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Secrecy, information shocks, and corporate investment: Evidence from European Union countries ☆

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ABSTRACT

This study examines how national culture affects corporate investment. We argue that national culture affects corporate investment efficiency through the level of secrecy that national culture exhibits. Using a sample of firms from eight culturally-diverse European Union countries, we find that the level of secrecy that national culture exhibits is negatively related to corporate investment efficiency after controlling for a number of firm- and country-level factors. We also find that the negative relation between national culture and corporate investment efficiency is mitigated by an exogenous shock to the information asymmetry problem between managers and investors. Our study highlights the importance of the cultural value of secrecy/transparency as a determinant of investment efficiency at the firm-level.

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1. Introduction

There has been a growing awareness among researchers of whether differences in national culture between societies explain differences in corporate decisions.[1] For instance, researchers have examined whether national culture influences financial reporting practices (e.g., Salter et al., 2013; Kanagaretnam et al., 2014), dividend payouts (Shao et al., 2010), and auditor choice (Hope et al., 2008). Yet, the channels through which national culture affects corporate decisions have not been widely investigated. In this paper, we attempt to explain how national culture affects corporate decisions pertaining to investment efficiency by focusing on the level of secrecy that national culture exhibits.

The principal challenge in studying the relation between national culture and corporate decisions stems from the fact that national culture is a broad term and, as a result, the channels through which it can explain economic phenomena are vague (Guiso et al., 2006). Therefore, to come up with our testable hypotheses on the role of national culture in corporate investment efficiency, we use Gray's (1988) conceptual framework to link the national culture to the information asymmetry

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[1] Hofstede (2001, p.9) defines culture as "the collective programming of the mind that distinguishes people of one country, region or group from people from other countries, regions or groups". According to Hofstede (2001), culture shapes people's perception and defines what is important.

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problem between managers and investors. Gray (1988) argues that managers in societies that are secretive based on national culture tend to be less transparent in their disclosure practices. This, in turns, leads to a more serious information asymmetry problem between managers/insiders and investors/outsiders in secretive societies. A number of empirical studies provide evidence in support of Gray's argument (e.g., Gray and Vint, 1995; Salter and Niswander, 1995; Hope et al., 2008).

Another strand of literature suggests that a lower level of corporate transparency reduces investment efficiency by increasing information asymmetries between managers/insiders and investors/outsiders (e.g., Leuz and Verrecchia, 2000; Bushman and Smith, 2001; Healy and Palepu, 2001; Verrecchia, 2001). A lower level of corporate transparency, for example, reduces investors' ability to monitor managerial investment decisions. Therefore, we hypothesize that firms in societies that are more secretive based on national culture will have lower investment efficiency relative to firms in societies that are less secretive.

Furthermore, we argue that changes in the information asymmetry problem between managers and investors lead to changes in corporate investment efficiency, *ceteris paribus*. For this reason, we test whether an exogenous shock to the firm's information environment mitigates the negative relation between corporate investment efficiency and the level of secrecy that national culture exhibits. To do so, we follow Hail et al. (2014) and consider the mandatory adoption of International Financial Reporting Standards (IFRS) in European Union (EU) countries as a proxy for the exogenous information shock.[2] Prior studies show improvements of the firm's information environment such as improved disclosure rules and better information acquisition by market participants following IFRS mandatory adoption (e.g., Horton et al., 2013).

Our sample firms come from eight EU countries that are considered culturally-diverse based on Hofstede's (1980) cultural dimensions and, at the same time, had an exogenous information shock (i.e., the mandatory adoption of IFRS) during the sample period (2000–2009). In addition, examining firms from culturally-diverse countries but belong to the same continent and the same politico-economic union would mitigate the concern that our results are driven by other institutional variables (e.g., political system, educational system, country's infrastructure) that widely vary across continents but are difficult to measure and/or fully control for.

Our results show that firms in EU countries that are more secretive based on national culture have lower investment efficiency. This finding is robust to a number of firm- and country-level factors including the country's legal environment and economic development. We also find that the negative relation between secrecy and corporate investment efficiency is mitigated by an exogenous shock to the firm's information environment. Our results suggest that the cultural value of secrecy/-transparency affects corporate investment efficiency and is an important factor in cross-country comparisons of corporate investment and growth. Our results also suggest that cultural values (or norms) that are communicated implicitly within a society as opposed to rules that are communicated explicitly must be accounted for when examining efficiency and productivity at the firm-level.

Our study is related to, but differs from, the work of Shao et al. (2013), who find that in individualistic societies wherein individuals are supposed to be independent and rely more on themselves and less on the social unit they belong to, firms have greater research and development (R&D) expenditures. However, Shao et al. (2013) find no significant relation between the level of capital expenditures (physical assets) and the individualism dimension of national culture. Our study extends Shao et al.'s (2013) by examining the relation between secrecy, which is based on three different cultural dimensions including individualism, and corporate investment efficiency (i.e., the deviation from the normal level of investment). More importantly, unlike Shao et al. (2013) who focus on culture's implications for corporate risk taking, we focus on culture's implications for the information asymmetry problem between managers and investors. In addition, our paper examines the relation between secrecy and corporate investment efficiency following an exogenous shock to the firm's information environment.

