lower when insider transactions are disclosed during a 30-day window, as per the significantly negative coefficients on *IT Disclosures*, suggesting that insider trade filings can reduce information asymmetry.

### **Parallel trend**

A potential concern with our research design is that our results capture a trend over time, i.e., the parallel trend assumption would be violated. For example, since MAR was published in 2014, firms and market participants may have anticipated its 2016 implementation. Incidentally, such an anticipatory effect possibly biases our estimates downwards. Nevertheless, to address this concern, we examine the time-series dynamics of insider trading and information asymmetry around the passage of MAR. To do so, instead of having a single *Post* indicator for observations after July 2016, we create separate indicator variables for each semester from the second half of 2012 to the second half of 2018 and omit the first half of 2016.

[Figures 2 and 3 about here]

Figures 2 and 3 plot the coefficients (along with confidence intervals at the 95% level) on  $Pre\ 30 \times Treatment$  interacted with each semester-specific indicator for the probability of insider trading (Figure 2) and information asymmetry (Figure 3) in a 30-day window.

Treatment is assigned to all firms in countries that adopt mandated closed periods.<sup>15</sup> In Figure 2, the coefficients are insignificantly different from zero until the second half of 2015, when we observe a relative downward shift in insider trading. Thus, some firms may have adopted closed periods prior to MAR's entry into force mid-2016. However, there is no trend prior to MAR's announcement in 2014.

In Figure 3, two patterns emerge. First, there is a relative *decrease* in information asymmetry ahead of earnings announcements in 2015. Second, and consistent with the main result, there is a significant increase in information asymmetry during mandated closed periods after MAR came into force in 2016. Thus, while the anticipatory adoption of closed periods by some firms in 2015 may have improved the information environment at first, those benefits were short-lived. Importantly, again, there is no pre-2014 trend in information asymmetry, which supports our attribution of the main results to MAR and specifically to Article 19(11).<sup>16</sup>

### Cross-Sectional Tests at the Firm-Level

Our analysis thus far suggests that firms from treated countries experience relatively higher illiquidity during closed periods. We explore potential mechanisms underlying this result. Specifically, we build on both theoretical (Huddart et al., 2001) and empirical (Veenman, 2012; Fidrmuc et al., 2013) evidence that the market learns about insiders' private information via the disclosure of their trades. By precluding insiders from trading ahead of earnings announcements, MAR potentially reduces the amount of disclosure during that window. We take advantage of the fact that some trades still take place during closed periods

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<sup>15</sup> We observe similar patterns when we exclude likely voluntary adopters.

<sup>16</sup> To further isolate the effect of mandatory closed periods, we examine firms that report earnings on a quarterly basis. Although some E.U. trading venues require firms to issue quarterly earnings (the German and Austrian bourse require quarterly reporting to some companies), many quarterly reports are voluntary and therefore not subject to mandatory closed periods. In untabulated results, we find that, among firms that report quarterly earnings, there is a significant decrease in insider trading and a significant increase in information asymmetry ahead of annual and semi-annual earnings announcements, but not quarterly ones. This result provides additional support to our interpretation of the main result, i.e., that firms comply with mandatory closed periods but experience an increase in information asymmetry as a result.

after MAR to test whether the information asymmetry results are muted when insider trades are still disclosed. Specifically, we partition treated observations between 30-day windows with (*IT Disclosure*) and without (*No IT Disclosure*) insider trade disclosures. Insiders have, of course, other tools to address information asymmetry and illiquidity besides their own trade disclosures. To capture more broadly firms' incentives to maintain liquidity, we also partition the sample based on ownership concentration. *High Concentration* (*Low Concentration*) indicates firms with free float ownership below (above) 50% of the shares, i.e., the sample median. We expect firms with low ownership concentration to experience a lesser increase in information asymmetry during mandated closed periods.

[Table 8 about here]

Table 8 presents the results. The dependent variable is *Illiquidity* and treatment is defined at the country level. In column 1, firms from treated countries with no insider trade disclosures experience a significant increase in illiquidity during close periods after MAR, as per the significantly positive coefficients on *Pre 30 × Post × Treatment × No IT Disclosure*. In contrast, firms with at least one insider trade disclosure experience a significant *decrease* in illiquidity. Indeed, the coefficient on *Pre 30 × Post × Treatment × IT Disclosure* is significantly negative. The difference between the two subgroups is significant, as per the F-test. In columns 2 and 3, treated firms exclude potential voluntary adopters based on pre-2012 trading patterns and annual report disclosures, respectively. The results are qualitatively similar.

Columns (4), (5), and (6) present the results for the cross-sectional partition based on ownership concentration. In column 4, the coefficient on *Pre 30 × Post × Treatment × Low Concentration* is insignificant, indicating that treated firms with more diffuse ownership experience no significant change in liquidity after MAR. The coefficient on *Pre 30 × Post × Treatment × High Concentration* is positive and significant. As per the F-test, the difference is

not significant at conventional levels ( $p=0.11$ ). The results are qualitatively similar when we exclude potential voluntary adopters based on trading patterns (column 5) and annual report disclosures (column 6), albeit statistically stronger for the former and weaker for the latter. Hence, among treated firms, the ones with more concentrated ownership are the ones experiencing a significant decrease in liquidity during mandated closed periods. Overall, the results suggest that the decrease in market liquidity associated with mandated closed periods is driven by (i) the loss of insider trade disclosures as a source of information and (ii) firms that have lower incentives to resolve information asymmetry.

### **Executive Compensation**

For a more complete picture of the potential wealth transfer between corporate insiders and outsiders around the passage of MAR, we examine changes in executive compensation using Model (2). The main motivation for this test is to see if boards and executives respond to the exogenous restriction on insider trading flexibility induced by mandated closed periods.

Table 9 reports OLS regression estimates of Model (2). In odd-(even-) numbered columns, the dependent variable is the natural logarithm of total (non-cash) compensation. In columns (1) and (2), treated observations include all firms from countries that did not have mandated closed periods prior to MAR. In columns (3) and (4), treated observations exclude potential voluntary adopters based on pre-MAR trading patterns. In columns (5) and (6), treated observations exclude potential voluntary adopters based on pre-MAR annual report disclosures. Results in columns (1) and (2) indicate that logged total and non-cash executive compensation significantly increase for treated firms after MAR. Coefficient magnitudes suggest that after the adoption of MAR, total compensation increases by 6.4% and non-cash compensation increases by 17.1%. In columns (3) to (6), coefficients are very similar in magnitude when the sample excludes potential voluntary adopters of closed periods, although they are not statistically significant at conventional levels

in columns (4) and (5), possibly due to limited power. Nevertheless, the evidence in Table 9 suggests that boards may have offered additional compensation to executives to offset the loss of potential trading profits. Overall, the evidence does not indicate a wealth transfer from insiders to outsiders due to MAR.

### **Institutional Ownership**

We build on the previous tests, which examine ownership structure as a partitioning criterion, by testing whether ownership structures change around MAR. While prior research indicates a positive association between institutional ownership and the voluntary adoption of closed periods, it is not clear (i) whether one is more likely to cause the other and (ii) whether the effect would differ based on mandatory adoption. Furthermore, since MAR's stated goal is to make E.U. capital markets more attractive, such test allows us to speak to the regulation's effectiveness. We thus estimate Model (2) using the percentage of shares held by institutions as the dependent variable and report the results in Table 10. The coefficient of interest is that on *Post × Treatment*, which captures the relative change in institutional ownership for treated firms (in terms of closed period adoption) after MAR. In the first column, we omit fixed effects to compare treated and control firms in the cross-section. The large negative coefficient on *Treatment* indicates that institutions hold almost 15% fewer shares in treated compared to control countries. In columns (2), (3), and (4), we add fixed effects and assign treatment at the country level (column 2), after excluding voluntary adopters as inferred from trading patterns (column 3) and annual report disclosures (column 4). The coefficients on *Post × Treatment* are significantly negative, suggesting that institutions hold even fewer shares in treated firms after MAR, by around 1%. This result goes against MAR's objective of convergence, casting doubt on the effectiveness of mandated closed periods as a tool to attract investors.

## Cross-Sectional Tests at the Country-Level

Next, we exploit heterogeneity in insider trading enforcement among treated countries to test whether the observed changes in insider trading and market liquidity during closed periods vary with other institutional factors. Specifically, we collect data on insider trading and market abuse sanctions before and after MAR. The data for before MAR (i.e., when insider trading was regulated under Market Abuse Directive – MAD) are collected from European Securities and Markets Authority report on *Actual use of sanctioning powers under MAD*. The report covers data for 2008, 2009, and 2010. Data for the MAR period comes from annual reports on *Administrative and criminal sanctions and other administrative measures imposed under the Market Abuse Regulation* for three years 2019, 2020, and 2021. We then partition our treatment sample into two groups (*High* indicating above the sample median and *Low* indicating below the median) based on treated countries with *High* and *Low* numbers of sanctions per listed firm (i) prior to MAR, (ii) after MAR, and (iii) after relative to before MAR. We re-estimate Model (1) by splitting our main variables of interest between  $Pre30 \times Post \times High$  and  $Pre30 \times Post \times Low$ . These interaction terms capture the effect of closed periods introduced with MAR on treated observations that are differentiated based on enforcement activity.

