Sticky cost behavior and its implication on accounting conservatism: a cross-country study

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Abstract

Purpose – This paper aims to investigate the impact of cost stickiness on conditional conservatism.

Design/methodology/approach – The research sample consists of listed companies from 18 countries, using stock market indices of the BRICS, MIST, North Africa, USA and EU over the period ranging from 1997 to 2015. The authors use the firm-fixed effects method in the estimation of the models.

Findings – The results provide evidence of the existence of cost stickiness and conditional conservatism in the international context, using the Banker *et al.* (2016) model. They also argue that the conditional conservatism model (Basu, 1997) is overstated because it does not control for cost stickiness. In additional analyses, the authors conclude that the association between cost stickiness and accounting conservatism changes across country groups and across industries. The authors also document that the employee intensity and free cash-flow, as cost stickiness determinants, remain significant in the model including accounting conservatism. Moreover, the findings show that sticky cost behavior distorts inferences about standard demand drivers of conservatism such as leverage and size.

Originality/value – The findings are interesting and provide a better understanding of cost stickiness and conditional conservatism, and the interaction between these two phenomena in the international context, across country groups and across industries. To the best of the author's knowledge, the study is the first one including free cash flow as a proxy for agency problem in the full model combining conservatism and cost stickiness models (Banker *et al.*, 2016).

Keywords Cost stickiness, Conditional conservatism, International context, Cost behaviour

Paper type Research paper

1. Introduction

Our study is spurred on by two streams of research dealing with the asymmetry in earnings. In fact, conditional conservatism takes a weighty place in financial accounting literature, and it investigates the asymmetry in accounting information system. Moreover, the sticky cost behavior holds a valuable place in the management accounting literature and it is the asymmetry in the economic activity.

We investigate the asymmetric cost behavior because this concept is considered as an important area of research in the accounting management, as well as in the economic research, and is also prominent for corporate insiders and outsiders. The traditional model of cost behavior respects the hypothesis whose cost increases (decreases) when the activity rises (declines) with a strict proportion (Noreen, 1991). The cost distinguishes between two types of fixed and variable costs. Different techniques are built on the traditional cost such

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as cost estimation, cost-volume-profit analysis and activity-based costing (ABC) (Ibrahim, 2015). The first study providing empirical evidence of cost stickiness and using a new methodology and model is Anderson *et al.* (2003). In this study, cost stickiness is explained by managers' decision to adjust resources. The result of this study shows that selling, general and administrative costs (SGA) rise more for sales increases than they fall for equivalent decreases, using a large sample of firms from multiple industries.

Cost stickiness is a phenomenon widely documented in the research of cost behavior, and it refers to the asymmetric response of costs to sales decreases versus increases (Banker and Chen, 2006; Anderson *et al.*, 2003; Balakrishnan *et al.*, 2004). Nevertheless, different studies show mixed results in the relationship between cost and activity, using a single industry or a small sample. For example, Noreen and Soderstrom (1997) use a sample of hospitals and do not find any evidence in the existence of cost stickiness. In contrast, Balakrishnan *et al.* (2004) confirm the existence of stickiness only in the case where resources are strained at therapy clinics using a sample of clinics. They conclude that capacity use represents an important omitted variable in a cross-sectional analysis of cost. Recently, Cannon (2014) has used a sample of the US air transportation industry. He has been interested in identifying the sources of stickiness and confirmed that cost stickiness exists because managers try to decrease prices to use the existing capacity when demand falls, but they attempt to increase capacity when demand grows. Prior studies in this area have looked into identifying reasons and consequences of this phenomenon.

In this study, we aim at drawing attention to an additional concept called conditional conservatism. This concept represents a very interesting principle in financial reporting (Sterling, 1967). Conditional conservatism is identified by Basu (1997) with the hypothesis of *earnings reflect bad news more quickly than good news*. In fact, the recognition of losses in the results are more rapid and complete than the good news. This is can also be called the asymmetric timeliness of earnings or conditional conservatism where good news allows seeing positive expected cash flows, and bad news allows seeing negative ones. This principle is of great value in accounting and has different economic effects.

Empirical studies on conditional conservatism document a piecewise linear relation between earnings and stock returns with more timely recognition of bad news than good news (Basu, 1997), branded as the asymmetric timeliness of earnings (Homburg and Nasev, 2008).

However, empirical studies on cost stickiness show an asymmetric cost-sales behavior explained by managerial decisions who face adjustment costs (Anderson *et al.*, 2003). This concept evokes also an asymmetric in earning because earnings respond more to sales decreases than to sales increases. The sales change and concurrent stock returns are positively correlated. Consequently, cost stickiness leads also to an asymmetric relation between earnings and stock returns (Banker *et al.*, 2016). This correlation is more important for negative returns than for positive returns.

As a result, we think about the existence of confounding effects between cost stickiness and conditional conservatism in standard models that can distort inferences about both the level of conservatism and the extent of the conditional conservatism model.

Banker *et al.* (2016) investigate this relation between conditional conservatism and cost stickiness and note that controlling the asymmetric impact of sales changes shows an average bias of more than 25 per cent in conservatism estimates, using a large sample of US firms for the period ranging from 1987 to 2007.

Recent studies have suggested that conservatism and cost stickiness are positively and significantly associated. As regards the relation between the unconditional conservatism and research and development (R&D) expenditures, Penman and Zhang (2002) notice that

unconditional conservatism creates "hidden reserves" and affects operating performance with a temporary distortion. Particularly, the decrease in R&D expenditures is associated with a decrease in future sales. Concerning the relation between conditional conservatism and cost stickiness, Banker *et al.* (2016) confirm that the conditional conservatism estimates in the Basu model are overstated since these models do not control cost stickiness using US firms during the period between 1987 and 2007.

The relationship between stock returns and cost stickiness constitutes an important area. On the one hand, most studies that are interested in the linkage between the stock returns and cost stickiness confirm that firms' stock returns are significantly and positively correlated with their SGA expenses (Anderson *et al.*, 2007; Novy-Marx, 2011; Eisfeldt and Papanikolaou, 2013). On the other hand, Huang *et al.* (2016) define cost growth as the percentage of change in total operating costs of firms (the sum of the cost of goods sold (COGS) SGA) containing major information about future profitability and stock returns of firms. Precisely, the high level of cost growth is associated with lower future stock returns comparing with those with low cost growth. They also demonstrate that investors do not succeed in incorporating the information of cost behavior into the valuation.

Cost stickiness approves an asymmetric relation between earnings and stock returns. This relation is more significant for negative returns than for positive returns as sales changes are positively associated with stock returns (Banker *et al.*, 2016). We propose theoretically that the estimation of asymmetric timeliness is biased upwards if the existing degree of cost stickiness is substantial.

In our study, we use a firm-fixed effects method in the estimation of all models. This method is applied by Ball *et al.* (2012) in conservatism who demonstrate that controlling for expected earnings eliminates the systematic variation of bias with several firm characteristics often used as proxies for conditional conservatism (Khan and Watts, 2009), as well as for risk (Fama and French, 1992, 1993). They also confirm that the inclusion of firm fixed effects in the estimation essentially eliminates the bias, which becomes insignificant. These authors show that cross-sectional correlation between the expected components of earnings and returns have a confounding effect on the relation between the news components, and biases estimates of how earnings incorporate the news in returns. The success of the firm-fixed effects specification implies that the bias is primarily cross-sectional in nature, due mainly to variation in risk across firms rather than to variation in risk or in risk premia over time (Ball *et al.*, 2012). For cost stickiness estimation, Anderson *et al.* (2016) compare pooled OLS with two-way clustering by industry and year, and the use of firm-fixed effects and find consistent results. Banker *et al.* (2016) use firm-fixed effects and cross-sectional methods in the estimation of conditional conservatism and cost stickiness.

In our analysis, we test the association between cost stickiness and accounting conservatism using different model. These models are accounting conservatism models (Basu, 1997; Khan and Watts, 2009), the cost stickiness model (Banker and Chen, 2006), and the extended model incorporating both accounting conservatism and cost stickiness (Banker *et al.*, 2016). We compare the degree of the interaction between these two phenomena, using a sample of 18 countries containing the Brazil, Russia, India, China and South Africa (BRICS), Mexico, Indonesia, South Korea and Turkey (MIST), some countries of North Africa (Morocco, Tunisia and Egypt), USA and some countries of European Union (EU) (Germany, France, Spain, UK and Greece).

Referring to previous studies examine the relation between conditional conservatism and cost stickiness, Homburg and Nasev (2008) find that the sticky cost is more costly when firms include rules of conditional conservatism, using the sample of 44,361 firm-year observations during the period from 1988 to 2004. Banker *et al.* (2016) also conclude that

sales changes are associated with a significant decrease in asymmetric timeliness, having an effect on conditional conservatism, using US firms in the period from 1987 to 2007.

Our research paper contributes to financial and management accounting literature in several ways. First, to the best of our knowledge, our study provides the first empirical evidence of the cost stickiness effect on conditional conservatism, using data from different groups of countries (cross-country groups study). In addition, our study is the first one using free cash flow as a proxy for agency problems in the full model combining conservatism and cost stickiness models (Banker *et al.*, 2016). We investigate whether determinants of sticky cost behavior: adjustment costs, agency problems (Anderson *et al.*, 2003; Chen *et al.*, 2012). Characteristics (size, market-to-book and leverage) are chosen by Khan and Watts (2009) because conservatism varies with them on Banker *et al.* (2016) model. We also estimate the Banker *et al.* (2016) model across country groups and across industries.

