ELSEVIER Journal of Accounting and Economics 26 (1999) 149–178

JOURNAL OF Accounting & Economics

Revaluations of fixed assets and future firm performance: Evidence from the UK[1]

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Received 1 September 1998

Abstract

We find, as predicted, that upward revaluations of fixed assets by UK firms are significantly positively related to changes in future performance, measured by operating income and cash from operations, indicating revaluations reflect asset value changes. Current year revaluations (revaluation balances) also are significantly positively related to annual returns (prices). Relations between revaluations and future performance and prices are weaker for higher debt-to-equity ratio firms, indicating motivation affects how revaluations reflect asset value changes. The relations also are weaker for cross-listed firms and in a more volatile economic time period. Our inferences are robust to controlling for firms' acquisition activity. © 1999 Elsevier Science B.V. All rights reserved.

JEL classification: M4; G15; G18

Keywords: Financial accounting; Asset revaluations; International; Future performance; UK

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[1] We appreciate helpful comments from Greg Clinch, Ed Maydew, Sir David Tweedie, Ken Peasnell, participants at the 1998 *Journal of Accounting and Economics* Conference, especially Richard Sloan, the discussant, the 1998 American Accounting Association annual meeting, especially Elizabeth Gordon, the discussant, Ray Ball, the editor, and an anonymous reviewer. Mary Barth and Ron Kasznik gratefully acknowledge the support of the Stanford GSB Financial Research Initiative. David Aboody acknowledges the support of the Anderson School at UCLA.

PII: S0165-4101(98)00040-8

1. Introduction

This paper tests whether revaluations of fixed assets by UK firms are associated with future firm performance, as measured by *ex post* realized operating income and cash flow from operations. Our motivation for the inquiry stems from the current debate among managers, investors, accounting standard-setters, and capital market regulators about disclosure and recognition of long-term nonfinancial assets at estimated value, rather than at depreciated historical cost. Current values of assets likely are relevant to financial statement users. However, US accounting standard-setters and others have expressed concern that long-term non financial asset values are not reliably estimable. The estimates' potential lack of reliability derives from uncertainties inherent in the estimation and from effects of the management discretion such estimation uncertainties admit. Although managers can exercise their discretion opportunistically, thereby reducing the estimates' reliability, managers also can use their discretion to reflect their private information. If asset revaluations reflect asset values and are timely, we will find a positive association between revaluations and future changes in firm performance. If revaluation amounts are unreliable, we will not find a significant association.

We focus on UK firms because UK generally accepted accounting principles (GAAP) permit fixed assets to be recognized in financial statements at revalued amounts. Many publicly traded UK firms revalue assets, resulting in a large sample of firms for our tests. Under UK GAAP, managers can increase or decrease the carrying value of assets when asset values change. Thus, UK asset revaluations provide an opportunity to test whether firms' estimates of fixed asset fair values reflect managers' expectations about future firm performance. We focus on upward revaluations because upward revaluations are discretionary and not permitted under US GAAP, whereas, as under US GAAP, downward revaluations are required when asset values fall.

Prior research investigating asset revaluations by UK and Australian firms focuses primarily on the relation between revaluation amounts and share prices and/or returns (e.g., Amir et al., 1993; Easton et al., 1993; Barth and Clinch, 1996; Barth and Clinch, 1998). Prices and returns summarize not only investors' assessments of firms' asset values and expectations about future operating performance, but also effects of firms' investing and financing decisions, e.g., associated with relaxing contracting constraints. Thus, as Bernard (1993) points out, market-based tests provide only indirect evidence about the relation between asset revaluations and future operating performance. We provide direct evidence on this relation. Such evidence is potentially useful for analysis of financial statements containing revaluations and complements evidence based on share prices and returns (Bernard, 1993). Prior research on UK asset revaluations focuses on revaluations by cross-listed firms and does not investigate the contemporaneous relation between revaluations

and returns. Thus, we also present findings from market-based tests for our sample.

To test whether asset revaluations are positively associated with future performance, we estimate the relation between upward fixed asset revaluations by UK firms from 1983 to 1995 and changes in operating performance over the subsequent one to three years. The analyses are based on handcollected revaluation data for over 5,000 firm year observations. We define operating performance as, alternatively, operating cash flows and operating accounting income, before depreciation, amortization, and gains on asset disposals. Our tests control for current year changes in operating performance, risk, growth, and size. As predicted, we find consistent evidence that current year revaluations are positively associated with changes in operating performance over all three horizons.

In our market-based tests, we estimate the relation between share prices and the revaluation balance, net income, and book value of equity, where the revaluation balance is the difference between revalued fixed assets measured at the recognized revalued amount and at historical cost. As predicted, we find that the revaluation balance is significantly positively related to share prices. We also test the association between current year upward revaluations and returns. Because when to revalue assets is management's choice, this analysis provides direct evidence on whether investors perceive revaluations as timely, i.e., the revaluation occurs in the year asset values change. We find, as predicted, that revaluations are significantly positively related to returns, indicating that upward UK revaluations reflect at least some changes in asset values on a timely basis.

Easton et al. (1993) report survey evidence that the primary reason Australian managers revalue assets is to present true and fair financial statements. Our analyses can be viewed as testing this motivation. Their survey also indicates that the second most common motivation is to affect debt-to-equity ratios, perhaps for debt contracting reasons.[2] Thus, we estimate our equations permitting the coefficients on revaluation variables to vary with debt-to-equity ratios, where equity excludes the revaluation balance. Consistent with a motive of affecting the debt-to-equity ratio rather than solely presenting true and fair financial statements, we find that the relation between revaluations and future operating performance is weaker for firms with higher debt-to-equity ratios. We also find an analogous weaker relation between revaluation amounts and share prices and returns, indicating the weaker valuation effects associated with future performance are not dominated by positive valuation effects associated with relaxing debt constraints.

Prior UK asset revaluation studies focus on cross-listed firms and provide evidence of a significant negative relation between share prices and revaluation

[2] These two motivations represent 45% and 40% of survey responses, respectively. The next most commonly cited reason was mentioned by only 6% of respondents.

balances, in contrast to our full sample findings. To investigate this inconsistency, we permit the relations we test to differ for cross-listed firms. All findings for non cross-listed firms are consistent with our full sample findings. However, for cross-listed firms, although we find a significantly positive relation between asset revaluations and future changes in operating income, the relation between revaluations and future changes in cash from operations is insignificant. Also, consistent with prior research, we find that asset revaluations by cross-listed firms are negatively associated with share prices, suggesting investors' assessments of revaluations by these firms do not only reflect the revaluations' relation with future operating income.

Although a positive correlation between revaluations and firms' investing in operating entities can affect our tests, additional analyses find no evidence that firms' acquisition activity systematically affects the relation between revaluations and future performance or returns. We also we find that revaluations before 1990, a period of increasing asset values, are more significantly related to future performance and returns than those after 1990, a period of volatile economic conditions.

Overall, our findings indicate revaluations reflect changes in values of assets associated with future operating performance, and at least a portion is timely. Taken together, the findings do not support claims that fixed assets' fair values are not reliably estimable. However, the findings also indicate that differing motivations for revaluations can affect the relation between revaluations and future performance, prices, and returns.

The paper proceeds as follows. Section 2 describes UK GAAP for asset revaluations and discusses related research. UK revaluation activity is described in Section 3. Sections 4 and 5 specify and present findings from our future performance and market-based tests, respectively. Section 6 discusses findings from additional analyses, including investigating debt-to-equity ratios as motivations for revaluations. Section 7 provides a summary and concluding remarks.

2. UK accounting for fixed asset revaluations and relation to prior research

2.1. UK GAAP for fixed asset revaluations

Companies Act of 1985 sets forth UK GAAP for asset revaluations, specifically, Alternative Accounting Rules, Part C, Schedule 4. UK GAAP permits upward revaluations of long-lived assets, including many types of intangible assets, but not goodwill. Downward revaluations are required for all long-lived assets, including goodwill, when the asset's carrying amount exceeds its net realizable value. Few UK firms revalue intangible assets, whereas revaluations of tangible fixed assets, i.e., land, buildings, plant, and equipment, are common.

