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The Value-relevance of Fair Value Measurement for Inventories

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The objective of this paper is to determine if fair value measurement for inventories is value-relevant. Inventories are measured at historical cost and investors will have to estimate the fair value for themselves. For a sample of firms listed in the UK and reporting from 2009 to 2018, multivariate regression results show that the historical cost component of inventories on the balance sheet is value-relevant, but that the fair value component is not. By contrast, both historical cost earnings and changes in the fair value of inventories are value-relevant. Results therefore imply that investors need both historical cost earnings and fair value movements to make decisions. By extension, fair value measurements complement, rather than replace, historical cost information.

Information is value-relevant if it has a predicted association with the market value of equity (Barth et al. 2001). In the case of fair value, extensive research on recognised and disclosed fair value measurements appears to have culminated in a consensus that fair values are value-relevant, particularly for equity valuation (Landsman 2007; Kothari et al. 2010; Barth 2018). Moreover, the use of fair value measurements in financial reporting has steadily been increasing in what some consider a self-reinforcing trend (Power 2010). Nevertheless, current accounting rules do not result in full fair value accounting, as a number of assets and liabilities are still measured on a historical cost basis. One such asset is inventories.

Under International Financial Reporting Standards (IFRS), IAS 2 determines that inventories are measured at the lower of cost and net realisable value (IASB 2003). As inventories are generally sold at a profit, the book value for the vast majority of inventories is equal to their cost (Welc 2020) and it is reasonable to say that the fair value of inventories is used for neither measurement nor disclosure in financial statements.[1] The book value of inventories, most frequently represented by cost, can be outdated and is influenced by factors like the choice of supplier and cost flow methods. This undermines financial statement comparability and obscures the true gearing of a firm (Barlev and Haddad 2003). Moreover, theoretical evidence shows that measuring inventories at fair value increases the likelihood that optimal quantities of inventories will be produced (Reis and Stocken 2007). Optimal production not only improves societal welfare, but makes firms easier to value and increases their cumulative profitability (Reis and Stocken 2007).[2] Despite theoretical support, no direct empirical evidence for measuring inventories at fair value exists. Indirect evidence shows that the fair value of biological assets is value-relevant (Gonçalves et al. 2017). Biological assets arguably represent unique inventories for a specialised industry that are measured at fair value less costs to sell under IAS 41 (IASB 2014). Nevertheless, these findings offer an initial suggestion that fair values of inventories may be more generally value-relevant. If this is the case, investors will plausibly use available information to estimate the fair value of inventories that is not available in the financial statements.

However, the case for measuring inventories on a historical cost basis should not be underestimated. Reis and Stocken (2007) note that several assumptions that underlie their theoretical argument for measuring inventories at fair value are difficult to satisfy in a complex setting. Penman (2007) argues that fair value measurement for inventories does not capture the value that a firm adds by finding a customer. Moreover, the historical cost of inventories affects gross profit and reflects the stewardship of management (Whittington 2008; Kothari et al. 2010). Gross margins have superior predictive ability for future equity returns (Novy-Marx 2013) while investors continue to demand historical cost earnings and other non-GAAP earnings measures, which incorporate fair value measurements to differing degrees (Ribeiro et al. 2019; McDonough et al. 2020). This implies that historical cost earnings have decision-useful attributes that could be lost or obscured when fair value measurement is applied. Therefore, the case

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for the measurement of inventories is not clear-cut and warrants further investigation.

We use a sample of firms listed in the UK that report from 1 January 2009 to 31 December 2018 and estimate the fair value of sample firms' inventories using publicly available information in the financial statements. We find that the calculated fair value measurements for inventories are value-relevant in a traditional value-relevance model (which focuses on the balance sheet). To reflect that fair value earnings will have different information content to historical cost earnings, we expand the traditional value-relevance model to explicitly model the earnings impact of measuring inventories at fair value. The expanded model does not detect value-relevance for the fair value component of inventories on the balance sheet. However, the changes in the fair value component recognised in earnings are value-relevant, as is the historical cost information (both on the balance sheet and in earnings).

To investigate the conflicting results for the balance sheet fair value component, we turn to valuation theory, which determines that decision-useful (i.e., value-relevant) information must correlate with future cash flows or earnings (Nissim and Penman 2001; Penman and Yehuda 2009). Correlations with future performance offer an 'out-of-sample' test to differentiate between meaningful value-relevance results and coincidental associations. Results show that the balance sheet fair value component has no association with future cash flows or earnings when historical cost information is available. The balance sheet fair value component is therefore not value-relevant in a meaningful way. By contrast, changes in the fair value component of inventories are associated with changes in future cash flows and earnings, and the detected value-relevance is therefore meaningful.

This paper contributes to the existing literature in several ways. Firstly, prior research focuses on recognised and disclosed fair value measurements (Holthausen and Watts 2001; Landsman 2007; Barth et al. 2021). We show that a fair value estimated by parties outside the firm can be value-relevant (although the balance sheet fair value measurement is not value-relevant, the changes therein assist in predicting changes in future cash flows and earnings).

Secondly, we offer insights into why prior research finds that gross profit (Novy-Marx 2013) and historical cost earnings outperform total earnings (which include fair value movements) in predicting future returns (Ball et al. 2015), when so many fair value measurements are value-relevant (Landsman 2007; Kothari et al. 2010; Barth et al. 2021). For our sample, a traditional value-relevance model would detect value-relevance on the balance sheet for the calculated fair value of inventories. However, such an approach assumes that historical cost earnings remain available to investors, which is typically not the case when the measurement base on the balance sheet is altered. By modelling the interrelationship in greater detail, we show that historical cost earnings information remains value-relevant in the presence of fair value measurement for inventories. This paper therefore highlights the importance of model specification when evaluating value-relevance results. It also shows how valuation theory can be used to sift value-relevance findings when the results from different model specifications conflict.

Thirdly, our results are detected when historical cost earnings remain available to investors. This provides empirical support for the arguments of prior researchers that historical cost earnings contain information that fair value earnings do not (Kothari et al. 2010; McDonough et al. 2020). Kothari et al. (2010) suggest that a potential solution would be to present historical cost earnings separately from fair value movements. This could be achieved, for example, by presenting fair value movements in other comprehensive income.

Finally, this paper offers evidence around the value-relevance of fair value measurements for inventories, an asset which is not particular to a specific industry. Importantly, recent research that challenges the consensus view that fair value measurements of assets are value-relevant focuses on the financial services industry. For example, McInnis et al. (2018) conclude that financial statements of banks prepared under current US GAAP are more useful than those prepared under fair value accounting would be. Liang and Riedl (2014) suggest that, despite a benefit for fair value balance sheet forecasts, fair value earnings reduce analyst forecast accuracy for the earnings of real estate investment trusts (REITs). Financial services firms (including REITs) are usually excluded from general samples for reasons such as their unique regulatory environment (Foerster and Sapp 2005; Cheng and Roulac 2007). This paper therefore offers more generalisable evidence that the decision-usefulness of fair value measurements deserves continued scrutiny.

While Reis and Stocken (2007) also provide evidence that supports measuring inventories at fair value, our paper differs in important ways. Firstly, they use hypothetical modelling, which relies on a number of restrictive assumptions to provide theoretical evidence. Indeed, they caution that their findings might not translate to more complex environments. By contrast, our assessment uses actual market and accounting data, so that our findings apply despite the complexities that arise outside of strictly controlled assumptions. Secondly, Reis and Stocken (2007) focus largely on the implications for management decisions, while our study considers investor decisions. Finally, the conclusions of Reis and Stocken (2007) rest on the assumption that fair value measurement has been implemented. For our sample, inventories are measured at the lower of cost

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and net realisable value, so that we reveal how the fair value of inventories impacts the decisions of investors when it is not provided and they need to estimate the information for themselves.

This paper will be of interest to standard setters as it provides empirical evidence that presentation of historical cost earnings separately from fair value movements assists in decision making. It will be useful for preparers of financial reports who may wish to separately disclose historical cost earnings on a voluntary basis to facilitate their investors' decisions. Those who research the decision usefulness of accounting information will also be interested in this paper.

The next section of the paper provides background, an overview of the existing literature and the hypotheses development. Thereafter, the calculation of fair value for inventories is discussed, followed by the market analyses section, encompassing the research design, data and regression results for our value-relevance tests. The cash flow and earnings analyses are discussed in a separate section, while results using an alternative fair value measurement calculation are considered thereafter. The final section summarises and concludes the paper.

Background, Literature Review and Hypotheses Development

Background

Under current accounting requirements, the measurements of most assets and liabilities are derived from either historical cost or fair value. Historical cost represents the amount at which the asset or liability entered the balance sheet,[3] while fair value represents the amount at which the asset or liability could potentially exit the balance sheet, that is, a market value (Whittington 2008). As the use of fair value measurements continues to increase (Power 2010), this will affect both the balance sheet and the movements (earnings) to be recognised.

A fair value measurement on the balance sheet effectively comprises two components, namely, the historical cost of the item and the cumulative adjustment to fair value. Analogously, the change in fair value also comprises two components, that is, the change in the historical cost component of the balance sheet measurement and the change in the fair value component. This paper therefore distinguishes historical cost earnings (the earnings amount when the balance sheet measurement is based on historical cost) from fair value movements (the change in the fair value component on the balance sheet).

Measuring inventories at fair value

Under IFRS, IAS 2 determines that inventories are measured at the lower of cost and net realisable value (IASB 2003). The book value for the vast majority of inventories is equal to their cost (Welc 2020) and information about the fair value of inventories is not disclosed in the financial statements. However, under IAS 41, the measurement of specialised inventories in the agricultural industry (biological assets) is based on fair value (IASB 2014). These fair values are known to be value-relevant (Gonçalves et al. 2017), while the fair value earnings of agricultural firms have predictive qualities (Argilés et al. 2011). Although these findings relate to specialised inventories and are therefore not immediately generalisable, they do suggest the possibility that fair values of other inventories may contain decision-useful information. If this is the case, it is plausible that investors would estimate fair values of inventories for decision making if these are not provided in financial statements.

Furthermore, theoretical evidence shows that measuring inventories at fair value will make firms cumulatively more profitable and easier to value, while resulting in increased social welfare, as optimal quantities of inventories are more likely to be produced (Reis and Stocken 2007).[2] Measuring inventories at fair value will improve comparability and will provide better insight into the true gearing of a firm (Barlev and Haddad 2003). These benefits arise as inventories would be measured using the most recent information about their value.