The results of our study indicate that Basu (1997) is overestimated by 46.55 per cent because of cost stickiness in an international context. The comparison between groups shows that conditional conservatism exists with a significant degree in the USA and some EU countries and cost stickiness exists with significant degree in the MIST, USA and some countries of EU but negative and significant in the BRICS and some countries of North Africa, confirming the asymmetric behavior of costs in all country groups. We also find evidence that sticky cost behavior distorts inferences about standard demand drivers of conservatism such as leverage and size. For cost stickiness determinants, we note that the free cash-flow used as a proxy of agency problem and employee intensity used as a proxy of adjustment costs remain significant in a model that incorporates accounting conservatism.

The remainder of this article is organized as follows. In Section 2, we present the concepts of conditional conservatism and cost stickiness, and we formulate our hypotheses. In Section 3, we describe our research design. Section 4 reports our main empirical results. Section 5 concludes.

2. Theoretical framework and hypotheses development

Prior researchers have identified cost stickiness and accounting conservatism as two different phenomena (Banker *et al.*, 2016), which we investigate. In accounting conservatism, we are interested in financial accounting literature (Basu, 1997; Khan and Watts, 2009; Callen *et al.*, 2010; Zhang, 2008), and we are concerned about cost stickiness in the management accounting literature (Anderson *et al.*, 2003; Weiss, 2010; Banker *et al.*, 2016). In this section, we present the literature of cost stickiness and accounting conservatism, and then the association between the two phenomena.

2.1 Cost stickiness

Sticky cost, also called asymmetric cost behavior, is an important area discussed in both accounting and economy research, and it is related to managers' motivations (Xue and Hong, 2016). The asymmetric cost-behavior model is developed firstly by Anderson *et al.* (2003) stating that SGA costs are asymmetrically and significantly associated with changes in sales revenues.

Many of previous researches in this area have called attention to the existence of cost stickiness, and whether the costs are really sticky (Balakrishnan *et al.*, 2004; Anderson *et al.*, 2007; Zanella *et al.*, 2015; Subramaniam and Watson, 2016). In these research studies, we find out studies in a specific industry (Balakrishnan *et al.*, 2004; Cannon and Watanabe, 2016; Noreen and Soderstrom, 1997; Cannon, 2014) across industries (Subramaniam and Watson, 2016; Subramaniam and Weidenmier, 2003) and across countries (Cheung *et al.*, 2016).

Other studies have shown concern about the reasons and determinants of cost stickiness, and why costs are sticky? There are many determinants. First, there is the adjustment cost theory, which is measured by asset and employee intensity (Kitching *et al.*, 2016; Banker *et al.*, 2013b; Anderson *et al.*, 2003; Banker and Byzalov, 2014; Balakrishnan *et al.*, 2004; Subramaniam and Watson, 2016; Chen *et al.*, 2012). Second, there is the political process theory (Lee *et al.*, 2016). Finally, we find the managerial behavior such as managerial opportunism associated with agency problem (He *et al.*, 2010; Chen *et al.*, 2012; Namitha and Shijin, 2016), managerial optimism, which trains to expectations of increase in future demand (He *et al.*, 2010; Cheung *et al.*, 2016; Anderson *et al.*, 2003), managerial overconfidence (Chen *et al.*, 2013), mergers and CEO Hubris (Yang, 2015). There are also external factors such as economic growth (Anderson *et al.*, 2003; Ibrahim, 2015) and country-level employment protection legislation (Banker *et al.*, 2013a).

Recent studies have examined the consequences of cost stickiness on audit (Liang *et al.*, 2014), on real activities such as labor cost (Zhang, 2016; Dierynck *et al.*, 2012), on credit risk (Homburg *et al.*, 2016), with analysts' forecast (Johnson, 2016; Ciftci *et al.*, 2016); on earnings management (Hartlieb and Loy, 2017; Xue and Hong, 2016), on culture (Kitching *et al.*, 2016) and on corporate social responsibility (Habib and Hasan, 2016).

Cost accounting literature deals with two fundamental issues:

(1) cost behavior as a function of activity (Anderson *et al.*, 2003); and

(2) the source of cost behavior (Anderson and Lanen, 2007).

Prior studies have looked into cost stickiness notion. For instance, Banker *et al.* (2011) consider cost stickiness as a complex phenomenon and define it as the reduced cost of less than 1 per cent when sales decrease by 1 per cent. Homburg *et al.* (2016) confirm that understanding cost behavior is essential for both corporate insiders and outsiders. Precisely, managers can look after costs to improve profitability when sales markets are very competitive and are difficult to be influenced. Following previous researches, we come up with the idea that the existence of cost stickiness has been documented in different countries (Banker *et al.*, 2013b; Calleja *et al.*, 2006; Dierynck *et al.*, 2012; Cheung *et al.*, 2016).

2.2 Accounting conservatism

Accounting conservatism is considered for centuries as a key attribute of financial reporting (Basu, 1997; Watts, 2003a), as the principle having influenced accounting practices (Sterling, 1967) as the practice of reducing earnings (Basu, 1997), and also as the most ancient and pervasive principle (Sterling, 1967; Byzalov and Basu, 2016).

Previous studies such as Watts (2003a, 2003b) and Givoly and Hayn (2000) point out that the accounting practice is conservative, and the degree of conservatism has increased over the past 30 years. That is why the analysis of time-series financial statements is very important. They also argue that the analysis of time series changes is very necessary for components such as accruals, earnings and cash-flow.

In accounting conservatism, we can distinguish between two types, namely, conditional conservatism and unconditional conservatism (Basu, 2005; Qiang, 2007; Mora and Walker, 2015; Bangmek *et al.*, 2016; Khalifa *et al.*, 2016). Conditional conservatism or income-statement approach (Zhang, 2000) is defined by Basu (1997) as earnings reflect bad news more quickly than good news, which means imposing stronger verification requirements for loss recognition than gain recognition. It is also defined by Watts (2006) as a higher standard of verifiability for the recognition of gains than for losses. This type of conservatism is related to the undervaluation of profits (Khalifa *et al.*, 2016). In contrast, unconditional conservatism or balance sheet approach (Zhang, 2000) is defined by

Beaver and Ryan (2005) as the on average understatement of the book value of net assets relative to their market value, which means reducing both earnings and net assets (Beaver and Ryan, 2005; Bandyopadhyay *et al.*, 2010; Bangmek *et al.*, 2016). This approach has advantages such as reducing risk because of its role in reducing earnings management (Biddle *et al.*, 2013). This type of conservatism is related to the undervaluation of assets (Khalifa *et al.*, 2016).

This concept has recently represented a fundamental accounting principle with significant economic consequences (Ho *et al.*, 2015), and it is not only a basic principle in the recognition of accounting, measurement and reporting but also an important element in measuring the quality of accounting information (Song, 2015).

Accounting conservatism has a prominent informational role. Both types of conservatism allow reducing uncertainties and asymmetries of information by constraining upward overstatement biases in net income and assets (Watts, 2003a, 2003b). Based on this stream of research, Hu *et al.* (2014) show that the association between accounting conservatism and the quality of the corporate information environment is positive.

2.3 Cost stickiness and conditional conservatism

Studying the interface between both financial and management accounting is scarce (Hartlieb and Loy, 2017). Few studies have given prominence to the linkage between cost stickiness and accounting conservatism. In this context, according to Homburg and Nasev (2008), cost stickiness is the manager's decision when the sale level decreases. Therefore, the project of cost stickiness is considered as risky. These authors interpret the sample of 44,361 firm-year observations between 1988 and 2004 and come to the conclusion that the sticky cost is more costly when firms include rules of conditional conservatism.

Recently, Banker *et al.* (2016) have documented that sales changes are associated with a significant decrease in asymmetric timeliness, and have an effect on conditional conservatism, using US firms collected from the Compustat database in the period from 1987 to 2007. In this line, Banker and Byzalov (2014) declare that cost represents a leading component of accounting earnings, and that financial accounting decisions affect cost behavior and vice versa.

Our study is based on both conditional conservatism (financial accounting literature) and cost stickiness (management accounting literature). The conditional conservatism is the asymmetry in the accounting information system that translates economic activity into accounting data. To understand conditional conservatism, we focus on different methods using to measure accounting conservatism including balance sheet measures, income statement measures and earnings/stock return relation measures (Zhong and Li, 2017). For example, Ball *et al.* (2013) provide an analysis of the model that incorporates economic income into accounting income. They find that conservatism is considered as one of the fundamental features of the temporal process of incorporating economic income into accounting income by using stock returns to represent economic income and earnings to represent accounting income.

Moreover, we focus on the effect of asymmetric cost behavior itself (Hoffmann, 2017) in cost stickiness studies, and we find that sticky cost is the asymmetry in the economic activity itself (Banker *et al.*, 2016). Banker *et al.* (2017) provide evidence that the cost behavior affects the properties of earnings. Indeed, resource-commitment decisions determining costs influence various earnings properties, such as asymmetric timeliness because earnings are equal to sales minus costs. Based on management accounting tradition, Banker and Chen (2006) suggest that earnings components are proportional to sales increases and decreases and consider sales as the key driver of profit and variable

costs as varying with sales. As such, costs represent a major component of accounting earnings (Banker and Byzalov, 2014) and financial accounting data is used as a proxy for cost accounting data in cost stickiness studies (Loy and Hartlieb, 2018). We conclude that the asymmetry in reported earnings can arise from either conservatism or cost stickiness. Precisely, empirical models should account for both phenomena to ensure accurate inferences.