Thus, our tests focus on revaluations of tangible fixed assets. UK Statement of Standard Accounting Practice No. 12 encourages revaluations of tangible fixed assets on the ground that they provide "useful and relevant information to users of accounts".

Under UK GAAP, the difference between an asset's carrying amount and its revalued amount is credited to a separate equity revaluation reserve account if the revaluation results in an increase in the asset's carrying amount, i.e., an upward revaluation. Largely at management's discretion, transfers are permitted between the revaluation reserve account and other equity reserves. Revaluations affect earnings by (1) depreciation charges, which are based on the revalued amount; (2) a downward revaluation, when it exceeds a previously recognized upward revaluation of the same asset; and (3) a gain or loss on disposition of the asset, which is based on the asset's carrying amount, including any associated revaluation reserve.[3] Transfers are permitted from the revaluation reserve to the profit and loss reserve for depreciation expense associated with revaluations. Required disclosures under UK GAAP include the details of changes to revaluation reserves, which, as described in Section 3, we use to enhance the accuracy of our revaluation variables.

2.2. Relation to prior research

Prior asset revaluation research investigates the relation between revaluation amounts and share prices and/or returns. Asset revaluations are permitted under UK and Australian GAAP and, except for the treatment of realized revaluation gains described in footnote 2, UK and Australian GAAP rules are similar. However, revaluation practices in the two countries can differ, potentially resulting in differences in revaluations' characteristics.[4] Thus, some related research focuses on UK revaluations and some focuses on Australian revaluations.

Prior research does not document a significantly positive relation between UK revaluations, the subject of this study, and share prices or returns. Although Standish and Ung (1982) find a positive market reaction to upward revaluation announcements from 1964 to 1973, a period that predates UK GAAP guidelines

[3] This differs from Australian GAAP, under which the portion of the revaluation reserve realized through asset disposal cannot be taken to earnings.

[4] For example, (1) Australian companies frequently revalue long-term investments and intangible assets, as well as long-lived tangible assets (Barth and Clinch, 1998). (2) Australian firms seem to more often have a practice of periodic asset revaluations, e.g., every three years, whereas UK revaluations are less consistently periodic. (3) UK GAAP permits considerable discretion regarding which assets are revalued. Under Australian GAAP, if one asset in a class is revalued, then all assets in that class must be revalued. It also is possible that UK and Australian firms systematically differently exercise discretion, e.g., in determining revaluation amounts. See Barth and Clinch (1996) and Easton et al. (1993) for summaries of UK and Australian GAAP related to asset revaluations.

for asset revaluations, the reaction is not correlated with the magnitude of the revaluation. More recent studies focus on UK firms that cross-list securities in US capital markets and provide evidence of a negative relation between share prices and revaluation balances (Amir et al., 1993; Barth and Clinch, 1996).[5] Because these studies focus on UK-to-US GAAP reconciling items, they do not investigate the relation between current year revaluations and returns.

Evidence on Australian revaluations generally supports their value-relevance. Sharpe and Walker (1975) find a positive market reaction to revaluation announcements from 1960–1970, a period that predates Australian GAAP guidelines for asset revaluations, although Brown and Finn (1980) suggest Sharpe and Walker's findings could be attributable to confounding contemporaneous announcements. More recently, Easton et al. (1993) find that although revaluation increments have weak explanatory power for returns, the revaluation reserve has significant explanatory power for prices. They interpret their findings as evidence that Australian revaluations are value-relevant, but not always timely. Barth and Clinch (1998) investigate the relation between prices and returns and Australian revaluations by asset class, among other partitions. They find consistent evidence of value-relevance for investments and intangible assets, but somewhat inconsistent evidence of value-relevance for property, plant, and equipment revaluations, the focus of our study.[6]

Our study's primary contribution to extant asset revaluation literature is testing whether revaluations are associated with realized future operating performance, as suggested by Bernard (1993) in his discussion of Easton et al. (1993). Prior research focuses on testing the relation between asset revaluations and expectations about future performance, as reflected in share prices and returns. Prices and returns reflect not only investors' expectations about future operating performance, but also the valuation implications of managements'

[5] Amir et al.'s (1993) sample includes Australian and UK firms, but their sample comprises predominantly UK firms. Regarding interpretation of the findings of Barth and Clinch (1996) and Amir et al. (1993), note that these authors define their revaluation balance variable as book value of equity under US GAAP minus book value of equity under UK GAAP. Because the revaluation balance causes book value of equity under UK GAAP to exceed book value of equity under US GAAP, their revaluation balance variables are negative. We define *REV* to be the positive amount of the revaluation balance. Amir et al. (1993) (Table 11, Panel A) and Barth and Clinch (1996) (Table 4, Panel B) report positive coefficients on book value of equity and their revaluation balance variable, where the coefficients on book value of equity are smaller than those on the revaluation balance variables. These coefficient estimates, coupled with Amir et al.'s (1993) and Barth and Clinch's (1996) revaluation balance variable definition, are consistent with a negative relation between the revaluation balance component of book value of equity and share prices.

[6] For a sample of Australian cross-listed firms, Barth and Clinch (1996) report a negative relation between revaluation balances and share prices, consistent with findings based on UK cross-listed firms, although small sample size precludes them from making strong inferences. We test for differences between cross-listed and non cross-listed firms in Section 6.2.

financing and investing decisions. Thus, one could observe a positive relation between revaluations and share prices and returns and an insignificant relation between revaluations and changes in future operating performance. For example, investors might increase their assessments of firm value when high debt-to-equity ratio firms upwardly revalue assets because doing so reduces the probability of debt default, even if the revaluations do not reflect changes in asset values. Similarly, investors in UK firms might increase their assessment of firm value because of anticipated benefits associated with relaxing a constraint on acquisitions imposed by the London Stock Exchange (LSE) (Muller, 1998). We investigate these examples in Sections 6.1 and 6.3. Also, because our operating performance measures exclude gains and losses on asset disposals, values of assets not associated with operations could increase without correlated increases in future operating performance.[7]

Focusing on future operating performance also has limitations. For example, we have available only a few subsequent years of realized performance, reducing our ability to detect a significant relation between revaluations of long-lived fixed assets and future performance. Also, if firms' investments in operating entities are positively associated with revaluations, one could observe a positive relation between revaluations and future operating performance that is attributable to the effects of acquisitions on future operations. We investigate this in Section 6.3.

Relating revaluations to future realized operating income and/or cash from operations provides direct evidence on the association between revaluations and future operating performance and complements findings from price and returns specifications. We also contribute to extant literature by documenting that UK asset revaluations are significantly positively related to share prices and returns for a large sample of firms that do not necessarily cross-list their equity securities in US capital markets.

3. UK revaluation activity

We obtain data for our analyses from Datastream International (DI), which includes market and accounting data for all UK industrial commercial firms. DI includes 11,319 firm-year observations from 1983 to 1995 associated with 1,236 firms. We use the UK-domiciled DI database because it is more comprehensive

[7] Our tests will detect associations between future performance and revaluations of not only operating assets, but also non operating assets whose value changes are correlated with future changes in operating performance. For example, if real estate values increase and the increase is correlated with increases in future performance, e.g., because of inflation, then we will detect a significant relation between revaluations and future changes in operating performance. In either case, revaluations provide information about changes in future operating performance.

for UK firms than other databases used in prior research, such as Global Vantage. For example, DI provides cash flow data for UK firms, which is central to our analyses, but Global Vantage does not. We handcollect from firms' annual reports the details necessary to construct each year's revaluation balance, and to identify precisely the amount of each current year revaluation.[8]

Table 1 presents descriptive statistics relating to UK fixed asset revaluation activity. Panel A (Panel B) presents statistics by industry (by year). Panel A reveals that upward revaluations are common in the UK; 6,633 of the possible 11,319 firm-year observations, 58.9%, have a non zero revaluation balance. These revaluations are associated with 738 firms. Although revaluations are not evenly distributed across industries, all but one of 32 DI industry classifications have at least one observation with a non zero revaluation balance. However, in no industry did all firms upwardly revalue fixed assets; the percentage ranges from 22.49 to 87.90. Panel A also reveals that current year revaluation data are available for 5,485 observations; we are unable to locate 1,148 financial statements, associated with 112 firms, on microfiche or on Laser Disclosure. Of the available observations, 1,334 or 24.3% relate to upward current year revaluations, which are the focus of this study, and 635 or 11.6% relate to downward revaluations.