The closest empirical evidence about the benefit of using more recent inventory valuations considers the impact of different cost flow methods. When older prices are used to value inventories under the last-in-first-out (LIFO) cost flow method, the comparatively lower book value of inventories (reflected in the LIFO reserve) is negatively associated with market values (Guenther and Trombley 1994; Jennings et al. 1996). The reason appears to be the unrecognised deferred tax liability that arises when suppressing inventory book values (Dhaliwal et al. 2000). Furthermore, equity returns are lower for firms that use the LIFO cost method compared to other firms (Houmes et al. 2012). By implication, investors attach greater value to inventory book values that are based on more recent prices. Fair value measurement of inventories would imply a further 'update' with more recent information which may well be value-relevant.

Another consideration is that fair value measurement of inventories would ensure that all the elements of working capital are effectively measured at realisable value. Kieschnick et al. (2013) find that an incremental dollar invested in cash or trade receivables adds more to

equity market value than an incremental dollar invested in inventories. They ascribe their results to the risk that an item of inventory might fail to sell. However, it is also plausible that a measurement akin to realisable value (e.g., trade receivables) is more value-relevant than a measurement akin to cost (i.e., inventories).

The above advantages from measuring inventories at fair value arise from the balance sheet. From an earnings perspective, the traditional argument is that inventories are measured at cost, as the profits are not yet earned (Whittington 2008). In other words, the unrealised gains from holding an asset should not affect earnings. However, fair value accounting frequently recognises unrealised gains and losses in earnings, with examples such as IAS 40 for investment property accounted for under the fair value model (IASB 2013) and IAS 41 for biological assets (IASB 2014). Similar to inventories, these assets frequently relate to the primary operating activities of a firm and their value often realises through sale. Therefore, based on current accounting conventions, there is no reason to avoid recognising unearned profits on inventories, should fair value measurement offer other benefits.

A more powerful argument against fair value measurement for inventories is that gross margins (unaffected by fair value movements) assist in predicting future equity returns (Novy-Marx 2013). Historical earnings margins reflect the stewardship of management in a manner that fair value earnings cannot (Whittington 2008; Kothari et al. 2010). Indeed, Chambers et al. (2007) find that unrealised gains attract a lower multiple than 'core earnings', which are priced as recurring in nature. Ball et al. (2015) find that operating earnings, excluding fair value movements, better predict future equity returns than either gross profit or net profit (i.e., earnings).

Notably, value-relevance research generally finds weaker support for fair value measurement in earnings than on the balance sheet (e.g., Easton et al. 1993; Barth 1994). In specialised industries, some papers find significant support for the use of fair value earnings. Argilés et al. (2011) find that fair value earnings predict future earnings for the agricultural industry. However, they also find that fair value earnings offer no advantage in predicting future cash flows. So and Smith (2009) show increased value-relevance for changes in fair value of investment properties recognised in profit or loss, rather than directly in equity. However, their study coincides with IFRS adoption in Hong Kong and may therefore reflect a general improvement in perceived financial reporting quality. Indeed, Liang and Riedl (2014) find that analysts' earnings forecasts for real estate investment trusts are less accurate when investment property is measured at fair value rather than on a historical cost basis. The empirical evidence supporting the use of fair value earnings is therefore somewhat mixed, especially when compared to the findings around historical cost earnings.

The preceding discussion reveals good arguments for measuring inventories at fair value on the balance sheet. There is also evidence that measuring specialised inventories (biological assets) at fair value conveys value-relevant information (Gonçalves et al. 2017). However, there is also a strong tradition of measuring inventories at the lower of cost and net realisable value, implying that there could be benefits from utilising this measurement base for the balance sheet. Therefore, the first hypothesis (in null form) is:

H1: The fair value component of inventories on the balance sheet is not value-relevant.

However, there is also substantial evidence that historical cost earnings, particularly with reference to inventories, are required for optimal decision making.[4] When inventories are measured at fair value on the balance sheet, earnings necessarily have to be recalculated to include fair value movements. Any assessment of the value-relevance of the fair value of inventories would therefore have to consider whether fair value movements have incremental information content to historical cost earnings. Consequently, the second hypothesis (in null form) is:

H2: Fair value movements of inventories are not incrementally value-relevant to historical cost earnings.

Calculating the Fair Value of Inventories

This paper investigates the fair value of inventories. However, inventories are measured at the lower of cost and net realisable value under IAS 2 (IASB 2003). Most inventories are measured at cost (Welc 2020) and the fair value of inventories is therefore not available as a measurement or a disclosure in the financial statements. Moreover, financial databases do not estimate the fair value of inventories. Therefore, an outsider (e.g., a researcher or investor) has to estimate the fair value of inventories from other data in the financial statements. Firstly, the outsider should determine the boundaries of the fair value measurement.

To determine the lower bound, we note that the book value of inventories will be the lower of cost and net realisable value. In this respect, the vast majority of inventories are carried at cost and reporting a gross loss is rare (Welc 2020). It is possible that the fair value of inventories carried at net realisable value could be lower than their book value. However, as net realisable value requires an entity to consider its specific circumstances (e.g., its specific contractual obligations), the possibility remains that the fair value of the inventories (an open market value) is higher than the book value. In addition,

write-downs to net realisable value are reported as part of gross profit. It follows that, for entities that report a positive gross profit, inventories at net realisable value are highly unlikely to dominate the inventory balance. As most inventories are carried at cost (Welc 2020), it is therefore reasonable to assume that, on average and in a large sample, the fair value of inventories will exceed their book values.[5]

The upper bound requires deeper consideration. Accounting standard guidance in IFRS 13 determines that fair value measurements for non-financial assets should reflect their highest and best use (IASB 2011). Furthermore, under IFRS 13, fair value measurements should assume that market participants own the necessary complementary assets to derive the highest and best use from the asset, including completing an asset if necessary (IASB 2011). Therefore, if a firm holds raw materials or work-in-progress, their fair value measurement should assume that they are converted to finished goods (adjusted for cost of conversion), if this maximises the fair value to be derived from them.[6] Again, as the objective of business is to realise a positive margin, the fair value of raw materials and work-in-progress will virtually always exceed their cost under these assumptions. A similar scenario applies if the inventories are being sold together with related services. The fair value measurement guidance assumes that the transferee already has the necessary assets to deliver the related services if this is the highest and best use of the inventories.

More practically, while guidance permits various approaches to determine fair value, Reis and Stocken (2007) determine that the fair value of inventories should be calculated using an income approach (i.e., based on the expected future revenue from their sale). However, IFRS 13 determines that the fair value of inventories differs from the amount in a sales transaction to an end customer (IASB 2011). Fair value of inventories should reflect a transferee that will sell these inventories to its own end customer and, presumably, realise a profit in the process. Consequently, under current accounting standard guidance, the fair value of inventories for a transferor is *not* its expected revenue from sale in the normal course of business to an end customer, but this revenue does represent its upper bound.

Importantly, the accounting standard guidance means that fair values for inventories will automatically contain entity-specific elements. For example, the finished products for one firm can be the raw materials for another. As the fair value of raw materials should assume their conversion into a finished product (if this is the highest and best use), the fair value of identical inventories could differ between firms. Therefore, it would be consistent with the general principles for measuring fair value of non-financial assets currently applied under IFRS, to determine fair values for inventories on the basis of information in a specific firm's financial statements. In other words, the upper bound for the fair value of inventories will be the book value of inventories plus the expected margin on sale.

Therefore, we conclude that the fair value of inventories lies somewhere between its book value and expected selling price. This is consistent with current accounting guidance as discussed above, as well as with the following limited instances where inventories are currently measured at fair value. Firstly, the closest related asset to general inventories, namely, biological assets, are measured at fair value less costs to sell under IAS 41 (IASB 2014). Secondly, when inventories are measured at fair value at the acquisition date in a business combination, IFRS 13.B35(f) explicitly determines that the fair value of inventories is the price that would be received if the inventories were to be transferred to another firm that would complete the requisite selling efforts (IASB 2011).[7]

Consequently, to determine the fair value of inventories, we start by obtaining data items for revenue (WC01001) and cost of sales (WC01051) from the Refinitiv database and calculate the gross profit for firm i in year t as:

$$\text{Gross profit}_{i,t} = \text{Revenue}_{i,t} - \text{Cost of sales}_{i,t} \quad (1)$$

To adjust the book value of inventories to fair value, the calculated gross profit must be converted into a margin expression. In this respect, we consider different possibilities which are illustrated further in Appendix A.

The first possibility is to divide gross profit by cost of sales (resulting in gross mark-up). If cost of sales were to include only costs that are permitted to be capitalised to inventories, the resulting fair value measurement would then be equal to the unadjusted selling price of inventories. However, it is possible that cost of sales will include costs that are excluded from the cost of inventories, such as storage costs or selling costs. Under such conditions, the fair value of inventories calculated by applying gross mark-up to book value will fall below unadjusted selling prices. However, the difference between the fair value calculated in this manner and the unadjusted selling prices will depend on the materiality of non-capitalised costs to total cost of sales. If the non-capitalised costs are immaterial, the resulting fair value measurement would not differ significantly from unadjusted selling prices. This is an important consideration, as such an answer is inconsistent with current accounting guidance discussed earlier (in terms of which the fair value of inventories for a transferor is not the expected selling price to its own end customer) and outsiders may take this guidance into consideration when determining the fair value of inventories.

When non-capitalised costs form a material portion of cost of sales, fair values of inventories calculated using

gross mark-up allocate a marginally higher proportion of profit to the transferee as the gross mark-up increases. A higher gross mark-up reasonably reflects that completion of a sales transaction requires greater effort, so that a transferee requires a larger portion of the potential profit to accept such a transfer. However, as further illustrated in Appendix A, calculating the fair values of inventories using the gross mark-up implies that market participants are either indifferent to risk or that the risk and uncertainty of realising cash flows from the sale of the inventories are substantially lower for the transferee compared to the transferor. This uncertainty is an important consideration when determining fair value, as IFRS 13.B16 determines that faithful representation of fair value requires that an appropriate risk premium be incorporated for uncertain cash flows (IASB 2011). As a sale to an end customer is not a certainty, faithful representation of the fair value of inventories should reflect the risk inherent to the underlying cash flows.

Considering that fair values calculated using the gross mark-up do not incorporate an adequate risk premium, we consider a different possibility, which is to divide gross profit by revenue, resulting in gross margin. In contrast to using gross mark-up, using the gross margin to calculate the fair value of inventories ensures that the resulting value is *always* lower than the expected selling price to an end customer, irrespective of the degree to which costs that are not capitalised to inventories form part of cost of sales. This means that the resultant fair value meets the requirements of current accounting guidance. Furthermore, Appendix A shows that the practical outcome from using this approach is that fair values calculated by using the gross margin allocate a larger portion of the total potential profit to the transferee as the gross margin increases (i.e., calculated fair values are proportionally closer to book value when the margin is high). In other words, fair values calculated using the gross margin assume that market participants demand a higher risk premium to accept a transfer as the gross margin increases. In our view, the practical outcome of using gross margin to calculate the fair value of inventories therefore better matches the expected risk premium of such a transfer.