[Table 11 about here]

Table 11 presents the results. In columns (1), (4), and (7), the dependent variable is the probability of at least one insider trade taking place. In all three columns, the coefficients on  $Pre30 \times Post \times High$  and  $Pre30 \times Post \times Low$  are negative. Furthermore, all but one are statistically significant, and the F-tests at the bottom of the table indicate that the coefficients are not significantly different between the high and low partitions. Therefore, there is no evidence that compliance with mandatory closed periods varies with the severity of sanctions against insider dealing and market abuse.

Next, in columns (2), (5), and (8), the dependent variable is the average of insiders' 20-day trading profits. In column (2), the coefficient on  $Pre30 \times Post \times High$  is significantly negative, whereas the coefficient on  $Pre30 \times Post \times Low$  is insignificant. Furthermore, the difference between the two coefficients is significant as per the F-test ( $p<0.05$ ). Therefore, the profitability of insider trades decreases during mandated closed periods when countries have stronger enforcement before the adoption of MAR. In contrast, in columns (5) and (8), the coefficient on  $Pre30 \times Post \times Low$  is significantly negative, whereas the coefficient on  $Pre30 \times Post \times High$  is insignificant. Furthermore, as per the F-test, the difference between the two coefficients is significant in column (8) ( $p<0.10$ ). Therefore, the decrease in insider trading profits during closed periods is driven by countries with relatively fewer sanctions after MAR. While the timeline cannot be ascertained given that we do not know when sanctioned offenses took place, the results suggest that insiders refrain from engaging in profitable trading after MAR, which leads to fewer sanctions. Thus, overall, the results suggest that insiders respond to ex ante enforcement risk, which leads to lower ex post enforcement activity.<sup>17</sup>

Finally, in columns (3), (6), and (9), the dependent variable is illiquidity. In all three columns, the coefficients on  $Pre30 \times Post \times High$  and  $Pre30 \times Post \times Low$  are positive, and significantly so at conventional levels for all but one. However, in column (6) and (9), there is a significant difference between the *High* and *Low* groups as per the F-test ( $p<0.05$ ), unlike column (3). That is, the observed decrease in market liquidity ahead of earnings announcements is greater in countries with steeper sanctions against market manipulation after MAR. Again, while the causality chain is unclear, the results suggest that regulators focus their enforcement actions on market manipulation and other (i.e., undisclosed) insider trading offenses that contribute to lower market liquidity.

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<sup>17</sup> When we examine the returns to insider trades instead of profits, we find largely insignificant results (not tabulated).

## **Robustness Analysis**

In untabulated analyses, we conduct additional robustness tests. First, we use entropy balancing to match treated and control firms on size, book-to-market, and prior-year returns before MAR adoption. After achieving balance across first, second, and third moments, our results remain consistent. Second, we re-run the analyses from Tables 5 and 6, excluding one treated country at a time, and find robust results throughout.

We also conduct supplementary analyses. Separating insider purchases and sales, we find that our results are primarily driven by purchases. Additionally, Guay et al. (2023) note that voluntarily adopted U.S. closed periods often begin before the fiscal period ends and thus exceed 30 days. To compare, we examine insider trading between the fiscal period end and the closed period start. Untabulated results show fewer trades even before the official closed period in treated firms, although the significance is marginal. Furthermore, we investigate whether insiders shift trades to the 30 days after earnings announcements but find no statistically significant increase in trading for treated firms post-MAR. Lastly, analyzing insider trading across all windows around earnings announcements, we observe no significant net change in treated firms after MAR.

## **6. Conclusions**

This paper examines the capital market effects of a regulatory intervention that restricts corporate insider trading. Specifically, we study the closed periods mandated across E.U. member countries effective July 3, 2016, under the Market Abuse Regulation (MAR). These periods ban insider trading 30 days before earnings announcements, replacing any prior national or firm-level closed-period policies. The varied pre-MAR practices across E.U. countries create a natural experiment to assess the new rules' impact on insider trading activity, profitability, and market consequences. Using a difference-in-differences approach, we

compare countries that adopted mandated closed periods after MAR (Treatment group) with those that already had such policies (Control group).

We find that mandated closed periods reduce insider trading activity during the restricted 30-day window in treated countries, driven by firms that did not previously adopt such measures. While some trades still occur, they are not profitable, indicating the regulation curtails opportunistic trading. However, we also observe increased executive compensation in treated firms, offsetting the reduction in trading profits and preventing a wealth transfer from insiders to outsiders.

The broader market effects include decreased liquidity and reduced institutional ownership in treated firms, especially in those with no prior insider trading disclosures or higher ownership concentration, and in countries with stricter enforcement of MAR. These findings suggest that removing insiders from the market ahead of earnings announcements worsens the information environment rather than improving it.

Overall, our results highlight that uniform closed periods deter informed trading but may unintentionally harm market liquidity and information quality. Cross-sectional analyses reveal that firm-level incentives and country-level enforcement influence the effects of closed periods. Additionally, increased executive compensation and reduced institutional ownership cast doubt on the regulation's ability to level the playing field between insiders and outsiders.

Our findings offer important insights for regulators and standard-setters. For E.U. regulators, the study provides direct evidence of the benefits and limitations of mandated closed periods. For regulators elsewhere, it informs ongoing debates on insider trading regulation and the potential value of mandating disclosure of closed periods rather than their existence, as recently implemented in the U.S.

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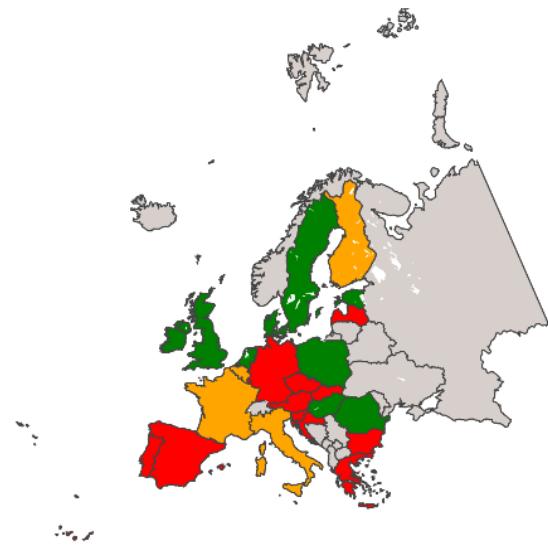
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## Appendix A. Variable Definitions