Untabulated statistics reveal that sample firms revalue at least some fixed assets on average every 4.6 years, and the median is 3.5 years. However, Table 1, Panel B, reveals that although many firms revalue assets in each year, there are noticeably more revaluations since the late 1980s. Also, revaluations are predominantly upward (downward) before (after) 1990. This shift coincides with increased volatility in UK economic conditions evidenced by the *Financial Times* UK real estate index, which increased steadily from 1985 to 1989 and then dropped precipitously from 1989 to 1992. In 1993 it increased dramatically and then began to slide again through 1995, falling back to approximately its 1987 level. Untabulated statistics reveal no significant association between the real estate index and the proportion of positive revaluations in a given year or with one-year lead or lagged revaluations. This lack of correlation suggests revaluations do not simply reflect changes in asset values associated with general market conditions. Rather, it suggests either that values of revalued assets depend on firm-specific factors or revaluations do not capture value changes. Findings reported below of significant relations between revaluations and future performance and returns indicate the former is a more plausible explanation.[9]

[8] This process also enables us to verify the accuracy of the DI database. Specifically, we compared all data that we use from the database to firms' published financial statements. We noted only three discrepancies related to the 5,485 firm-year observations we verified.

[9] Note that because any marketwide index is the same for all firms in a given year, our fixed-year effects estimation procedure described below precludes including it as an additional explanatory variable. Its effects are reflected in the year-specific intercept.

4. Revaluations and future performance

4.1. Research design

Our tests focus on whether upward UK fixed asset revaluations explain future changes in firm performance, measured by operating income and cash from

Table 1
Summary of fixed asset revaluations relating to 6,633 UK firm year observations for 738 firms from 1983–1995

Panel A: *Industry distribution*

	Revaluation balance			Current year revaluations		
Industry classification	*N*	% in industry	% in sample	Positive	Negative	Zero
Alcoholic beverages	80	78.43	1.21	13	7	45
Building materials	440	70.29	6.63	98	47	231
Building and construction	538	68.54	8.11	124	77	224
Chemicals	203	57.83	3.06	46	17	127
Distributors	430	63.05	6.48	72	38	213
Diversified industrials	198	79.52	2.99	57	29	94
Electricity	18	52.94	0.27	6	2	10
Electrical equipment	406	61.05	6.12	69	30	252
Engineering	1058	69.42	15.95	170	100	596
Engineering vehicles	144	73.85	2.17	28	20	56
Extractive industries	39	52.70	0.59	4	3	26
Retailers, food	79	36.74	1.19	15	7	48
Food producers	280	59.83	4.22	51	23	181
Household goods	203	50.75	3.06	30	6	136
Health care	78	33.77	1.18	24	5	34
Leisure and hotels	316	65.56	4.76	82	36	123
Media	338	51.52	5.10	90	33	121
Oil exploration	38	22.49	0.57	12	4	7
Oil, integrated	23	58.97	0.35	7	2	8
Pharmaceuticals	26	26.53	0.39	3	2	16
Paper and packaging	285	60.51	4.30	51	26	151
Breweries, pubs	247	87.90	3.72	62	29	116
Retailers, general	397	60.52	5.99	78	31	235
Support services	248	30.17	3.74	38	25	142
Textiles and apparel	366	55.20	5.52	58	18	242
Transport	137	58.05	2.07	42	17	69
Other	18	12.50	0.26	4	1	13
Total	6,633		100.00	1,334	635	3,516

Table 1 (*continued*)

Panel B: *Calendar year distribution of current year revaluations for* 5,485 *firm-years for* 526 *firms with available data*

	Positive		Negative		Zero	
Year	*N*	% in sample	*N*	% in sample	*N*	% in sample
1983	123	2.24	11	0.20	25	0.46
1984	122	2.22	13	0.24	117	2.13
1985	74	1.35	22	0.40	173	3.15
1986	65	1.19	22	0.40	199	3.63
1987	94	1.71	11	0.20	189	3.45
1988	147	2.68	4	0.07	190	3.46
1989	167	3.04	9	0.16	203	3.70
1990	153	2.79	47	0.86	329	6.00
1991	88	1.60	86	1.57	380	6.93
1992	55	1.00	102	1.86	410	7.47
1993	69	1.26	120	2.19	424	7.73
1994	83	1.51	102	1.86	440	8.02
1995	94	1.71	86	1.57	437	7.97
Total	1,334	24.32	635	11.58	3,516	64.10

Notes: 'Revaluation balance' is the revalued amount associated with fixed assets that have been revalued. 'Current year revaluation' refers to the net increment to the revaluation balance as a result of revaluations made in the current year. Industry classification is based on Datastream International.

operations. First, we estimate the following cross-sectional equation:

$$\Delta OPINC_{t+\tau,i} = \sum_{Y=83}^{95} \alpha_{0Y} YR_{Yti} + \alpha_1 REV_{ti} + \alpha_2 \Delta OPINC_{ti} + \alpha_3 MB_{ti} + \alpha_4 ASSETS_{ti} + \varepsilon_{ti}. \quad (1)$$

We estimate Eq. (1) separately for changes in operating income over each of three horizons, from year t to year $t+\tau$, where $\tau = 1, 2, 3$. Thus, $\Delta OPINC_{t+\tau}$ is operating income in year $t+\tau$ minus operating income in year t. Operating income is income before interest, income tax, and depreciation and amortization expenses, and net gains on asset dispositions. We exclude interest and income tax expenses because we focus on operating performance. We exclude depreciation and amortization expense and net gains on asset dispositions because asset revaluations affect these amounts. Thus, excluding them eliminates any mechanical effects of revaluations on our performance measure. We focus on performance over several years subsequent to a revaluation because revalued assets

are long-term and, thus, the operating effects of changes in their values occur over several years. Lack of availability of subsequent data limits our tests to three future years. We present findings for each horizon, even though they are not independent, because we are uncertain when the future performance effects will be evident.[10]

REV_t is the revaluation in year t, i.e., the increase to the revaluation reserve in a particular year as a result of revaluing fixed assets. Its estimated coefficient, α_1, is the focus of our inquiry. If revaluations reflect changes in values of assets associated with operations, then revaluations will be positively associated with future changes in performance and, thus, we predict α_1 to be positive. However, estimating values of fixed assets is subjective and prone to estimation error. Thus, testing this prediction also provides evidence on whether managers of UK firms use their discretion in revaluing fixed assets to recognize amounts that reflect asset values. If they do, we will observe a positive relation between revaluations and future changes in performance. However, to the extent management exercises its discretion opportunistically, recognized asset revaluations will not reflect changes in asset values, and we will not observe a significant positive relation. Our ability to detect a significant relation also is reduced to the extent revaluations reflect changes in future performance beyond three years because our tests likely do not capture the full effect of changes in future performance.[11]

The change in operating income from year $t-1$ to year t, $\Delta OPINC_t$, controls for the time-series properties of earnings that can affect future operating income. The market-to-book ratio, where book value of equity excludes the revaluation balance, MB_t, controls for potential effects of risk and growth (Fama and French, 1992). The logarithm of total assets at the end of year t, excluding the

[10] Changes in future performance over the three horizons are not perfectly correlated. Untabulated Pearson correlations between one-year ahead changes in operating income (cash from operations) and two- and three-year ahead changes in operating income (cash from operations) are 0.60 and 0.49 (0.66 and 0.53). Spearman correlations are similar in magnitude.

Regarding the one-year horizon, it is possible that management observes performance for the first few months of the first subsequent year before deciding to revalue assets as of the prior year. Although such behavior enhances our ability to detect a relation between revaluations and future performance, it does not alter our inferences. That is, if managers revalue assets when performance increases, then revaluations reflect changes in performance. Also, if the change in performance is transitory and, thus, the revaluation was not based on anticipated long-term increases in performance, then we will not observe a significant relation in the two- and three-year ahead performance tests. Nonetheless, to ensure our findings are insensitive to this potential confounding factor, we estimated Eq. (1) using year $t+1$ as the base year. Our inferences regarding the association between revaluations and changes in performance for the year $t+2$ and $t+3$ specifications are unaffected.