Conditional conservatism has a significant influence on financial reporting and accounting practice and involves a higher degree of verification of good news as gains than bad news as losses in earnings (Basu, 1997; Watts, 2003a). This definition takes into consideration different types of economic income based on the timeliness of recognizing economic losses (Zhong and Li, 2017). As such, earnings incorporate bad news about future cash flows faster than good news. Asymmetric timeliness in Basu (1997) model is based on a regression of net income on stock returns with separate slopes for positive and negative returns (proxies for good and bad news, respectively). This model (Basu, 1997) is used in different studies to test the prevalence of conservatism and to examine theories about the causes and correlates of conservatism (Watts, 2003b; Qiang, 2007).

Cost stickiness is considered as a source of asymmetry in cost and earnings behavior. The majority of recent studies reject the traditional model and document that costs arise more for sales increases than they fall for equivalent decreases. Anderson *et al.* (2003) investigate on the reasons of cost stickiness and find that deliberate decision by managers to adjust resources affect the degree of cost stickiness. The document also that the increases in sales require additional resources while the decrease in sales can occur without adjusting the resources committed. Consequently, the increase in costs is less proportional than the sales decrease.

When sales decrease, managers should decide to cut or maintain resources. On the one hand, if managers choose to cut the redundant resources, the adjustment costs appear. We find holding costs of unused capacity and capacity releases, for example, wages and depreciation (Reimer, 2019). On the other hand, if managers choose to maintain unutilized resources for economic considerations such as adjustment costs of reducing capacity and ramping up capacity in case sales rebound, this choice is interpreted as a risky project (Homburg and Nasev, 2008). This choice can be made for the interest of managers or for the interest of the company. Consequently, the information asymmetry between the management and outside investors increases. The high information asymmetry increases the incentives for the manager to overstate financial performance. High conditional conservatism can counteract this incentive by restricting managers' discretion to overstate gains and to understate losses should reduce information asymmetry (Homburg and Nasev, 2008).

In contrast, when sales increase managers even though managers may be reluctant to hire more workers because of adjustment costs, the increase in current sales can only be achieved if additional workers are hired, the effect of reluctance will probably be more mitigated (Banker and Byzalov, 2014). Consequently, costs are more sensitive to sales increases than to sales decreases because of asymmetric resource adjustment (Banker *et al.*, 2016). The direction of asymmetry is reversed for earnings because costs appear in earnings with a negative and significant coefficient.

Previous studies show that changes in sales and concurrent stock returns are positively correlated (Banker *et al.*, 2016). In our study, we provide additional evidence in this relation between changes in sales and concurrent stock returns with a positive coefficient of 0.197 and significant at the 1 per cent level. Consequently, sales changes can constitute a correlated omitted variable in the standard conservatism models. This omitted variable

increases the asymmetry effect of earnings especially if costs are sticky, which is stronger for sales decreases than for sales increases. The correlation between earnings and stock returns should be stronger for negative returns than for positive returns even if conservatism is absent because this association is positive. As a consequence, the estimates of the linear relation between stock returns and earnings in standard models reflect both conditional conservatism (asymmetric loss recognition) and cost stickiness (confounding asymmetric effect of sticky costs). The asymmetric loss recognition and the confounding asymmetric effect of sticky costs act in the same direction because when costs are sticky, we find an upward bias on average in the standard estimates of asymmetric timeliness.

The relation between earnings and stock returns represents a chief issue in financial accounting literature (Basu, 1997; Givoly and Hayn, 2000; Khan and Watts, 2009; Huang *et al.*, 2016), and it is interpreted as evidence of conditional conservatism. Givoly *et al.* (2007) suggest using accruals to capture conditional conservatism. Collins *et al.* (2014) show that cash flow asymmetry introduces bias in tests that use an earnings-based measure of asymmetric timeliness and recommend future research to estimate conditional conservatism using operating accruals as a dependent variable and find out a significant result by estimation conservatism using accruals in Basu model.

As a result, we use operating accruals as a dependent variable in standard conservatism model (Basu, 1997). The confounding effect of cost stickiness resists after the modification of the Basu model because cost stickiness affects operating accruals.

It is not completely obvious what the effect of conservatism on cost stickiness is as indicated through mixed results presented in the accounting management literature.

Therefore, our first hypothesis is as follows:

H1. Asymmetric timeliness estimates in conservatism models are overstated because these models do not control for cost stickiness.

Most studies investigating the association between conditional conservatism and cost stickiness do not focus on the difference between industries and between countries (Homburg and Nasev, 2008; Banker *et al.*, 2016). Following across countries and across industries study in cost stickiness or in conservatism, we find that stickiness is not present for all magnitudes of changes and in all industries (Subramaniam and Weidenmier, 2003). For conditional conservatism research, Khalifa *et al.* (2016) document that countries from East Europe are the most conservative followed by Asia countries and MENA/Africa firms. However, firms from the America region produce non-conservative financial statements. In addition, they find that firms belong to the telecommunications sector has earnings that are more conservative than other sectors.

Therefore, our second hypothesis is as follows:

H2. The association between conditional conservatism and cost stickiness changes across country groups and across industries.

3. Data and empirical model

3.1 Sample-selection process

To test the link between conditional conservatism and cost stickiness, we use financial data available in DataStream database over the period ranging from 1997 to 2015 across 18 countries. Since 1995, data from most emergent countries have been available in DataStream, data from developed countries have been available before this date. Because some variables are measured with two lags in the data, our final sample starts in 1997.

Panel A summarizes the selection procedure of our sample. We choose our sample in reference to groups. The EU is considered as one of the most major groups, and the USA is regarded as the most important countries in the world. BRICS and MIST are seen as the most substantial groups in emerging markets. BRICS countries occupying more than a quarter of the land area have surprised the world with a high level of growth, and influence regional and global affairs (De Aquino and Robertson, 2015; de Boyrie and Pavlova, 2016). Previous studies show that most researchers have analyzed the BRICS group, but those interested in the MIST group are limited (Yarovaya and Lau, 2016). They focus separately on countries of the MIST without a specific emphasis on the whole MIST group. However, it is really prominent to take into account the entire MIST group identified as the largest economy in the (N-11) groups (following the identification of Jim O'Neil from Goldman Sachs) with high growth, favorable demographics and large economies including countries with a different range of living standards, GDP and cultures (de Boyrie and Pavlova, 2016).

In our study, we use Hausman test that determines the application of the fixed effect model versus random effect model. Significance level of F is less than 5 per cent for all models, so null hypothesis (random effect model) is rejected and fixed effect model should be used in panel data. We correct the problem of heteroscedasticity using the command robust in STATA 13. All of the continuous regression variables are winsorized at the 1 per cent.

Panel A in Table I presents the sample selection process. We start with 79,380 firm-year observations, using 18 indices from 1995 to 2015, and we exclude the observations in the regulatory industry such as financial institutions (SIC 6000-6999). We then discard firms with insufficient data in Models (1) and (2). Following previous studies such as Banker *et al.* (2016), Khan and Watts (2009); we drop all observations with price per share less than $1. Finally, we eliminate observations with negative or zero sales. Panel B in Table I reports the annual distribution of observations for our entire sample. We conclude that the sample size has increased over the years. Panel C in Table I shows the sample distribution by industry, the most represented industry is manufacturing. Eventually, Panel D in Table I details the sample distribution by 18 countries that contains four groups: BRICS: Brazil, Russia, India, China and South Africa; some countries of North Africa: Morocco, Tunisia and Egypt; MIST: Mexico, Indonesia, South Korea and Turkey; USA and some countries of European Union: Germany, France, Spain, UK and Greece. We conclude that the most heavily represented group is the EU (32.31 per cent); followed by BRICS (26.19 per cent), followed by MIST (22.51 per cent), followed by US (17.04 per cent), followed by North Africa (1.95 per cent).

3.2 Univariate results

Panel A in Table II presents the univariate statistics of our entire sample, including the mean, standard deviation, median, first and third quartile, minimum and maximum. Panel B in the same table illustrates the correlation metrix for all the key variables in our sample. Following Banker *et al.* (2016), we scale all financial variables by the lagged market value of equity. Comparing with Banker *et al.* (2016), we find in our study that earnings before extra items scaled by the lagged market value are equal to 5.2 per cent (median = 6.1 per cent). We confirm that scaled earnings are negatively skewed because the mean is less than the median (Basu, 1997). The same result which is consistent with the existence of conservatism is obtained by Banker *et al.* (2016). On average, the market-adjusted stock returns (RET) are 25.9 per cent (median = 14.3 per cent) and the correlation between the stock returns (RET) and the variation in sales ($\Delta S/P$) is significant. The correlation between two negative portions stock returns (DR*RET) and sales changes (DS*$\Delta S/P$), is 0.224 and it is significant at 1 per cent level.