We conclude that utilising gross margin to calculate fair value of inventories has practical merit and we calculate the fair value of closing inventories by obtaining the book value of inventories (WC02101) from Refinitiv and adjusting it using the gross margin as follows:

$$\text{Fair value}_{i,t} = \text{Book value}_{i,t} \times (1 + \text{Gross profit}_{i,t}/\text{Revenue}_{i,t}) \quad (2)$$

We acknowledge that the resulting fair value measurement is not ideal or perfectly accurate. However, some measurement error is to be expected whenever fair value measurement is utilised, which does not prevent the information from being decision-useful (Barth 2018). This is further supported by evidence that fair value measurement does not increase audit risk (Sangchan et al. 2020). Furthermore, insight into *current* value-relevance can only be determined with reference to data that are *currently* available to outsiders. As outsiders could be affected by *current* accounting standard guidance about determining fair values for inventories, we believe it is important that our fair value measurement should fall within the bounds dictated by that guidance.

However, we are also aware that accounting standard guidance is not the only source that determines our understanding of economic and accounting phenomena. In fact, in their theoretical modelling, Reis and Stocken (2007) assume that the fair value of inventories is the unadjusted selling price to an end customer. Moreover, as inventories represent a cost value, it may be argued that grossing up book value by using a cost-based ratio (gross mark-up) has theoretical merit. In addition, if non-capitalised costs are material, gross mark-up remains theoretically consistent in allocating a greater portion of profit to the transferee as the gross mark-up increases. Therefore, we also consider the impact on all of our analyses if the fair value of inventories is calculated using the gross mark-up (resulting in a fair value which is closer to the expected selling price of the inventories than what is achieved by applying gross margin).

Notably, any fair value calculation for inventories (by insiders or outsiders) will require subjectivity and should use an income approach (Reis and Stocken 2007). By implication, all fair value calculations for inventories will reference expected revenue or expected profit on sale. Consequently, fair values calculated under alternative methods are likely to be highly correlated with the measurements utilised in this paper.

Market Analyses

Research methodology

Value-relevance research often relates the equity market value of a firm to summative measures of accounting information, namely, the book value of equity and earnings (Barth et al. 2001). This approach reflects a simplified residual earnings valuation model (Ohlson 1995) which is equivalent to free cash flow valuation, provided that the model is properly implemented (Lundholm and O'Keefe 2001). This model can be implemented as a price-level specification or a returns specification, where the latter is most appropriate for research questions around the timeliness of information (Barth et al. 2001). As we are primarily interested in whether the fair value of inventories and changes therein are priced, rather than the timeliness of their incorporation into market

value, we use a price-level specification. The basic form of the price-level specification used in prior research is (firm and time subscripts have been suppressed):

$$MV3 = \alpha + \beta_1 BVC + \beta_2 NI + \varepsilon \quad (3)$$

where *MV3* is the market value of equity, *BVC* is the closing book value of equity and *NI* represents earnings attributable to ordinary shareholders. *MV3* is specified three months after the reporting date to allow for the information dissemination process (Veith and Werner 2014).

Following a traditional value-relevance approach, the variable of interest, namely, inventories, would be separated from the closing book value of equity. The fair value component of the inventories is then added to the model:

$$MV3 = \alpha + \beta_1 BVEclose + \beta_2 InvClose + \beta_3 FVclose + \beta_4 NI + \beta_5 Neg + \varepsilon \quad (4)$$

where *BVEclose* is the closing book value of equity, excluding the closing book value of inventories, which is separately included in the model as *InvClose*. The difference between the fair value of closing inventories and their book value (the fair value component) is included as *FVclose* in this model. *Neg* is included as a control variable for loss-making firms, as loss-making firms are priced differently from profit-making firms (Hayn 1995). This variable is set to one if earnings are negative and zero otherwise. All other variables are as previously defined.

However, model (4) is a clean surplus model and does not accurately reflect accounting interrelationships which is a necessary precondition to draw meaningful conclusions (Penman and Yehuda 2009). Accommodating a more accurate reflection of accounting interrelationships in model (4) means that the model must reflect the reality of dirty surpluses and avoid double-counting the same accounting information. This leads to the following specification:

$$MV3 = \alpha + \beta_1 BVE + \beta_2 Inv + \beta_3 \Delta BVE + \beta_4 FV + \beta_4 NI + \beta_5 Neg + \varepsilon \quad (5)$$

where *BVE* is the *opening* book value of equity, excluding the *opening* book value of inventories, which is included separately in the model as *Inv*. ΔBVE is the difference between the opening and closing book value of equity for the period. As earnings (*NI*) is entered separately into the model, ΔBVE reflects the change in the book value of equity excluding earnings. *FV* is the difference between the fair value of *opening* inventories and their book value (i.e., the fair value component). All other variables are as previously defined.

To investigate the impact that measurement at fair value will have on historical cost earnings, *NI* is separated into its comprising components and the fair value movement is added. This results in the following model to be estimated:

$$MV3 = \alpha + \beta_1 BVE + \beta_2 Inv + \beta_3 FV + \beta_4 \Delta BVE + \beta_5 GP + \beta_6 \Delta Inv + \beta_7 \Delta FV + \beta_8 NIoth + \beta_9 Neg + \varepsilon \quad (6)$$

where earnings *(NI)* in the previous models is represented in model (6) by its components, that is, *GP*, the gross profit, excluding the change in the book value of inventories; ΔInv, the change in the book value of inventories; and *NIoth*, the remaining component of earnings. ΔFV is the fair value movement for inventories (i.e., the change in the fair value component of inventories for the year). All other variables are as previously defined.

Model (6) results in changes in quantities, as well as changes in prices of inventories, to be recognised in earnings. This ensures that historical cost earnings, which recognise changes in inventory quantities in earnings, remain available to investors. Furthermore, changes in quantity and price are also recognised in earnings under IAS 41 for the closest related asset measured at fair value, namely, biological assets (IASB 2014).[8] Model (6) includes the book value of inventories and gross profit, thereby controlling for the elements used to calculate the fair value of inventories. As the fair value information and historical cost information are included for both the balance sheet and earnings, the model can detect the incremental value-relevance of fair value measurement when historical cost information remains available.

Scaling and outliers

All variables, apart from the indicator variable (*Neg*), are scaled by the number of shares outstanding, which most reliably compensates for scale effects when using accounting data (Barth and Clinch 2009; Aledo Martínez et al. 2020). To mitigate against the impact of outlying observations, we winsorise all variables, other than *Neg*, by year, at the 5% and 95% levels, similar to prior research (Barth et al. 2012; Cipriano et al. 2022).

Sample, data and descriptive statistics

The sample includes all firms listed in the UK on the Refinitiv database that report from 1 January 2009 to 31 December 2018. Live and dead tickers are included in the sample. Data for all variables are obtained from Refinitiv. We select the UK for its deep markets and

IFRS reporting requirements, which increase the likelihood that investors will be familiar with using fair value measurements, whether reported in the financial statements or developed themselves. Using a sample period of 2009–2018 ensures sufficient data for the analyses, while simultaneously avoiding the potentially confounding impacts of the global financial crisis dating from 2007 to 2008 (Francis et al. 2013; Kane et al. 2015) and the global pandemic at the start of 2020.

Panel A of Table 1 reconciles an initial sample of 15 092 firm years to a final sample of 8080 firm years (representing 1355 unique firms) for the market analyses. Panel B of Table 1 shows that 37 industries are identified using sector classifications on Refinitiv. The largest industry grouping in the sample is support services (10.3%) while no other industry grouping represents much above 6% of the sample.[9] Panel C of the same table reveals a fairly stable spread of firm years across the years of the sample period. The decline in firm years in later sample years is consistent with the decline in the number of listed companies in the UK since the turn of the millennium (Stafford et al. 2019; Kyriakou 2020).

Panel A of Table 2 contains the descriptive statistics for the winsorised variables of the market analyses. Sample firms hold mean (median) inventories (*Inv*) of 35.3p (7.8p) per share, which represents around 11% (6%) of the mean (median) market value of equity (*MV3*). This suggests that inventories represent significant assets of the sample firms. It is also possible to deduce from Panel A that, on average, the estimated fair value of inventories is around 34%–35% higher than their book value. The fair value component of the balance sheet measurement (*FV*), being the difference between the fair value of inventories and their book values, equates to around 2%–4% of the market value of equity. This would be economically significant, even when a market-to-book ratio of one is assumed. A potential concern for our analysis is a situation where a firm reports a gross loss, as this could confound our estimate of the fair value of inventories. In this respect, we note that the minimum value for both gross profit (*GP*) and the fair value component of the balance sheet measurement (*FV*), although low, is positive, implying that our sample excludes firms that report a gross loss.

Pearson and Spearman univariate correlations (untabulated) support a view of economic significance, as both the book value of inventories (*Inv*) and the uplift to fair value (*FV*) are significantly correlated with the market value of equity at the 1% level. In fact, all of the independent variables are significantly correlated with the market value of equity at the 1% level and with each other at the 10% level or better. This implies potential multicollinearity, which is considered in the discussion of the multivariate regression results in the section titled 'Market Analyses: Additional Considerations and Results'.

Market analyses results

Table 3 contains the results of the market analyses.[10] The column labelled MM1 reflects the value-relevance results from a traditional value-relevance model, which separates only the balance sheet variable to investigate the impact of fair value measurement. These results show that the historical cost of closing inventories (*InvClose*) is positive and significant at the 1% level ($p = 0.002$). Furthermore, the fair value component of closing inventories (*FVclose*) is positive and significant at the 5% level ($p = 0.025$). The column labelled MM2 shows that results remain qualitatively the same if the model is adjusted to reflect opening balances and a dirty surplus approach to the book value of equity. The opening historical cost of inventories (*Inv*) is positive and significant at the 1% level ($p = 0.009$) and the fair value component of these inventories (*FV*) is positive and significant at the 5% level ($p = 0.020$). Therefore, the results from a traditional value-relevance model imply that the fair value component of inventories is value-relevant.

Interestingly, the coefficient for the book value of equity is close to one in these results, while the coefficients for the inventory variables and net income are much higher. These results are consistent with theoretical arguments that inventories represent a greater than one-to-one relationship with market value (Penman 2007) and that net income is a proxy for unrecognised assets on the balance sheet (Barth et al. 2001).