[11] Also, lack of availability of data and information preclude us from designing more refined tests relating to performance effects specific to particular assets. To the extent our performance measures are imprecise, we will be unable to find evidence supporting our predictions.

revaluation balance, $ASSETS_t$, controls for potential effects of size. Finally, to control for the possibility of omitted time-specific macro-economic effects, e.g., marketwide changes in property values, we permit the regression intercept to vary across years. YR_Y is an indicator variable that equals one if an observation is from year Y, and zero otherwise. We deflate both $\Delta OPINC$ variables and REV_t by beginning of year t market value of equity. i represents firms.[12]

We also estimate:

$$\Delta CFO_{t+\tau,i} = \sum_{Y=83}^{95} \beta_{0Y} YR_{Yti} + \beta_1 REV_{ti} + \beta_2 \Delta CFO_{ti} + \beta_3 \Delta WC_{ti} + \beta_4 MB_{ti} + \beta_5 ASSETS_{ti} + \upsilon_{ti}. \quad (2)$$

Eq. (2) is similar to Eq. (1) except for the focus on changes in cash from operations, ΔCFO, and the inclusion of ΔWC_t, the change in working capital from year $t-1$ to year t. Both ΔCFO variables and ΔWC_t are deflated by market value of equity at the beginning of year t. We include change in working capital because of the documented significant association between operating cash flows and lagged working capital accruals (e.g., Dechow, 1994).[13] All other variables are as previously defined. We expect current year revaluations to be positively associated with future changes in cash from operations and, thus, predict β_1 to be positive.

4.2. Descriptive statistics

Table 2 presents descriptive statistics associated with our regression variables. It indicates that revaluations are potentially economically material; the mean (median) of current year revaluations scaled by beginning of year market value of equity, REV, is 11% (2%). Untabulated statistics indicate that the mean (median) of current year revaluations, after adjusting for tax effects, scaled by book value of equity exclusive of the revaluation balance is 9% (4%).[14] Untabulated statistics also reveal that current year revaluations are large in relation to reported earnings; the mean (median) of revaluations, after adjusting for tax effects, is 33% (19%) of current year net income. Table 2 shows that mean (median) revaluation balance per share is £1.88 (£0.49), which is 17.5% (6.5%) of the mean (median) book value of equity per share, excluding the

[12] Our inferences are unaffected by estimating the relation using undeflated variables (Barth and Kallapur, 1996).

[13] As specification check, following Sloan (1996), we also include change in working capital in Eq. (1). Although it is a significant explanatory variable, it has no effect on our inferences.

[14] We thank Ed Maydew for bringing to our attention omitted tax effects. These statistics are based on assuming a 40% tax rate.

Table 2
Descriptive statistics for regression variables. Sample of 347 UK firms with positive current year revaluations in 1983–1995

Variable	Mean	Median	Std. dev.	N
Dependent variables				
$\Delta OPINC_{t+1}$	0.02	0.02	0.07	740
$\Delta OPINC_{t+2}$	0.03	0.03	0.11	665
$\Delta OPINC_{t+3}$	0.05	0.02	0.16	597
ΔCFO_{t+1}	0.01	0.01	0.20	730
ΔCFO_{t+2}	0.01	0.02	0.29	647
ΔCFO_{t+3}	0.04	0.03	0.21	598
$PRICE$	38.78	23.23	49.42	5,591
$RETURN$	0.06	0.05	0.29	765
Independent variables				
REV	0.11	0.02	0.24	740
$\Delta OPINC_t$	0.02	0.02	0.11	740
MB	2.12	1.08	2.12	740
$ASSETS$	11.85	11.49	3.79	740
ΔCFO_t	0.03	0.02	0.28	730
ΔWC	− 0.01	0.01	0.31	730
REV_BAL	1.88	0.49	11.39	5,591
EPS	1.32	1.00	2.19	5,591
$BVPS$	10.77	7.54	27.01	5,591
NI	0.13	0.09	0.29	765
ΔNI	0.02	0.01	0.11	765

Notes: $\Delta OPINC_{t+\tau}$ ($\Delta CFO_{t+\tau}$) is operating income (cash from operations) in year $t+\tau$ ($\tau = 1, 2, 3$) minus operating income (cash from operations) in year t. $PRICE$ is share price three months after fiscal year end. $RETURN$ is year t stock return, measured from three months after end of year $t-1$ to three months after the end of year t. REV is net increment to the revaluation balance from revaluations to fixed assets in year t, i.e., current year revaluations. MB is market to book ratio at end of year t, where book value of equity excludes the revaluation balance. $ASSETS$ is log of book value total assets, excluding the revaluation balance, at end of year t. ΔWC is working capital in year t minus working capital in year $t-1$. REV_BAL is revaluation balance at end of year t, i.e., the revalued amount associated with fixed assets that have been revalued, per share. EPS is operating earnings per share. $BVPS$ is book value of equity, excluding the revaluation balance, per share. NI is net income in year t deflated by market value of equity at the beginning of year t; ΔNI_t is NI in year t minus NI in year $t-1$. $\Delta OPINC_{t+\tau}$, $\Delta CFO_{t+\tau}$, REV, ΔWC, NI, and ΔNI are deflated by market value of equity at the beginning of year t.

revaluation balance, of £10.77 (£7.54). The table also reveals skewness in the revaluation variables, motivating us to ensure our inferences are insensitive to outliers.

Table 2 also reveals that the median market-to-book ratio is 1.08, although the mean of 2.12 indicates that some sample firms have substantial unrecognized

net assets.[15] Consistent with this, on average, sample firms are profitable, with mean (median) net income per share of £1.32 (£1.00), which represents 13% (9%) of beginning of year market value of equity. Sample firms also are growing, with mean (median) increases in net income of 2% (1%) of beginning of year market value of equity. They also have mean and median increases in operating income, cash from operations, and working capital for all horizons.

4.3. Findings relating to future firm performance

Table 3 presents regression summary statistics from Eq. (1), which relates upward current year revaluations to future changes in firm performance. Panel A (Panel B) presents findings for future performance defined as one-, two-, and three-year ahead operating income (cash from operations). The reported statistics reflect elimination of observations for the largest 1% of current year revaluations as a percentage of beginning of year market value of equity, which exceeded 100%.[16] Reported t-statistics are based on White (1980) standard errors (Barth and Kallapur, 1996), and the estimation controls for outliers using a robust regression technique.[17]

Table 3, Panel A, provides strong evidence that current year revaluations are positively associated with future performance, as measured by operating income. In all three horizons, the coefficient on current year revaluations, REV, is significantly positive as predicted (t-statistics = 6.96, 2.52 and 4.02 for the one-, two-, and three-year horizons).[18] These findings are consistent with increases in values of fixed assets being realized over extended time horizons, and with REV reflecting the value increases. If future performance is sustained, the coefficients

[15] Observing an average market-to-book ratio above one does not indicate that sample firms are not following UK GAAP; upward revaluations are discretionary. Also, an untabulated chi-square statistic reveals that firms with market-to-book ratios above (below) one, where book value of equity excludes the revaluation balance, are significantly more likely to revalue assets upward (downward).

[16] These extreme observations had a noticeable effect on two estimated coefficients. When these observations are included, current year revaluations are significantly negatively related to one-year ahead cash from operations, and insignificantly related to returns. We also eliminate one observation, which has a noticeable effect on some estimated coefficients and standard errors, but not on our inferences regarding asset revaluations.

[17] The procedure begins by calculating Cook's D statistic and excludes observations with $D > 1$. Then, the regression is reestimated, weights for each observation are calculated based on absolute residuals, and the estimation is repeated using the weighted observations (Berk, 1990). This procedure results in differing numbers of observations across specifications and can result in the same observation having different weights in different specifications. Our inferences are unaltered if we estimate the equations using ordinary least squares and if we remove observations with an R-student statistic greater than three in absolute value, rather than use the robust regression procedure. They also are unaltered using ranks of the regression variables.

[18] We use the term significant to denote statistical significance at less than the 5% level.