Panel A: Sample selection process

Publicly traded firms (18 indices) in DataStream during the period of 1995-2015	79,380
Less: Observations over the years 1995 and 1996	7,560
Less: Financial institutions	14,573
Less: Observations with insufficient data in model (1) and model (2)	30,897
Less: Observations with price per share less than $1	789
Less: Observations with negative or zero sales	13
Final sample	25,548

Panel B: Distribution across years

Year	Number of firms	Percentage of firms
1997	526	2.06
1998	605	2.37
1999	659	2.58
2000	725	2.84
2001	823	3.22
2002	945	3.70
2003	1,032	4.04
2004	1,128	4.42
2005	1,280	5.01
2006	1,389	5.44
2007	1,524	5.97
2008	1,591	6.23
2009	1,652	6.47
2010	1,744	6.83
2011	1,795	7.03
2012	2,001	7.83
2013	1,997	7.82
2014	2,035	7.97
2015	2,097	8.21
Total	*25,548*	*100.00*

Panel C: Distribution across industries

Industry	SIC codes	Number of firms	Percentage of firms
Agriculture, forestry and fishing	01-09	196	0.77
Mining	10-14	1,133	4.43
Construction	15-17	1,093	4.28
Manufacturing	20-39	14,335	56.11
Utilities	40-49	2,978	11.66
Wholesale trade	50-51	824	3.23
Retail trade	52-59	1,530	5.99
Services	70-89	3,459	13.54
Total		*25,548*	*100.00*

Panel D: Distribution across countries

Country	Stock indices	Number of observations	Percentage of sample
BRICS		6,691	26.19
Brazil	BOVESPA	383	1.50
Russia	RETTS INDEX	274	1.07
India	NIFTY 500	3,123	12.22
China	SHENZHENSE composite SUB	1,682	6.58
South Africa	FTSE/JSE All Share	1,229	4.81

(*continued*)

Table I.
Sample selection and distribution

North Africa		499	1.95
Morocco	All listed companies	198	0.78
Tunisia	Tunisia-Ibes coverage	72	0.28
Egypt	Egypt Hermes financial	229	0.90
MIST		5,750	22.51
Mexico	MEXICO IPC (BOLSA)	335	1.31
Indonesia	IDX COMPOSITE	225	0.88
South Korea	KOREA SE COMPOSITE (KOSPI)	4,460	17.46
Turkey	BIST NATIONAL 100	730	2.86
USA	S&P 500 COMPOSITE	4,354	17.04
EU		8,254	32.31
Germany	Prime all share (XETRA)	2,931	11.47
France	CAC All-tradable	2,408	9.43
Spain	MADRID SE GENERAL (IGBM)	627	2.45
UK	FTSE ALL SHARE	1,899	7.43
Greece	ATHEX composite	389	1.52
Total		*25,548*	*100.00*

Note: The table above represents the sample selection process in Panel A, and the sample distribution by years in Panel B, by industry in Panel C and by country in Panel D

Table I.

3.3 Empirical model

Our starting point in the multivariate analysis is the base model of conditional conservatism (Basu, 1997):

$$E_t/P_{t-1} = \alpha_0 + \alpha_1 DR_t + \alpha_2 RET_t + \alpha_3 DR_t * RET_t + \varepsilon_{i,t} \quad (1)$$

where:

E_t/P_{t-1} = the annual earnings deflated by the beginning of the period market value of equity;

DR_t = represents the dummy variable that equals one if the stock return is negative and equals zero, otherwise;

RET_t = a 12-month stock return of fiscal year; and

$\varepsilon_{i,t}$ = an error term having a zero mean, and it is independent of the explanatory variables.

Second, we estimate equation (2) as the base model of cost stickiness (Banker and Chen, 2006):

$$E_t/P_{t-1} = \beta_0 + \beta_1 DS_t + \beta_2 \Delta S_t/P_{t-1} + \beta_3 DS_t * \Delta S_t/P_{t-1} + \varepsilon_t \quad (2)$$

where:

DS_t = the dummy variable that is equal to one if sales decreases from year t-1 to year *t* or the variation of sales is negative, and zero otherwise;

$\Delta S_t/P_{t-1}$ = the sales change from year t-1 to year *t* scaled by the market value of equity at the beginning of the fiscal year; and

DS, ΔS/P and DS*ΔS/P = capture sticky costs.

DS_t is considered as a proxy for managerial optimism or pessimism regarding future demand (Li and Zheng, 2017).

Panel A: Descriptive statistics

Variables	Mean	Std.	Q1	Median	Q3	Minimum	Maximum
E/P	0.052	0.198	0.030	0.061	0.100	−1.294	0.766
ACC/P	−0.101	0.326	−0.113	−0.036	0.000	−2.330	0.751
DR	0.361	0.480	0.000	0.000	1.000	0.000	1.000
RET	0.259	0.667	−0.130	0.143	0.464	−0.882	4.049
DR*RET	−0.097	0.178	−0.130	0.000	0.000	−0.882	0.000
DS	0.288	0.453	0.000	0.000	1.000	0.000	1.000
ΔS/P	0.213	0.898	−0.015	0.061	0.243	−2.613	6.088
DS*ΔS/P	−0.095	0.334	−0.015	0.000	0.000	−2.613	0.000

Panel B: Correlation matrix

Variables	E/P	ACC/P	DR	RET	DR*RET	DS	ΔS/P	DS*ΔS/P
E/P	1.000	0.105	−0.178	0.212	0.198	−0.164	0.280	0.163
ACC/P	0.431	1.000	−0.113	0.129	0.126	−0.096	−0.009	0.118
DR	−0.153	−0.114	1.000	−0.832	−0.968	0.185	−0.145	−0.201
RET	0.172	0.074	−0.593	1.000	0.860	−0.219	0.197	0.233
DR*RET	0.196	0.158	−0.724	0.556	1.000	−0.203	0.156	0.224
DS	−0.128	−0.046	0.185	−0.180	−0.207	1.000	−0.784	−0.981
ΔS/P	0.118	−0.247	−0.046	0.113	0.061	−0.384	1.000	0.799
DS*ΔS/P	0.180	0.177	−0.152	0.129	0.240	−0.445	0.470	1.000

Notes: This table presents summary statistics for 25,548 firm-year observations from 1997 to 2015. Panel A reports the mean, standard deviation, median, first and third quartiles, minimum and maximum, respectively. Panel B shows the Pearson (Spearman) correlations. E is earnings Before Extraordinary Items and Preferred Dividends, P is the market value of equity at the beginning of the fiscal year, ACC is total or operating accruals, RET is the market-adjusted stock return for the period of fiscal year t (12 months), DR is a dummy variable equal to one if market-adjusted stock return for the period of fiscal year t is negative and zero, otherwise, ΔS is the sales change from year t − 1 to year t, and DS is a dummy variable equal to one if sales decreased from year t − 1 to year t and zero, otherwise. All variables are defined in Appendix

Table II.
Univariate analysis

This model reflects earnings with both cost variability and cost stickiness, but it does not involve conservatism in the estimation.

Like Banker *et al.* (2016), we estimate the relation between accounting conservatism and cost stickiness:

$$E_t/P_{t-1} = \alpha_0 + \alpha_1 DR_t + \alpha_2 RET_t + \alpha_3 DR_t{*}RET_t + \beta_1 DS_t + \beta_2 \Delta S_t/P_{t-1} + \beta_3 DS_t{*}\Delta S_t/P_{t-1} + \upsilon t \quad (3)$$

where all variables are previously defined. In *H1*, we propose that the effect of increase in cost stickiness is associated with a decrease in conditional conservatism. Therefore, the coefficient of DR*RET in our full model will be less than that of the Basu model (1). Following Banker *et al.* (2016), we use operating accruals substracting CFO from earnings (Barth *et al.*, 2008; Gassen and Sellhorn, 2006) as a dependent variable in conservatism model (Basu, 1997), cost stickiness model (Banker and Chen, 2006) and full model incorporating both conservatism and cost stickiness model (Banker *et al.*, 2016). We also use Khan and Watts (2009) model, which is the model of conservatism score that incorporates control variables: market to book ratio, leverage and size. These variables are also associated with cost stickiness. That is why we incorporate these variables in the full model. In *H2*, we suggest that the effect of cost stickiness in

conditional conservatism should vary across country groups of the country and across industries.

4. Estimation results

Panel A in Table III reports regression results of three models: conditional conservatism using Basu (1997), sticky-cost model using Banker and Chen (2006), and the full model developed by Banker *et al.* (2016) combining Basu (1997) and Banker and Chen (2006) models. We find that the adjusted R^2 in the sticky-cost model is close to the conditional conservatism one (the adjusted R^2 is equal to 2.53 per cent and 2.6 per cent, respectively). Column 1 indicates a significant positive coefficient of DR*RET at 1 per cent level, which approves the existence of conservatism. Column 2 denotes a significant positive coefficient of DS*ΔS/P, which supports the existence of sticky cost behavior.

Column 3 shows the results of the full model developed by Banker *et al.* (2016), and the adjusted R^2 improves to 4.36 per cent. That is why, both conservatism and sticky cost models are rejected in favor of the full model.

In the full model, the coefficients of both conditional conservatism (DR*RET) and cost stickiness (DS*ΔS/P) are positive and significant at 1 per cent level. The asymmetric timeliness (DR*RET) presents an important parameter. The comparison between these parameters in Basu (1997) model and in the full model shows that this coefficient decreases from 0.085 to 0.058, and this decrease is significant at 1 per cent level. Consistent with our prediction in *H1* we confirm that the estimation of conservatism is associated with a substantial upward bias of 46.55 per cent (= [0.085/0.058] −1) because the conditional conservatism model does not control cost stickiness.