The last two columns in Table 3 display results when we explicitly model the impact of fair value measurement on earnings. The column labelled MM3 models the relevant earnings components while using closing balances. While the historical cost of closing inventories (*InvClose*) remains positive and significant at the 1% level ($p = 0.001$), the fair value component of closing inventories (*FVclose*) is no longer significant ($p = 0.578$). In the case of earnings, gross profit (*GP*), the change in book value of inventories (ΔInv) and the fair value movement for inventories (ΔFV) are all positive and significant at the 1% level. Results are very similar when the model is adjusted to reflect opening balances and a dirty surplus approach to the book value of equity. The column labelled MM4 shows that the historical cost of opening inventories (*Inv*) is positive and significant at the 5% level ($p = 0.020$) but that the fair value component of opening inventories (*FV*) is not significant ($p = 0.551$). In the case of earnings, gross profit (*GP*) and the change in the book value of inventories

Table 1 **Sample reconciliation and composition**

Panel A: Sample reconciliation

Description	Firm years	Unique firms
Starting firms with market value and accounting data for the sample period	15 092	2178
Removing duplicates for firms with more than one share class	(654)	–
Firms before applying restrictions unique to this paper	14 438	2178
No inventory information (opening, closing or both balances missing)	(6009)	
No information to calculate gross margin (current or previous year information missing)	(272)	
Firms delisted within three months after a reporting date	(68)	
No earnings information	(1)	
One firm, representing an obvious outlier, removed[a]	(8)	
Firms for market analyses	8080	1355
No operating cash flow information (current, previous or next year information missing)	(673)	
Other information missing for the additional analyses (e.g., operating profit information)	(5)	
Firms for operating analyses (cash flow used to calculate working capital changes)	7402	1220
Trade receivables or accounts payable data missing	(262)	
Firms for operating analyses (balance sheet used to calculate working capital changes)	7140	1196

Panel B: Sample composition per industry

Industry [b]	Firm years	%	Industry[b]	Firm years	%
Aerospace and Defence	125	1.5	Industrial Engineering	180	2.2
Alternative Energy	84	1.0	Industrial Metals and Mining	166	2.1
Automobiles and Parts	53	0.7	Industrial Transportation	128	1.6
Banks	4	0.1	Leisure Goods	73	0.9
Beverages	97	1.2	Media	421	5.2
Chemicals	189	2.3	Mining	420	5.2
Construction and Materials	319	4.0	Nonlife Insurance	4	0.1
Electricity	52	0.6	Oil and Gas Producers	403	5.0
Electronic and Electrical Equipment	460	5.7	Oil Equipment and Services	112	1.4
Financial Services (Sector)	160	2.0	Personal Goods	112	1.4
Fixed Line Telecommunications	147	1.8	Pharmaceuticals and Biotechnology	356	4.4
Food and Drug Retailers	98	1.2	Real Estate Investment and Services	256	3.2
Food Producers	242	3.0	Real Estate Investment Trusts	52	0.6
Forestry and Paper	20	0.2	Software and Computer Services	493	6.1
Gas, Water and Multi-utilities	98	1.2	Support Services	835	10.3
General Industrials	217	2.7	Technology Hardware and Equipment	247	3.1
General Retailers	487	6.0	Tobacco	20	0.2
Health Care Equipment and Services	258	3.2	Travel and Leisure	477	5.9
Household Goods / Home Construction	215	2.7	**Total**	**8080**	**100.0**

Panel C: Sample composition per sample year

Year	Firm years	%
2009	927	11.5
2010	865	10.7
2011	834	10.3
2012	817	10.1
2013	796	9.9

(*Continued*)

Table 1 (Continued)

Panel C: Sample composition per sample year		
Year	**Firm years**	**%**
2014	787	9.7
2015	784	9.7
2016	771	9.5
2017	751	9.3
2018	748	9.3
Total	**8080**	**100.0**

[a] The firm in question has a low number of shares outstanding. This results, for example, in a market value per share of over £1 million, while the next largest firm has a market value per share of around £120.
[b] Industry is based on sector classifications on Datastream. Where sector classifications are missing (for a limited number of observations), firms are manually allocated to sectors using available subsector classification information from the database.

(ΔInv) remain positive and significant at the 1% level, while the fair value movement for inventories (ΔFV) is positive and significant at the 5% level ($p = 0.017$).

Therefore, when we explicitly model the earnings impact, the fair value component for inventories on the balance sheet is not value-relevant in either of the model specifications. By contrast, the historical cost of inventories remains value-relevant. The results imply that the fair value of inventories on the balance sheet is primarily value-relevant in earlier analyses because of the historical cost information that it contains. In the case of earnings, both historical cost earnings and fair value movements have information content, which implies that investors use both components for decisions and supports the theoretical recommendation of Kothari et al. (2010) that historical cost earnings should be available to investors.

This conclusion is supported when the coefficients from these models are evaluated. The book value of equity coefficient remains close to one and the combined coefficients for balance sheet inventories decline compared to the earlier models. Importantly, the coefficients of the change in book value of inventories (ΔInv) and the fair value movement for inventories (ΔFV) are both greater than one-to-one as Penman (2007) predicts. By implication, these variables represent unrecognised assets (Barth et al. 2001). The unrecognised asset is the future profit from selling the inventories, as Reis and Stocken (2007) show that changes in the quantity and price of inventories (their fair value) predict changes in future revenues. In common parlance, this asset is the value of the customer relationships or internally generated goodwill. Interestingly, the coefficient for gross profit (GP) is greater than one, while the coefficient for *NIoth* is well below one. This is consistent with prior research findings that gross profit contains greater decision-useful information than other earnings measures (Novy-Marx 2013).

In summary, conclusions about the value-relevance of balance sheet fair value measurement for inventories are inconsistent between different value-relevance specifications. Prior research suggests that better modelling of the interrelationship between financial statements improves the likelihood of meaningful inferences (Penman and Yehuda 2009), which implies a preference for modelling the earnings impact explicitly. However, additional investigation is required to determine which model specification provides meaningful results, which is discussed in the section titled 'Cash Flow and Earnings Analyses'.

Market analyses: Additional considerations and results

The results of univariate investigations reveal that multicollinearity could be a concern. Therefore, Table 3 also reports the variance inflation factor (VIF) for each of the independent variables. The VIFs are all less than five and well below the critical level of 10. Therefore, multicollinearity does not impact on inferences.

We also consider the impact of the length of the return window on results. The dependent variable, market value of equity, is specified three months after the reporting date. The three-month lag is to allow for the dissemination of financial information and is the most commonly used return window in value-relevance research (Veith and Werner 2014). However, Veith and Werner (2014) find that different return windows can impact on inferences and recommend a six-month return window for markets such as the UK, where most financial reports are released semi-annually. Therefore, we also run all the market analyses using a six-month return window for the dependent variable. Untabulated results show that results are qualitatively similar for all the analyses and independent variables, with the exception of *NIoth* (the difference between gross profit and earnings) which is insignificant in a longer return window. Consequently, the choice of return window does not impact on inferences.

Table 2 Descriptive statistics for winsorised variables

Panel A: Descriptive statistics of variables for market analyses

Variable	N	Mean	Median	Standard deviation	Minimum	Maximum
MV3	8080	3.269	1.258	4.825	0.014	24.209
BVE	8080	1.056	0.474	1.492	–0.364	6.829
Inv	8080	0.353	0.078	0.587	<0.000	2.860
FV	8080	0.120	0.027	0.202	<0.000	0.926
ΔBVE	8080	–0.074	–0.008	0.295	–1.099	0.711
GP	8080	1.116	0.489	1.535	<0.000	7.338
ΔInv	8080	0.017	0.001	0.076	–0.305	0.290
ΔFV	8080	0.008	<0.000	0.034	–0.115	0.140
NIoth	8080	–0.990	–0.448	1.331	–6.119	–0.004
Neg	8080	0.331	0.000	0.471	0.000	1.000

Panel B: Descriptive statistics of variables for operating analyses (balance sheet used to calculate working capital changes)

Variable	N	Mean	Median	Standard deviation	Minimum	Maximum
CFOnext	7140	0.374	0.149	0.571	–0.089	3.069
ΔCFOnext	7140	0.027	0.007	0.132	–0.346	0.487
CFOthis	7140	0.348	0.138	0.532	–0.124	3.105
ΔCFOthis	7140	0.023	0.006	0.130	–0.409	0.480
OPnext	7140	0.334	0.123	0.532	–0.123	3.012
ΔOPnext	7140	0.020	0.007	0.112	–0.330	0.410
OPthis	7140	0.312	0.117	0.493	–0.133	2.774
ΔOPthis	7140	0.015	0.006	0.113	–0.442	0.366
Size	7140	11.724	11.609	2.478	2.996	18.561
MTB	7140	2.301	1.540	2.221	–0.298	10.524
GPexcl	7140	1.185	0.530	1.614	<0.000	8.291
WC1	7140	0.490	0.151	0.769	–0.116	4.354
ΔWC1	7140	0.021	0.002	0.138	–0.472	0.743
FVclose	7140	0.135	0.031	0.227	<0.000	1.220
ΔFV	7140	0.008	<0.000	0.034	–0.109	0.156
Neg	7140	0.311	0.000	0.463	0.000	1.000

Panel C: Descriptive statistics of variables for operating analyses (cash flow used to calculate working capital changes)

Variable	N	Mean	Median	Standard deviation	Minimum	Maximum
ΔCFOnext	7402	0.027	0.007	0.131	–0.357	0.487
ΔCFOthis	7402	0.023	0.006	0.129	–0.409	0.480
ΔOPnext	7402	0.020	0.001	0.112	–0.311	0.410
ΔOPthis	7402	0.015	0.006	0.113	–0.442	0.366
Size	7402	11.706	11.589	2.287	7.512	16.184
MTB	7402	2.283	1.524	2.217	–0.247	10.524
GPexcl	7402	1.162	0.511	1.589	<0.001	8.103
ΔWC2	7402	0.021	0.003	0.120	–0.462	0.500
ΔFV	7402	0.008	<0.000	0.035	–0.129	0.140
Neg	7402	0.317	0.000	0.465	0.000	1.000

Variables are defined in Appendix B. The fair value of inventories is calculated in each instance by adjusting the book value of inventories by the gross margin. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels.