Table 3
Summary statistics from fixed effects regressions. Sample of 347 UK firms with positive current year revaluations in 1983–1995

Panel A: *Future change in operating income as dependent variable*

		One year ahead		Two years ahead		Three years ahead	
Independent variable	Prediction	Coeff.	*t*-stat.	Coeff.	*t*-stat.	Coeff.	*t*-stat.
REV	+	0.07	6.96	0.05	2.52	0.12	4.02
$\Delta OPINC$	?	0.11	4.04	− 0.11	− 2.32	0.08	1.42
MB	?	0.01	0.13	− 0.01	− 1.41	− 0.01	− 1.34
$ASSETS$	?	0.01	0.76	0.01	0.67	0.01	0.25
N		737		664		597	
Adj. R^2		0.31		0.26		0.28	

Panel B: *Future change in cash from operations as dependent variable*

REV	+	0.06	2.37	0.05	1.34	0.07	2.32
ΔCFO	?	− 0.38	− 15.00	− 0.56	− 26.35	− 0.41	− 22.13
ΔWC	?	0.24	11.90	0.11	4.45	0.18	4.97
MB	?	− 0.01	− 0.39	− 0.01	− 1.30	− 0.01	− 0.29
$ASSETS$	?	− 0.01	− 0.57	0.01	0.41	− 0.01	− 0.58
N		730		647		598	
Adj. R^2		0.68		0.79		0.62	

Notes: REV is the net increment to the revaluation balance from revaluations to fixed assets in year t, i.e., current year revaluations. $\Delta OPINC$ is operating income before depreciation, interest, taxes, and gains on assets in year t minus operating income in year $t-1$. ΔWC is working capital in year t minus working capital in year $t-1$. MB is market-to-book ratio at the end of fiscal year t where book value of equity excludes the revaluation balance. $ASSETS$ is log of book value total assets, excluding the revaluation balance, at the end of year t. ΔCFO is cash from operations in year t minus cash from operations in year $t-1$. One, two, and three years ahead refer to operating income or cash from operations in year $t+1$, $t+2$, and $t+3$ minus operating income or cash from operations in year t. All variables, except for MB and $ASSETS$, are deflated by market value of equity at the beginning of year t.
The regression equations include untabulated year-specific intercepts.

on REV should increase, or at least not decrease, with horizon length because year t is the base year for calculating changes in performance for all three horizons. One can interpret the coefficient estimates on REV in as indicating that approximately 7% of revaluations is realized as increased operating income in the first year subsequent to the revaluation and 12% is realized after three years. These findings are consistent with our three-year estimation horizon being too short to capture all of the increase in future operating performance associated with fixed asset revaluations. The two-year horizon REV coefficient

is less than the one-year horizon coefficient, but the difference is not significant.[19]

Panel A also reveals that, as expected, the year t change in operating income is significantly positively associated with one-year ahead changes in operating income (t-statistic = 4.04). It is significantly negatively (insignificantly) associated with changes in operating income two (three) years ahead (t-statistics = -2.32 and 1.42). Market-to-book ratios and total assets are insignificantly associated with future performance (t-statistics = 0.13, -1.41, and -1.34 and 0.76, 0.67, and 0.25 for one, two, and three years ahead, respectively).[20]

Table 3, Panel B, presents summary statistics from estimating Eq. (2), in which performance is measured by cash from operations. Panel B reveals that, as predicted and consistent with Panel A, current year revaluations are significantly positively related to one- and three-year ahead changes in cash from operations (t-statistics = 2.37 and 2.32). They are positively, but not significantly, related to two-year ahead changes in cash from operations (t-statistic = 1.34). These findings corroborate those in Panel A in indicating that current year revaluations are significantly positively associated with future performance.[21]

Regarding the control variables, Panel B reveals that year t change in cash from operations, change in working capital, market-to-book ratio, and total assets are significantly negatively, significantly positively, insignificantly, and

[19] Untabulated findings reveal that the decrease in *REV*'s coefficient between the one- and two-year horizons is attributable to sample composition. In particular, estimating the Panel A equations using observations common to all three horizon specifications results in coefficients on *REV* of 0.08, 0.10, and 0.14 for the one-, two-, and three-year ahead specifications, respectively. The loss of observations across the three horizons results primarily from unavailability of future performance variables for 1993 and 1994 revaluations, not from lack of survivorship of sample firms. Estimating the relations based on the observations reported in Table 3, but using ranks of the variables, also results in a monotonic increase in coefficient estimates with horizon length.

[20] Approximately 1% of sample firms has negative book value of equity. Estimating all equations omitting these firms results in untabulated inferences similar to those we tabulate.

[21] Untabulated correlations indicate future changes in operating income and cash from operations are significantly positively correlated over all three horizons (Pearson (Spearman) correlations equal 0.25, 0.45, and 0.86 (0.29, 0.38, and 0.50) for one-, two-, and three-year horizons) and, thus, the regressions reported in Panels A and B are not independent tests. Untabulated statistics also indicate that when current year revaluations are regressed on the two performance measures simultaneously, in the one- and three-year horizons changes in operating income (cash from operations) provides significant (insignificant) explanatory power for revaluations incremental to changes in cash from operations (operating income). For the two-year horizon, both provide incremental explanatory power. Thus, henceforth we only tabulate findings relating to changes in operating income.

insignificantly associated with change in cash from operations for all three horizons, respectively.[22]

5. Market-based tests

5.1. Research design

Following prior research, our market-based tests use price and returns specifications. First, we estimate a cross-sectional equation relating share prices to revaluation balances:

$$PRICE_{ti} = \sum_{Y=83}^{95} \lambda_{0Y} YR_{Yti} + \sum_{F=1}^{N} \lambda_{1F} FIRM_{Fti} + \lambda_2 REV\_BAL_{ti} + \lambda_3 EPS_{ti} + \lambda_4 BVPS_{ti} + \xi_{ti}, \tag{3}$$

where $PRICE$ is share price three months after fiscal year end. REV_BAL is the revaluation balance, EPS is earnings from continuing operations, and $BVPS$ is book value of equity, excluding the revaluation balance, all per share. The revaluation balance is the recognized cumulative amount of upward revaluation related to fixed assets.[23] Eq. (3) is similar to specifications in Amir et al. (1993), Easton et al. (1993), and Barth and Clinch (1996).[24] As in Eqs. (1) and (2), Eq. (3) includes separate-year intercepts. Because a firm enters Eq. (3) in every year with available data, not only when it revalues assets, we also include firm-specific intercepts to mitigate intertemporal residual dependencies and to control for

[22] To test whether the significant relation between revaluations and future performance relates to the act of revaluation, rather than the magnitude of the revaluation, we estimated Eqs. (1) and (2) using all firms with available data and included an indicator variable that equals one if a firm revalued its assets upward in a given year, and zero otherwise. The untabulated findings indicate the significance of the coefficients on REV is similar to those we tabulate and, in most cases, the coefficient on the indicator variable insignificantly differs from zero.

[23] We do not include the recognized revaluation reserve in our estimation equation because it is affected by transactions unrelated to revaluations, e.g., exchange rate adjustments, discretionary transfers among reserve accounts, additional depreciation attributable to revaluations, and sales of revalued fixed assets (see Easton et al. (1993) for further discussion). Thus, we construct REV_BAL by handcollecting thirteen years of footnote disclosures and eliminating effects of these unrelated transactions. This procedure yields the revaluation balance associated with recognized revalued assets at the end of each year and changes in the reserve attributable to current year revaluations. Estimating Eq. (3) using the recognized revaluation reserve yields inferences similar to those based on REV_BAL.

[24] Easton et al. (1993) and Amir et al. (1993) estimate Eq. (3) deflated by book value of equity. Our inferences are unaltered when based on this alternative specification.

firm-specific intertemporally constant omitted variables. $FIRM_F$, equals one for firm F, and zero otherwise. N is the number of sample firms.

One can view Eq. (3) as based on the Ohlson (1995) valuation model, where we permit the coefficient on book value of equity to vary for its revaluation and non revaluation components.[25] Alternatively, one can view Eq. (3) as deriving from an asset-based valuation equation, where earnings is a proxy for unrecognized net assets (Barth and Landsman, 1995). Both views lead to similar interpretations of the coefficient on *REV_BAL*. In particular, assuming revalued amounts are value-relevant incremental to their historical cost leads us to predict λ_2 is positive. Also, if investors similarly assess the two components of book value of equity, *BVPS* and *REV_BAL*, λ_2 will equal λ_4. Based on prior research, we also predict positive coefficients on earnings and book value of equity, λ_3 and λ_4.