We believe that endogeneity is unlikely to be a concern for our findings. First, reverse causality (i.e., corporate investment efficiency affecting national culture) seems implausible. Cultural values tend to be relatively stable over time (Han et al., 2010) and they have long existed before the formation of corporations and capital markets. Second, our finding that an exogenous information shock alleviates the effects of national culture on corporate investment efficiency helps mitigate the omitted variable concern. For an omitted variable to explain our findings, it has to affect both national culture and corporate investment efficiency when there is an exogenous shock to the firm's information environment.

Our study contributes to the existing literature in three ways. First, it highlights the importance of cultural values to economic productivity and promotes a better understanding of how differences in cultural values result in differences in corporate investment efficiency. This understanding, in turn, may help policy-makers promote productivity and growth through measures that take into account differences in national culture.[3] To our knowledge, our study is the first to establish a link between national culture and corporate investment efficiency, a key determinant of economic productivity, based on culture's implications for the information asymmetry problem between managers and investors. Second, our results suggest that the effects of national culture on firm-level investment efficiency is not subsumed by other firm-level and institutional factors discussed in the literature. Hence, future research attempting to explain international differences in corporate investment efficiency should consider culture, which imposes informal constraints on management behavior, as a potentially explanatory variable in the analysis. In this regard, our study extends a strand of literature (e.g., Alesina and Angeletos, 2005; Guiso et al.,

[2] According to Hail et al. (2014), IFRS mandatory adoption not only reflects a regulatory change but also serves as a proxy for a general improvement of the information environment and, hence, the corporate governance structure in the economy.

[3] North (1990, p.6) states that: "Although formal rules may change overnight as the result of political or judicial decisions, informal constraints embodied in customs, traditions and codes of conduct are much more impervious to deliberate policies."

2006, 2009; Tabellini, 2010) who find that culture affects economic outcomes and productivity at the macro-level. Third, our study contributes to the literature on the economic consequences of corporate transparency and information disclosure (see Leuz and Wysocki (2008) for an overview). Our results suggest that an exogenous shock to the firm's information environment in secretive societies has real consequences in terms of promoting efficient corporate investment decisions.

2. Related literature and hypotheses

2.1. Related literature

Prior research has examined the role of national culture in both managerial and financial settings. For example, Hope (2003) shows that cultural values have explanatory power for firms' disclosure even after controlling for variations in legal origin. Hope et al. (2008) test Gray's (1988) secrecy hypothesis which posits that corporate transparency is negatively related to the level of secrecy that national culture exhibits. Using Hofstede's (1980) cultural dimensions, Hope et al. (2008) find that firms in countries that are more secretive based on national culture are less likely to hire high-quality auditors. Their results provide evidence in support of Gray's secrecy hypothesis and suggest that managements' choice between high-quality auditors and low-quality auditors is related to the cultural value of secrecy/transparency. Other empirical studies also provide evidence in support of Gray's secrecy hypothesis (see e.g., Gray and Vint, 1995; Salter and Niswander, 1995).

Tsakumis (2007) examines the influence of national culture on accountants' application of accounting rules. He selects the U.S. and Greece to represent low and high secretive countries, respectively, based on Hofstede (1980). His results show no significant differences between U.S. and Greek accountants' recognition decisions involving contingent assets and liabilities. However, he finds that Greek accountants are less likely to disclose the existence of contingent assets and liabilities (i.e., are more secretive) than U.S. accountants. His findings suggest that the level of secrecy that national culture exhibits does play a role in accountants' disclosure judgments. In addition, Doupnik (2008) and Han et al. (2010) examine the influence of national culture on earnings management across countries and find that national culture is an important explanatory variable of earnings management practices around the world. Other recent studies also show that cultural values affect managers' financial reporting practices. For instance, Salter et al. (2013) and Kanagaretnam et al. (2014) show that differences in national culture across countries are associated with differences in the quality of reported earnings.

Shao et al. (2010) examine the link between national culture and corporate dividend policies. They find that national culture explains corporate dividend policies by affecting management and investors' perceptions of dividend-related issues such as agency problems and asymmetric information. Furthermore, Chui et al. (2010) examine whether cultural differences influence investors' trading strategies. They find that national culture is associated with trading volume and volatility, as well as to the magnitude of momentum profits. In a related study, Eun et al. (2015) show that culture influences stock price co-movements across countries by affecting correlations in investors' trading activities and the country's information environment. Shao et al. (2013) investigate the relation between national culture and horizons and types of corporate investment, based on culture's implications for risk taking. They find that national culture is related to whether managers invest in long-term and risky assets such as R&D.

Prior research has also examined the role of national culture in explaining macro-level differences across countries. For example, Kwok and Tadesse (2006) examine the differences in the configuration of financial systems across countries. They show that national culture and the likelihood of having bank-based financial systems are significantly related, after controlling for variables such as the legal environment, the level of economic development, and political conditions. In addition, Ding et al. (2005) investigate the role of culture as an explanatory factor underlying differences between national accounting standards and International Accounting Standards (IAS). They find that culture matters more than legal origin in explaining divergences between national accounting standards and IAS.

The current study adds to the above literature by examining the relation between national culture and corporate investment efficiency, based on culture's implications for the information asymmetry problem between managers and investors. Our study also examines this relation following an exogenous shock to the firm's information environment. The following section develops our testable hypotheses.