Cash Flow and Earnings Analyses

The theory behind decision-useful fair value measurements

The section titled 'Market Analyses' shows that model specification impacts on the value-relevance conclusions of this paper. Value-relevance research depends on predicted associations with the market value of equity (Barth et al. 2001). When market value is the dependent variable, tests of association can easily reflect meaningless relationships, as Leinweber (2007) shows by way of several examples. Therefore, the underlying theory must be considered to ensure that detected relationships

Table 3 Market analyses results

Market model	MM1		MM2		MM3		MM4	
Model description	Traditional model		Traditional model with dirty surplus		Modelling earnings impact (closing balances)		Modelling earnings impact (opening balances)	
Variables	Beta	VIF	Beta	VIF	Beta	VIF	Beta	VIF
BVE			***0.920 (<0.001)	1.123			***0.787 (<0.001)	1.267
BVEclose	***0.961 (<0.001)	1.138			***1.009 (<0.001)	1.176		
Inv			***1.313 (0.009)	2.427			**1.269 (0.020)	2.526
InvClose	***1.644 (0.002)	2.505			***1.762 (0.001)	2.671		
FV			**2.359 (0.020)	2.462			0.490 (0.551)	3.007
FVclose	**2.636 (0.025)	2.582			–0.568 (0.578)	3.400		
ΔBVE			*0.576 (0.081)	1.125			0.318 (0.312)	1.181
GP					***1.205 (<0.001)	3.165	***1.512 (<0.001)	3.051
ΔInv					***3.357 (<0.001)	2.299	***5.210 (<0.001)	2.318
ΔFV					***2.758 (0.003)	2.707	**3.309 (0.017)	2.293
NIoth					*0.300 (0.073)	2.231	***0.587 (0.004)	2.817
NI	***3.637 (<0.001)	1.482	***4.710 (<0.001)	1.379				
Neg	***0.518 (0.002)	1.286	***0.461 (0.003)	1.297	**–0.248 (0.011)	1.130	***–0.397 (0.002)	1.124
Year fixed effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Firm fixed effects	Yes		Yes		Yes		Yes	
N	8080		8080		8080		8080	
Within R-square	38.3%		35.5%		34.9%		30.5%	

Variables are defined in Appendix B. The fair value of inventories is calculated in each instance by adjusting the book value of inventories by the gross margin. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels. *p*-values for two-tailed significance are indicated in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Significance of standard errors is based on robust standard errors clustered in three dimensions, namely, by firm, year and industry. VIF is the variance inflation factor.

are not spurious (Ilmanen 2011). For value-relevance models, the underlying theory is valuation theory, which explains how investors make decisions, while value-relevance research seeks to identify information that correlates with these decisions. Therefore, we evaluate the circumstances under which valuation theory recommends the use of fair values for decisions.

In this respect, valuation theory distinguishes between non-operational and operational assets. In the case of *non-operational* assets and liabilities, valuation theory often recommends incorporating their fair values separately in a valuation (Nissim and Penman 2001; Koller et al. 2010). This approach is seen as appropriate for assets and liabilities that do not share synergies with the rest of the firm (Nissim and Penman 2001; Penman 2007; Koller et al. 2010). However, in the case of *operational* assets and liabilities, synergies arise which causes the sum of their standalone market values (fair values) to equal less than their value when combined. Therefore, the recommended valuation approach for operational assets and liabilities is a cash flow or earnings approach that can reflect these synergies (Nissim and Penman 2001; Penman 2007; Koller et al. 2010).

In summary, valuation theory creates the expectation that, for *non-operational* assets and liabilities, the fair value component on the balance sheet should be value-relevant, while historical cost earnings and fair value movements should not be. By contrast, there is an expectation that, for *operational* assets and liabilities (which are valued using a cash flow or earnings valuation approach), the standalone fair value information should not be value-relevant, while historical

cost earnings (used for valuation purposes) should be. As inventories represent an operational asset, the initial expectation from valuation theory is therefore that the fair value information for inventories should not be value-relevant in any of the model specifications.

However, in the case of operational assets, the fair values of operational assets could be decision-useful because of the information they correlate with. Reis and Stocken (2007) determine that the fair value of inventories should be determined using an income approach. An income approach under IFRS 13 is based on forecasted cash flows or earnings (IASB, 2011) and the calculated fair value therefore correlates with this information. The starting point (current cash flows or earnings) for management and investors is the same and therefore some similarity in forecasts is to be expected. However, management has an information advantage and their forecasts (incorporated in the reported fair value measurement) could serve as a guide for investors. This would create information content (i.e., value-relevance) for fair value information of operational assets. When investors can distinguish between the earnings of the current period (historical cost earnings) and the earnings of future periods that have been recognised during the current period (fair value movements) both can be useful in an equity valuation. Historical cost earnings will be value-relevant as the starting point of forecasts, while fair value information will serve as a guide to forecasting the future cash flows or earnings.

Importantly, research around non-operational assets already suggests that investors sometimes deviate from valuation theory conventions, so that deviations from theory could also be possible for operational assets. For example, the valuation literature largely considers investments in associates to be non-operational assets and recommends that their fair values be incorporated separately into equity valuations (Koller et al. 2010). However, Badenhorst et al. (2015) suggest that investors use disclosed accounting information of listed associates to develop their own intrinsic valuation for these investments, instead of using disclosed fair values. By contrast, Badenhorst et al. (2016) conclude that fair values as well as equity accounted carrying amounts are utilised by investors. It may be that investors use both sets of information. Alternatively, some investors may use the fair values directly while others develop their own intrinsic valuation. These findings therefore imply that, in contrast to valuation theory, the valuation of non-operational assets requires more than fair value measurements.

Consequently, a true test of association from a value-relevance model should rely on an even deeper valuation principle, namely, that the value of any asset is the present value of its future cash flows (Penman 2007; Ilmanen 2011). True value-relevant information assists in predicting future cash flows. However, earnings are also frequently used as a heuristic valuation method (Penman and Yehuda 2009), so that meaningful value-relevant information should also correlate with future earnings. Indeed, when Aboody et al. (1999) investigate the value-relevance of property, plant and equipment revaluations (operational assets), they also consider whether these correlate with future cash flows and earnings. We therefore use a similar approach to assess whether value-relevance associations for inventories (also an operational asset) are meaningful.

Research methodology

To test whether the fair value measurements correlate with future cash flows (or future earnings), we use an approach similar to that of Aboody et al. (1999) and estimate the following model (firm and time subscripts have been suppressed):

$$Next = \alpha + \beta_1 This + \beta_2 Size + \beta_3 MTB + \beta_4 WC1 + \beta_5 FV close + \beta_6 Neg + \varepsilon \quad (7)$$

Next in Model (7) alternatively represents operating cash flow or operating profit of the next reporting period. To eliminate the mechanical impact that changes in inventories have on operating cash flow, operating cash flow is specified before working capital changes. We use operating profit, as Ball et al. (2015) show that operating profit best correlates with future equity returns. The model only considers one year of future cash flow or profit for two reasons. Firstly, inventories generally have a short-term operating cycle and tend to realise within one year. Secondly, both the opening and closing balance of inventories form part of the calculation of cash flow and profit. By implication, inventories have a limited timeframe during which they are useful for predictions before being replaced by new information.

This in Model (7) alternatively represents operating cash flow or operating profit of the current reporting period to control for serial correlation inherent to cash flows and profits (Aboody et al. 1999). *Size* is the natural logarithm of the market value of equity at the reporting date. *MTB* is the market-to-book ratio at the reporting date. *WC1* is working capital calculated from the balance sheet as net receivables plus inventories reduced by accounts payable. *Neg* is an indicator variable set to one if earnings are negative and zero otherwise. The variable of interest is *FVclose*, which represents the difference between the fair value of closing inventories and their book value (i.e., the fair value component).[11]

Model (7) provides insights on whether or not fair value measurements on the balance sheet correlate with future earnings or cash flows, but does not consider the correlation with fair value movements. Therefore, a change specification is also estimated to consider whether changes in fair value (the fair value movement)

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is associated with changes in future cash flows or operating profit:

$$\Delta Next = \alpha + \beta_1 \Delta This + \beta_2 Size + \beta_3 MTB + \beta_4 \Delta WC1 + \beta_5 \Delta FV + \beta_6 Neg + \varepsilon \quad (8)$$

where Δ denotes change, ΔFV is the fair value movement for inventories (i.e., the change in the fair value component of inventories for the year) and all other variables are as previously specified.

Scaling and outliers

All variables, apart from *Size*, *MTB* and *Neg*, are scaled by number of shares outstanding, which has been shown to most reliably compensate for scale effects when using accounting data (Barth and Clinch 2009; Aledo Martínez et al. 2020). To mitigate against the impact of outlying observations, we winsorise all variables, other than *Neg*, by year, at the 5% and 95% levels, similar to prior research (Barth et al. 2012; Cipriano et al. 2022).

Sample, data and descriptive statistics

The starting point for the cash flow and earnings analyses is the same sample described in the market analyses section. However, some observations are lost due to missing data on Refinitiv, mainly due to a lack of working capital or cash flow information. The sample reconciliation in Panel A of Table 1 provides further details on the nature of the missing data. This panel shows that 7140 firm years are utilised for the main cash flow and earnings analyses, represented by 1196 unique firms.

Panel B of Table 2 displays descriptive statistics for variables used in the main cash flow and earnings analyses. These reflect a mean (median) difference between the fair value and book value of closing inventories (*FVclose*) of 13.5p (3.1p) per share. This equates to roughly 28% (21%) of the mean (median) working capital (*WC1*) in which the book value of closing inventories has been included. Comparatively, the mean fair value movement of inventories (Δ*FV*) of 0.8p per share represents around 38% of the mean change in working capital (Δ*WC1*) per share. Untabulated Pearson and Spearman univariate correlations show significant correlations between each of the dependent variables and their respective independent variables at the 1% level. Most of the independent variables are also significantly correlated with each other at the 10% level or better. This implies potential multicollinearity, which is considered in the discussion of the regression results in the section titled 'Cash Flow and Earnings Analyses: Additional Considerations and Results'.

Main cash flow and earnings analyses results

The regression results are contained in Table 4. The first column in Panel A shows that the closing fair value component of inventories *(FVclose)* is significantly associated with future operating cash flows ($p = 0.016$). It is also significantly associated with future operating profits as shown in the first column of Panel B, albeit at only the 10% level ($p = 0.082$). However, the closing fair value component of inventories is calculated by adjusting the book value of inventories by the gross margin. Therefore, the possibility exists that the significance reflects the information content of gross profit (the income statement measure) rather than the fair value of inventories (the balance sheet measure).