Because scale effects can affect inferences from levels specifications such as Eq. (3), we deflate the regression variables, include firm-specific intercepts, and focus our tests on variables less likely affected by scale than other included variables, specifically *REV_BAL* rather than *BVPS* or *EPS* (Barth and Kallapur, 1996). Although a returns specification likely is less affected by scale, correlated omitted variables can affect inferences from any regression specification. If the omitted variables and their coefficients are constant (change) over time, then a returns (levels) regression can be better-specified (Landsman and Magliolo, 1988). Thus, consistent evidence from a returns specification indicates inferences from Eq. (3) are not attributable to intertemporally constant omitted variables.

We also estimate a returns specification because it provides direct evidence on asset revaluation timeliness. Managers of UK firms have considerable discretion regarding when to revalue assets. Thus, it is possible that revaluations are not timely in the sense that the underlying changes to asset values occur in years other than those in which the revaluations occur. The future performance specifications relate current year revaluations to changes in performance over the next three years. However, they do not provide direct evidence of revaluation timeliness. For example, if a revaluation occurs three years after a change in asset value, but the asset has a ten-year life, we could detect a significant relation between the revaluation and changes in performance in what is effectively years four through seven of the asset's life. Similarly, if revaluations reliably reflect asset value changes but do not occur in the year of the change, i.e., are not timely, we can observe a significant relation in the price specification, but

[25] Note, however, that the model of Ohlson (1995) requires clean surplus, which does not hold under UK GAAP. Moreover, publicly available data are insufficient to restate UK financial statements to a clean surplus basis.

not in the returns specification. Observing a significant relation in both is evidence that at least a portion of revaluations is timely.

Thus, we estimate a cross-sectional equation relating returns to current year revaluations:

$$RETURN_{ti} = \sum_{Y=83}^{95} \gamma_{0Y} YR_{Yti} + \gamma_1 REV_{ti} + \gamma_2 NI_{ti} + \gamma_3 \Delta NI_{ti} + \eta_{ti}, \quad (4)$$

where $RETURN$ is the firm's year t share return, measured from three months after year end for year $t-1$ to three months after year end for year t, and NI is net income. ΔNI_t is NI_t minus NI_{t-1} and other variables are as previously defined. All independent variables, except YR, are deflated by market value of equity at the beginning of year t. This specification is similar to those estimated in Easton et al. (1993) and Barth and Clinch (1998). Assuming revaluations provide at least some timely value-relevant information, we predict γ_1 is positive. As in prior returns/earnings research (e.g., Easton and Harris, 1991), we also predict γ_2 and γ_3 are positive.[26]

5.2. Findings from market-based tests

Table 4, Panel A, presents summary statistics from estimating Eq. (3). As predicted, revaluation balances are significantly positively related to share prices, after controlling for earnings and book value of equity (t-statistic = 4.76). Also as expected, the coefficients on earnings, EPS, and book value of equity, $BVPS$, are significantly positive (t-statistics = 6.70 and 13.46).

Untabulated statistics indicate that the coefficient on the revaluation balance, REV_BAL, 0.34, is significantly smaller than that on $BVPS$, 1.00, (p-value = 0.001). Assuming a 40% tax rate, the coefficient on a tax adjusted REV_BAL would be 0.57, which also is significantly less than that on $BVPS$, consistent with the market discounting REV_BAL relative to other net assets. The relatively larger coefficient on $BVPS$ could reflect depressed UK equity balances attributable to, e.g., direct write-off of purchased goodwill.[27] However, it also could

[26] We do not include the change in revaluations as an additional independent variable because most firms do not revalue assets every year. Thus, for many firms, in a revaluation year ΔREV equals REV (the untabulated correlation between REV and ΔREV is 0.88) and in the year following a revaluation, ΔREV equals $-REV_{t-1}$. Nonetheless, we estimated Eq. (4) including ΔREV as an additional variable. Untabulated findings indicate that its inclusion does not alter our inferences regarding REV's coefficient. ΔREV's coefficient is significantly negative. However, the high correlation and mechanical relation between REV and ΔREV make ΔREV's coefficient difficult to interpret.

[27] Ohlson's (1995) model predicts that the coefficient on book value of equity is less than or equal to one, and is only equal to one if the coefficient on earnings equals zero, which it does not in Table 4. As noted above, Ohlson's model is based on the assumption of clean surplus, which does not hold under UK GAAP.

Table 4
Summary statistics from fixed effects regressions. Sample of 347 UK firms with positive current year revaluations in 1983–1995

Panel A: *Share price as dependent variable*

Independent variable	Prediction	Coefficient	t-statistic
REV_BAL	+	0.34	4.76
EPS	+	5.14	6.70
BVPS	+	1.00	13.46
N		5,591	
Adj. R^2		0.83	
Panel B: *Returns as dependent variable*			
REV	+	0.09	2.57
NI	+	0.31	5.69
ΔNI	+	0.42	3.93
N		763	
Adj. R^2		0.30	

Notes: Share price is measured three months after the end of year t. Returns are measured beginning (ending) three months after the beginning (end) of year t. *REV_BAL* is the revaluation balance, i.e., the revalued amount associated with fixed assets that have been revalued, per share. *EPS* is operating earnings per share. *BVPS* is book value of equity, excluding the revaluation balance, per share. *REV* is the current year revaluation, i.e., the net increment to the revaluation balance as a result of revaluations made in year t. *NI* is net income; ΔNI is *NI* in year t minus *NI* in year $t-1$. All independent variables in the returns equation are deflated by market value of equity at the beginning of year t.
The price regression equation includes untabulated firm and year-specific intercepts.
The returns regression equation includes untabulated year-specific intercepts.

reflect investors' assessment of the estimation error inherent in revalued amounts or effects of management's motives for revaluations other than to present true and fair financial statements. We provide evidence on the latter explanation in Section 6.1.

Table 4, Panel B, presents summary statistics from estimating Eq. (4) and reveals that current year revaluations are significantly positively associated with returns (t-statistic = 2.57). The significant positive coefficient on *REV* indicates that upward U.K. revaluations reflect at least a portion of asset value changes on a timely basis. However, because the coefficient on *REV* is less than that on net income, even after adjusting for tax effects, the findings also are consistent with some of the asset value change occuring in another year.[28] As expected,

[28] This interpretation is consistent with inferences one could obtain by viewing Eq. (4) as a first-difference version of Eq. (3), with a different deflator. Untabulated statistics reveal that estimating Eq. (4) without lagged market value of equity as a deflator results in an estimated coefficient on *REV* of 0.16. Comparing this coefficient to that on *REV_BAL* in Panel A of 0.34 suggests approximately one-half of the investor-assessed value change occurs in the year of the revaluation.

Panel B also reveals that net income and change in net income are significantly positively associated with returns (t-statistics = 5.69 and 3.93).

6. Additional analyses

6.1. Debt-to-equity ratios

We next investigate whether the relations we document in Section 5 are systematically associated with cross-sectional differences in debt-to-equity ratios. Specifically, we estimate all equations permitting coefficients on the revaluation variables to vary with debt-to-equity ratios. Because we expect revaluations associated with debt-to-equity ratio motivations are less likely to reflect future performance than revaluations intended to reflect true and fair financial statements, we predict negative incremental coefficients on revaluations interacted with debt-to-equity ratios in Eq. (1). This prediction is consistent with debt contracting motivations for revaluations and with Lin and Peasnell (1998) who argue that equity depletion motivates UK managers to revalue assets.

Table 5, Panel A, presents the findings. Consistent with predictions, the incremental coefficients on revaluations interacted with debt-to-equity ratios, $REV*DE$, are significantly negative in all three future performance horizons (t-statistics = -1.71, -3.87, and -6.78), indicating revaluations of firms with higher debt-to-equity ratios have weaker associations with future changes in performance. Table 5, Panel A, also reveals that the base coefficient on revaluations, REV, is significantly positive in all three horizons (t-statistics = 5.61, 3.70, 6.39), consistent with Table 3. The sum of the coefficients on REV and $REV*DE$ also is significantly positive. Because DE is less than five for all sample firms, this indicates that revaluations are positively related to future performance regardless of debt-to-equity ratio. Untabulated findings from regressions based on changes in operating cash flows are similar to those in Panel A. The untabulated findings also are similar to those in Table 3, Panel B, except the coefficient on REV for the two-year horizon is significantly positive when the estimating equation includes $REV*DE$.