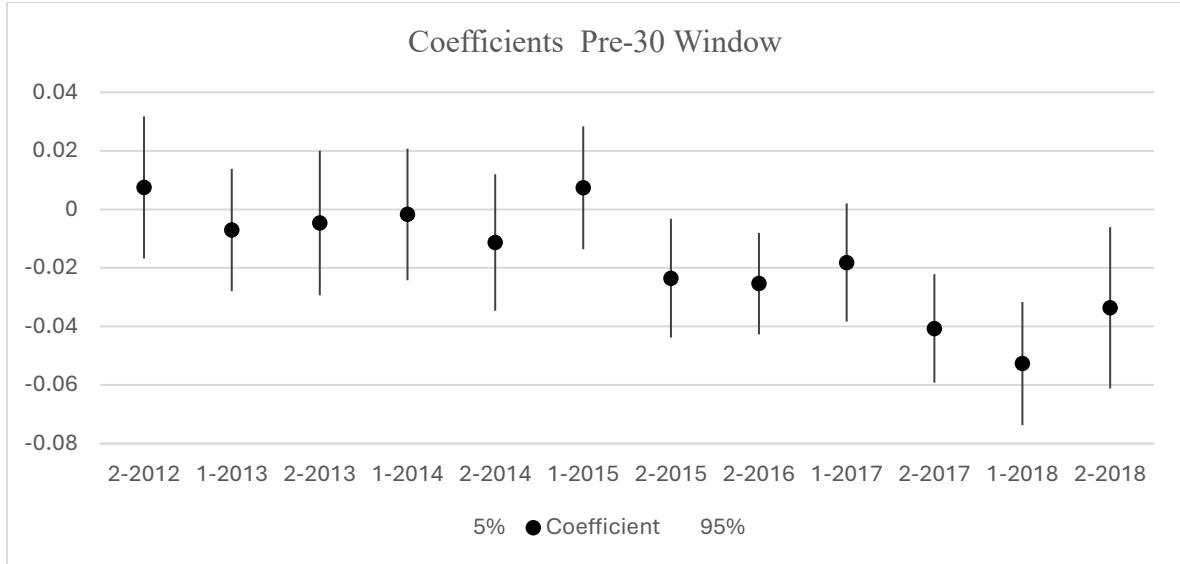
Variable	Definition	Source
<i>Probability</i>	Indicator variable that equals one if there is any insider purchase or sale in a 30-day period and zero otherwise.	Smart Insider
<i>Ln (Trade Value USD)</i>	Natural logarithm of one plus the total USD value of purchases and sales in a 30-day period.	Smart Insider
<i>Average Abnormal 20-day return</i>	The 30-day average of buy-and-hold market-adjusted returns over the 20 trading days following each insider trade (times -1 for sales).	Datasream
<i>20-day Value Profits</i>	<i>Average Abnormal 20-day return</i> time the insider's trade value scaled by market capitalization	Datasream
<i>Ln(Depth)</i>	The natural logarithm of the 30-day mean of the daily volume divided by the number of shares.	Datasream
<i>Ln(Spread)</i>	The natural logarithm of the 30-day mean of the bid-ask spread, i.e., the difference between the ask and bid prices divided by the midpoint.	Datasream
<i>LDV Cost</i>	Estimate of total round trip transaction based on a monthly time-series regression of daily stock returns on the aggregate market returns (Lesmond et al. 1999).	Datasream
<i>Zero Returns</i>	Percentage of zero returns in the period.	Datasream
<i>Illiquidity</i>	The first principal component of <i>Ln(Depth)</i> , <i>Ln(Spread)</i> , <i>LDV Cost</i> , and <i>Zero Returns</i> .	Datasream
<i>Treatment</i>	Indicator variable that equals one if the firm is incorporated in one of the countries that adopted closed periods for the first time after the adoption of MAR in July of 2016, and zero otherwise.	
<i>Post</i>	Indicator variable that equals one for 30-day periods after the adoption of MAR, i.e., from 3 July 2016.	
<i>Pre30</i>	Indicator variable that equals one for the 30 days before an earnings announcement and zero otherwise.	
<i>Size</i>	Natural logarithm of total assets in thousands of U.S. dollars at the beginning of fiscal year.	Worldscope
<i>Book-to-Market</i>	The ratio of the book to the market value of common equity at the beginning of the fiscal year.	Worldscope
<i>Return FYE</i>	Buy-and-hold stock return over the fiscal year.	Worldscope
<i>Negative Earnings</i>	Indicator variable that equals one when the announced earnings is negative and zero otherwise.	Worldscope
<i>Fiscal Year End</i>	Indicator variable that equals one if the earnings announcement corresponds to the fiscal year-end and zero otherwise.	Worldscope
<i>Volatility</i>	The standard deviation of daily returns over the 30-day period.	Datasream
<i>Price</i>	Stock price in U.S. dollars at the end of the fiscal year.	Datasream
<i>Ln (Analysts)</i>	Natural log of one plus the number of unique analysts providing a forecast for the fiscal quarter prior to the earnings announcement.	I/B/E/S
<i>Guidance</i>	Indicator variable that equals one if the firm issued earnings guidance during the fiscal year and zero otherwise.	Capital IQ
<i>GDP</i>	Real gross domestic product (constant 2010 US\$).	World Bank
<i>GDP Growth</i>	Percentage change in real gross domestic product relative to the previous year.	World Bank
<i>Ln (Disclosure Date)</i>	The natural logarithm of the number of dates during the period disclosing insider trades.	Smart Insider

<i>(No) IT Disclosure Concentration</i>	Dummy variable that equals one if the firm has one or more disclosure dates during the period and zero otherwise.	NRG Metrics
<i>Total Compensation</i>	Dummy variable that equals one if the percentage of free float ownership is below 50% and zero otherwise.	Capital IQ
<i>Non-Cash Compensation</i>	Total annual compensation in USD (Type ID 23) by executive-year.	Capital IQ
<i>Institutional Ownership</i>	Non-cash annual compensation in USD (Type ID 31) by executive-year.	Capital IQ
<i>High(Low) MAD</i>	Percentage of institutional ownership by firm-year.	NRG Metrics
<i>High(Low) MAR</i>	Dummy variable that equals one if the firm's country is above (below) the median of the total number of sanctions pre-MAR divided by the number of firms in our sample and zero otherwise.	ESMA
<i>High(Low) MAR-MAD</i>	Dummy variable that equals one if the firm's country is above (below) the median of the total number of sanctions post-MAR divided by the number of firms in our sample and zero otherwise.	ESMA
<i>Voluntary Trade</i>	Dummy variable that equals one if the firm's country is above (below) the median of the difference between the total number of sanctions post-MAR and pre-MAR divided by the number of firms in our sample and zero otherwise.	ESMA
<i>Voluntary Text</i>	An indicator variable that equals one if there was no insider trading in the pre-30 window from 2005 to 2012.	Smart Insider
	Indicator variable that equals one if the firm had any of the following mentions in its annual report between 2003 and 2014: “insider trad*”, “insider deal*”, “director deal*”, “closed period”, “blackout period”, “PDMR”.	Osiris Global Reports



**Figure 1.** Pre-MAR insider trading restrictions across E.U. member countries as of 2016

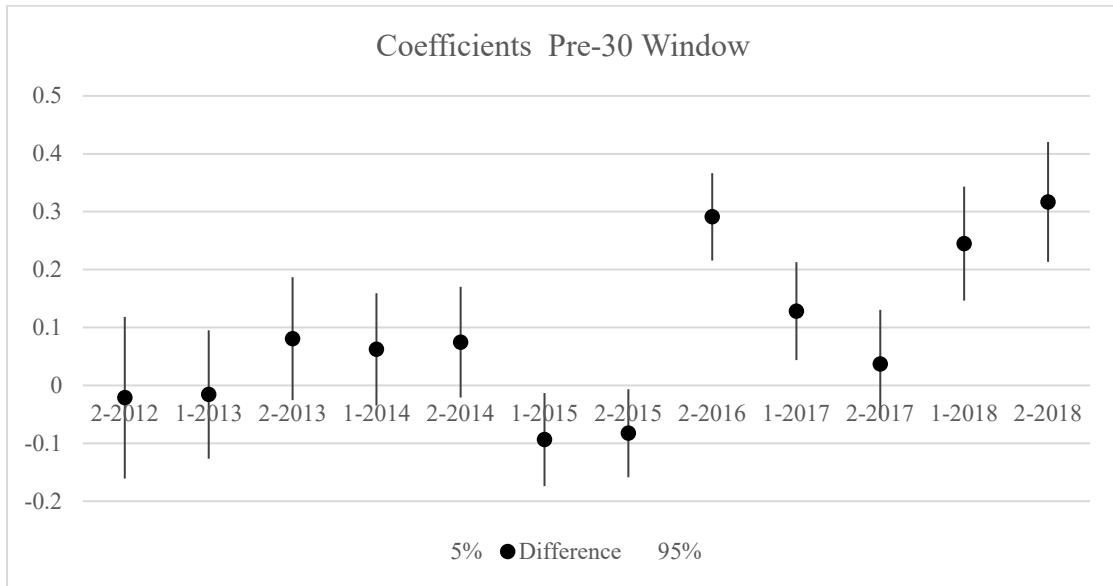
This figure illustrates graphically the strength of pre-MAR restrictions on insider trading before earnings announcements in the E.U. Green color reflects countries with restrictions at least as stringent as the restrictions implemented by MAR, orange reflects countries with restrictions more lenient or only recommended but not mandated, and red denotes countries that did not have any trading restrictions before earnings announcements.



**Figure 2.** The difference in probability of insider trading by semester

This figure presents coefficients of a difference-in-difference specification estimating the likelihood of insider trade taking place during the pre-30 window by calendar quarter during our sample period. Vertical lines indicate confidence intervals at the 5% level. We plot coefficients  $\delta_k$  of the following regression.

$$Insider\ Trading_{it} = \sum \beta_k \times Post(k)_{it} + \sum \delta_k Post(k)_{it} \times Treatment_i + \sum \gamma_m Controls_{it} + \alpha_i + \alpha_{m-y} + \varepsilon_{it}, \quad (3)$$



**Figure 3.** Difference in illiquidity by semester

This figure presents coefficients of a difference-in-difference specification estimating *Illiquidity* during the pre-30 window by calendar quarter during our sample period. Vertical lines indicate confidence intervals at the 5% level. We plot the coefficients  $\delta_k$  of the following regression:

$$Illiquidity_{it} = \sum \beta_k \times Post(k)_{it} + \sum \delta_k Post(k)_{it} \times Treatment_i + \sum \gamma_m Controls_{it} + \alpha_i + \alpha_{m-y} + \varepsilon_{it}, \quad (4)$$

**Table 1.** Closed Periods before MAR

Country	Length of closed periods before earnings announcement		
	Annual	Semi-annual	Quarterly
Countries with closed period recommended at country level before MAR			
Denmark	Each issuer's internal rules shall contain a period within which directors are permitted to trade. The maximum length of this period is six weeks after each published interim report or preliminary announcement of annual results.		
Estonia	1wk before to 1 day after disclosure	1wk before to 1 day after disclosure	1wk before to 1 day after disclosure
Hungary	FYE to EA	30 days	15 days
Ireland	60 days	60 days	30 days
Netherlands	60 days	21 days	21 days
Poland	2 months	1 month	14 days
Romania	2 months	2 months	2 months
Slovenia	30 days	30 days	30 days
Sweden	30 days	30 days	30 days
United Kingdom	60 days	30 days	30 days
Countries with closed period recommended at firm level before MAR			
Finland	No mandated non-trading period, set only by the issuer.		
France	15 day long closed period recommended but not mandated		
Italy	On a discretionary basis, many listed companies have adopted specific rules on internal dealing, specifying "blackout periods" which usually prohibit any transactions by directors or their related persons in the 15-day period prior to the approval of annual results.		
Countries with no close period before MAR			
Austria			
Belgium			
Bulgaria			
Croatia			
Cyprus			
Czechia			
Germany			
Greece			
Latvia			
Lithuania			
Luxembourg			
Malta			
Portugal			
Slovakia			
Spain			