2.2. Testable hypotheses

Using Hofstede's (1980) cultural dimensions, Gray (1988) presents a model that links national culture to four accounting values: professionalism, uniformity, conservatism, and secrecy. Gray (1988) defines secrecy versus transparency accounting value, which is the focus of our study, as "a preference for confidentiality and the restriction of disclosure of information about the business only to those who are closely involved with its management and financing as opposed to a more transparent, open and publicly accountable approach." Gray hypothesizes that managers would share less information with outsiders if their cultural tendency is to be secretive. Accordingly, this managerial behavior leads to a more serious information asymmetry problem between managers/insiders and investors/outsiders.

Another strand of research suggests that a lower level of corporate transparency reduces investment efficiency by increasing information asymmetries between managers/insiders and investors/outsiders (e.g., Leuz and Verrecchia, 2000; Bushman and Smith, 2001; Healy and Palepu, 2001; Verrecchia, 2001). A lower level of corporate transparency reduces

investors' ability to monitor managerial investment decisions. In addition, managers are expected to be, *ex ante*, less disciplined in their investment behavior when they operate within an environment of high information asymmetry.

Therefore, we posit that the information asymmetry problem in secretive societies will result in lower levels of corporate investment efficiency. Our first testable hypothesis (stated in the alternative form) is as follows:

H1. *There is a negative association between secrecy and corporate investment efficiency.*

Improvements of the firm's information environment will enable investors to better monitor managerial investment decisions and will also make managers more disciplined in their investment behavior. Hence, we examine whether an exogenous shock to the firm's information environment mitigates the negative association between corporate investment efficiency and secrecy. This leads us to our second hypothesis (stated in the alternative form):

H2. *The negative association between secrecy and corporate investment efficiency is mitigated by an exogenous information shock.*

Following Hail et al. (2014), we choose the mandatory adoption of IFRS as an exogenous information shock. IFRS are elaborated to satisfy investors' information needs in the context of reducing the information asymmetry between managers and investors (Ding et al., 2007). In this respect, prior studies show improvements of the firm's information environment following IFRS mandatory adoption (e.g., Horton et al., 2013).

3. Methodology

3.1. Secrecy measure

To capture the level of secrecy that national culture exhibits, we focus on three dimensions of national culture identified by Hofstede (1980): individualism, uncertainty avoidance, and power distance. These three cultural dimensions are the most closely related to the level of secrecy according to Gray's (1988) framework.[4] Gray (1988, p.11) notes that secrecy is negatively related to individualism and is positively related to uncertainty avoidance and power distance.

First, individualism stands for a society wherein individuals are supposed to be independent and take care of themselves. Its opposite, collectivism, stands for a society wherein individuals can expect their relatives, clan, or other in-group to look after them in exchange for unquestioning loyalty. According to Gray's (1988) framework and based on Hofstede's (1980) individualism scores, people in high individualistic societies, such as the U.K. and the U.S., are expected to be less secretive and are more willing to share information with external parties, other than related parties, as opposed to people in high collectivistic societies, such as Brazil and Mexico, who are more likely to restrict information to related parties or the social unit they belong to. Thus, Gray (1988) argues that secrecy is consistent with a preference for collectivism, as opposed to individualism.

Second, strong uncertainty avoidance societies maintain rigid codes of belief and behavior and are intolerant towards deviant persons and ideas. Weak uncertainty avoidance societies maintain a more relaxed atmosphere in which practice counts more than principles and deviance is more easily tolerated. Therefore, Gray (1988) argues that people in societies with high uncertainty avoidance tend to restrict information disclosures so as to avoid conflict and competition and to preserve security.

Third, power distance is the extent to which the members of a society accept that power in institutions and organizations is distributed unequally. This affects the behavior of the less powerful as well as of the more powerful members of society. People in high power distance societies accept a hierarchical order in which everybody has a place which needs no further justification. However, people in low power distance societies strive for power equalization and demand justification for power inequalities. Hence, people in societies that are characterized by high power distance tend to restrict information to preserve power inequalities.

Therefore, according to Gray's (1988) framework and following Hope et al. (2008), we measure secrecy (*SEC*) as the sum of uncertainty avoidance (*UA*) and power distance (*PD*) scores less the individualism (*IND*) score:

$$SEC = UA + PD - IND \tag{1}$$

where *UA, PD* and *IND* scores are from Hofstede (1980).

3.2. Investment efficiency measure

For measuring corporate investment efficiency, we follow prior research (e.g., Biddle et al., 2009; Cutillas Gomariz and Sanchez Ballesta, 2014; Goodman et al., 2014) and measure corporate investment efficiency as deviations from expected level of investment using a model that predicts investment as a function of growth opportunities. Specifically, we estimate a firm-specific model of capital expenditures as a function of sales growth. The model can be written as follows:

$$CAPEX_t = \gamma_0 + \gamma_1 Sales_Growth_{t-1} + \upsilon_t \tag{2}$$

[4] The dimensions of culture developed by Hofstede (1980) have been widely accepted and used by many studies in different disciplines including accounting, economics, finance, marketing, and management. See Kanagaretnam et al. (2014) for examples of those studies.

where $CAPEX_t$ is capital expenditures in year t obtained from the cash flow statement.[5] $Sales_Growth_{t-1}$ is percentage change in net sales in year $t-1$. To obtain expected *CAPEX*, we estimate Eq. (2) by year for each 2-digit SIC industry with at least 20 observations in a given year. We also control for country fixed effects. Since both underinvestment (negative deviations from expected *CAPEX*) and overinvestment (positive deviations from expected *CAPEX*) are considered inefficient investments, we take the absolute value of the residuals of actual *CAPEX* from expected *CAPEX* and use it as a firm-specific investment efficiency proxy (*InvEff*). We multiply *InvEff* by minus one so that a larger number indicates more efficient investment.