We investigate this possibility by controlling for gross profit (excluding the change in working capital) in the regressions. The third column in Panel A shows that the historical cost information (the gross profit) is significantly associated with future operating cash flows ($p = 0.004$), but that the closing fair value component of inventories is no longer significantly associated with future operating cash flows ($p = 0.209$). Panel B, in the third column, similarly reflects insignificance for *FVclose* ($p = 0.140$) when future operating profits are the dependent variable and gross profit is controlled for. Therefore, once gross profit is controlled for, the fair value component of closing inventories (the balance sheet value) is not associated with future cash flows or profits.

Next, we investigate whether the fair value movement of inventories is associated with changes in future operating cash flows or operating profit. The results from these regressions are displayed in columns (5) and (7) of Table 4. Panel A shows that the fair value movement of inventories *(ΔFV)* is positive and significantly associated with changes in future cash flows at the 5% level or better, irrespective of whether gross profits are controlled for or not. Panel B similarly shows that the fair value movement of inventories is positive and significantly associated with changes in future operating profits at the 10% level or better. In addition, irrespective of whether the association with changes in cash flows or operating profits is considered, the historical cost information in gross profit is significant at the 1% level. Consequently, these results reflect that the fair value movement of inventories (the earnings measure) is value-relevant because it is associated with changes in future operating cash flows and operating profit.[12]

The results from the cash flow and earnings analyses therefore support the value-relevance conclusions from the expanded models. We conclude that the balance sheet component for the fair value of inventories is not value-relevant in a meaningful way if historical

Table 4 Main cash flow and earnings analyses results

Panel A: Cash flow analyses

Dependent	CFOnext		CFOnext		ΔCFOnext		ΔCFOnext	
Variables	**Beta**	**VIF**	**Beta**	**VIF**	**Beta**	**VIF**	**Beta**	**VIF**
CFOthis	***0.631 (<0.001)	1.478	***0.585 (<0.001)	1.802				
ΔCFOthis					***–0.225 (<0.001)	1.131	***–0.217 (<0.001)	1.138
Size	***0.013 (0.009)	1.290	***0.014 (0.004)	1.292	–0.005 (0.281)	1.268	–0.004 (0.427)	1.275
MTB	***0.007 (0.002)	1.189	***0.007 (0.002)	1.189	***0.007 (<0.001)	1.188	***0.007 (<0.001)	1.188
GPexcl			***0.039 (0.004)	1.721			***–0.021 (0.001)	1.050
WC1	***0.053 (0.002)	1.509	***0.056 (0.001)	1.512				
ΔWC1					–0.014 (0.595)	1.260	–0.035 (0.117)	1.314
FVclose	**0.212 (0.016)	1.668	0.111 (0.209)	1.878				
ΔFV					**0.290 (0.011)	1.328	***0.321 (0.004)	1.335
Neg	***0.026 (0.009)	1.094	**0.021 (0.031)	1.103	***0.028 (0.001)	1.097	***0.028 (0.001)	1.097
Year fixed effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Firm fixed effects	Yes		Yes		Yes		Yes	
N	7140		7140		7140		7140	
Within R-square	46.7%		47.3%		6.0%		6.8%	

Panel B: Operating profit analyses

Dependent	OPnext		OPnext		ΔOPnext		ΔOPnext	
Variables	**Beta**	**VIF**	**Beta**	**VIF**	**Beta**	**VIF**	**Beta**	**VIF**
OPthis	***0.681 (<0.001)	1.475	***0.671 (<0.001)	1.737				
ΔOPthis					**–0.086 (0.021)	1.178	**–0.078 (0.042)	1.188
Size	0.005 (0.240)	1.295	0.005 (0.218)	1.296	***–0.010 (0.009)	1.269	**–0.009 (0.014)	1.275
MTB	**0.007 (0.034)	1.190	**0.007 (0.034)	1.190	***0.005 (0.001)	1.187	***0.005 (0.001)	1.188
GPexcl			0.009 (0.197)	1.662			***–0.017 (0.005)	1.053
WC1	***0.052 (0.003)	1.502	***0.052 (0.004)	1.503				
ΔWC1					0.015 (0.409)	1.261	–0.002 (0.921)	1.313
FVclose	*0.183 (0.082)	1.667	0.160 (0.140)	1.885				
ΔFV					*0.140 (0.072)	1.368	**0.161 (0.048)	1.374
Neg	**0.015 (0.016)	1.094	**0.014 (0.016)	1.102	***0.028 (<0.001)	1.097	***0.028 (<0.001)	1.097
Year fixed effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Firm fixed effects	Yes		Yes		Yes		Yes	
N	7140		7140		7140		7140	
Within R-square	50.7%		50.7%		2.2%		3.0%	

Variables are defined in Appendix B. The fair value of inventories is calculated in each instance by adjusting the book value of inventories by the gross margin. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels. *p*-values for two-tailed significance are indicated in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Significance of standard errors is based on robust standard errors clustered in three dimensions, namely, by firm, year and industry. VIF is the variance inflation factor.

Table 5 **Additional cash flow and earnings analyses results**

Model description	Cash flow	Cash flow	Operating profit	Operating profit
ΔCFOthis	***–0.217	***–0.213		
	(<0.001)	(<0.001)		
ΔOPthis			**–0.095	**–0.087
			(0.011)	(0.019)
Size	–0.003	–0.002	**–0.008	**–0.007
	(0.507)	(0.613)	(0.016)	(0.028)
MTB	***0.007	***0.007	***0.005	***0.005
	(<0.001)	(0.001)	(0.001)	(0.001)
GPexcl		–0.010		*–0.011
		(0.124)		(0.079)
ΔWC2	***–0.178	***–0.183	**–0.080	**–0.085
	(0.003)	(0.002)	(0.024)	(0.011)
ΔFV	***0.349	***0.363	**0.190	**0.201
	(0.005)	(0.003)	(0.035)	(0.027)
Neg	***0.024	***0.024	***0.027	***0.027
	(0.002)	(0.002)	(<0.001)	(<0.001)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
N	7402	7402	7402	7402
Within R-square	8.1%	8.3%	2.9%	3.2%

Variables are defined in Appendix B. The fair value of inventories is calculated by adjusting the book value of inventories by the gross margin. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels. *p*-values for two-tailed significance are indicated in brackets. *** and ** indicate significance at the 1% and 5% levels, respectively. Significance of standard errors is based on robust standard errors clustered in three dimensions, namely, by firm, year and industry.

cost information is available. However, the changes in that fair value are meaningful as these changes correlate with changes in future cash flows and earnings. It is therefore possible to conclude that investors should use the changes in the fair value of inventories in their decisions, as this information will assist in predicting future changes in the performance of a firm.

Cash flow and earnings analyses: Additional considerations and results

The results from our univariate analyses reflect a risk of multicollinearity within the data. Therefore, Table 4 also reports the variance inflation scores for all of the regression models. These are all below two and well below the critical level of 10. Multicollinearity therefore does not impact on inferences.

We also consider the impact of the definition of working capital. The main analyses calculate changes in working capital with reference to the balance sheet numbers available on Refinitiv. However, it is also possible to calculate changes in working capital by comparing operating cash flow before working capital changes to the same measure after those changes. Some differences arise, potentially because of differences between the definition of working capital for the purposes of the balance sheet and cash flow statement on the database. The impact of these differences is small, as can be seen when comparing the descriptive statistics in Panel C of Table 2 with those in Panel B. Nevertheless, we consider the impact on results when the cash flow statement is used to calculate changes in working capital.[13] Results are displayed in Table 5. These results are qualitatively similar to those reported earlier and show that the fair value movement of inventories *(ΔFV)* is positive and significantly associated with changes in both future operating cash flows and future operating profits. Results are therefore robust to nuances in the definition of changes in working capital.

Results Using an Alternative Fair Value Measurement Calculation

The results reported in the previous sections utilise the gross margin to calculate the fair value of inventories to fall within the bounds determined by current accounting standard guidance. However, Reis and Stocken (2007) utilise the expected selling price as the fair value of inventories in their theoretical model. Applying gross mark-up to reported book value of inventories, rather than gross margin, results in a value closer to the expected selling price. Furthermore, using a cost-based ratio to adjust inventories to fair value has theoretical merit. Therefore, we also run all previous regression results, tabulated and untabulated, where the fair value

Table 6 Market analyses results using gross mark-up to estimate fair value

Market model	MM1	MM2	MM3	MM4
Model description	Traditional model	Traditional model with dirty surplus	Modelling earnings impact (closing balances)	Modelling earnings impact (opening balances)
Variables				
BVE		***0.906		***0.783
		(<0.001)		(<0.001)
BVEclose	***0.958		***1.018	
	(<0.001)		(<0.001)	
Inv		***1.499		**1.131
		(0.002)		(0.032)
InvClose	***1.804		***1.480	
	(0.001)		(0.001)	
FV		**0.987		**0.735
		(0.008)		(0.023)
FVclose	**1.186		0.477	
	(0.007)		(0.294)	
ΔBVE		*0.570		0.340
		(0.091)		(0.291)
GP			***1.108	***1.441
			(<0.001)	(<0.001)
ΔInv			***3.472	***5.119
			(<0.001)	(<0.001)
ΔFV			0.762	**1.828
			(0.130)	(0.010)
NIoth			*0.291	***0.551
			(0.091)	(0.005)
NI	***3.544	***4.644		
	(<0.001)	(<0.001)		
Neg	***0.504	***0.450	**–0.242	***–0.406
	(0.002)	(0.003)	(0.014)	(0.002)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
N	8012	8012	8012	8012
Within R-square	38.8%	35.8%	35.2%	30.9%

Variables are defined in Appendix B. The fair value of inventories is calculated in each instance by adjusting the book value of inventories by the gross mark-up. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels. *p*-values for two-tailed significance are indicated in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Significance of standard errors is based on robust standard errors clustered in three dimensions, namely, by firm, year and industry. Some observations are lost compared to the main analyses when using gross mark-up due to a lack of data.

of inventories is determined by applying the calculated gross mark-up to reported book value.

The results of the market analyses using the alternative fair value measurement are displayed in Table 6. It is evident from this table that, apart from small differences, results are largely qualitatively unchanged from the main regression results of Table 3, with two exceptions. Firstly, the fair value movement for inventories (ΔFV) is insignificant for the model specification labelled MM3 when the dependent variable is market value of equity three months after reporting date. However, untabulated results show that the variable remains significant at the 10% level when the dependent variable is market value of equity six months after the reporting date. Secondly, the fair value component on the balance sheet (*FV*) is significant at the 5% level for the model specification labelled MM4. The results for all untabulated market analyses are qualitatively unchanged from those reported earlier.