**Table 2.** Sample construction and data availability

Country	Number of Annual and Semi-Annual Earnings Announcements	Missing Accounting or Price Data	Price > 1USD and Book-to- market<0	Final Sample		
				Total	Non Voluntary Trade	Non Voluntary Text
<i>Panel A. Treated</i>						
Austria	401	123	0	278	46	112
Belgium	651	304	3	344	40	100
Bulgaria	0	0	0	0	0	0
Croatia	0	0	0	0	0	0
Cyprus	22	2	0	20	10	20
Czechia	33	11	0	22	9	9
Finland	1,031	496	62	473	3	305
France	2,124	559	26	1,539	499	754
Germany	2,398	921	55	1,422	228	901
Greece	195	66	23	106	26	93
Italy	1,019	388	98	533	270	368
Latvia	0	0	0	0	0	0
Luxembourg	87	29	9	49	4	36
Malta	0	0	0	0	0	0
Portugal	256	88	56	112	37	99
Slovakia	0	0	0	0	0	0
Spain	714	160	28	526	217	474
Slovenia	0	0	0	0	0	0
<b>Total</b>	<b>8,931</b>	<b>3,147</b>	<b>360</b>	<b>5,424</b>	<b>1,389</b>	<b>3,271</b>
<i>Panel B. Control</i>						
Denmark	474	189	9	276		
Estonia	0	0	0	0		
Hungary	46	10	0	36		
Ireland	384	120	35	229		
Netherlands	418	84	2	332		
Romania	48	20	15	13		
Poland	520	114	1	405		
Sweden	1,258	818	29	411		
United Kingdom	4,262	1,004	575	2,683		
<b>Total</b>	<b>7,410</b>	<b>2,359</b>	<b>666</b>	<b>4,385</b>		

This table presents the sample selection process and includes the number of firm-earnings announcement observations between 2012 and 2018 available after each step, separately for countries in the *Treated* (Panel A) and *Control* (Panel B) groups. The treated group includes countries where closed periods were introduced with the adoption of MAR or where MAR increased trading restrictions. The *Control* group includes countries with existing and at least equally stringent closed periods prior to MAR. Earnings announcement dates are downloaded from Bloomberg, accounting data from Worlscope and price data from Datastream. Insider trading data are from Smart Insider. All variables are defined in Appendix A.

**Table 3.** Descriptive Statistics –Country level

Country	Probability	Insider Trading				Liquidity				Governance			
		Trade value in USD	Average 20-Day Return	20-day Value Profits (x1,000)	Ln(Depth)	Ln(Spread)	Zero Returns (%)	LDV Cost	Pre-MAR Close Period	Pre-MAR Sanctions per # of firms	MAR Sanctions per # of firms	Change in Sanctions per # of firms	
<i>Panel A. Treated</i>													
Austria	0.08	142,835	0.56%	-0.38	-7.45	-5.57	8.64	0.01	1	3.39	1.35	-2.04	
Belgium	0.10	158,240	0.68%	2.90	-7.57	-4.99	7.93	0.01	1	0.37	0.74	0.37	
Cyprus	0.05	28,124	1.09%	16.12	-6.29	-4.47	10.64	0.02	1	17.00	2.50	-14.50	
Czechia	0.19	1,477,014	0.13%	-0.03	-7.21	-6.35	2.85	0.00	1	1.00	1.50	0.50	
Finland	0.12	264,382	0.42%	0.53	-7.07	-5.60	8.37	0.01	0	0.13	0.04	-0.09	
France	0.17	3,303,245	0.18%	1.26	-7.09	-5.84	6.26	0.01	0	1.38	0.14	-1.24	
Germany	0.09	541,652	0.73%	1.11	-6.94	-5.43	8.03	0.01	1	0.09	0.16	0.07	
Greece	0.17	158,287	1.53%	-1.74	-7.11	-5.04	9.60	0.02	1	0.00	3.91	3.91	
Italy	0.17	1,661,492	0.59%	0.67	-6.39	-5.85	3.71	0.01	0	2.09	1.38	-0.70	
Luxembourg	0.06	320,037							1	0.00	0.50	0.50	
Portugal	0.11	1,772,683	-1.13%	-3.55	-7.55	-5.23	9.04	0.01	1	3.67	10.17	6.50	
Spain	0.19	3,401,743	0.76%	3.30	-6.69	-5.41	10.12	0.01	1	0.49	0.26	-0.23	
All Treated	0.14	1,655,900	0.46%	1.25	-7.00	-5.57	7.39	0.01		2.47	1.89	-0.58	
<i>Panel B. Control</i>													
Denmark	0.10	177,529	0.29%	-0.91	-6.83	-5.48	11.06	0.02					
Hungary	0.23	668,312	-0.10%	1.72	-6.93	-5.40	6.41	0.01					
Ireland	0.17	620,069	0.82%	1.04	-6.67	-5.22	7.80	0.01					
Netherlands	0.13	407,756	0.93%	-0.08	-6.34	-6.13	3.03	0.01					
Poland	0.10	204,851	-0.37%	0.70	-7.50	-5.03	7.98	0.01					
Romania	0.04	89	-5.14%	-0.03	-8.08	-5.39	9.88	0.01					
Sweden	0.24	185,006	0.86%	1.81	-6.50	-5.64	7.60	0.01					
United Kingdom	0.20	599,353	0.22%	0.28	-6.51	-6.27	4.27	0.01					
All Control	0.18	482,915	0.32%	0.47	-6.63	-5.99	5.46	0.01					

This table presents descriptive statistics of dependent variables used in the main regressions for countries in a *Treated* (*Panel A*) and *Control* (*Panel B*) group. The sample includes all European countries subject to MAR, for which insider trading and earnings announcement data are available in the 2012-2018 period. The *Treated* group includes countries where closed periods were introduced with the adoption of MAR or where MAR increased trading restrictions. The *Control* group includes countries with existing and at least equally stringent closed periods prior to MAR. All variables are defined in Appendix A.

**Table 4.** Descriptive Statistics

	N	Mean	SD	P1	P10	Median	P90	Min	Max
Probability	58,035	0.16	0.36	0.00	0.00	0.00	1.00	0.00	1.00
Trade value (Million USD)	58,035	1,130,073	29,420,000	0	0	0	126,011	0	4,496,000,000
Average Abnormal 20-day	9,994	0.00	0.06	-0.16	-0.07	0.00	0.08	-0.18	0.20
20-day Value Profits Return	9,964	0.00	0.02	-0.07	0.00	0.00	0.00	-0.13	0.16
Ln(Depth)	55,287	-6.83	1.30	-11.11	-8.59	-6.55	-5.45	-11.52	-4.34
Ln(Spread)	55,216	-5.76	1.28	-8.12	-7.35	-5.85	-4.03	-8.94	-2.35
Zero Returns	55,348	6.54	12.38	0.00	0.00	0.00	18.18	0.00	100.00
LDV Cost	54,504	0.01	0.01	-0.01	0.00	0.01	0.02	-0.01	0.09
Illiquidity	54,400	-0.16	1.46	-2.03	-1.63	-0.53	1.73	-2.50	8.03
Non-Cash Compensation	9,177	13.67	1.14	11.02	12.20	13.65	15.10	7.25	17.80
Total Compensation	9,177	12.12	1.86	7.06	9.62	12.26	14.43	5.07	15.90
Institutional Ownership	10,054	15.77	19.26	0.00	0.00	8.43	44.86	0.00	81.27
Size	58,035	21.47	1.99	17.13	18.95	21.33	24.40	15.84	25.20
Book-to-Market	58,035	0.71	0.59	0.07	0.20	0.56	1.34	0.00	8.14
Return FYE	58,035	0.14	0.38	-0.56	-0.24	0.09	0.55	-0.82	3.63
Negative Earnings	58,035	0.14	0.35	0.00	0.00	0.00	1.00	0.00	1.00
Fiscal year end	55,199	0.02	0.01	0.01	0.01	0.02	0.03	0.00	0.10
Volatility	58,035	0.49	0.50	0.00	0.00	0.00	1.00	0.00	1.00
Price	58,035	73.64	561.03	1.10	2.06	11.99	85.80	1.00	12,370.00
Ln (Analysts)	58,035	0.96	0.90	0.00	0.00	0.69	2.30	0.00	3.56
Guidance	58,035	0.36	0.48	0.00	0.00	0.00	1.00	0.00	1.00
GDP (Billions USD)	58,035	2,045.49	1,206.42	149.00	314.00	2,600.00	3,560.00	22.88	3,940.00
GDP Growth	58,035	1.59	2.09	-2.98	-0.01	1.58	2.86	-7.08	25.18

This table presents descriptive statistics of dependent and independent variables used in the main regressions. The sample includes all European countries subject to MAR for which insider trading and earnings announcement data are available in the period 2012-2018. All variables are defined in Appendix A.