Panel B in Table III reports regression results of the full model across country groups: BRICS, some countries of NORTH AFRICA, MIST, US and some countries of EU. The main parameters of interest are DR*RET and DS*ΔS/P.

The coefficient of asymmetric timeliness (DR*RET) is positive and significant at 1 per cent level in the USA and in some countries of EU (existence of conditional conservatism). The coefficient in some countries of NORTH AFRICA is negative and significant, but it is insignificant in the BRICS and MIST. The coefficient of sticky cost (DS*ΔS/P) is positive and significant in the MIST, USA and in some countries of EU, but negative and significant in the BRICS and in some countries of North Africa.

There are differences between country groups. The cross country group analysis provides evidence that there is asymmetric behavior of costs in all groups of the country. We also confirm the existence of conditional conservatism in the USA and some countries EU. In Panel C of Table III, we report the regression results of the full model across industries. DR*RET and DS*ΔS/P are positive and significant in the most representative industries called manufacturing (existence of both conditional conservatism and cost stickiness phenomena). The coefficient of asymmetric timeliness (DR*RET) is also positive and significant in utilities. The coefficient of sticky cost (DS*ΔS/P) is positive in wholesale trade. We find that stickiness and conservatism are not present for all industries, for example, agriculture, forestry and fishing, which approves our prediction. Our result is consistent with cost stickiness study approving that manufacturing firms show the highest level of stickiness in SG&A costs with the estimated coefficient (Subramaniam and Weidenmier, 2003). These results validated our second hypothesis.

In Panel D of Table III, we present results of the robustness test of the models for operating accruals used in Collins *et al.* (2014) and Hsu *et al.* (2012). We remark that accruals in the conditional conservatism model (Basu, 1997) are biased since this model does not control sticky cost. The parameters of interest (DR*RET and DS*ΔS/P) are positive and

Table III.
Regression analysis of conditional conservatism model, sticky cost model and full model

Panel A: Pooled sample
Dependent variable = E/P

	Conservatism model		Sticky costs model		Full model	
	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic
Intercept	0.049***	28.40	0.059***	26.21	0.052***	19.45
DR	0.007*	1.81			0.005	1.27
RET+	0.031***	10.60			0.029***	10.36
*DR*RET+*	0.085***	5.20			0.058***	3.49
DS			−0.017***	−5.32	−0.009***	−2.99
Δ*S/P+*			0.012**	2.23	0.013**	2.44
*DS*ΔS/P+*			0.053***	4.35	0.043***	3.55
Hausman test:x2	15.01 (0.002)		55.98 (0.000)		96.67 (0.000)	
Firm-fixed effects	Included		Included		Included	
Adj. R^2	0.0260		0.0253		0.0436	
N	25,548		25,548		25,548	

Panel B: Analysis across country groups
Dependent variable = E/P

	BRICS		North Africa		MIST		USA		EU	
	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic
Intercept	0.046***	14.20	0.015	1.53	0.068***	8.09	0.051***	35.40	0.049***	12.45
DR	0.007	1.11	−0.011	−0.60	−0.005	−0.35	0.010	1.60	0.001	0.20
RET	0.044***	10.36	0.033***	4.43	0.010	1.31	0.007***	3.19	0.022***	5.84
*DR*RET*	*0.016*	*0.70*	*−0.164***	*−2.57*	*0.045*	*0.78*	*0.087****	*2.80*	*0.079****	*3.60*
DS	0.002	0.43	−0.008	−0.82	−0.035***	−3.81	−0.005	−1.22	−0.003	−0.76
ΔS/P	0.059***	10.63	0.154***	6.25	−0.006	−0.77	0.004	0.64	0.014	1.39
*DS*ΔS/P*	*−0.055****	*−2.65*	*−0.135****	*−2.90*	*0.050****	*2.58*	*0.079***	*2.07*	*0.072****	*3.49*
Hausman test:x2	41.02 (0.000)		17.49 (0.008)		38.71 (0.000)		31.89 (0.000)		47.62 (0.000)	
Firm−fixed effects	Included		Included		Included		Included		Included	
Adj. R^2	0.1479		0.3386		0.0157		0.0789		0.1065	
N	6,691		499		5,750		4,354		8,254	

(*continued*)

Panel C: Analysis across industries
Dependent variable = E/P

	Sector 1		Sector 2		Sector 3		Sector 4		Sector 5		Sector 6		Sector 7		Sector 8	
	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic
Intercept	0.042**	2.54	0.056***	7.95	0.045***	3.04	0.056***	14.69	0.050***	6.51	0.073***	4.11	0.061***	9.02	0.039***	5.95
DR	0.001	0.03	−0.025	−1.63	−0.021	−0.87	0.012**	2.12	−0.004	−0.32	−0.031	−1.03	0.001	0.16	0.007	0.79
RET	0.053*	2.02	0.055***	4.96	0.031**	2.22	0.032***	8.60	0.016	1.52	0.002	0.18	0.015	1.43	0.013**	2.55
*DR*RET*	*−0.061*	*−0.45*	*−0.128***	*−2.37*	*0.029*	*0.36*	*0.085****	*3.55*	*0.081**	*1.77*	*−0.154*	−1.38	−0.030	−0.71	0.099***	3.07
DS	−0.017	-1.00	−0.035***	−3.98	−0.009	−0.39	−0.012***	-2.86	0.002	0.26	−0.013	−0.68	−0.010	−0.99	0.000	−0.05
Δ*S/P*	0.041***	3.11	0.047**	2.49	0.031**	2.02	0.011	1.47	0.018	1.14	−0.014	−1.04	0.005	0.29	0.013	0.54
DS*ΔS/P	*−0.044*	*−1.57*	*−0.052*	*−1.17*	*0.050*	*0.91*	*0.044****	*2.85*	*0.018*	*0.45*	*0.099**	*1.97*	*0.008*	*0.14*	*0.06*	*1.59*
Hausman test: x2	17.99 (0.006)		18.07 (0.006)		13.98 (0.030)		79.34 (0.000)		16.15 (0.013)		59.55 (0.000)		15.81 (0.015)		21.23 (0.002)	
Firm-fixed effects	Included		Included		Included		Included		Included		Included		Included		Included	
Adj. R^2	0.1797		0.1509		0.0670		0.0463		0.0320		0.0342		0.0112		0.0647	
N	196		1,133		1,093		14,335		2,978		824		1,530		3,459	

Panel D: Pooled sample
Dependent variable = ACC/P

	Conservatism model		Sticky costs model		Full model	
	Estimate	*t*-statistic	Estimate	*t*-statistic	Estimate	*t*-statistic
Intercept	−0.077***	−24.07	−0.037***	−9.40	−0.029***	−6.09
DR	0.000	0.02			−0.001	−0.20
RET	−0.008	−1.52			0.006	1.25
*DR*RET+*	0.231***	9.25			0.135***	5.71
DS			−0.021***	−4.46	−0.013***	−2.65
ΔS/P			−0.142***	−14.99	−0.139***	−14.75
*DS*ΔS/P+*			0.301***	15.15	0.284***	14.17
Hausman test:x2	14.34 (0.002)		85.00 (0.000)		63.92 (0.000)	
Firm-fixed effects	Included		Included		Included	
Adj. R^2	0.0162		0.1157		0.1233	
N	25,548		25,548		25,548	

Notes: This table summarizes the regression estimates for 25,548 firm-year observations from 1997 to 2015. The statistical significance at the 10, 5 and 1% levels is indicated, respectively by *; ** and *** Panel A presents the results of regression in three models: conservatism model (1), sticky costs model (2) and full model (3) using E/P as a dependent variable. In Panel B, we estimate the full model (3) across country groups. In Panel C, we estimate the full model (3) across industries, and finally, in Panel D, we estimate three models: conservatism model (1), sticky costs model (2) and full model (3) using ACC/P as a dependent variable. E is earnings before extraordinary items and Preferred Dividends, P is the market value of equity at the beginning of the fiscal year, ACC is total accruals or operating accruals, RET is the market-adjusted stock return for the period of fiscal year t (12 month), DR is a dummy variable equal to one if the market-adjusted stock return is negative, and zero otherwise, ΔS is the sales change from year t − 1 to year t, DS is a dummy variable equal to one if sales decreased from year t − 1 to year t and zero otherwise. All variables are defined in Appendix

Table III.

significant at 1 per cent level. This outcome confirms that the operating accruals asymmetry can reflect both conservatism and cost stickiness.

4.1 The association between sales changes with sticky cost and conditional conservatism

We estimate the full model (3) for three earnings components: interest expense, depreciation expense, and change in net receivable having different predictions for the coefficient DS*ΔS/P. Similar to Banker *et al.* (2016), we use a negative code for items reducing earnings (interest expense and depreciation expense). The interest expense and depreciation expense are associated with cost stickiness (Subramaniam and Watson, 2016; Cheung *et al.*, 2016), and net receivables are associated with conditional conservatism. Subramaniam and Watson (2016) confirm that the coefficient of interest expense is significant and that interest expense exhibits sticky cost behavior. Cheung *et al.* (2016) consider depreciation expense as entry cost, and it is used as proxy of capital intensity for firms' economic characteristics (Cheng, 2005). This measure is significantly associated with cost stickiness. Our empirical result of analysis shows that cost stickiness predicts a significant positive coefficient of DS*ΔS/P for both interest expense and depreciation expense. This result is similar to Banker *et al.* (2016) and that can be explained by the asymmetric resource adjustment that influences expenses while the coefficient of conservatism with interest expenses of debt is insignificant. We conclude that the impact of changes in sales on interest expense and depreciation expense is significant, which is consistent only with cost stickiness (not with conservatism).