In the case of the cash flow and earnings analyses, the results when using the alternative fair value measurement are displayed in Tables 7 and 8. There are again two exceptions where results differ qualitatively from those reported earlier. Firstly, gross profit (*GPexcl*) is now significant at the 5% level or better for all the operating profit analyses. Secondly, the balance sheet fair value component (*FVclose*) is no longer significantly associated with future operating profit in any of the analyses.

Therefore, model specification continues to affect value-relevance results when the fair value of inventories is calculated by applying the gross mark-up to book value. However, the earnings and cash flow analyses results, which are used to distinguish between meaningful value-relevance results, are qualitatively unchanged.

Table 7 **Cash flow and earnings analyses results using gross mark-up to estimate fair value**

Panel A: Cash flow analyses

Dependent	CFOnext	CFOnext	ΔCFOnext	ΔCFOnext
Variables				
CFOthis	***0.633	***0.584		
	(<0.001)	(<0.001)		
ΔCFOthis			***–0.224	***–0.216
			(<0.001)	(<0.001)
Size	***0.013	***0.014	–0.005	–0.003
	(0.004)	(0.002)	(0.287)	(0.455)
MTB	***0.007	***0.007	***0.007	***0.007
	(0.002)	(0.002)	(<0.001)	(<0.001)
GPexcl		***0.039		***–0.021
		(0.003)		(<0.001)
WC1	***0.062	***0.060		
	(0.003)	(0.003)		
ΔWC1			–0.001	–0.022
			(0.969)	(0.339)
FVclose	**0.080	0.046		
	(0.008)	(0.133)		
ΔFV			**0.092	***0.103
			(0.022)	(0.010)
Neg	***0.026	**0.021	***0.028	***0.028
	(0.008)	(0.032)	(0.001)	(0.001)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
N	7089	7089	7089	7089
Within R-square	46.4%	47.1%	5.8%	6.7%

Panel B: Operating profit analyses

Dependent	OPnext	OPnext	ΔOPnext	ΔOPnext
Variables				
OPthis	***0.689	***0.673		
	(<0.001)	(<0.001)		
ΔOPthis			**–0.087	**–0.078
			(0.027)	(0.050)
Size	0.005	0.006	***–0.010	**–0.008
	(0.220)	(0.197)	(0.008)	(0.012)
MTB	**0.007	**0.007	***0.005	***0.005
	(0.034)	(0.033)	(0.001)	(0.002)
GPexcl		*0.013		***–0.017
		(0.090)		(0.004)
WC1	***0.064	***0.064		
	(0.007)	(0.007)		
ΔWC1			0.019	–0.002
			(0.313)	(0.885)
FVclose	0.043	0.032		
	(0.117)	(0.261)		
ΔFV			*0.054	**0.062
			(0.057)	(0.043)
Neg	**0.015	**0.014	***0.029	***0.029
	(0.012)	(0.019)	(<0.001)	(<0.001)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
N	7089	7089	7089	7089
Within R-square	50.2%	50.3%	2.2%	3.0%

Variables are defined in Appendix B. The fair value of inventories is calculated in each instance by adjusting the book value of inventories by the gross mark-up. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels. *p*-values for two-tailed significance are indicated in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Significance of standard errors is based on robust standard errors clustered in three dimensions, namely, by firm, year and industry. Some observations are lost compared to the main analyses when using gross mark-up due to a lack of data.

Table 8 Additional cash flow and earnings analyses results using gross mark-up to estimate fair value

Model description	Cash flow	Cash flow	Operating profit	Operating profit
ΔCFOthis	***–0.213	***–0.209		
	(<0.001)	(<0.001)		
ΔOPthis			**–0.092	**–0.085
			(0.016)	(0.026)
Size	–0.003	–0.002	**–0.007	**–0.007
	(0.534)	(0.657)	(0.012)	(0.022)
MTB	***0.007	***0.007	***0.005	***0.005
	(<0.001)	(0.001)	(0.003)	(0.003)
GPexcl		–0.010		*–0.011
		(0.126)		(0.080)
ΔWC2	***–0.168	***–0.173	**–0.076	**–0.082
	(0.003)	(0.002)	(0.026)	(0.012)
ΔFV	***0.118	***0.123	**0.073	**0.078
	(0.008)	(0.005)	(0.023)	(0.019)
Neg	***0.024	***0.024	***0.027	***0.027
	(0.002)	(0.002)	(<0.001)	(<0.001)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
N	7347	7347	7347	7347
Within R-square	7.8%	8.0%	2.9%	3.1%

Variables are defined in Appendix B. The fair value of inventories is calculated by adjusting the book value of inventories by the gross mark-up. All variables, other than indicator variables, are scaled by ordinary shares outstanding and have been winsorised at the 5% and 95% levels. *p*-values for two-tailed significance are indicated in brackets. *** and ** indicate significance at the 1% and 5% levels, respectively. Significance of standard errors is based on robust standard errors clustered in three dimensions, namely, by firm, year and industry. Some observations are lost compared to the main analyses when using gross mark-up due to a lack of data.

Consequently, we conclude that calculating the fair value of inventories by using the gross mark-up does not alter overall conclusions that the balance sheet component for the fair value of inventories is not value-relevant in a meaningful way if historical cost information is available. However, the changes in that fair value are meaningful, as these changes correlate with changes in future cash flows and earnings.

Summary and Conclusion

This paper investigates if fair value measurements for inventories are value-relevant. Despite sound theoretical arguments to suggest that fair value measurements may be decision-useful, there is also a significant amount of evidence that historical cost earnings for inventories (gross profits) are important for equity investors' decisions. Therefore, although results from a traditional value-relevance model suggest that fair value measurements for inventories are value-relevant, we also investigate further by modelling the impact on earnings explicitly. The expanded value-relevance models show that historical cost earnings remain value-relevant for inventories, even when fair value information is available. However, while the fair value movements are also value-relevant, the fair value component on the balance sheet is not.

The results imply that investors use historical cost earnings to make decisions, even when fair value information is available. This is important, as the application of fair value accounting generally does not allow investors to determine historical cost earnings for themselves. In addition, the results imply that fair value movements (changes) are of greater importance for investors' decisions than the fair value component on the balance sheet. By linking to the valuation literature, we show that, given historical cost information, the balance sheet component for the fair value of inventories is not value-relevant in a meaningful way. However, the changes in the fair value of inventories predict future changes in cash flows and earnings and reflect meaningful value-relevance.

This paper highlights an approach to sift value-relevance results for meaning when different models have conflicting results. In particular, this paper provides evidence that model specification could potentially explain why prior research finds that gross earnings (Novy-Marx 2013) and historical cost earnings outperform in predicting future returns (Ball et al. 2015) when so many fair value measurements have been found to be value-relevant (Landsman 2007; Kothari et al. 2010; Barth et al. 2021). Therefore, while we investigate the fair value measurement of inventories, our findings potentially have wider implications.

In a context where it is not certain whether fair value information is a substitute or complement for

Table 9 Comparison of hypothetical profit allocation outcomes

Information reported by the transferor in its financial statements	**Firm 1**	**Firm 2**
Revenue	100	100
Cost of sales (of inventory sold during the year)	(80)	(40)
Gross profit	20	60
Closing book value of inventories on hand at year-end	80	40
Information calculated for the transferor by an outsider	**Firm 1**	**Firm 2**
Gross margin	20%	60%
Gross mark-up	25%	150%
Estimated fair value of inventories on hand at year-end:		
• Add gross margin to book value: book value x (1 + gross margin)	96	64
• Add gross mark-up to book value: book value x (1 + gross mark-up)	100	100

Gross profit and margins for the transferee

Assumption 1: Non-capitalised costs in cost of sales for the transferor are immaterial and the expected selling price for the transferee is 100. Expected non-capitalised costs in cost of sales for the transferee are zero.

	Fair value calculated using gross margin		**Fair value calculated using gross mark-up**	
	Firm 1	**Firm 2**	**Firm 1**	**Firm 2**
Revenue of transferee	100	100	100	100
Cost of sales of transferee (fair value of inventories for the transferor)	(96)	(64)	(100)	(100)
Gross profit of transferee	4	36	0	0
Gross margin of transferee	4%	36%	0%	0%
Revenue of transferee	100	100	100	100
Book value of transferor	(80)	(40)	(80)	(40)
Non-capitalised costs in cost of sales of transferor and transferee	-	-	-	-
Total expected profit available for transferor and transferee combined	20	60	20	60
Portion of total available profit earned by the transferee	20%	60%	0%	0%

Assumption 2: Non-capitalised costs in cost of sales for the transferor are material at five for each firm. The expected selling price for the transferee is calculated to be the same as the actual selling price of the inventory on hand at year-end for the transferor. This is done by calculating the gross mark-up on inventory sold during the year, by reducing cost of sales with the non-capitalised cost and increasing gross profit with the same amount.[a] Expected non-capitalised costs in cost of sales for the transferee are five, while it is assumed that the transferor will also incur non-capitalised costs for the transferred inventories (e.g., holding costs) of five before the transfer takes place.

	Fair value calculated using gross margin		**Fair value calculated using gross mark-up**	
	Firm 1	**Firm 2**	**Firm 1**	**Firm 2**
Revenue of transferee[a]	107	114	107	114
Cost of sales of transferee[b]	(101)	(69)	(105)	(105)
Gross profit of transferee	6	45	2	9
Gross margin of transferee	6%	39%	2%	8%
Revenue of transferee	107	114	107	114
Book value of transferor	(80)	(40)	(80)	(40)
Non-capitalised costs in cost of sales of transferor and transferee	(10)	(10)	(10)	(10)
Total expected profit available for transferor and transferee combined	17	64	17	64
Portion of total available profit earned by transferee	35%	70%	12%	14%

[a] For assumption 2, the expected selling price for the transferee is calculated using insider information about the non-capitalised cost included in the transferor's cost of sales. For Firm 1, the actual gross mark-up of the transferor is therefore calculated as (20 + 5)/(80 – 5) = 33% and the expected selling price of the closing inventories for the transferee is therefore 80 x (1 + 33%) = 107. A similar process is followed for Firm 2.

[b] For assumption 2, the cost of sales for the transferee includes expected non-capitalised cost of five. The cost of sales is therefore the cost of the inventories for the transferee (the fair value for the transferor calculated using the cost of sales and gross profit as reported by the transferor in its financial statements) plus the non-capitalised cost of the transferee.