3.3. Research design

To examine the relation between secrecy and corporate investment efficiency, we estimate the following regression (firm and time subscripts omitted):

$$InvEff = \beta_0 + \beta_1 SEC + \beta_2 Credit(or\ other\ country\text{-}level\ control\ variable) + \beta_3 Tangibility + \beta_4 Cash + \beta_5 Size + \beta_6 Leverage + \beta_7 Loss + \beta_8 MTB + \beta_9 DIV + \beta_{10} Big4_5 + Industry\ Indicators + \varepsilon \quad (3)$$

where *InvEff* and *SEC* are as previously defined. We control for three country-level variables that could affect our dependent variable, corporate investment efficiency. Specifically, we control for the availability of domestic credit to private sectors (*Credit*). The availability of domestic credit could negatively or positively affect investment efficiency depending on how firms might use available credit in their investment decisions.

We further control for investor protection (*InvPro*) because firms in stronger legal environments are less likely to extract rents and mislead their shareholders. We use the "legal enforcement" variable from La Porta et al. (1998) to proxy for the legal environment in a country. Following Hope et al. (2008), legal enforcement is measured as the mean score across three legal variables used in La Porta et al. (1998): (1) the efficiency of the judicial system, (2) an assessment of rule of law, and (3) the corruption index. In addition, we control for the country's level of economic development which is measured as the logarithm of the gross domestic product per capita (*LGDP*). We expect more positive Net Present Value (NPV) projects in countries of high economic development and, therefore, we expect a positive association between corporate investment efficiency and the level of economic development.

Following prior literature (e.g., Biddle et al., 2009; Cutillas Gomariz and Sanchez Ballesta, 2014; Goodman et al., 2014), we control for a number of firm characteristics that have been found to be related to firm's investment behavior and, thus, could confound our findings. Specifically, we control for beginning-of-year gross property, plant and equipment (*Tangibility*) and beginning-of-year cash level (*Cash*). *Tangibility* is included to control for capital intensity whereas *Cash* is included to control for slack (i.e., cash richness). We also control for firm size (*Size*), leverage (*Leverage*), the frequency of losses (*Loss*), market-to-book ratio (*MTB*), and dividend payouts (*DIV*). *Size* is measured as the logarithm of beginning-of-year market value of equity and it is a proxy for economies of scale. *Leverage* is the ratio of total liabilities to total equity. *Loss* is an indicator variable that takes the value of one if the firm's net income before extraordinary items is negative, and zero otherwise. *Leverage* and *Loss* capture financial distress, which might affect investment efficiency. *MTB* is the ratio of market value of total assets to book value of total assets at beginning of year and it is a proxy for firm growth. *DIV* is an indicator variable that takes the value of one if the firm paid a dividend, and zero otherwise. *DIV* is included to indicate whether management is using available cash to pay shareholders.

Furthermore, we include *Big4_5*, an indicator variable equaling one when the firm's auditor is either one of the big four or five auditors (i.e., high-quality auditors), and zero otherwise, to control for any potential positive relation between this governance variable and investment efficiency. Finally, we include industry indicators (two-digit SIC codes) to control for industry-specific shocks. In the context of Eq. (3), if there is a negative association between corporate investment efficiency and secrecy (H1), then we expect a significantly negative β_1 coefficient. We also expect corporate investment efficiency to be positively related to the firm's size and auditor quality and negatively related to cash, leverage, and losses.

To examine the relation between secrecy and corporate investment efficiency following an exogenous information shock, we introduce to Eq. (3) an indicator variable, *InfoShock*, that equals one for firms adopting IFRS after January 1, 2005, and zero otherwise. Hence, we estimate the following regression (firm and time subscripts omitted):

$$InvEff = \beta_0 + \beta_1 SEC + \beta_2 SEC * InfoShock + \beta_3 InfoShock + \beta_{4-12} CONTROLS + Industry\ Indicators + \varepsilon \quad (4)$$

where *InvEff*, *SEC*, and *InfoShock* are as previously defined. *CONTROLS* is a vector of control variables listed in Eq. (3). In the context of Eq. (4), if the negative association between secrecy and corporate investment efficiency is mitigated by an exogenous information shock (H2), then we expect a significantly positive β_2 coefficient on the interaction of *SEC* and *InfoShock*.

[5] The importance of capital expenditures to firm value is well established in the literature (e.g., Kerstein and Kim, 1995). In our setting, R&D expenditures (i.e., non-capital expenditures) that are reported in the income statement are mechanically related to the accounting standards adopted during the sample period. For example, under IFRS that are adopted beginning in 2005, development costs must be capitalized once certain criteria are met, whereas under domestic accounting standards (e.g., the French standards) that were adopted prior to IFRS, development costs were normally expensed as incurred. Hence, in our study, we focus on capital expenditures that can be obtained directly from the cash flow statement (i.e., the cash paid for acquiring physical assets) and, therefore, are not mechanically related to the accounting standards followed. As a robustness test, we add R&D expenditures to capital expenditures in the above model. Our final sample drops to 1835, but results (untabulated) remain consistent with those reported in the paper.

Table 1
Country-level variables and industry distribution.