The findings in Panel A indicate revaluations by firms with higher debt-to-equity ratios are less positively related to future performance, supporting a prediction of a negative incremental coefficient on REV_BAL*DE in the price regressions. Such a prediction is analogous to Barth, Beaver, and Landsman (1996) who predict and find a significantly negative incremental relation between share prices and loans fair values for banks with low regulatory capital. However, prices could reflect implications for firm value not directly related to the revaluations' association with future operating performance, such as benefits from relaxing debt constraints. Thus, we could observe a positive incremental coefficient or, if the positive and negative valuation effects offset, an incremental

coefficient insignificantly different from zero. Thus, we do not predict the sign of the coefficient on *REV_BAL*DE* in the price regression.[29]

Table 5, Panel B, reveals that the incremental coefficient on the revaluation balance interacted with debt-to-equity ratios, *REV_BAL*DE*, is significantly negative (t-statistic $= -2.02$), indicating that revaluations of firms with higher debt-to-equity ratios are less positively associated with share prices. The base coefficient on the revaluation balance, *REV_BAL*, is significantly positive, consistent with Table 4 (t-statistic $= 3.17$). Also, as in Panel A, the sum of the coefficients on *REV_BAL* and *REV_BAL*DE* is significantly positive, indicating the revaluation balance is significantly positively related to prices, even for firms with high debt-to-equity ratios. Further, untabulated statistics indicate that equality of coefficients on book value of equity, *BVPS*, and *REV_BAL* cannot be rejected, after adjusting for tax effects (p-value $= 0.28$). Although failure to reject the null hypothesis is not strong evidence, it is inconsistent with investors perceiving the revaluation balance as significantly less reliable than other components of book value of equity.

For reasons analogous to those relating to prices, we do not predict the sign of the incremental coefficient on current year revaluations, i.e., that on *REV*DE*, in the returns regression. Table 5, Panel C indicates it is negative, but not significantly so (t-statistic $= -1.21$). Consistent with Table 4, the base coefficient on revaluations, *REV*, is significantly positive (t-statistic $= 2.56$) indicating the association between returns and revaluations is significantly positive, regardless of the debt-to-equity ratio. Untabulated statistics indicate that, as in Table 4, the coefficient on *REV* is significantly smaller than that on net income, *NI*, even after adjusting for tax effects.

6.2. Cross-listed versus non cross-listed firms

Findings from our price specification differ from those in prior research focusing on UK firms that cross-list equity shares in US markets. Thus, Table 6, Panel A, presents summary statistics from the future performance regression, permitting different coefficients on current year revaluations for non cross-listed firms and the 15 cross-listed firms, relating to 31 firm year observations. The findings reveal that, consistent with Table 3, Panel A, revaluations by both types of firms have a significant positive relation with future changes in operating income. However, untabulated statistics reveal an insignificant (significantly

[29] Easton et al. (1993) suggest that if firms with higher debt-to-equity ratios revalue assets more frequently, their revaluation balances could reflect more current values than the revaluation balances of low debt-to-equity ratio firms. This could offset the lower association with future performance we document in Panel A and also lead to an ambiguous prediction for the incremental coefficient in the price regression.

positive) relation between revaluations and future cash from operations for cross-listed (non cross-listed) firms.

Panel B of Table 6 presents findings from the price regression and reveals that the revaluation balance for non cross-listed firms is significantly positively related to share prices, consistent with Table 4, Panel A. In contrast, but consistent with findings in Amir et al. (1993) and Barth and Clinch (1996), the revaluation balance for the 27 cross-listed firms, relating to 186 firm-year observations, is significantly negatively related to share prices. Untabulated findings indicate revaluations by cross-listed (non cross-listed) firms are insignificantly (significantly positively) related to returns.

Table 5
Summary statistics from fixed effects regressions, permitting the coefficients on the revaluation variables to differ depending on debt-to-equity ratio. Sample of 347 UK firms with positive current year revaluations in 1983–1995

Panel A: *Future change in operating income as dependent variable*

		One year ahead		Two years ahead		Three years ahead	
Independent variable	Prediction	Coeff.	*t*-stat.	Coeff.	*t*-stat.	Coeff.	*t*-stat.
REV	+	0.06	5.61	0.08	3.70	0.19	6.39
*REV*DE*	−	− 0.01	− 1.71	− 0.01	− 3.87	− 0.04	− 6.78
$\Delta OPINC$	?	0.11	3.90	− 0.10	− 1.98	0.09	1.94
MB	?	0.01	0.03	− 0.01	− 1.22	− 0.01	− 1.10
ASSETS	?	0.01	0.73	0.01	0.74	0.01	0.20
N		737		662		597	
Adj. R^2		0.31		0.27		0.32	

Panel B: *Share price as dependent variable*

Independent variable	Prediction	Coefficient	*t*-stat.
REV_BAL	+	0.44	3.17
*REV_BAL*DE*	?	− 0.02	− 2.02
EPS	+	5.40	6.29
BVPS	+	1.00	11.93
N		5,142	
Adj. R^2		0.79	

Table 5 (*continued*)
Panel C: *Returns as dependent variable*

Independent variable	Prediction	Coefficient	*t*-stat.
REV	+	0.10	2.56
*REV*DE*	?	− 0.01	− 1.21
NI	+	0.31	5.58
ΔNI	+	0.40	3.78
N		761	
Adj. R^2		0.30	

Notes: *REV_BAL* is the revaluation balance, i.e., the revalued amount associated with fixed assets that have been revalued, per share. *DE* is debt-to-equity ratio at the end of fiscal year *t* where book value of equity excludes the revaluation balance. *EPS* is operating earnings per share. *BVPS* is book value of equity, excluding the revaluation balance, per share. *NI* is net income; ΔNI is *NI* in year *t* minus *NI* in year $t-1$. *REV* is the net increment to the revaluation balance from revaluations to fixed assets in year *t*, i.e., current year revaluations. $\Delta OPINC$ is operating income before depreciation, interest, taxes, and gains on assets in year *t* minus operating income in year $t-1$. *MB* is market-to-book ratio at the end of fiscal year *t* where book value of equity excludes the revaluation balance. *ASSETS* is log of book value total assets, excluding the revaluation balance, at the end of year *t*. One, two, and three years ahead refer to operating income in year $t+1$, $t+2$, and $t+3$ minus operating income in year *t*. All variables in Panel A, except for *MB* and *ASSETS*, are deflated by market value of equity at the beginning of year *t*. All independent variables in Panel C are deflated by market value of equity at the beginning of year *t*. Share price is measured three months after the end of year *t*. Returns are measured beginning (ending) three months after the beginning (end) of year *t*. The future performance and returns equations include untabulated year-specific intercepts.
The price regression equation includes untabulated firm and year-specific intercepts.

Taken together, these findings suggest that the differences in value-relevance between Australian and UK revaluations are attributable to prices of cross-listed firms reflecting something other than the revalued amounts' association with future operating income. For example, investors could interpret the insignificant association between revaluations and future operating cash flows and significantly positive association between revaluations and future operating income as indicating cross-listed firms engage in earnings and/or balance sheet management, and assess a lower share price as a result. We leave to future research comprehensive investigation of this potential explanation.