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historical cost information (McDonough et al. 2020), our findings imply the latter. This is consistent with Ribeiro et al. (2019) who find that the attributes of non-GAAP earnings measures differ from those of reported earnings, suggesting that different earnings measures are necessary to completely meet all investor needs. Indeed, some of the standard-setting projects currently underway are considering mandating more earnings subtotals, which will allow investors greater scope to develop their own earnings measures with the attributes that are most useful to them (Black et al. 2021). Notably, prior researchers have also argued that segregating fair value earnings into components is necessary to improve information content (Barth 2018; Barth and Landsman 2018). However, our empirical results suggest that historical cost earnings already do a reasonable job of capturing the information that investors desire (at least in the case of inventories). We therefore offer empirical support for the theoretical argument of Kothari et al. (2010) that historical cost earnings should be presented separately from fair value movements. Our results suggest that standard setters could consider mandating a historical cost earnings subtotal, which might be achieved by requiring fair value movements to be presented in other comprehensive income.

For practitioners, it is worth noting that separate presentation of historical cost earnings would also assist investors' understanding of the economic decisions of firms. For example, He et al. (2021) find that fair value adjustments for the biological assets of agricultural firms frequently result in managed earnings that are ignored for compensation purposes. Chen et al. (2020) reveal that unrealised fair value gains are often distributed as dividends, which may place an undue cash flow strain on a firm. As reduced information asymmetry offers a range of benefits to firms (Abad et al. 2018), preparers of financial statements might consider separately disclosing historical cost earnings on a voluntary basis.

It is important to note that it does not follow from the conclusions of this paper that inventories should necessarily be measured at fair value in the financial statements. Firstly, our findings suggest that fair value measurement on the balance sheet would add little or no information content. Secondly, we were able to easily calculate a meaningful estimate of the fair value of inventories using information in the historical cost financial statements. This leads to an important practical implication that investors are equally capable of constructing information they need. In other words, financial statements only need to provide the tools that investors need, rather than a completed edifice. Preparers of financial statements may therefore want to consider whether the level of aggregation in earnings and other disclosures obscures the tools that investors need for optimal decision making.

We caution that findings in this paper may be specific to the sample country or sample period utilised. Furthermore, this paper utilises an 'as if' fair value measurement for inventories. In this respect, Chambers et al. (2007) show that results may differ between 'as if' and actual data. In other words, findings may differ if fair value measurement for inventories is implemented and actual financial reporting data become available. It is also true that findings for fair value measurements of other assets could potentially differ from our results. Finally, our value-relevance model specification is a price-level specification. Therefore, although our overall analyses provide some evidence that fair value information about inventories is timely, this is not the primary focus of our investigations. Investigation of these and other unanswered questions we leave to future research.

Notes

1 There is an argument that both net realisable value and fair value could sometimes be developed from a common departure point, namely the expected selling price of inventories. However, neither measurement is generally available to users for inventories, most of which are measured at cost (Welc 2020).
2 As most inventories are sold at a profit (Welc 2020), if optimal quantities of inventories are produced, write-off of excess production is avoided. In turn, this increases the cumulative profitability of firms.
3 Historical cost can sometimes be the fair value at date of initial recognition, which remains a historical value if it is not subsequently updated for fair value changes.
4 Notably, Gonçalves et al. (2017) only consider value-relevance for the balance sheet in their study of biological assets measured at fair value, which limits inferences for earnings.
5 If a gross loss is used to calculate fair value, the answer would imply that the fair value is lower than the book value. This could potentially confound inferences and we therefore exclude firm years with a gross loss from the sample. By implication, we exclude observations where a gross loss reflects that fair value is lower than book value, to avoid inaccurately including observations where the gross loss might relate to unique or firm-specific circumstances during the year, which are unrelated to the fair value of closing inventories.
6 The fair value of an incomplete asset is therefore not necessarily equal to its cost (or zero). A similar principle applies when investment property under construction or a biological asset such as a growing plant is measured at fair value under existing accounting standards.
7 Inventories acquired in a business combination must be measured at fair value at acquisition date, which might therefore represent the book value for part of the inventory balance of a few sample firms. However, we are not aware of any evidence of the prevalence of inventory adjustments in business combinations. Dickinson et al. (2016) estimate such adjustments, but do not consider actual disclosures. However, they do find that the impact of inventory adjustments at the acquisition date disappears within three quarters, so that the use of annual results mitigates against this. In addition, we note that there are no disclosures that allow outsiders to assess which part of the closing inventory balance comprises inventories that were measured at fair value at acquisition date and have not yet been sold. Therefore, as value-relevance research focuses on the perceptions of investors (who,

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as outsiders, rely on the same data that researchers do), inventories measured at fair value at acquisition date should not affect inferences.

8 This treatment is theoretically consistent for all fair value measurements. When additional cost is applied to an asset, the updated fair value is determined using the new quantity of the asset held. However, for most assets measured at fair value under IFRS (e.g., financial assets, investment property) the additional cost is recognised on the balance sheet under historical cost accounting. In the case of inventories, the impact of the additional cost is recognised in earnings.

9 The firm years from the banking and insurance sector appear unusual at first, given that the sample only includes firms with inventories. However, investigations reveal that these firms are conglomerates where other divisions carry the inventories identified on the database. Similarly, for REITs with inventories, their inventories represent trading properties that must be accounted for as inventories under IFRS.

10 Standard errors are clustered by firm, year and industry, as clustering only by firm and year ignores the fact that industry shocks can be intertemporally correlated (Conley et al. 2018). Similarly, industry fixed effects are added to firm and year fixed effects in the model to reduce the risk of type 1 errors, as industry correlates with both the dependent and independent variables and is constant within the firm and year fixed effect groups (deHaan 2021).

11 Only the difference between the fair value of closing inventories and their book value is modelled, as the book value of inventories has already been included in the model as part of working capital (*WC1*).

12 The negative signs for the changes in operating cash flows ($\Delta CFOthis$), changes in operating profit ($\Delta OPthis$) and gross profit (*GPexcl*) of the current year essentially reflect the rule of large numbers. It is difficult for a firm to follow a large increase in cash flows and profits during one year with a similarly large increase in the following year.

13 It is not possible to calculate an alternative measure for working capital balances (the balance sheet number) using the cash flow statement, as cash flows are by definition a change variable.

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Conflict of Interest

All authors declare that they have no conflicts of interest in relation to this research.

Data Availability Statement

The data that support the findings of this study are available from Refinitiv. Restrictions apply to the availability of these data, which were used under licence for this study. The existence of the data that support the findings of this study can be verified at https://doi.org/10.25403/UPresearchdata.19845619. However, the underlying data are only available from the authors with the permission of Refinitiv.

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Appendix A

Using a hypothetical example, which is presented in Table 9, the discussion in this appendix shows how the total available profit from the sale of inventories to an end customer is allocated between the different parties when inventories are measured at fair value. The example considers calculations for two firms with differing profit margins. From a product perspective, Firm 1 represents a situation with an inherently lower product margin and Firm 2 represents a situation with an inherently higher product margin.

In particular, the example contrasts the proportion of the total profit that is allocated to the transferee when the fair value of inventories of the transferor is alternately calculated using gross margin and gross mark-up under varying assumptions. The modelling shows that using gross margin in the fair value calculation allocates a larger portion of the total potential profit to the transferee as the gross margin increases. In fact, under the assumptions used in the example, the portion allocated to the transferee doubles (increases from 35% to 70%). By contrast, although the potential profit allocated to the transferee also increases when using gross mark-up in the fair value calculation, the increase is much smaller. Using the same starting point, the example shows that the portion allocated to the transferee increases by around 17% (from 12% to 14%). An increase in the portion of profit allocated to the transferee is important, as a higher inherent product margin represents compensation for the fact that a sales transaction is more difficult to complete. In other words, a higher inherent product margin reflects the risk and uncertainty of realising cash flows from the sale of inventories.

Under IFRS 13, faithfully represented fair values should reflect the risk premium that market participants would demand for accepting a transfer of an asset (IASB 2011). Given the illustrated outcomes of the

hypothetical example, it is clear that fair values of inventories calculated using gross margins capture higher risk premiums in situations where they may reasonably be expected to exist. Fair values of inventories calculated using gross mark-up also allocate a greater proportion of profit to the transferee for products that are more difficult to sell. However, the allocation is much smaller and, therefore, depending on the underlying assumptions, implies that market participants are either indifferent to risk, or that the risk and uncertainty of realising cash flows from the sale of the inventories are substantially lower for the transferee compared to the transferor. This seems unlikely to be the case in reality and therefore it appears that fair values of inventories that are calculated using gross margins more faithfully represent fair values, being prices at which market participants would actually be willing to accept transfers of inventories.

Appendix B: Variable definitions B

Variable	Definition
For market analyses	
MV3	Cum dividend market value of equity three months after the reporting date, calculated as the market value of equity at the reporting date adjusted by a firm-specific total return index
BVE	Opening book value of equity, excluding the opening book value of inventories
BVEclose	Closing book value of equity, excluding the closing book value of inventories
Inv	Opening book value of inventories
InvClose	Closing book value of inventories
FV	Difference between the fair value of opening inventories and their book value
FVclose	Difference between the fair value of closing inventories and their book value
Δ*BVE*	Change between opening and closing *BVE* excluding the change due to earnings
GP	Gross profit, excluding the change in the book value of inventories
Δ*Inv*	Change in the book value of inventories
Δ*FV*	Fair value movement for inventories (i.e., the change in the fair value component of inventories for the year)
NIoth	Remaining component of earnings, calculated as the difference between earnings attributable to ordinary shareholders and *GP*
NI	Earnings attributable to ordinary shareholders
Neg	Indicator variable set to one if earnings are negative and zero otherwise
For cash flow and earnings analyses	
CFOthis	Cash flow from operations before changes in working capital for the current year
CFOnext	Cash flow from operations before changes in working capital for the next year
Δ*CFOthis*	Change in cash flow from operations before changes in working capital for the current year
Δ*CFOnext*	Change in cash flow from operations before changes in working capital for the next year
OPthis	Operating profit for the current year
OPnext	Operating profit for the next year
Δ*OPthis*	Change in operating profit for the current year
Δ*OPnext*	Change in operating profit for the next year
Size	Natural logarithm of the market value of equity at reporting date
MTB	Market-to-book ratio calculated at reporting date
GPexcl	Gross profit, excluding the change in working capital
WC1	Working capital calculated from the balance sheet as net trade receivables plus inventories, reduced by accounts payable
Δ*WC1*	Change in working capital calculated as the difference in *WC1* at the end and start of the reporting period
Δ*WC2*	Change in working capital, calculated as the difference between cash flow from operations before changes in working capital and cash flow from operations after changes in working capital
FVclose	Difference between the fair value of closing inventories and their book value
Δ*FV*	Fair value movement for inventories (i.e., the change in the fair value component of inventories for the year)
Neg	Indicator variable set to one if earnings are negative and zero otherwise