Country	No. of Obs.	%	SEC	Credit	InvPro	LGDP
Panel A: Country-level variables						
France	1,430	24.58	83	0.851	8.68	10.39
Ireland	101	1.74	−7	1.047	8.36	10.64
Italy	566	9.73	49	0.755	7.07	10.30
Netherlands	281	4.83	11	1.342	10.00	10.53
Norway	226	3.89	12	0.655	10.00	11.01
Spain	263	4.52	92	0.978	7.14	10.08
Sweden	551	9.47	−11	0.423	10.00	10.51
United Kingdom	2,399	41.24	−19	1.279	9.22	10.44
	5,817	100.00				

Panel B: Industry distribution		
Industry	No. of Obs.	%
Oil & Gas	256	4.40
Building and Heavy Construction	283	4.87
Food Products	344	5.91
Printing, Publishing & Paper Products	339	5.83
Primary and Fabricated Metal Products	211	3.63
Chemicals and Allied Products	386	6.64
Industrial, Commercial & Computer Equipment	391	6.72
Electronic and Other Electrical Equipment	392	6.74
Transportation	321	5.52
Medical and Industrial Devices	243	4.18
Communications	229	3.94
Electric, Gas, and Sanitary Services	266	4.57
Wholesale/Retail Trade	362	6.22
Business and Computer Services	1,184	20.35
Consulting and Research Services	343	5.90
Others	267	4.59
	5,817	100.00

This table reports the country-level variables (Panel A) and distribution by industry (Panel B). The sample includes 5,817 firm-year observations from 2000 to 2009 in 8 EU countries. *SEC* is secrecy defined as *UA+PD-IND*, where *UA*, *PD*, and *IND* are uncertainty avoidance, power distance, and individualism scores from Hofstede (1980), respectively. *Credit* is domestic credit to private sectors as a percentage of GDP for 2000 from the World Bank Country Development Indicators. *InvPro* is investor protection measured as the mean score across three legal variables from La Porta et al. (1998): (1) the efficiency of the judicial system, (2) an assessment of rule of law, and (3) the corruption index. *LGDP* is the log of the gross domestic product per capita for 2000 from the World Bank Country Development Indicators.

4. Sample and descriptive statistics

Our sample consists of all publicly-listed non-financial firms available on WorldScope database in eight EU countries that are listed in Table 1 (Panel A). To capture an exogenous shock to the firms' information environment, we include firms only from those eight EU countries that mandated IFRS adoption beginning in 2005 but did not allow voluntary IFRS adoption prior to 2005. By doing so, we eliminate the self-selection bias related to managers' incentives to voluntarily adopt IFRS (i.e., early adopters) or to lately adopt IFRS (i.e., late adopters or resisters).[6] Furthermore, we believe that examining the effect of national culture among countries that are culturally-diverse but are within the same continent and the same politico-economic union would mitigate the effects of other institutional factors (e.g., political system, educational system, country's infrastructure) that widely vary across the different continents (e.g., EU countries versus Latin American countries) but are difficult to measure and/or fully control for. Our sample period spans from 2000 to 2009 (i.e., five years before/after the exogenous information shock) and our final sample is comprised of 5,817 firm-year observations after removing those with missing financial data.

Table 1 (Panel A) reports the country scores for secrecy and for the other country-level variables used in our analysis. Panel A shows that U.K. is the least secretive country in the sample with a score of −19 while Spain is the most secretive with a score of 92. Panel A also shows that the greatest number of firm-years comes from the U.K., with 2399 firm-years representing approximately 41% of the sample. Given that the bulk of the sample is from the U.K., we address this issue in the following section by rerunning our tests after excluding U.K. firms. Panel B of Table 1 presents the distribution of the sample by industry. Panel B shows that the business and computer services industry is heavily represented by approximately 20% of the sample. However, there is a reasonable distribution of the sample across all other industries.

Table 2 presents the descriptive statistics for the variables used in the estimation of Eqs. (3) and (4). The differences between the lower and upper quartile values show considerable cross-sectional dispersion for our dependent variable

[6] Prior literature (e.g., Verriest et al., 2013; Christensen et al., 2015; Capkun et al., 2016) shows that the effects of IFRS adoption in EU countries that allowed voluntary IFRS adoption prior to 2005 are highly dependent on managers' incentives to adopt IFRS voluntarily prior to 2005 or postpone adoption till IFRS became mandatory beginning in 2005. Also, related macroeconomic impacts, see, Cummins et al. (2017), Eichler and Sobanski (2016), Galariotis et al. (2016), and Oet et al. (2016).

Table 2
Descriptive statistics.

Variables	Mean	Std Dev	25th Pctl	Median	75th Pctl
InvEff	−0.084	0.142	−0.094	−0.048	−0.017
SEC	21.330	45.032	−19.000	−11.000	83.000
Credit	100.302	29.198	85.000	97.770	130.000
InvPro	8.911	0.863	9.000	9.220	9.220
LGDP	10.434	0.150	10.390	10.440	10.440
InfoShock	0.524	0.499	0.000	1.000	1.000
Tangibility	1.055	1.558	0.116	0.415	1.353
Cash	0.304	0.456	0.048	0.147	0.358
Size	5.336	2.434	3.538	5.194	7.007
Leverage	1.858	3.397	0.611	1.266	2.348
Loss	0.307	0.461	0.000	0.000	1.000
MTB	2.328	3.670	0.926	1.177	1.788
DIV	0.661	0.473	0.000	1.000	1.000
Big4_5	0.734	0.442	0.000	1.000	1.000