**Table 5.** Insider trading around MAR adoption – trading behavior

Panel A: Treatment Sample: All firms in treated countries

	(1)	(2)	(3)	(4)
	Probability			Ln (Trade Value)
Post × Treatment	0.008 (0.560)	0.002 (0.140)	0.004 (0.318)	0.014 (0.078)
Post	-0.009 (-1.219)	0.007 (0.825)	-0.020 (-1.106)	-0.223 (-0.887)
Treatment	-0.066*** (-5.234)			
<b>Pre30 × Post × Treatment</b>	<b>-0.038**</b> <b>(-2.487)</b>	<b>-0.038**</b> <b>(-2.475)</b>	<b>-0.038**</b> <b>(-2.480)</b>	<b>-0.460**</b> <b>(-2.302)</b>
Pre30 × Treatment	0.118*** (10.068)	0.118*** (10.083)	0.118*** (10.088)	1.506*** (9.563)
Pre30 × Post	-0.000 (-0.033)	-0.000 (-0.022)	-0.000 (-0.021)	-0.009 (-0.053)
Pre30	-0.188*** (-19.434)	-0.188*** (-19.484)	-0.188*** (-19.484)	-2.419*** (-17.970)
Size	0.017*** (8.348)	0.005 (0.577)	0.004 (0.417)	0.116 (0.950)
Book-to-Market	-0.032*** (-5.903)	-0.023*** (-3.060)	-0.022*** (-2.870)	-0.322*** (-3.117)
Return FYE	-0.003 (-0.463)	-0.008 (-1.559)	-0.008 (-1.493)	-0.083 (-1.196)
Negative Earnings	-0.022** (-2.456)	-0.008 (-0.942)	-0.008 (-1.009)	-0.123 (-1.167)
Fiscal year end	0.002 (0.644)	0.001 (0.268)	0.009 (1.130)	0.177* (1.825)
GDP	0.000 (0.646)	-0.000 (-1.077)	-0.000 (-0.914)	-0.000 (-0.915)
GDP Growth	-0.004** (-2.265)	-0.003 (-1.598)	-0.003 (-1.551)	-0.032 (-1.430)
Observations	58,035	58,035	58,035	58,035
R-squared	0.0384	0.1340	0.1354	0.1413
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
Year FE	No	Yes	No	No
Month-Year FE	No	No	Yes	Yes
Firm FE	No	Yes	Yes	Yes

*Panel B: Treatment Sample: Non-voluntary adopters in treated countries*

	(1)	(2)	(3)	(4)
	Treated: Non-Voluntary - Trade		Treated: Non-Voluntary - Text	
	Probability	Ln (Trade Value)	Probability	Ln (Trade Value)
Post × Treatment	-0.027 (-1.312)	-0.417 (-1.458)	0.006 (0.437)	0.036 (0.203)
Post	-0.033 (-1.146)	-0.389 (-1.008)	-0.023 (-1.145)	-0.252 (-0.960)
<b>Pre30 × Post × Treatment</b>	<b>-0.071*** (-4.217)</b>	<b>-0.809*** (-3.636)</b>	<b>-0.043*** (-2.951)</b>	<b>-0.533*** (-2.833)</b>
Pre30 × Treatment	0.119*** (7.575)	1.399*** (6.459)	0.141*** (12.001)	1.813*** (11.740)
Pre30 × Post	-0.000 (-0.022)	-0.009 (-0.055)	-0.000 (-0.022)	-0.009 (-0.055)
Pre30	-0.188*** (-19.471)	-2.418*** (-17.957)	-0.188*** (-19.481)	-2.419*** (-17.967)
Controls	Included	Included	Included	Included
Observations	34,214	34,214	45,310	45,310
R-squared	0.1304	0.1355	0.1349	0.1381
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
Year FE	No	No	No	No
Month-Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

*Panel C: Within-country analysis*

	(1)	(2)	(3)	(4)
	Treated: Non-Voluntary - Trade		Treated: Non-Voluntary - Text	
	Probability	Ln (Trade Value)	Probability	Ln (Trade Value)
Post × Treatment	-0.040** (-2.396)	-0.549** (-2.353)	0.009 (0.621)	0.129 (0.676)
Post	-0.005 (-0.271)	-0.032 (-0.110)	-0.013 (-0.635)	-0.143 (-0.479)
<b>Pre30 × Post × Treatment</b>	<b>-0.045** (-2.371)</b>	<b>-0.472* (-1.962)</b>	<b>-0.015 (-1.013)</b>	<b>-0.201 (-0.989)</b>
Pre30 × Treatment	0.001 (0.051)	-0.145 (-0.649)	0.057*** (4.291)	0.779*** (4.380)
Pre30 × Post	-0.026*** (-2.823)	-0.348*** (-3.019)	-0.028** (-2.394)	-0.341** (-2.058)
Pre30	-0.070*** (-8.370)	-0.877*** (-8.550)	-0.104*** (-8.839)	-1.386*** (-8.743)
Controls	Included	Included	Included	Included
Observations	32,019	32,019	32,019	32,019
R-squared	0.1380	0.1453	0.1378	0.1452
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
Year FE	No	No	No	No
Month-Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

*Panel D: Treatment Sample: Voluntary adopters in treated countries*

	(1)	(2)	(3)	(4)
	Treated: Voluntary - Trade		Treated: Voluntary - Text	
	Probability	Ln (Trade Value)	Probability	Ln (Trade Value)
Post × Treatment	0.015 (1.175)	0.159 (0.949)	-0.002 (-0.112)	-0.045 (-0.193)
Post	-0.028 (-1.563)	-0.326 (-1.387)	-0.041 (-1.292)	-0.469 (-1.016)
<b>Pre30 × Post × Treatment</b>	<b>-0.026 (-1.518)</b>	<b>-0.340 (-1.511)</b>	<b>0.008 (0.338)</b>	<b>0.063 (0.211)</b>
Pre30 × Treatment	0.118*** (8.989)	1.544*** (8.925)	0.056** (2.421)	0.700** (2.400)
Pre30 × Post	-0.000 (-0.022)	-0.009 (-0.054)	-0.012 (-0.786)	-0.143 (-0.724)
Pre30	-0.188*** (-19.476)	-2.419*** (-17.963)	-0.128*** (-7.686)	-1.621*** (-7.868)
Controls	Included	Included	Included	Included
Observations	49,837	49,837	16,834	16,834
R-squared	0.1338	0.1396	0.1595	0.1743
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
Year FE	No	No	No	No
Month-Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

This table presents regression results for difference-in-difference tests around the adoption of the Market Abuse Regulation (MAR) for *Probability* and value (*Ln(Trade value)*) of insider trading. MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. *Panel A* presents results where the treatment sample is defined at the country level. *Treatment* is a dummy variable equal to one for firm months in countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions and zero for firm months in a control group that includes countries with existing and at least equally stringent closed periods before MAR. *Panel B* excludes voluntary adopters from the treatment sample. In columns (1) and (2), we exclude firms from the treatment sample for which there is no insider trading the 30 days before earnings announcements between 01/01/2005 and 01/01/2012 (*Voluntary Trade*). In columns (3) and (4), we exclude firms from the treatment sample that mention insider trading or closed period-related strings in any of their 2003-2015 annual reports (*Voluntary Text*). *Panel C* presents regression results only for treated countries. The control sample corresponds to voluntary adopters. *Panel D* defines treated firms as those firms in treated countries that voluntarily adopted closed periods. Our unit of observation is firm-month. For the probability results, the dependent variable is equal to 1 if there is at least one insider trade in a firm month and zero otherwise. *Ln (Trade value)* is a natural logarithm of the sum of all insider trading transactions in a firm-month in dollars. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). *Pre30* is a dummy variable equal to one for a period of 30 days prior to earnings announcement and zero for any other firm-month. The sample includes all European countries subject to MAR, for which insider trading and earnings announcement data are available in the 2012-2018 period. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 6.** Insider trading around MAR adoption – profitability