For changes in net receivables **(**ΔREC/P**)**, we realize that cost stickiness foresee an insignificant coefficient DS*ΔS/P emphasizing that sales changes do not have an important role in conservatism for net receivables. Byzalov and Basu (2016) consider receivables and inventory as accounting guidance for working capital accounts and notice that in the relation with conditional conservatism, these standards (ASC topics 310 and 330 based on receivable and inventory) incorporate asymmetric treatment of unrealized losses versus unrealized gains for small asset pools. In relation to sales, they find out that high sales are associated with an increase in inventory and receivable.

To test the effect of negative stock returns and decrease in sales in the prior period at the level of asymmetry in the current period, we use the same model as of Banker *et al.* (2016):

$$\begin{aligned} E_t/P_{t-1} = {} & \alpha_0 + \alpha_1 DR_t + \alpha_2 RET_t + \alpha_3 DR_t * RET_t + \beta_1 DS_t + \beta_2 \Delta S_t/P_{t-1} + \beta_3 DS_t \\ & * \Delta S_t/P_{t-1} + \alpha_4 DR_{t-1} + \alpha_5 RET_{t-1} + \alpha_6 DR_{t-1} * RET_{t-1} + \beta_4 DS_{t-1} \\ & + \beta_5 \Delta S_{t-1}/P_{t-1} + \beta_6 DS_{t-1} * \Delta S_{t-1}/P_{t-1} + DR_{t-1} \\ & * \left(\alpha_7 DR_t + \alpha_8 RET_t + \alpha_9 DR_t * RET_t (+ DS_{t-1} * (\beta_7 DS_{t-1} \right. \\ & \left. + \beta_8 \Delta S_t/P_{t-1} + \beta_9 DS_t * \Delta S_{t-1}/P_{t-1}) + \grave{u}_t \right. \end{aligned} \tag{4}$$

where all variables are previously defined.

In this model, we replicate the same model used in Banker *et al.* (2016), and we estimate the relationship between prior and current periods through adding interactions with both lagged sales decreases and lagged negative returns in the full model. $DS_{t\ -\ 1}$*DS*ΔS/P presents the parameter of interest. This coefficient is positive and significant at the 1 per cent level, the degree of cost stickiness decreases, using the prior period of sales decrease ($DS_{t-1} = 1$). The result of the analysis shows a decrease in sales reflecting pessimism about future sales (Anderson *et al.*, 2003; Banker and Byzalov, 2014; Banker *et al.*, 2016). This pessimism is associated with a reduction in the degree of cost stickiness because sales increase is more associated with adding resources than sales decrease. This positive and significant coefficient (DS_{t-1}*DS*ΔS/P) indicates that the asymmetry for current sales

changes DS*ΔS/P is larger in the case of a prior sales decrease ($DS_{t-1} = 1$) comparing with the case of a prior sales increase ($DS_{t-1} = 0$). The outcome is consistent with cost stickiness but not with conservatism for sales changes (Table IV).

In our next test, we investigate on determinants of the asymmetric cost behavior and we add adjustment costs and managerial incentives variables. We extend the full model containing both cost stickiness and conditional conservatism via adding interactions with three standard proxies, using cost stickiness literature (Anderson *et al.*, 2016; Chen *et al.*, 2012; Anderson *et al.*, 2003), which prove that if firms have greater resource adjustment costs with more asset and employee-intensive, the degree of cost stickiness increases. As matter of fact, two standard proxies for adjustment costs considered as economic variables: asset intensity (AINT) and employee intensity (EINT), and the third proxy free cash flow (FCF), is used for agency costs to capture managers empire building incentives. AINT is the lagged asset intensity, and it is calculated as total assets scaled by net sales or revenues. EINT is the lagged employee intensity, and it is calculated as total employees scaled by net sales or revenues, and FCF is the lagged free cash and calculated as net cash flow from operating activities minus common and preferred dividend scaled by total assets (Anderson *et al.*, 2003; Chen *et al.*, 2012; Banker *et al.*, 2016), this variable is considered as important for the agency problem and the resulting empire building incentives (Jensen, 1986; Masulis *et al.*, 2007; Richardson, 2006). We find evidence on the association between agency problem and cost stickiness (Chen *et al.*, 2012), and with conditional conservatism (García Lara *et al.*, 2009; Louis *et al.*, 2012).

In the subsequent test, we use extend model incorporating two standard proxies for adjustment cost developed by Banker *et al.* (2016), and we add the free cash flow as a proxy for agency problem. We use the following model:

$$\begin{aligned} E_t/P_{t-1} = {} & \alpha_0 + \alpha_1 DR_t + \alpha_2 RET_t + \alpha_3 DR_t{*}RET_t + \beta_1 DS_t + \beta_2 \Delta S_t \\ & + \beta_3 DS_t{*}\Delta S_t/P_{t-1} + AINT_{t-1}{*}(\alpha_4 DRt + \alpha_5 RET_t + \alpha_6 DR_t{*}RET_t) \\ & + EINT_{t-1}{*}(\alpha_7 DR_t + \alpha_8 RET_t + \alpha_9 DR_t{*}RET_t) \\ & + FCF_{t-1}{*}(\alpha_{10} DR_t + \alpha_{11} RET_t + \alpha_{12} DR_t{*}RET_t) \\ & + AINT_{t-1}{*}(\beta_4 DS_t + \beta_5 \Delta S_t + \beta_6 DS_t{*}\Delta S_t/P_{t-1}) \\ & + EINT_{t-1}{*}(\beta_7 DS_t + \beta_8 \Delta S_t/P_{t-1} + \beta_9 DS_t{*}\Delta S_t/P_{t-1}) \\ & + FCF_{t-1}{*}(\beta_{10} DS_t + \beta_{11} \Delta S_t/P_{t-1} + \beta_{12} DS_t{*}\Delta S_t/P_{t-1}) + \gamma_1 AINT_{t-1} \\ & + \gamma_2 EINT_{t-1} + \gamma_3 FCF_{t-1} + \nu_t \end{aligned} \tag{5}$$

The main parameters of interest are AINT*DS*ΔS/P, EINT*DS*ΔS/P and FCF*DS*ΔS/P. The result of analysis expects that EINT*DS*ΔS/P is positive and significant at the 1 per cent level, and FCF*DS*ΔS/P is negative and significant, but AINT*DS*ΔS/P is insignificant, which indicates that employee intensive firms have greater resource adjustment costs that increase cost stickiness (Anderson *et al.*, 2003; Banker *et al.*, 2016), the asymmetry for sales changes increases with employee intensity, and the asymmetry for sales changes increases with free cash flow. Following previous results, Anderson *et al.* (2003) find that the asymmetric cost behavior is positively associated with asset intensity. For employee intensity, Balakrishnan and Gruca (2008) provide evidence that cost stickiness is more pronounced for costs related to core functions than for those related to peripheral functions due to greater adjustment costs associated with core functions). Chen *et al.* (2012) document a positive and significant coefficient of employee intensity in their sample and

	Predicted sign under		Estimate	*t*-statistic
	Stickiness	Conservatism		
Panel A: Estimates for individual line items				
Dependent variable = Depreciation expense (−DEP/P)				
Intercept			−0.052***	−32.41
DR			−0.003	−1.56
RET			0.000	−0.06
*DR*RET*			0.052***	6.28
DS			0.000	−0.07
ΔS/P			−0.084***	−28.29
*DS*ΔS/P*	+	*0*	0.166***	22.54
Hausman test: χ^2			24.92 (0.000)	
Firm-fixed effects			Included	
Adj. R^2			0.2923	
N			25,548	
Panel B: Estimates for individual line items				
Dependent variable = Interest expense (−INT/P)				
Intercept			−0.008***	−3.89
DR			−0.001	−0.53
RET			0.002	1.50
*DR*RET*			0.028***	3.51
DS			−0.005***	−3.00
ΔS/P			−0.089***	−21.13
*DS*ΔS/P*	+	*0*	0.176***	17.23
Hausman test: χ^2			125.19 (0.000)	
Firm-fixed effects			Included	
Adj. R^2			0.2829	
N			25,548	
Panel C: Estimates for individual line items				
Dependent variable = Change in net receivables (ΔREC/P)				
Intercept			0.011***	3.92
DR			0.011***	2.80
RET			0.003	1.29
*DR*RET*			0.039***	2.84
DS			−0.010***	−3.29
ΔS/P			0.136***	25.28
*DS*ΔS/P*	*0*	+	0.017	1.62
Hausman test: χ^2			24.37 (0.000)	
Firm-fixed effects			Included	
Adj. R^2			0.3297	
N			25,548	
Panel D: The effect of negative stock returns and sales decreases in the prior period on the degree of asymmetry in the current period				
Dependent variable = E/P				
Intercept			0.045***	12.36
DR			0.002	0.46
RET			0.031***	7.87
*DR*RET*			0.009	0.47
DS			−0.007**	−2.02
ΔS/P			0.035***	5.91
*DS*ΔS/P*			0.018	1.22
DR_{t-1}			−0.002	−0.50
RET_{t-1}			0.008***	3.44
DR_{t-1}* RET_{t-1}			0.018	1.09
DS_{t-1}			0.002	0.72
$\Delta S_{t-1}/P$			0.039***	4.97
DS_{t-1}* $\Delta S_{t-1}/P$			−0.029***	−2.92
DR_{t-1}* DR			0.010	1.13
DR_{t-1}*RET			−0.002	−0.33
DR_{t-1} DR*RET*			*0.147***	*3.93*
DS_{t-1}*DS			0.004	0.55
DS_{t-1}* ΔS/P			−0.029***	−3.01
*DS_{t-1}*DS*ΔS/P*	−	+	*0.071***	*2.81*