This table reports the descriptive statistics for the variables used in our analysis. The sample includes 5,817 firm-year observations from 2000 to 2009 in 8 EU countries. *InvEff* is investment efficiency, measured as the absolute value of the residual from an industry-year regression of capital expenditures in year t onto sales growth in year t−1. We multiply this measure by minus one so that a larger number indicates more efficient investment. *SEC* is secrecy defined as *UA+PD-IND*, where *UA*, *PD*, and *IND* are uncertainty avoidance, power distance, and individualism scores from Hofstede (1980), respectively. *Credit* is domestic credit to private sectors as a percentage of GDP for 2000 from the World Bank Country Development Indicators. *InvPro* is investor protection measured as the mean score across three legal variables from La Porta et al. (1998): (1) the efficiency of the judicial system, (2) an assessment of rule of law, and (3) the corruption index. *LGDP* is the log of the gross domestic product per capita for 2000 from the World Bank Country Development Indicators. *InfoShock* is an indicator variable equaling one for firms adopting International Financial Reporting Standards after January 1, 2005, and zero otherwise. *Tangibility* is beginning-of-year gross property, plant and equipment. *Cash* is beginning-of-year cash and cash equivalents. *Size* is the log of beginning-of-year market value of equity. *Leverage* is the ratio of total liabilities to total equity. *Loss* is an indicator variable equaling one if the firm's net income before extraordinary items in year t is negative, and zero otherwise. *MTB* is the ratio of the market value of total assets to book value of total assets at beginning of year, where the market value of total assets is equal to total assets plus market value of equity minus book value of equity. *DIV* is an indicator variable equaling one if the firm paid a dividend in year t, and zero otherwise. *Big4_5* is an indicator variable equaling one if the firm's auditor is either one of the big four or five auditors, and zero otherwise. Continuous variables are deflated by the firm's size (beginning-of-year market value of equity) and are winsorized at the 1st and 99th percentiles.

(*InvEff*) and for our main independent variable (*SEC*). Not surprisingly, *InvPro* and *LGDP* of EU countries in the sample are not much dispersed between quartiles. Table 2 also shows that roughly half of the observations in the sample are after the information shock. Furthermore, Table 2 indicates that, on average, 31% of observations in the sample incurred losses and 66% (73%) of observations paid dividends (had a Big4_5 auditor).

5. Empirical results

5.1. Correlations

Table 3 presents the Pearson correlation coefficients among the regression variables. *InvEff* is negatively correlated with *SEC* as hypothesized (p-value < .01). This finding provides bivariate evidence for the prediction that firms in more secretive societies exhibit lower investment efficiency. Further, Table 3 shows that *InvEff* is negatively correlated with *Credit* and, as expected, positively correlated with *InvPro* and *LGDP* (p-value < .01). In addition, *InvEff* is positively correlated with *InfoShock* (p-value < .01), suggesting that the exogenous shock to the firm's information environment has led to greater investment efficiency. The correlation between *InvEff* and firm's size, dividend payouts, and Big4_5 auditor is positive (p-value is at least less than the 5% level), while the correlation between *InvEff* and tangibility, cash, leverage, and market-to-book ratio is negative (p-value < .01). Consistent with Hope et al. (2008), *SEC* is strongly negatively correlated with *InvPro*, suggesting that investors are better protected in less secretive societies. *SEC* is also strongly negatively correlated with *Credit* and *LGDP*, which is intuitive as one would expect less availability of credit to private sectors and less economic development in more secretive societies. Lastly and consistent with Hope et al. (2008), the correlation between *SEC* and Big4_5 auditor is negative and significant. In sum, the correlations in Table 3 are consistent with our first hypothesis and predictions. However, these correlations should be interpreted cautiously as they do not control for differences in firm and country characteristics which could affect corporate investment efficiency. This will be dealt with in the multivariate regression analysis below.

5.2. Multivariate results

Table 4 reports the multivariate results based on Eq. (3), which is designed to test whether the level of secrecy that national culture exhibits is negatively associated with corporate investment efficiency. The high correlation among country-level variables reported in Table 3 raises the question whether multicollinearity distorts regression results. Hence, we follow Doupnik (2008) and Hope et al. (2008)and report different models of the regression both with and without each of

Table 3
Correlation matrix.

	InvEff	*SEC*	*Credit*	*InvPro*	*LGDP*	*InfoShock*	*Tangibility*	*Cash*	*Size*	*Leverage*	*Loss*	*MTB*	*DIV*
SEC	−0.094***												
Credit	−0.101***	−0.451***											
InvPro	0.101***	−0.598***	0.131***										
LGDP	0.108***	−0.422***	−0.097***	0.702***									
InfoShock	0.040***	0.023*	−0.066***	0.010	0.072***								
Tangibility	−0.249***	0.104***	0.123***	−0.182***	−0.167***	−0.102***							
Cash	−0.202***	0.068***	0.130***	−0.127***	−0.116***	0.017	0.156***						
Size	0.120***	0.062***	−0.358***	0.033**	0.134***	0.172***	−0.134***	−0.283***					
Leverage	−0.061***	0.003	0.052***	0.002	−0.018	−0.066***	0.083***	0.112***	−0.242***				
Loss	−0.015	−0.100***	0.049***	0.043***	0.064***	−0.051***	−0.029**	0.143***	−0.302***	0.121***			
MTB	−0.056***	−0.119***	0.156***	0.074***	0.003	−0.152***	0.063***	0.005	−0.415***	0.117***	0.158***		
DIV	0.026**	0.058***	−0.010	−0.050***	−0.072***	0.013	0.057***	−0.147***	0.402***	−0.144***	−0.523***	−0.274***	
Big4_5	0.074***	−0.054***	−0.137***	−0.013	0.060***	0.055***	−0.023*	−0.068***	0.465***	−0.146***	−0.130***	−0.302***	0.174***