	(1)	(2)	(3)	(4)	(5)	(6)
	Average Abnormal 20-day return			20-day Value Profits		
Post × Treatment	0.001 (0.249)	0.000 (0.012)	-0.001 (-0.320)	0.870 (0.971)	0.885 (0.930)	1.247 (1.282)
Post	0.003 (1.647)	0.003 (1.661)	-0.023 (-0.876)	0.094 (0.248)	0.201 (0.458)	1.097 (1.152)
Treatment	0.001 (0.840)	0.003* (1.856)		0.124 (0.216)	0.305 (0.504)	
<b>Pre30 × Post × Treatment</b>	<b>-0.041** (-2.291)</b>	<b>-0.041** (-2.322)</b>	<b>-0.035* (-1.916)</b>	<b>-9.754** (-2.008)</b>	<b>-10.161** (-2.085)</b>	<b>-8.454 (-1.543)</b>
Pre30 × Treatment	0.006 (0.671)	0.006 (0.651)	0.002 (0.303)	2.096 (0.732)	2.187 (0.770)	1.096 (0.537)
Pre30 × Post	0.018 (1.303)	0.019 (1.350)	0.010 (0.760)	3.418 (1.653)	3.661* (1.818)	0.889 (0.636)
Pre30	-0.009 (-1.174)	-0.008 (-1.136)	-0.002 (-0.375)	-4.054* (-1.769)	-4.080* (-1.866)	-1.305 (-1.058)
Size		-0.001 (-1.329)	-0.005 (-0.902)		-0.185 (-1.269)	-0.377 (-0.255)
Book-to-Market		-0.004 (-1.239)	-0.003 (-0.593)		-0.418 (-0.350)	0.178 (0.104)
Negative Earnings		0.001 (0.461)	-0.000 (-0.079)		1.166 (1.314)	-0.226 (-0.207)
Fiscal year end		0.004* (1.754)	0.002 (0.507)		0.135 (0.219)	-0.331 (-0.237)
Ln (Analysts)		-0.001 (-0.906)	0.000 (0.196)		-0.085 (-0.417)	0.124 (0.264)
Guidance		0.002 (1.062)	-0.003 (-1.169)		-0.048 (-0.139)	-0.260 (-0.367)
GDP		-0.000* (-1.755)	0.000*** (3.201)		-0.000 (-0.878)	0.000** (1.997)
GDP Growth		0.000 (0.271)	0.001* (1.787)		-0.026 (-0.196)	0.117 (0.782)
Observations	7,278	7,278	7,243	7,259	7,259	7,224
R-squared	0.0021	0.0050	0.1132	0.0020	0.0034	0.1306
Cluster	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month
Year FE	No	No	Yes	No	No	Yes
Firm FE	No	No	Yes	No	No	Yes

This table presents regression results for changes in the profitability of insider trading around the adoption of the Market Abuse Regulation (MAR). MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. Our unit of observation is firm-month. *Average Abnormal 20-day return* is calculated as the monthly average of the net cumulative 20 trading days abnormal returns following an insider trading transaction. *20-day Value Profits* is the product of the abnormal return times the value of the trade, scaled by the firm's market capitalization. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). *Treatment* is a dummy variable equal to one for firm-months in countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions and zero for firm-months in a control group that includes countries with existing and at least equally stringent closed periods prior to MAR. *Pre30* is a dummy variable equal to one for a period of 30 days prior to earnings announcement and zero for any other firm-month. The sample includes all European countries subject to MAR for which insider trading and earnings announcement data are available in the period 2012-2018. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 7.** Information asymmetry and liquidity around MAR Adoption

*Panel A: All sample*

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Depth)	Ln(Spread)	LDV Cost	Zero Returns	Illiquidity	Illiquidity
Post × Treatment	-0.234*** (-5.785)	0.046 (1.320)	0.000 (0.494)	0.869 (1.515)	0.142*** (2.970)	0.132*** (2.722)
Post	0.191*** (7.215)	-0.130*** (-4.891)	-0.000 (-0.905)	-0.315 (-0.850)	-0.141*** (-4.397)	-0.079 (-0.502)
<b>Pre30 × Post × Treatment</b>	<b>-0.031 (-1.252)</b>	<b>0.054** (2.125)</b>	<b>0.001*** (3.059)</b>	<b>0.328 (1.065)</b>	<b>0.074*** (2.674)</b>	<b>0.075*** (2.705)</b>
Pre30 × Treatment	0.027 (1.437)	-0.006 (-0.378)	-0.000 (-1.097)	-0.133 (-0.707)	-0.021 (-1.130)	-0.021 (-1.146)
Pre30 × Post	-0.001 (-0.020)	-0.021 (-1.095)	-0.001*** (-3.034)	-0.122 (-0.665)	-0.038* (-1.721)	-0.039* (-1.779)
Pre30	-0.103*** (-5.113)	0.025** (2.544)	0.000* (1.718)	0.276* (1.725)	0.063*** (3.176)	0.063*** (3.181)
Size	0.164*** (3.000)	-0.269*** (-5.210)	-0.002*** (-5.303)	-1.999*** (-5.032)	-0.317*** (-5.941)	-0.323*** (-5.980)
Book-to-Market	-0.008 (-0.217)	0.149*** (3.712)	0.002*** (4.928)	1.254*** (3.932)	0.183*** (4.532)	0.188*** (4.590)
Return FYE	0.070*** (2.751)	0.011 (0.425)	-0.000 (-1.171)	-0.588*** (-2.756)	-0.054** (-2.242)	-0.049* (-1.913)
Negative Earnings	0.043 (1.402)	0.101*** (3.264)	0.001** (2.473)	0.765** (2.369)	0.087** (2.462)	0.087** (2.527)
Volatility	11.306*** (13.946)	5.357*** (4.437)	0.040*** (3.828)	-54.135*** (-3.899)	-2.471** (-2.296)	-2.476** (-2.294)
Fiscal year end	0.105*** (4.983)	-0.019 (-1.091)	0.000** (2.135)	0.218** (2.209)	-0.017 (-1.079)	0.039** (2.036)
Price	-0.000 (-1.629)	0.000 (1.046)	0.000 (0.736)	0.000* (1.956)	0.000* (1.671)	0.000 (1.562)
Ln (Analysts)	0.016* (1.721)	-0.021 (-1.636)	-0.000 (-1.609)	-0.160*** (-2.714)	-0.024*** (-2.731)	-0.030*** (-3.116)
Guidance	0.105*** (4.115)	-0.015 (-0.581)	0.000 (0.702)	-0.332 (-1.453)	-0.050* (-1.882)	-0.058** (-2.011)
GDP	-0.000 (-0.292)	0.000 (0.187)	0.000** (2.054)	0.000** (2.087)	0.000* (1.704)	0.000 (1.551)
GDP Growth	-0.002 (-0.213)	-0.063*** (-3.091)	-0.000* (-1.828)	-0.055 (-0.948)	-0.033*** (-3.251)	-0.036*** (-3.277)
Ln(DisclosureDates)	0.085*** (10.318)	-0.003 (-0.321)	-0.000 (-0.278)	-0.124** (-2.342)	-0.036*** (-4.788)	-0.037*** (-4.841)
Observations	54,241	54,241	54,241	54,241	54,241	54,241
R-squared	0.8159	0.8699	0.4543	0.6245	0.8108	0.8122
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
FE	Firm and Year	Firm and Year	Firm and Year	Firm and Year	Firm and Year	Firm and Month-Year

*Panel B: Non-Voluntary Adopters*

	(1)	(2)	(3)	(4)
	Illiquidity			
	Treated: Non-Voluntary Adopters	Treated: Non-Voluntary Adopters	Control: Non-Treated Countries	Control: Voluntary Adopters
	Trade	Text	Trade	Text
Post × Treatment	0.015 (0.252)	0.092 (1.645)	-0.116* (-1.970)	-0.037 (-0.712)
Post	-0.040 (-0.249)	-0.037 (-0.279)	0.101 (0.433)	0.102 (0.438)
<b>Pre30 × Post × Treatment</b>	<b>0.085*** (2.904)</b>	<b>0.084*** (2.916)</b>	<b>0.016 (0.539)</b>	<b>0.021 (0.453)</b>
Pre30 × Treatment	-0.015 (-0.621)	-0.017 (-0.812)	0.010 (0.360)	0.014 (0.611)
Pre30 × Post	-0.039* (-1.793)	-0.039* (-1.767)	0.032 (0.857)	0.024 (0.485)
Pre30	0.064*** (3.244)	0.064*** (3.207)	0.040* (1.804)	0.034* (1.745)
Controls	Included	Included	Included	Included
Observations	32,155	41,980	30,042	30,042
R-squared	0.8048	0.8048	0.8287	0.8285
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
FE	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year

This table presents regression results testing the effect of the introduction of insider trading closed periods via Market Abuse Regulation (MAR) on market liquidity. MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. Our unit of observation is a firm-month. In Panel A, the dependent variables are the natural logarithm of the 30-day mean daily volume divided by the number of shares (*Ln(Depth)*), the natural logarithm of the mean daily bid-ask spread (*Ln(Spread)*), measured as the difference between the ask and bid prices divided by the midpoint, estimated round-trip transaction costs as per Desmond et al. (1999) (*LDV Cost*), the proportion of zero-return days (*Zero Returns*), and *Illiquidity*, the first principal component of those four variables. This test focuses on the 30-day window before the earnings announcement. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). *Treatment* is a dummy variable equal to one for firm-months in countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions, and zero for firm-months in a control group that includes countries with existing and at least equally stringent closed periods prior to MAR. In Panel B we exclude voluntary adopters from the treatment sample and only examine *Illiquidity* as the dependent variable. In columns (1) and (2), we exclude firms from the treatment sample for which there is no insider trading in the 30 days before earnings announcements between 01/01/2005 and 01/01/2012 (Voluntary Trade). In columns (3) and (4), we exclude firms from the treatment sample that mention insider trading or closed period-related strings in any of their 2003-2015 annual reports (Voluntary Text). The sample includes all European countries subject to MAR for which insider trading and earnings announcement data are available in the period 2014-2018. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 8.** *Information asymmetry and liquidity around MAR adoption: Cross-sectional tests at the firm-level*