(*continued*)

Table IV.
Validation tests of the sticky cost modification

Hausman test: χ^2			339.77 (0.000)	
Firm-fixed effects			Included	
Adj. R^2			0.0844	
N			25,548	
Panel E: The impact of control variables (asset intensity, employee intensity and free cash flow) on conservatism and cost stickiness				
Dependent variable = E/P			0.055***	8.95
Intercept			0.008	0.80
DR			0.029***	4.98
RET			0.068**	2.09
*DR*RET*			−0.022***	−2.82
DS			0.023***	2.90
ΔS/P			0.024	0.87
*DS*ΔS/P*			0.002	0.73
AINT*DR			−0.003	−1.33
AINT*RET			*0.018***	*2.28*
*AINT*DR*RET*			0.387	0.50
EINT*DR			−0.854*	−1.73
EINT*RET			*2.259*	*0.71*
*EINT*DR*RET*			−0.056	−0.92
FCF*DR			−0.066**	−2.28
FCF*RET			*−0.391**	*−1.84*
*FCF*DR*RET*			−0.002	−1.02
AINT*DS			−0.010***	−3.56
AINT* ΔS/P			*0.010*	*0.54*
*AINT*DS*ΔS/P*			1.786***	3.36
EINT*DS			0.195	0.20
EINT*ΔS/P			*9.009****	*2.64*
*EINT*DS*ΔS/P*	+	*0*	0.063	1.28
FCF*DS			0.090	1.19
FCF*ΔS/P			*−0.413****	*−2.60*
*FCF*DS*ΔS/P*			−0.006**	−2.33
AINT			−1.609**	−2.10
EINT			0.272***	9.05
FCF				
Hausman test: χ^2			338.16 (0.000)	
Firm-fixed effects			Included	
Adj. R^2			0.0799	
N			18,225	

Notes: The table presents the regression estimates of a sample of 25,548 firm-year observations from 1997 to 2015 (the sample size in some specifications is smaller due to missing data for additional variables). Statistical significance at the 10, 5 and 1% levels is indicated, respectively by *; ** and ***E is earnings before extraordinary items and preferred dividends, P is the market value of equity at the beginning of the fiscal year, RET is the market-adjusted stock return for the period of fiscal year *t* (12 months), DR is a dummy variable equal to one if the market-adjusted stock return is negative and zero otherwise, ΔS is the sales change from year t − 1 to year *t*, DS is a dummy variable equal to one if sales decrease from year t − 1 to year *t* and zero otherwise. All variables are defined with data items in Appendix. In Panel A, DEP is depreciation expense. In Panel B, INT is net interest expense. In Panel C, ΔREC is change in net receivable. To obtain consistent coefficient signs, we use a negative sign in items that reduce earnings especially DEP and INT. In Panel E, we add control variables to the full model AINT is the lagged asset intensity, EINT is the lagged employee intensity, and FCF is the lagged free cash flow. All variables are defined in Appendix

Table IV.

suggest that the asymmetry in SGA cost is lower for firms requiring more employees to support operations and find a negative and significant coefficient of asset intensity (0.055 for the base model, and 0.154 for the testing one). They also suggest that the asymmetry in SGA cost is greater for firms requiring more assets to their activities.

Chen *et al.* (2012) find a positive and significant association between cost stickiness and agency cost. They provide evidence that the agency problem complements known economic factors in explaining SGA cost asymmetry because the strong alignment of managerial ownership between the managers' incentives and the shareholders' interests can lead to

lower cost stickiness. For free cash flow, they document that cost asymmetry increases with free cash-flow with negative and significant coefficient at 1 per cent level.

In the interaction with conservatism coefficient, we get mixed results: the coefficient of AINT*DR*RET is positive and significant, the coefficient of FCF*DR*RET is negative and significant, but the coefficient of EINT*DR*RET is insignificant. Employee intensity does not have an effect on conservatism because intangibles investments, for example, in human capital, are not recognized as assets on the balance sheet. Asset intensity should increase conservatism because more asset-intensive firms have an important potential for large write-downs in the event of bad news (Banker *et al.*, 2016). Agency problem exists in cost stickiness and in conditional conservatism. To reduce agency problems in accounting conservatism, managers should provide incentives for *ex ante* efficient investment decisions and facilitate *ex post* monitoring of managers' investment decisions (Louis *et al.*, 2012).

4.2 The impact of cost stickiness on conditional conservatism C-score

Foregoing studies criticize the Basu model, as it does not include firm-specific factors such as size of firm (SIZE) defined as the lagged natural logarithm of market value of equity, market to book ratio (MTB) defined as the lagged ratio of market to book value of equity and leverage (LEV) described as the lagged total debt divided by total assets providing evidence for conservatism especially in determining the firm's investment opportunities (Khan and Watts, 2009). SIZE, MTB and LEV are considered as risk factors, which may affect the cost of equity (Fama and French, 1992; Chan *et al.*, 2009; Artiach and Clarkson, 2013; Li, 2015). Khan and Watts (2009) argued that firms with large size have to be less conservative. LaFond and Roychowdhury (2008) confirm that conservatism varies with these factors.

So as to examine the link between cost stickiness variations and conditional conservatism C-score, we consider the Khan and Watts model involving control variables, and we estimate the modified model proposed by Banker *et al.* (2016) incorporating cost stickiness:

$$\begin{aligned} E_t/P_{t-1} = {} & \alpha_0 + \alpha_1 DR_t + \alpha_2 RET_t + \alpha_3 DR_t{*}RET_t \\ & + MTB_{t-1}{*}(\alpha_4 DR_t + \alpha_5 RET_t + \alpha_6 DR_t{*}RET_t + LEV_{t-1}{*}(\alpha_7 DR_t + \alpha_8 RET_t \\ & + \alpha_9 DRt{*}RET_t + SIZE_{t-1}{*}(\alpha_{10} DR_t + \alpha_{11} RET_t + \alpha_{12} DR_t{*}RET_t) \\ & + \gamma_1 MTB_{t-1} + \gamma_2 LEV_{t-1+} \gamma_3 SIZE_{t-1} + \varepsilon_t \end{aligned} \tag{6}$$

Similar to Banker *et al.* (2016), we measure the modified C_Score including not only conditional conservatism variables but also the variation in cost stickiness:

$$\begin{aligned} E_t/P_{t-1} = {} & \alpha_0 + \alpha_1 DR_t + \alpha_2 RET_t + \alpha_3 DR_t{*}RET_t \\ & + MTB_{t-1}{*}(\alpha_4 DR_t + \alpha_5 RET_t + \alpha_6 DR_t{*}RET_t) \\ & + LEV_{t-1}{*}(\alpha_7 DR_t + \alpha_8 RET_t + \alpha_9 DR_t{*}RET_t) \\ & + SIZE_{t-1}{*}(\alpha_{10} DR_t + \alpha_{11} RET_t + \alpha_{12} DR_t{*}RET_t) + \gamma_1 MTB_{t-1} + \gamma_2 LEV_{t-1} \\ & + \gamma_3 SIZE_{t-1} + \beta_1 DS_t + \beta_2 \Delta S_t/P_{t-1} + \beta_3 DS_t{*}\Delta S_t/P_{t-1} \\ & + MTB_{t-1}{*}(\beta_4 DS_t + \beta_5 \Delta S_t/P_{t-1} + \beta_6 DS_t{*}\Delta S_t/P_{t-1}) \\ & + LEV_{t-1}{*}(\beta_7 DS_t + \beta_8 \Delta S_t/P_{t-1} + \beta_9 DS_t{*}\Delta S_t/P_{t-1}) \\ & + SIZE_{t-1}{*}(\beta_7 DS_t + \beta_8 \Delta S_t/P_{t-1} + \beta_9 DS_t{*}\Delta S_t/P_{t-1}) + \eta t \end{aligned} \tag{7}$$

The coefficients of interest are MTB*DR*RET, LEV*DR*RET and SIZE*DR*RET, respectively. Banker *et al.* (2016) argue that the bias in the standard C-Score is positively and significantly associated with cost stickiness. More precisely, the bias is significantly associated with the book to market, size and leverage. In our study, we come up with mixed results. First, the coefficient MTB*DR*RET is insignificant in both models of Khan and Watts (2009), and Banker *et al.* (2016). Second, the coefficient LEV*DR*RET is positive and significant at 10 per cent level in Khan and Watts (2009), but insignificant in the extended model by Banker *et al.* (2016). Eventually, the coefficient SIZE*DR*RET is negative and significant at 1 per cent level in khan and watts (2009) model, but the coefficient SIZE*DR*RET is less significant in Banker *et al.* (2016) at the 5 per cent level. For the relationship with cost stickiness, the coefficients of interest are MTB*DS*ΔS/P, LEV*DS*ΔS/P and SIZE*DS*ΔS/P, respectively. The coefficient LEV*DS*ΔS/P is positive and significant, but MTB*DS*ΔS/P and SIZE*DS*ΔS/P are insignificant. The adjusted R^2 is low in Khan and Watts (2009), which can be explained by the fact that there is a strong heterogeneity of the observations in the estimation of the global model. The adjusted R^2 is different when we estimate this model across industries and across country groups and when we change the dependent variable.