This table presents the Pearson correlations for the variables used in our analysis. The sample includes 5,817 firm-year observations from 2000 to 2009 in 8 EU countries. See Table 2 for variable definitions.
*** Significance at the 1% level (two-tailed).
** Significance at the 5% level (two-tailed).
* Significance at the 10% level (two-tailed).

Table 4
The relation between secrecy and investment efficiency.

	Pred.	Dependent variable = *InvEff*							
		Model 1		Model 2		Model 3		Model 4	
	Sign	Estimate	*p*-value	Estimate	*p*-value	Estimate	*p*-value	Estimate	*p*-value
SEC	–	−0.018***	.000	−0.031***	<.0001	−0.018***	0.002	−0.011**	.014
Credit	+/–			−0.044***	<.0001				
InvPro	+					0.013	0.477		
LGDP	+							0.048***	<.0001
Tangibility	+/–	−0.015***	<.0001	−0.015***	<.0001	−0.015***	<.0001	−0.015***	<.0001
Cash	–	−0.047***	<.0001	−0.045***	<.0001	−0.047***	<.0001	−0.047***	<.0001
Size	+	0.005***	<.0001	0.002**	.018	0.005***	<.0001	0.004***	.000
Leverage	–	−0.009	.199	−0.011	.167	−0.009	0.198	−0.010	.183
Loss	–	0.000	.544	0.000	.471	0.000	0.545	0.000	.503
MTB	+/–	−0.028	.394	−0.030	.366	−0.028	0.393	−0.029	.387
DIV	+/–	−0.002	.621	0.002	.714	−0.002	0.622	−0.001	.830
Big4_5	+	0.008*	.055	0.008*	.062	0.008*	0.056	0.009**	.039
Intercept	+/–	−0.042***	<.0001	0.013	.228	−0.043*	0.075	−0.539***	<.0001
Industry Indicators		Yes		Yes		Yes		Yes	
Observations		5,817		5,817		5,817		5,817	
Adj. R^2		15%		16%		15%		15%	

This table presents the OLS regression estimates of the relation between secrecy and corporate investment efficiency. The sample includes 5,817 firm-year observations from 2000 to 2009 in 8 EU countries. *P*-values are one-tailed when a directional prediction is made, two-tailed otherwise, and are based on White (1980) heteroskedasticity-consistent standard errors. See Table 2 for variable definitions.

*** Significance at the 1% level.
** Significance at the 5% level.
* Significance at the 10% level.

country-level control variables. The variance inflation factors for all variables in the four regression models described below are 3.4 or less, suggesting that multicollinearity is not a concern (Doupnik, 2008).

Model 1 in Table 4 employs only firm-level control variables to ensure that our inferences related to *SEC* is not driven by correlations with other country-level control variables. Each of Models 2, 3, and 4 add one country-level control variable as follows: *Credit* in Model 2, *InvPro* in Model 3, and *LGDP* in Model 4. Across all four specifications, the estimated coefficient on *SEC* is consistently negative and significant (*p*-value is at least less than the 5% level). This finding documents, as predicted, a negative relation between secrecy and corporate investment efficiency. It is worth noting that the negative relation between secrecy and corporate investment efficiency is not subsumed by *Credit*, a measure of availability of domestic credit to private sectors, *InvPro*, a measure of the country's legal enforcement, or *LGDP*, a measure of the country's economic development. Hence, our results in Table 4 show that cultural values reflected in the level of secrecy have explanatory power over and above a number of firm- and country-level factors.

Results in Table 4 also show that corporate investment efficiency is negatively related to *Credit*, suggesting that high availability of credit at the country-level creates slack at the firm-level which, in turn, leads to inefficient investment decisions. As predicted, corporate investment efficiency is positively related to *LGDP*. However, the relation between corporate investment efficiency and *InvPro* is positive but not significant, suggesting that the significant bivariate effect of *InvPro* on corporate investment efficiency reported in Table 3 is subsumed by *SEC* and by the firm-level control variables included in the multivariate regression. This finding is consistent with that of Doupnik (2008) who find that the effect of legal enforcement on earnings management is subsumed by culture. In terms of the firm-level control variables, results in Table 4 indicate that *Tangibility* (capital intensity) and *Cash* (slack) are negatively associated with corporate investment efficiency. The results also indicate that *Size* (economies of scale) and *Big4_5* (high-quality auditor) are positively associated with corporate investment efficiency.

In sum, the results reported in Table 4 provide support to our first hypothesis that the level of secrecy that national culture exhibits is negatively associated with corporate investment efficiency. This finding is important because it suggests that the cultural value of secrecy/transparency is a main determinant of corporate investment efficiency.

Table 5 reports the multivariate results based on Eq. (4), which is designed to test whether the negative association between secrecy and corporate investment efficiency is mitigated by an exogenous information shock. The estimated coefficient on *SEC* remains negative and significant (*p*-value < .01) across all models. Moreover, the estimated coefficient on the interaction of *SEC* and *InfoShock* is positive and significant (*p*-value < .05) across all models. This finding shows that the negative association between secrecy and corporate investment efficiency is mitigated by the informational shock, which is the mandatory adoption of new international accounting standards. This finding provides support to our second hypothesis. In terms of the control variables (country- and firm-level), results in Table 5 remain consistent with those in Table 4.

Taken as a whole, our findings in Table 5 show that the negative association between secrecy and corporate investment efficiency is mitigated by an exogenous shock to the information asymmetry problem between managers and investors (H2). These findings also provide support to our first hypothesis by showing that national culture matters to the efficiency of corporate investments (H1).

Table 5
The relation between secrecy and investment efficiency following an information shock.

		Dependent Variable = *InvEff*							
	Pred.	Model 1		Model 2		Model 3		Model 4	
	Sign	Estimate	*p*-value	Estimate	*p*-value	Estimate	*p*-value	Estimate	*p*-value
SEC	–	−0.026***	.000	−0.041***	<.0001	−0.026***	.002	−0.020***	.006
*SEC*InfoShock*	+	0.016**	.031	0.018**	.018	0.017**	.028	0.018**	.019
InfoShock	+	0.002	.320	0.002	.325	0.002	.322	0.001	.385
Credit	+/–			−0.045***	<.0001				
InvPro	+					0.055	.406		
LGDP	+							0.049***	<.0001
Tangibility	+/–	−0.015***	<.0001	−0.014***	<.0001	−0.015***	<.0001	−0.015***	<.0001
Cash	–	−0.048***	<.0001	−0.046***	<.0001	−0.048***	<.0001	−0.047***	<.0001
Size	+	0.004***	<.0001	0.002**	.034	0.004***	.000	0.004***	.000
Leverage	–	−0.009	.208	−0.010	.174	−0.009	.206	−0.010	.190
Loss	–	0.000	.535	0.000	.458	0.000	.536	0.000	.488
MTB	+/–	−0.028	.402	−0.030	.372	−0.028	.400	−0.029	.390
DIV	+/–	−0.002	.635	0.002	.689	−0.002	.640	−0.001	.843
Big4_5	+	0.008*	.051	0.008*	.057	0.008*	.050	0.009**	.036
Intercept	+/–	−0.042***	<.0001	0.014**	.198	−0.047*	.051	−0.554***	<.0001
Industry Indicators		Yes		Yes		Yes		Yes	
Observations		5,817		5,817		5,817		5,817	
Adj. R^2		15%		16%		15%		16%	

This table presents the OLS regression estimates of the relation between secrecy and corporate investment efficiency following an information shock. The sample includes 5,817 firm-year observations from 2000 to 2009 in 8 EU countries. *P*-values are one-tailed when a directional prediction is made, two-tailed otherwise, and are based on White (1980) heteroskedasticity-consistent standard errors. See Table 2 for variable definitions.

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

To mitigate any concern that our results are biased towards U.K. that makes up a large portion of the sample, we rerun the above multivariate tests after excluding U.K. firms. Results (untabulated) remain consistent with those reported in Tables 4 and 5 and confirm our conclusions regarding our two hypotheses with statistical significance at the 1% level. Furthermore, given that U.K. and Ireland are the only two countries in the sample that have common law as their legal origin, dropping U.K. firms from the sample mitigates the concern that our results are driven by differences in the legal origin between common law countries and code law countries.

6. Conclusion

We examine the relation between secrecy and corporate investment efficiency in eight EU countries that are considered culturally-diverse based on Hofstede's (1980) cultural dimensions and had an exogenous information shock during the sample period. The key findings of our study support the argument that the level of secrecy that national culture exhibits is negatively related to corporate investment efficiency after controlling for a number of firm- and country-level factors. We also find that the negative relation between secrecy and corporate investment efficiency is mitigated by an exogenous shock to the firm's information environment.

Our study suggests that national culture is a main determinant of corporate investment efficiency based on culture's implications for the information asymmetry problem between managers and investors. In this regard, our study lends support to Gray's (1988) secrecy hypothesis and extends prior studies on the role of national culture in decision-making at the corporate level. Our study also suggests that future cross-country studies on corporate efficiency and productivity that do not include in their research design a proxy for the level of secrecy that national culture exhibits suffer from an omitted variable bias and, hence, their results may lead to incorrect inferences.

Given that corporate investment is a critical component of a nation's gross domestic product, our study enhances our understanding of differences in economic productivity across countries. Our findings show that cultural differences still matter to productivity even within the same politico-economic union and after controlling for a number of firm- and country-level factors. Hence, our study implies that policies that are set to promote efficiency and productivity across countries must account not only for differences in formal institutions across countries (e.g., legal system) but also for differences in cultural values that are considered informal institutions regulating human behavior. Therefore, one avenue for future research is to examine whether the outcomes of policies that promote corporate efficiency and productivity within the EU are explained by differences in national culture, the level of secrecy in particular.

Finally, this study is subject to the following caveat. As is common in this line of research, we examine the association between national culture and corporate investment efficiency, not the causal effect of national culture on corporate investment efficiency. However, given that endogeneity is unlikely to be a concern for our findings as discussed earlier, we believe that our tests provide reasonable evidence from EU countries for the possible effects of national culture on corporate investment efficiency.

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