	(1)	(2)	(3)	(4)	(5)	(6)
	Illiquidity					
	Treated: Treated Countries	Treated: Non-Voluntary Adopters	Treated: Treated Countries	Treated: Non-Voluntary Adopters		
	Control: Non-Treated Countries		Control: Non-Treated Countries			
	All	Trade	Text	All	Trade	Text
<b>Pre30 × Post × Treatment × IT Disclosure</b>						
	<b>-0.124**</b> (-2.018)	<b>-0.189*</b> (-1.860)	<b>-0.106</b> (-0.709)			
<b>Pre30 × Post × Treatment × No IT Disclosure</b>						
	<b>0.081***</b> (2.850)	<b>0.093***</b> (3.013)	<b>0.101***</b> (3.148)			
<b>Pre30 × Post × Treatment × High Concentration</b>					<b>0.088**</b> (2.347)	<b>0.106**</b> (2.162)
						<b>0.045</b> (1.311)
<b>Pre30 × Post × Treatment × Low Concentration</b>					<b>0.032</b> (0.876)	<b>0.017</b> (0.381)
						<b>0.065</b> (1.194)
IT Disclosure	-0.048*** (-2.687)	-0.037 (-1.416)	-0.045 (-1.499)			
Pre30 × IT Disclosure	-0.032 (-0.569)	-0.031 (-0.422)	-0.007 (-0.101)			
Pre30 × No IT Disclosure	-0.031* (-1.831)	-0.025 (-1.335)	-0.027 (-1.336)			
Post × IT Disclosure	0.126*** (2.932)	0.080 (1.446)	0.044 (0.833)			
Post × No IT Disclosure	0.134** (2.628)	0.106* (1.859)	0.017 (0.261)			
High Concentration				0.209*** (3.076)	0.170** (2.264)	0.314 (1.577)
Pre30 × High Concentration				-0.013 (-0.459)	-0.001 (-0.014)	0.065* (1.999)
Pre30 × Low Concentration				-0.011 (-0.439)	-0.003 (-0.083)	-0.015 (-0.366)
Post × High Concentration				0.122* (1.867)	0.140* (1.833)	0.165** (2.006)
Post × Low Concentration				0.095*** (3.300)	0.077** (2.060)	0.070 (1.575)
Post	-0.078 (-0.491)	-0.106*** (-3.397)	-0.069*** (-3.514)	0.096 (0.592)	-0.069** (-2.130)	-0.065*** (-3.018)
Pre30	0.073*** (3.909)	0.072*** (3.880)	0.072*** (3.875)	0.062*** (3.659)	0.063*** (3.666)	0.064*** (3.630)
Pre30 × Post	-0.038* (-1.778)	-0.038* (-1.721)	-0.038* (-1.749)	-0.031 (-1.485)	-0.031 (-1.449)	-0.031 (-1.458)
Size	-0.324*** (-5.992)	-0.351*** (-5.558)	-0.323*** (-4.833)	-0.236*** (-4.449)	-0.257*** (-3.859)	-0.257*** (-4.146)
Book-to-Market	0.188*** (4.596)	0.172*** (3.841)	0.136*** (2.676)	0.154*** (2.885)	0.130** (2.259)	0.129** (2.433)
Return FYE	-0.048* (-0.048)	-0.073*** (-0.073)	-0.045 (-0.045)	0.000 (0.000)	-0.033 (-0.033)	-0.023 (-0.023)

	(-1.878)	(-2.763)	(-1.313)	(0.006)	(-0.950)	(-0.544)
Negative Earnings	0.087** (2.545)	0.071* (1.965)	0.097** (2.327)	0.021 (0.822)	0.004 (0.115)	0.027 (0.650)
Volatility	-2.481** (-2.298)	-2.204* (-1.801)	-1.732 (-1.236)	-3.457*** (-4.010)	-3.055*** (-3.010)	-2.926*** (-3.081)
Fiscal year end	0.038* (1.944)	-0.009 (-0.446)	-0.032* (-1.706)	0.038 (1.609)	-0.001 (-0.026)	-0.007 (-0.249)
Price	0.000 (1.556)	0.000* (1.672)	0.000 (1.362)	0.000*** (3.609)	0.000*** (3.694)	0.000*** (3.511)
Ln (Analysts)	-0.030*** (-3.127)	-0.021** (-2.377)	-0.002 (-0.309)	-0.020* (-1.775)	-0.013 (-1.156)	-0.005 (-0.427)
Guidance	-0.058** (-2.016)	-0.039 (-1.359)	-0.008 (-0.299)	-0.010 (-0.535)	0.004 (0.201)	0.015 (0.631)
GDP	0.000 (1.541)	0.000* (1.860)	-0.000 (-0.015)	0.000 (0.797)	0.000 (1.130)	0.000 (0.260)
GDP Growth	-0.036*** (-3.274)	-0.026*** (-2.697)	-0.021** (-2.634)	-0.014*** (-3.017)	-0.013** (-2.514)	-0.015*** (-3.719)
Ln(DisclosureDates)				-0.028*** (-3.249)	-0.026*** (-3.116)	-0.024*** (-2.787)
Observations	54,241	41,980	32,155	32,780	24,990	19,721
R-squared	0.8122	0.8033	0.8025	0.8185	0.8120	0.8033
Cluster	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year	Firm and Month-Year
FE	Firm and Year	Firm and Year	Firm and Year	Firm and Year	Firm and Year	Firm and Year
F-test	0.0027	0.0125	0.186	0.107	0.0307	0.761

This table presents firm level, cross-sectional results testing the effect of insider trades taking place during closed periods on information asymmetry after the introduction of closed periods via Market Abuse Regulation (MAR) depending on the trading disclosure (columns 1-3) and ownership concentration (columns 4-6). MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. Our unit of observation is firm-month. The dependent variable is *Illiquidity*, the first principal component of *Ln(Depth)*, *Ln(Spread)*, *LDV Cost*, and *Zero Returns*. This test focuses on the 30-day window before the earnings announcement. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). In columns (1) and (4), *Treatment* is a dummy variable equal to one for firm-months in countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions, and zero for firm-months in a control group that includes countries with existing and at least equally stringent closed periods prior to MAR. In columns (2) and (5), we exclude firms from the treatment sample for which there is no insider trading in the 30 days before earnings announcements between 01/01/2005 and 01/01/2012 (Voluntary Trade). In columns (3) and (6), we exclude firms from the treatment sample that mention insider trading or closed period-related strings in any of their 2003-2015 annual reports (Voluntary Text). (*No*) *IT Disclosure*, is a dummy variable equal to one if there was at least one (no) trade is disclosed during a 30-day window. *High (Low) Concentration* is a dummy variable that equals one if the percentage of free float is less than 50%. The sample includes all European countries subject to MAR for which insider trading and earnings announcement data are available in the period 2014-2018. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 9. Executive Compensation**

	(1)	(2)	(3)	(4)	(5)	(6)
	Treated: Treated Countries		Treated: Non-Voluntary Adopters			
	Control: Non-Treated Countries		Control: Non-Treated Countries			
	All		Trade		Text	
	Ln(Total Compensation)	Ln(Non-Cash Compensation)	Ln(Total Compensation)	Ln(Non-Cash Compensation)	Ln(Total Compensation)	Ln(Non-Cash Compensation)
Post × Treatment	<b>0.064*</b> (1.736)	<b>0.171**</b> (1.946)	<b>0.060</b> (1.550)	<b>0.182*</b> (1.918)	<b>0.135***</b> (2.636)	<b>0.156</b> (1.059)
Post	-0.036 (-0.724)	-0.138 (-0.975)	-0.037 (-0.732)	-0.141 (-0.979)	-0.018 (-0.342)	-0.122 (-0.780)
Size	0.174*** (4.954)	0.254*** (3.083)	0.180*** (4.987)	0.264*** (3.087)	0.166*** (3.779)	0.223** (2.059)
Book-to-Market	0.007 (0.215)	-0.073 (-1.226)	0.006 (0.186)	-0.071 (-1.215)	-0.057 (-1.499)	-0.149 (-1.584)
Return FYE	0.040* (1.740)	0.055 (1.223)	0.041* (1.685)	0.062 (1.274)	0.050 (1.568)	0.065 (1.037)
Negative Earnings	-0.042 (-1.121)	0.001 (0.007)	-0.043 (-1.066)	-0.002 (-0.024)	-0.045 (-0.838)	0.020 (0.151)
GDP	-0.000 (-0.120)	-0.000 (-1.571)	-0.000 (-0.023)	-0.000 (-1.255)	-0.000 (-0.047)	-0.000 (-0.749)
GDP Growth	0.006 (1.243)	0.012* (1.825)	0.006 (1.280)	0.013* (1.898)	0.006 (1.323)	0.014** (2.003)
Observations	9,177	9,177	8,380	8,380	6,180	6,180
R-squared	0.7976	0.7740	0.8062	0.7754	0.8111	0.7708
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
FE	Firm and Year	Firm and Year	Firm and Year	Firm and Year	Firm and Year	Firm and Year