We conclude that cost stickiness distorts inferences about standard demand drivers of conservatism such as leverage, and size, and that controlling for cost stickiness has a significant effect on the estimated effects of the standard proxies of the demand (Tables V and VI).

5. Conclusion

In this paper, we have examined the association between accounting conservatism and cost stickiness across groups of countries over the period between 1997 and 2015. To do so, following Homburg and Nasev (2008) and Banker *et al.* (2016), we have used different models such as Basu (1997) and Khan and Watts (2009) to look into the existence of conservatism, and we have also used Banker and Chen (2006) model to investigate the existence of cost stickiness. To test the effect of cost stickiness in asymmetric timeliness, we have used the model of combination developed by Banker *et al.* (2016). This model incorporates both models of conservatism and cost stickiness models. Then, we have added a new model including free cash flow as proxy of the agency problem.

Our study contributes to the literature concerning conditional conservatism and cost stickiness by showing additional evidence of their existence, and the relation between them across country groups and across industries. We conclude a very important change after extending cost stickiness in the conditional conservatism model.

In additional analyses, we have tried on the model combining both cost stickiness and conditional conservatism models, and we have come up with a mixed results confirming that the coefficient of interest in conditional conservatism is significant at the 1 per cent level in the USA and in some of EU countries, but insignificant in BRICS and MIST and negative in some countries of North Africa with a significant degree. The coefficient of interest in the sticky cost model is positive and significant in the MIST, USA and in some countries of EU, and negative and significant in BRICS and in some countries of North Africa. We came to the conclusion that the existing degree of cost stickiness and conditional conservatism varies across country groups.

Our study substantiates the province of cross countries and cross industries analyses. The cross-country group analysis provides evidence that cost behaves asymmetrically in all groups of countries, but the existence of conditional conservatism is approved only in the USA and in some countries of the EU. The cross-industry analysis shows that the existence

		Dependent variable = E/P Khan and Watts model		Extended model	
		Estimate	*t*-statistic	Estimate	*t*-statistic
Intercept		0.303***	5.24	0.222***	4.28
DR		0.046**	2.14	0.035	1.62
RET		0.041***	3.17	0.033***	2.58
DR*RET		0.312***	3.23	0.227**	2.37
MTB*DR		0.002	1.62	0.002*	1.68
MTB*RET		−0.002**	−2.19	−0.002**	−2.05
*MTB*DR*RET*		*0.000*	*0.05*	*0.005*	*0.89*
LEV* DR		0.021	0.65	0.031	0.98
LEV *RET		0.019	1.03	0.038**	2.15
*LEV*DR*RET*	+	*0.212**	*1.75*	*0.110*	*0.91*
SIZE* DR		−0.003***	−2.74	−0.003**	−2.40
SIZE* RET		−0.001	−1.12	−0.001	−1.12
*SIZE*DR*RET*	−	*−0.016****	*−3.00*	*−0.012***	*−2.28*
MTB		0.001	1.13	0.001	1.18
LEV		−0.113***	−4.29	−0.089***	−3.33
SIZE		−0.012***	−3.90	−0.008***	−2.95
DS				0.043***	3.06
ΔS/P				0.122***	6.09
DS*ΔS/P				0.011	0.23
MTB*DS				0.001	0.57
*MTB*ΔS/P*				0.002	0.56
*MTB*DS*ΔS/P*				*−0.013*	*−1.63*
LEV*DS				0.012	0.50
LEV*ΔS/P				−0.071**	−2.24
*LEV*DS*ΔS/P*	+			*0.196****	*2.74*
SIZE*DS				−0.003***	−4.27
SIZE*ΔS/P				−0.004***	−4.14
SIZE DS*ΔS/P*				*−0.002*	*−0.70*
Hausman test: χ^2		533.97 (0.000)		566.28 (0.000)	
Firm-fixed effects		Included		Included	
Adj. R^2		0.0336		0.0642	
N		21,962		21,962	

Notes: The table presents the regression estimates on a sample of 25,548 firm-year observations from 1987 to 2007 (the sample size in some specifications is smaller due to missing data for additional variables). Statistical significance at the 10, 5 and 1% levels is indicated, respectively by *; ** and ***. E is earnings before extraordinary items and preferred dividends, P is the market value of equity at the beginning of the fiscal year, RET is the market-adjusted stock return for the period of fiscal year t (12 months), DR is a dummy variable equal to one if the market-adjusted stock return is negative and zero, otherwise, ΔS is the sales change from year t − 1 to year t, DS is a dummy variable equal to one if sales decrease from year t − 1 to year *t* and zero otherwise, MTB is the ratio of market capitalization to book value of equity, LEV is total debt divided by total assets, and SIZE is market value of equity. All variables are defined in Appendix

Table V.
Regression of Khan and Watts (2009) model and the extended model with sticky cost behavior

H1	Asymmetric timeliness estimates in conservatism models are overstated because these models do not control for cost stickiness	The estimation of conservatism is associated with a substantial upward bias of 46.55% because the conditional conservatism model does not control cost stickiness
H2	The association between conditional conservatism and cost stickiness changes across country groups and across industries	Our analysis provides evidence that cost stickiness changes across country groups and across industries

Table VI.
Summary of hypotheses

of cost stickiness and conditional conservatism is taken on significantly in the most representative industries called manufacturing.

Using DataStream database during the period from 1997 to 2015, we use an international context, and we point out that the conditional conservatism model (Basu, 1997) is overstated by more than 45 per cent because this model does not control for cost stickiness. We also find evidence that sticky cost behavior distorts inferences about standard demand drivers of conservatism such as leverage and size.

Following Banker *et al.* (2016), we have provided additional evidence for the association between conditional conservatism in financial accounting and cost stickiness in management accounting by confirming that Basu (1997) is overestimated by 46,55 per cent owing to cost stickiness. The comparison between Khan and Watts (2009) model and between the extended model shows that the impact of control variables in conservatism (market to book ratio, size and leverage) changes when we include cost stickiness.

Using Ball *et al.* (2012) firm-fixed effects correction in conditional conservatism models (Basu, 1997; Khan and Watts, 2009) is designed to take into account the asymmetric correlation between expected earnings and returns. This correction continues to be relevant after controlling sticky costs. Using accruals as a dependent variable in the conservatism model (Basu, 1997) is recommended by Collins *et al.* (2014) to isolate asymmetries in financial reporting. Our results and their implications are consistent with findings by Banker *et al.* (2016) substantiating that the operating accruals asymmetry could reflect both conservatism and cost stickiness, using international context, which is a fundamentally different phenomenon arising from the managers' operational decisions.

Our results have two implications. First, the findings indicate that it's important to control for cost stickiness even in the case of analyzing characteristics of financial reporting related to conditional conservatism. In this case, researchers can exclude cost stickiness from the conservatism estimate after controlling for it. Second, managers should pay close attention when using the traditional cost model as the study provides evidence on the asymmetric behavior in the international context and in different groups of countries. Especially, in cost accounting and management accounting techniques assumed by the traditional cost model (Ibrahim, 2015).

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Appendix

Variables	Definition	Source
E_t/P_{t-1}	The earnings in year *t* scaled by the market value of equity at the beginning of the fiscal year	Datastream database version 2017
ACC_t/P_{t-1}	Total or operating accruals scaled by the market value of equity at the beginning of the fiscal year	Datastream database version 2017
RET_t	Market-adjusted stock return for the period of fiscal year *t* (12 months)	Datastream database version 2017
DR_t	Dummy variable equal to one if market-adjusted stock return for the period of fiscal year *t* is negative, and zero otherwise	Datastream database version 2017
DS_t	Dummy variable equal to one if sales decrease from year t-1 to year *t*, and zero otherwise	Datastream database version 2017
$\Delta S_t/P_{t-1}$	The sales change from year t-1 to year *t* scaled by the market value of equity at the beginning of the fiscal year	Datastream database version 2017
INT_t/P_{t-1}	The interest expense on debt minus non-operating interest income in year *t* scaled by the market value of equity at the beginning of the fiscal year	Datastream database version 2017
DEP_t/P_{t-1}	Depreciation expense in years *t* scaled by the market capitalization of equity at the beginning of the fiscal year	Datastream database version 2017
$\Delta REC_t/P_{t-1}$	Change in net receivables scaled by the market value of equity at the beginning of the fiscal year	Datastream database version 2017
$AINT_{t-1}$	Asset intensity at the beginning of the fiscal year	Datastream database version 2017
$EINT_{t-1}$	Employee intensity at the beginning of the fiscal year	Datastream database version 2017
FCF_{t-1}	Free cash flow at the beginning of the fiscal year	Datastream database version 2017
MTB_{t-1}	The ratio of market capitalization to book value of equity at the beginning of the fiscal year	Datastream database version 2017
LEV_{t-1}	Leverage at the beginning of the fiscal year	Datastream database version 2017
$SIZE_{t-1}$	Size of firm at the beginning of the fiscal year	Datastream database version 2017

Table AI.
Variable definitions and sources

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