6.3. Acquisitions by sample firms

Firms' acquisition activity could affect our inferences. First, because future performance measures can reflect operations of subsequently acquired firms,

Table 6
Summary statistics from fixed effects regressions, permitting the coefficients on revaluations to differ for cross-listed and noncross-listed firms. Sample of 347 UK firms with positive current year revaluations in 1983–1995

Panel A: *Future change in operating income as dependent variable*

Independent variable	Prediction	One year ahead		Two years ahead		Three years ahead	
		Coeff	*t*-stat.	Coeff.	*t*-stat.	Coeff.	*t*-stat.
REV_ UK	+	0.06	6.59	0.05	2.18	0.09	3.09
REV_CROSS	+	0.26	5.63	0.40	3.92	0.26	4.28
$\Delta OPINC$	?	0.11	3.85	− 0.12	− 2.45	0.07	1.26
MB	?	0.01	0.17	− 0.01	− 1.35	− 0.01	− 1.33
ASSETS	?	0.01	0.76	0.01	0.36	0.00	0.13
N		737		664		597	
Adj. R^2		0.33		0.27		0.27	

Panel B: *Share price as dependent variable*

Independent variable	Prediction	Coefficient	*t*-stat.
REV_BAL_UK	+	0.39	5.27
REV_BAL_CROSS	?	− 0.50	− 2.49
EPS	+	5.39	6.88
BVPS	+	1.00	13.79
N		5,591	
Adj. R^2		0.83	

Notes: *REV_CROSS* (*REV_UK*) is current year revaluation to fixed assets made in year t by UK firms that are cross-listed (not cross-listed), deflated by beginning of year t market value of equity, and zero otherwise. $\Delta OPINC$ is operating income before depreciation, interest, taxes, and gains on assets, in year t minus operating income in year $t-1$, deflated by beginning of year t market value of equity. *MB* is market-to-book ratio at the end of fiscal year t where the book value excludes the revaluation balance. *ASSETS* is log of book value total assets, excluding the revaluation balance, in year t. One, two, and three years ahead refer to operating income in year $t+1$, $t+2$, and $t+3$ minus operating income in year t. Share price is measured three months after the end of year t. *REV_BAL_CROSS* (*REV_BAL_UK*) is the revaluation balance, i.e., the revalued amount associated with fixed assets that have been revalued, per share, for UK firms that are cross-listed (not cross-listed), and zero otherwise. *EPS* is operating earnings per share. *BVPS* is book value of equity, excluding the revaluation balance, per share.
The future changes in operating income regressions include untabulated year-specific intercepts. The price regression equation includes untabulated firm and year-specific intercepts.

confounding our tests relating to changes in performance, we include in Eq. (1) an incremental intercept and incremental coefficient on revaluations for firms making an acquisition in the revaluation year. Untabulated findings reveal that although approximately 35% of the sample firms revalue assets and make an acquisition in the same year, acquisition activity does not explain our findings. That is, the base coefficient on revaluations, *REV*, is significantly positive for all three horizons. The incremental intercepts are significantly positive for all horizons, indicating acquisition activity is positively associated with future changes in operating income. However, the incremental coefficients on *REV* vary in sign and significance across horizons, indicating no pattern to *REV*'s relation to future performance associated with acquisition activity.

Second, as explained in Section 2, the positive association we observe between revaluations and returns could result from benefits associated with removing a potentially binding constraint on acquisitions imposed by the LSE. The LSE requires shareholder approval for acquisitions exceeding a size criterion based on book value of equity. Thus, we estimate Eq. (4), after including the incremental intercept and incremental coefficient on *REV* described in the previous paragraph. Consistent with benefits associated with removing a contracting constraint, the untabulated findings indicate that the incremental intercept is significantly positive, i.e., mean returns are larger for firms making acquisitions in the revaluation year. However, the findings also indicate, consistent with our primary results, that *REV*'s base coefficient is significantly positive and its incremental coefficient is insignificantly different from zero, indicating no significant difference in the relation between revaluations and returns for firms with acquisition activity.

Third, to investigate further potential effects of the LSE constraint, we estimate Eq. (4) after including an incremental intercept for firms with low book value of equity, exclusive of the revaluation balance, scaled by sales. Inconsistent with expectations based on the LSE constraint, untabulated findings indicate firms with low book value of equity have significantly lower returns. However, consistent with our primary findings, *REV*'s coefficient is significantly positive.

6.4. Changes during sample period

As noted in Section 3, there was a notable shift in firms' revaluation activity around 1990, coinciding with increased volatility in economic conditions. Thus, we estimate the future performance and returns equations permitting the relations between current year revaluations and future performance and returns to vary before and after 1990. We exclude 1990 revaluations to provide a clean

cutoff for the partition. We do not estimate the price specification because we cannot distinguish the revaluation balance relating to revaluations before and after 1990.

Untabulated findings reveal that revaluations before and after 1990 are significantly positively related to future changes in operating income, except for revaluations after 1990, which are insignificant in the two-year horizon. However, revaluations before 1990 have a stronger relation with future profitability than do those after 1990, in that the coefficients are significantly larger, with larger t-statistics, for all horizons.[30] Untabulated returns findings reveal that the significant positive relation between revaluations and returns documented in Table 4 is attributable to revaluations before 1990; those after 1990 are insignificantly related to returns.

7. Summary and concluding remarks

We test whether upward revaluations of fixed assets by UK firms are positively associated with realized future changes in firm operating performance. Prior research focuses primarily on the relation between asset revaluations and share prices and returns and presents mixed findings regarding asset revaluations' value-relevance. Share prices reflect investors' assessments of asset values and expectations about future operating performance. However, they also reflect valuation effects of firms' investing and financing decisions. Thus, market-based tests provide only indirect evidence about the relation between asset revaluations and future changes in operating performance. We directly test this relation where future performance is measured as changes in operating income and cash from operations.

We find that asset revaluations by UK firms are significantly positively associated with future changes in operating performance, over one, two, and three years subsequent to the revaluation. Our tests control for current changes in performance, risk, growth, and size. These findings provide strong evidence that revaluations reflect changes in asset values that are realized in subsequent operations.

We also test the association between revaluation amounts and share prices and annual returns. As predicted, we find that the revaluation balance is

[30] Untabulated findings from future cash from operations regressions also reveal that revaluations before 1990 are significantly positively related to changes in performance over all three horizons. However, revaluations after 1990 are insignificantly related to changes in cash from operations, except for the three-year horizon in which the relation is significantly negative.

significantly positively associated with prices incremental to net income and book value of equity. This finding is consistent with prices reflecting revaluations' association with future performance, and with prior research on Australian revaluations. We also find, as predicted, that current year upward revaluations are significantly positively associated with returns. Prior UK revaluation research does not investigate this relation; findings from prior Australian revaluation research are not consistently strong. This finding not only complements our future performance and price regressions findings, but also indicates that revaluations by UK firms reflect at least a portion of asset value changes on a timely basis.

Upward revaluation of assets is discretionary under UK GAAP, and thus management's revaluation motive could affect the revaluation amounts. One such motive relates to managing debt-to-equity ratios, perhaps because of debt covenants. Consistent with this motive conflicting, in part, with presenting true and fair financial statements, we find that the relations between revaluation amounts and future performance, prices, and returns are weaker for firms with high debt-to-equity ratios. After controlling for effects associated with debt-to-equity ratios, we find evidence inconsistent with investors perceiving revaluations as significantly less reliable than other assets and liabilities.

Prior UK revaluation research focuses on UK firms that list their shares in US equity markets and provides evidence of a significant negative relation between asset revaluation balances and share prices. Permitting the relations we test to differ for cross-listed sample firms yields similar findings. In particular, although we find that revaluations by both types of firms are significantly positively associated with future changes in operating income, those of cross-listed firms are insignificantly related to future changes in operating cash flow and significantly negatively related to share prices, consistent with prior research and in contrast to non cross-listed firms. These findings suggest prices of cross-listed firms reflect something other than the revaluations' relation with future operating performance. We leave to future research comprehensive investigation of this finding.

We find no evidence that acquisition activity affects the relation between revaluations and future performance or returns, indicating that a positive correlation between revaluations and firms investing in operating entities does not affect our inferences. Finally, we find that upward revaluations are more significantly related to future performance and returns in a period of consistently increasing asset values than in a period of economic volatility.

Our evidence provides input to the debate about the efficacy of disclosing and recognizing long-term non financial assets at estimated value, rather than at depreciated historical cost. Consistently finding that revaluations are positively associated with future performance, share prices, and returns suggest that fixed asset revaluation amounts are not unreliable. We also find evidence that

revaluations reflect at least some changes in underlying asset values on a timely basis. Because revaluations are discretionary, our findings are consistent with asset revaluations reflecting changes in management expectations about future firm performance.

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