This table presents regression results testing the effect of implementation of closed periods via Market Abuse Regulation (MAR) on executive compensation. MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. The dependent variable is *Total (Non-Cash) Compensation*, that is dollar value obtained from Capital IQ. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). In columns (1) and (2), *Treatment* is a dummy variable equal to one for firms in countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions, and zero for firms in a control group that includes countries with existing and at least equally stringent closed periods prior to MAR. In columns (3) and (4), we exclude firms from the treatment sample for which there is no insider trading in the 30 days before earnings announcements between 01/01/2005 and 01/01/2012 (Voluntary Trade). In columns (5) and (6), we exclude firms from the treatment sample that mention insider trading or closed period-related strings in any of their 2003-2015 annual reports (Voluntary Text). The sample includes all European countries subject to MAR for which insider trading and earnings announcement data are available in the period 2014-2018. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 10.** *Institutional Ownership*

	(1)	(2)	(3)	(4)
	Institutional Ownership			
	Treated: Treated Countries		Treated: Non-Voluntary Adopters	
	Control: Non-Treated Countries		Control: Non-Treated Countries	
	All	All	Trade	Text
<b>Post × Treatment</b>	<b>-1.265**</b> (-2.260)	<b>-0.881**</b> (-2.255)	<b>-1.462**</b> (-2.130)	<b>-0.785*</b> (-1.904)
Post	0.603 (1.410)			
Treatment	-14.753*** (-18.791)			
Size	0.050 (0.307)	-0.524 (-0.845)	0.283 (0.307)	-0.511 (-0.787)
Book-to-Market	-0.125 (-0.491)	0.213 (0.637)	0.330 (0.978)	0.182 (0.529)
Return FYE	-1.404*** (-3.144)	-0.122 (-0.608)	0.176 (0.458)	-0.070 (-0.318)
Negative Earnings	-0.977 (-1.499)	-0.291 (-0.854)	0.460 (0.936)	-0.323 (-0.861)
GDP	0.000*** (4.860)	0.000*** (3.178)	0.000*** (3.385)	0.000*** (2.777)
GDP Growth	-0.010 (-0.071)	-0.055 (-1.028)	-0.024 (-0.399)	-0.044 (-0.813)
Observations	10,054	10,054	4,491	8,288
R-squared	0.1606	0.9106	0.9063	0.9119
Cluster	Firm	Firm	Firm	Firm
FE	None	Firm and Year	Firm and Year	Firm and Year

This table presents regression results testing the effect of implementation of closed periods via Market Abuse Regulation (MAR) on ownership structure. MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. The dependent variable is *Institutional Ownership*, defined as percentage of shares held by institutional investors. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). In columns (1) and (2), *Treatment* is a dummy variable equal to one for firms in countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions, and zero for firms in a control group that includes countries with existing and at least equally stringent closed periods prior to MAR. In columns (3), we exclude firms from the treatment sample for which there is no insider trading in the 30 days before earnings announcements between 01/01/2005 and 01/01/2012 (Voluntary Trade). In columns (4), we exclude firms from the treatment sample that mention insider trading or closed period-related strings in any of their 2003-2015 annual reports (Voluntary Text). The sample includes all European countries subject to MAR for which insider trading and earnings announcement data are available in the period 2014-2018. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

**Table 11.** Information asymmetry and liquidity around MAR adoption: Cross-sectional tests at the country-level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	MAD			MAR			MAR-MAD		
	Probability	20-day Value Profits	Illiquidity	Probability	20-day Value Profits	Illiquidity	Probability	20-day Value Profits	Illiquidity
<b>Pre30 × Post × High</b>	-0.035** (-2.130)	-0.013*** (-3.676)	0.078*** (2.666)	-0.035* (-1.762)	-0.004 (-1.031)	0.120*** (3.189)	-0.026 (-1.440)	0.005 (0.533)	0.111*** (3.604)
<b>Pre30 × Post × Low</b>	-0.041** (-2.019)	0.006 (0.660)	0.063** (2.100)	-0.039** (-2.332)	-0.010** (-2.185)	0.056** (2.035)	-0.044*** (-2.693)	-0.012*** (-3.600)	0.050 (1.633)
Pre30 × Post	-0.000 (-0.022)	0.001 (0.545)	-0.037* (-1.708)	-0.000 (-0.022)	0.001 (0.552)	-0.037* (-1.714)	-0.000 (-0.022)	0.001 (0.492)	-0.037* (-1.710)
Pre30 × High	0.110*** (8.747)	0.004 (1.576)	-0.019 (-0.965)	0.132*** (9.416)	0.001 (0.432)	-0.024 (-1.151)	0.134*** (10.457)	0.003 (0.895)	-0.042** (-2.178)
Pre30 × Low	0.131*** (9.288)	0.002 (0.539)	-0.023 (-1.128)	0.113*** (8.329)	0.004 (1.651)	-0.020 (-0.987)	0.109*** (8.368)	0.003 (1.533)	-0.008 (-0.381)
Post × High	-0.011 (-0.795)	0.000 (0.147)	0.137*** (2.708)	-0.011 (-0.744)	-0.000 (-0.128)	0.204*** (2.717)	0.002 (0.175)	-0.000 (-0.086)	0.165** (2.115)
Post × Low	0.024 (1.403)	-0.001 (-0.691)	0.144** (2.228)	0.006 (0.417)	-0.000 (-0.127)	0.117** (2.458)	0.001 (0.081)	-0.000 (-0.134)	0.123** (2.579)
Pre30	-0.188*** (-19.486)	-0.001 (-0.988)	0.062*** (3.176)	-0.188*** (-19.484)	-0.001 (-0.988)	0.062*** (3.174)	-0.188*** (-19.483)	-0.001 (-0.988)	0.062*** (3.177)
Post	0.007 (0.846)	-0.002*** (-2.782)	-0.139*** (-4.408)	0.007 (0.863)	-0.002*** (-2.855)	-0.140*** (-4.384)	0.007 (0.832)	-0.002*** (-2.762)	-0.137*** (-4.490)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	58,035	9,913	54,241	58,035	9,913	54,241	58,035	9,913	54,241
R-squared	0.1343	0.1369	0.8122	0.1341	0.1360	0.8122	0.1342	0.1368	0.8122
Cluster	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month	Firm and Month
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.790	0.0493	0.509	0.874	0.256	0.0486	0.282	0.0608	0.0362

This table presents regression results on the effect of sanctions around the adoption of the Market Abuse Regulation (MAR) on the incidence of insider trades (columns 1, 4, and 7), the profitability thereof (columns 2, 5, and 7) and market liquidity (columns 3, 6, and 9). MAR took effect in July 2016 in the European Union and prohibits corporate insiders from trading within 30 days prior to earnings announcements. Additionally, MAR also unified sanctions for market abuse across all E.U. countries. Columns (1), (2), and (3) present results based on sanctions imposed under Market Abuse Directive (MAD) a predecessor of MAR. Under MAD sanctions were regulated at a country (not E.U.) level. Columns (4), (5), and (6) present results based on sanctions imposed under MAR. Columns (7), (8), and (9) present results based on the difference of sanctions imposed under MAR and MAD. In columns (1) to (6) *High* (*Low*) equals one if the ratio of sanctions to the number of firms listed in our treated countries under MAD for columns 1-3 and under MAR for columns 4-6 is above (below) the sample median, and zero otherwise. In columns (7) to (9), *High* (*Low*) equals one if the difference between the ratio of sanctions imposed under MAR and MAD to the number of listed firms is above (below) the treated sample median, and zero otherwise. The data on number of sanctions imposed is collected from European Securities and Markets Authority (ESMA). The treatment sample consists of countries where closed periods were introduced either for the first time with the adoption of MAR or where MAR increased trading restrictions. The control group includes countries with existing and at least equally stringent closed periods before MAR. Our unit of observation is a firm-month. For the probability results, the dependent variable is equal to 1 if there is at least one insider trade in a firm month and zero otherwise. *Illiquidity*, the first principal component of *Ln(Depth)*, *Ln(Spread)*, *LDV Cost*, and *Zero Returns*. *Average Abnormal 20-day return* is calculated as the monthly average of the net cumulative 20 trading days abnormal returns following an insider trading transaction. *20-day Value Profits* is the product of the abnormal return times the value of the trade, scaled by the firm's market capitalization. *Post* is a dummy variable equal to one for firm-months after the adoption of MAR (i.e. 06/07/2016 – 31/12/2018) and zero before (01/2012 – 05/07/2016). *Pre30* is a dummy variable equal to one for a period of 30 days prior to earnings announcement and zero for any other firm-month. The sample includes all European countries subject to MAR, for which insider trading and earnings announcement data are available in the 2012-2018 period. All variables are defined in Appendix A. T-statistics are reported in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively