Journal of Financial Economics 25 (1989) 349–370. North-Holland

THE INFORMATION CONTENT OF EQUITY-FOR-DEBT SWAPS
An Investigation of Analyst Forecasts of Firm Cash Flows*

Ronen ISRAEL

University of Michigan, Ann Arbor, MI 48109, USA

Aharon R. OFER

Tel-Aviv University, Tel-Aviv, Israel
Northwestern University, Evanston, IL 60208, USA

Daniel R. SIEGEL

Northwestern University, Evanston, IL 60208, USA

Received November 1988, final version received December 1989

We demonstrate that analysts revise their forecasts of net operating income downward following the announcement of an equity-for-debt swap. Their revisions are positively correlated with the size of the stock-price reaction to the swap announcement. This evidence supports the hypothesis that announcements of equity-for-debt swaps convey information about the expected level of cash flows of the firm. We also provide evidence that this information is about transitory changes in the expected cash flows.

1. Introduction

Recent studies document significant negative stock-price reactions to announcements of leverage-decreasing transactions.[1] This paper examines whether some portion of the stock-price drop might be explained by the cash-flow information hypothesis. This hypothesis postulates that the announcement of a decrease in leverage conveys negative information about the

*We thank John Hand for his helpful comments and for providing his data set on equity-for-debt swaps. We thank Sanjai Bhagat, Tom Lys, Richard Ruback (the editor), Paul Healy (the referee), and the finance seminars at the University of California/Davis, the University of Colorado/Boulder, and the University of Virginia/Darden for helpful suggestions.

[1]Examples include Masulis (1980, 1983), Mikkelson (1981), Finnerty (1985), Rogers and Owers (1985), Eckbo (1986), Mikkelson and Partch (1986), Asquith and Mullins (1986), Bruner (1986), Ofer and Natarajan (1987), Lys and Sivaramakrishnan (1988), and Hand (1989).

0304-405X/89/$3.50 © 1989, Elsevier Science Publishers B.V. (North-Holland)

firm's cash flows.[2,3] Using a sample of equity-for-debt swaps,[4] in which firms issue new equity and use the proceeds to retire debt, we find evidence consistent with the hypothesis.

We test the cash-flow information hypothesis by examining updates in analyst forecasts of cash flows around announcements of equity-for-debt swaps. If these announcements convey information about expected cash flows, analysts will update their cash-flow forecasts. If, as implied by the efficient-markets hypothesis, abnormal returns around swap announcements capture the value of the information released by the announcement, there should be a positive correlation between updates in analysts' cash-flow forecasts and the stock-price reaction; larger decreases in stock price should be associated with larger downward revisions in cash-flow forecasts. We find such a positive correlation.

This study is related to two previous studies: Ofer and Siegel (1987) and Lys and Sivaramakrishnan (1988). Our study is similar to Ofer and Siegel's, which documents a positive correlation between analysts' forecast errors for earnings-per-share forecasts made before dividend announcements and the price change surrounding those announcements.[5,6] The use of forecasts of earnings per share to examine the information content of announcements of equity-for-debt swaps is not appropriate, however, because the pure mechanics of the swap change expected earnings per share. For example, in a Modigliani–Miller (1958) world, a swap of equity for debt will leave the stock price unchanged, but will decrease the cost of equity and the expected

[2]For example, Ross (1977) suggests that the firm's choice of capital structure may signal managers' private information about cash flows. In this type of signaling equilibrium, managers receiving bad news do not want to signal this information to the market, but are forced to do so because it is too expensive to mimic those not receiving bad news.

[3]Other hypotheses have been offered to explain the stock-price reactions to leverage-decreasing event announcements [see Hand (1989)]. First, imperfect managerial contracting can create a divergence between the interests of managers and stockholders [see Defeo, Lambert, and Larker (1989)]. Thus, managers may decrease leverage to manipulate reported earnings and increase current compensation, even though this can cause a loss of tax shields for the firm and reduce firm value. Second, there may have been an increase in the risk of the underlying assets of the firm, which was not previously known to the capital markets. As a result, the optimal capital structure of the firm contains less debt and the announced reduction in leverage conveys this increase in risk to the market, causing a drop in stock price. These explanations and the cash-flow information hypothesis are not mutually exclusive.

[4]Several other papers have examined equity-for-debt swaps. Finnerty (1985) and Rogers and Owers (1985) report significant abnormal returns around announcements of these swaps. Hand (1989) attempts to identify motivations for swaps. Using a variety of tests, he finds evidence consistent with the hypothesis that firms use swaps to smooth earnings. Another paper, Lys and Sivaramakrishnan (1988), we discuss later.

[5]Ofer and Siegel (1987) use forecast errors instead of revisions in forecasts for reasons related to the construction of the consensus forecasts used in their study.

[6]Other studies that examine changes in earnings or changes in earnings expectations following changes in corporate financial policy include Ofer and Natarajan (1987), Jain (1988), Healy and Palepu (1988, 1989), and Dann, Masulis, and Mayers (1989).

earnings per share. Moreover, a loss of tax shields associated with the swap can cause a further drop in expected earnings per share. Thus, even if no information is conveyed by the swap announcement, we would expect analysts to lower their forecasts of earnings per share. These effects would probably lead to a spurious correlation between revisions in analysts' earnings-per-share forecasts and the negative stock-price movements around the swap announcement.

Lys and Sivaramakrishnan (1988) examine the relation between changes in earnings per share (adjusted for changes in the number of shares outstanding) and changes in stock prices around swap announcements. As with earnings per share, their measure of adjusted earnings per share is affected by the mechanics of the swap. The reduction in after-tax interest brought about by the swap causes an increase in their adjusted earnings per share relative to earnings per share before the swap.[7] This increase can offset any drop in expected earnings per share due to bad news released by the swap announcement or to the pure mechanics of the swap. (This may explain why Lys and Sivaramakrishnan find that swapping firms on average show better performance after the swap, when compared with a group of industry competitors.) Thus, the overall effect of the swap announcement on forecast revisions (or forecast errors) for adjusted earnings and on the correlation between forecast revisions (or forecast errors) and the change in price surrounding the swap announcement is ambiguous. Lys and Sivaramakrishnan document a positive relation between forecast errors based on a time-series model of past realized earnings per share and the change in stock price surrounding swap announcements. They are unable, however, to find a significant relation between revisions in analysts' forecasts of adjusted earnings and the change in stock price.

In this study, we use analysts' forecasts of *net operating income* of the firm as a proxy for market expectations of firm cash flows. Unlike earnings per share, net operating income measures cash flows before interest and taxes are removed, and is not affected by the change in the number of shares outstanding. Thus, the pure mechanics of the swap will not affect net operating income. Any revisions in forecasts of net operating income associated with the swap announcement should reflect only changes in analysts' expectations of operating cash flows of the firm. Therefore, analysis of such

[7] Let N_b, I_b, and EPS_b denote the number of shares, interest payments, and expected earnings per share before the swap. Let N_a, I_a, and EPS_a be the analogous quantities after the swap. Let $EBIT$ denote expected earnings before interest and taxes and t the tax rate. EPS_b, EPS_a, and $EBIT$ represent expectations for the fiscal year that includes the swap. Finally, suppose that expectations about $EBIT$ are not affected by the swap announcement. Then $EPS_b = [(EBIT - I_b)(1-t)]/N_b$ and $EPS_a = [(EBIT - I_a)(1-t)]/N_a$. Lys and Sivaramakrishnan (1988) define adjusted earnings per share as $EPS'_a = EPS_a(N_a/N_b) = [(EBIT - I_a)(1-t)]/N_b$. Subtracting the EPS before the swap from the adjusted EPS after the swap yields $[(I_b - I_a)(1-t)]/N_b$. This is positive, because the swap reduces interest payments.

revisions allows us to test directly whether some portion of the negative stock-price reactions associated with swap announcements is due to adverse information about expected cash flows.

Using net operating income as a measure of cash flow, we are able to document a significant relation between revisions in analysts' forecasts and changes in stock price surrounding swap announcements. Theories proposing that swap announcements convey information about firm cash flows imply that stock-price reactions to these announcements come as a result of market participants updating their *expectations* of cash flows. Because analysts' forecasts are perhaps the closest measure of market expectations available, our results provide strong and direct evidence consistent with the hypothesis that market participants update their cash-flow expectations following swap announcements. Using both short- and long-term forecasts of cash flows, we provide evidence that the information conveyed by swap announcements is about transitory changes in expected cash flows. Finally, we show that a significant relation between revisions in analysts' forecasts and changes in stock price is present only in the latter part of our sample period. Since equity-for-debt swaps were an innovation, this could be evidence that the financial analysts we study did not at first recognize the information content of swaps, but learned after observing them over time.

Section 2 develops a model of the relation between revisions in expectations about net operating income and changes in stock price associated with the announcement of a swap. Section 3 uses this model to develop the equations we use to test our hypotheses and discusses the econometric issues surrounding the estimation of these equations. Section 4 discusses the data and presents the test results. Section 5 concludes.

2. The model

To test whether announcements of equity-for-debt swaps convey information about firm cash flows, we construct a model characterizing the changes in share price that would result from changes in the expected level of net operating income conveyed by swap announcements. We consider both permanent and transitory changes in net operating income.[8] This model enables us to place restrictions on the parameters we estimate and to evaluate our specification.

We define the relation between NOI^e, the market's expectation of net operating income for the entire firm, and EPS^e, the market's expectation of

[8]Lys and Sivaramakrishnan (1988) also address the distinction between permanent and transitory changes in cash flows.

earnings per share, by

$$EPS^e \equiv \delta NOI^e, \tag{1}$$

where the parameter δ is a firm-specific multiplier.

Eq. (1) is an identity, with δ incorporating the number of shares outstanding, interest payments, taxes, and tax shields of the firm. Thus EPS^e represents that portion of expected net operating income per share that goes to equity holders.

We assume that the price of the firm's stock (P) is

$$P = EPS^e/d = \delta NOI^e/d, \tag{2}$$

where d is a firm-specific capitalization factor that equals the difference between the required rate of return on the firm's equity and the expected growth rate in earnings per share.

2.1. Permanent change in NOI^e

Suppose that any information the swap announcement releases about expected net operating income concerns a permanent change. Taking the total differential of the price in (2), the change in the share price resulting from the announcement is

$$\begin{aligned} \Delta P &= \left[\frac{\partial P}{\partial NOI^e}\right]\Delta NOI^e + \left[\frac{\partial P}{\partial \delta}\right]\Delta\delta + \left[\frac{\partial P}{\partial d}\right]\Delta d \\ &= \left[\frac{\delta}{d}\right]\Delta NOI^e + \left[\frac{NOI^e}{d}\right]\Delta\delta - \left[\frac{\delta NOI^e}{d^2}\right]\Delta d, \end{aligned} \tag{3}$$

where ΔNOI^e, $\Delta\delta$, and Δd are the changes in the market's values for the respective parameters due to the swap announcement. Eq. (3) explicitly models the change in price associated with the announcement as a function of changes not only in the expected level of net operating income, but also in risk and growth rates (through Δd), and in the number of shares, tax shields, and the debt–equity ratio (through $\Delta\delta$).

Dividing (3) by P and substituting from (2), eq. (3) becomes

$$\frac{\Delta P}{P} = \left[\frac{\Delta NOI^e}{NOI^e}\right] + \left[\frac{\Delta\delta}{\delta}\right] - \left[\frac{\Delta d}{d}\right]. \tag{4}$$

Eq. (4) shows how the different aspects of a swap can cause a change in the stock price. The first term represents a pure information effect about the

expected level of net operating income. All else being equal, if the market's expectation of NOI changes by a given percentage, the per-share price of the firm changes by the same percentage. The next two terms have more complex interpretations. The pure mechanics of the swap increase the number of shares outstanding (decreasing δ), reduce interest payments (increasing δ), reduce the risk of equity (decreasing d), and possibly reduce tax shields (decreasing δ).

To see the impact of the changes, suppose first that we are in a pure Modigliani–Miller (1958) world and that no information is released by the swap (i.e., $\Delta NOI^e = 0$). Modigliani–Miller Proposition I implies that the swap will not change the stock price and therefore the second and third terms must cancel. Thus, any changes in d and δ caused by the pure mechanics of the swap will offset each other. Other effects on δ and d may affect the stock price, as demonstrated by (4). For example, any information about the change in firm risk or rate of income growth released by the swap induces a negative correlation between $\Delta d/d$ and $\Delta P/P$. Similarly, any unexpected change in tax shields resulting from the swap induces a positive correlation between $\Delta\delta/\delta$ and $\Delta P/P$. The correlations between $\Delta\delta/\delta$, $\Delta d/d$, and $\Delta P/P$ affect our estimating equations, as we discuss later.

2.2. *Transitory change in NOI^e*

Suppose that any information the swap announcement releases about the net operating income concerns only a transitory change, i.e., a change in next period's NOI^e only. We take the total differential of (2) with respect to changes in δ and d, while allowing for only a transitory change in NOI^e. Thus, the change in share price resulting from the announcement is

$$\begin{aligned} \Delta P &= \delta \Delta NOI^e + \left[\frac{\partial P}{\partial \delta}\right] \Delta\delta + \left[\frac{\partial P}{\partial d}\right] \Delta d \\ &= \delta \Delta NOI^e + \left[\frac{NOI^e}{d}\right] \Delta\delta - \left[\frac{\delta NOI^e}{d^2}\right] \Delta d. \end{aligned} \tag{5}$$

Dividing (5) by P and substituting from (2), eq. (5) becomes

$$\frac{\Delta P}{P} = d\left[\frac{\Delta NOI^e}{NOI^e}\right] + \left[\frac{\Delta\delta}{\delta}\right] - \left[\frac{\Delta d}{d}\right]. \tag{6}$$

Eq. (6) specifies the relation between the relative change in price and the relative change in expected net operating income when the change in expected net operating income is transitory. The equation is very similar to

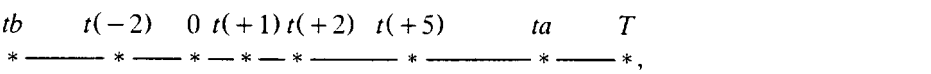
(4) for permanent changes, because that equation arose from a constant-growth perpetuity model. Thus, knowing next period's earnings (and the discount factor) is sufficient for determining the equity value. The only difference is the coefficient on $\Delta NOI^e/NOI^e$. This difference arises because a dollar increase in transitory income is worth only d as much as a dollar increase in permanent income.

3. Econometric specification

We use (4) and (6) to develop a test of whether announcements of equity-for-debt swaps convey information about expected levels of net operating income. First, we describe the proxies we use to measure the relative change in stock price, $\Delta P/P$, and the relative change in expected net operating income, $\Delta NOI^e/NOI^e$, induced by the swap. We then discuss the implications of using these proxies in our estimation.

3.1. Proxy variables

Our proxy variables are measured along the following time line:



where

0 = date of the swap announcement,

tb = date of the market's last forecast of net operating income before the swap announcement,

ta = date of the market's first forecast of net operating income after the swap announcement,

$t(j)$ = date j days from the swap announcement [for example, $t(-2)$ is the date two days before the swap announcement],

T = end of the fiscal year.

3.1.1. Relative change in price

As a proxy for the price change due to the swap announcement, we use the change in price from the close of trading two days before the swap announcement to the close of trading one day after the announcement. We then divide this price change by the price two days before the announcement. We use a three-day window to accommodate both leakage of information before the announcement and uncertainty about the announcement date.

This proxy for the relative price change may be error-ridden. Even though we remove observations for which there is a confounding event in the

announcement window, there may be information other than the swap announcement that can change the stock price during this window. Thus, we denote our proxy for the relative change in P as

$$PR\left[\frac{\Delta P}{P}\right] = \left[\frac{\Delta P}{P}\right] + \eta_p, \tag{7}$$

where $PR[\cdot]$ refers to 'proxy' and η_p is the component of the relative change in price due to events other than the swap announcement. By construction, η_p is independent of $\Delta P/P$.

3.1.2. *Relative change in expected net operating income*

As a proxy for the market's expectation of net operating income, we use data from Value Line to construct a forecast. We discuss details of the Value Line data and the construction of the forecast below. We take the Value Line forecasts at dates *tb* and *ta* to be the market's expectations of net operating income before and after the swap announcement. The time between *tb* and *ta* is at least three months.[9] Therefore, our proxy for $\Delta NOI^e/NOI^e$ is error-ridden, because it includes updates in the Value Line forecast due to events other than the swap announcement during this three-month (or longer) period. We denote our proxy for the relative change in NOI^e as

$$PR\left[\frac{\Delta NOI^e}{NOI^e}\right] = \left[\frac{\Delta NOI^e}{NOI^e}\right] + \eta_n, \tag{8}$$

where η_n is the component of the relative change in the forecast of net operating income due to events other than the swap announcement. By construction, η_n is independent of $\Delta NOI^e/NOI^e$. Further, because we have defined $\Delta P/P$ as the change in stock price due only to the swap announcement, η_n is independent of $\Delta P/P$.

3.2. *Testing for information content*

Eq. (4) and (6) indicate that, if swap announcements convey information about the expected level of net operating income, there will be a positive correlation between $\Delta P/P$ and $\Delta NOI^e/NOI^e$. We cannot observe $\Delta P/P$ and $\Delta NOI^e/NOI^e$ directly, however, and therefore use the proxies discussed above. To examine whether swap announcements convey information about

[9]We use quarterly forecast data. If the swap-announcement date is too close to the forecast-announcement date, however, we increase the time between *tb* and *ta* to six months.

expected net operating income, we test for a positive correlation between these proxies. For this test to have any meaning, however, we need to show that there is no correlation between the proxies if there is no information. To demonstrate this, we derive the estimating equations by rewriting (4) and (6) as

$$\frac{\Delta NOI^e}{NOI^e} = \left[\frac{\Delta P}{P}\right] + \left[\frac{\Delta d}{d}\right] - \left[\frac{\Delta \delta}{\delta}\right], \tag{4'}$$

$$\frac{\Delta NOI^e}{NOI^e} = \left[\frac{1}{d}\right]\left[\frac{\Delta P}{P}\right] + \left[\frac{1}{d}\right]\left[\frac{\Delta d}{d}\right] - \left[\frac{1}{d}\right]\left[\frac{\Delta \delta}{\delta}\right]. \tag{6'}$$

We use $\Delta NOI^e/NOI^e$ as a left-hand-side variable because the measurement error will be larger for our proxy of this variable than for our proxy of $\Delta P/P$.[10] This is true because the change in the forecast of net operating income we use occurs over at least a three-month period, whereas the change in stock price occurs over a three-day period.

3.3. Estimating equations

If information about the expected level of *NOI* is conveyed by the swap announcement, $\Delta NOI^e/NOI^e \neq 0$. We can substitute the expressions for $\Delta P/P$ and $\Delta NOI^e/NOI^e$ from (7) and (8) into (4') and (6'). This yields

$$PR\left[\frac{\Delta NOI^e}{NOI^e}\right] = \beta PR\left[\frac{\Delta P}{P}\right] + \beta[\mu - \eta_p] + \eta_n, \tag{9}$$

where

$$\mu = \left[\frac{\Delta d}{d}\right] - \left[\frac{\Delta \delta}{\delta}\right]$$

and

$\beta = 1$ if permanent change in NOI^e,

$= 1/d$ if transitory change in NOI^e.

If no information about the expected level of *NOI* is conveyed by the swap announcement, $\Delta NOI^e/NOI^e = 0$. In this case, the drop in stock price observed after a swap announcement is due either to a perceived increase in risk, a drop in the rate of growth of NOI^e, or a loss of tax shields. Then, from

[10] We choose to place the variable with the largest error component on the left-hand side, because error in the left-hand-side variable will not bias OLS estimates.

(4') and (6'), $\mu = \Delta d/d - \Delta\delta/\delta = -\Delta P/P$. Using (7) and substituting this expression for μ, eq. (9) becomes

$$PR\left[\frac{\Delta NOI^e}{NOI^e}\right] = \eta_n. \tag{9'}$$

Thus, if we write

$$PR\left[\frac{\Delta NOI^e}{NOI^e}\right] = \alpha + \beta PR\left[\frac{\Delta P}{P}\right] + \varepsilon, \tag{10}$$

then, because in the no-information case $PR[\Delta P/P]$ does not appear on the right-hand side of eq. (9'),

$\beta = 0$ if no information is conveyed about the level of NOI^e,

> 0 if information is conveyed about the level of NOI^e.

The resulting coefficient estimates for (10) represent averages for the sample.

We can now use (10) to construct a test of whether swap announcements contain information about expected levels of NOI, by examining whether $\beta = 0$.[11] First, however, we need to show that our construction of proxy variables will not lead to a spurious positive correlation between the proxies under the no-information hypothesis, and thus a spurious positive estimate for β. Second, even if we show that the first issue is not a problem, we need to understand the properties of the point estimate of β that we obtain and the properties of our test for $\beta = 0$.

3.4. Control regression to test for spurious correlation

Suppose there is no information in the swap announcement about the level of NOI^e, so that (9') holds. Then, in estimating (10), we will find that $\beta = 0$ as long as η_n and $PR[\Delta P/P] = \Delta P/P + \eta_p$ are independent. As discussed above, η_n and $\Delta P/P$ are independent by construction. Thus, we need to examine the correlation between the two errors η_n and η_p. A positive correlation will induce a spurious positive correlation between $PR[\Delta P/P]$ and $PR[\Delta NOI^e/NOI^e]$. These two error terms represent the relative changes in price and expected net operating income that are not associated with the swap announcement. To the extent that non-swap-related news in the three-day window surrounding the swap announcement affects both NOI^e and price, there may be a positive correlation between η_n and η_p. This will induce a spurious positive regression coefficient. To test for such a spurious

correlation, we run a control regression:

$$PR\left[\frac{\Delta NOI^e}{NOI^e}\right] = \alpha_c + \beta_c PR\left[\frac{\Delta P}{P}\right]_c + \varepsilon_c, \tag{11}$$

where subscript c refers to the control window from dates $t(+2)$ through $t(+5)$. News that arrives in this window should be representative of the kind of non-swap-related news that might occur during the window $t(-2)$ through $t(+1)$. Theoretically, we would expect a positive coefficient from this regression, because any news that arrives in the three-day control window that affects the market's forecast of net operating income should also affect the stock price in the same direction. If there is no major event in the control window, however, we would expect this effect to be weak empirically, because the price change is measured over a three-day window, whereas the forecast change is measured over at least three months. By running this control regression, we can determine whether the correlation between η_p and η_n is strong enough to affect our results. A positive and significant coefficient from this regression indicates that news other than that associated with the swap will induce spurious positive correlation between $PR[\Delta P/P]$ and $PR[\Delta NOI^e/NOI^e]$. A nonsignificant coefficient indicates that spurious correlation is not likely to be a problem. If the control experiment shows no spurious correlation, then under the no-information hypothesis, we should obtain a coefficient of zero from estimating (10).

3.5. *Properties of OLS*

We now examine the properties of ordinary-least-squares (OLS) estimates of (10), assuming that η_n and η_p are independent. The control experiment discussed in the previous section allows us to test the validity of this independence assumption.

From (9) the error term in that equation is

$$\varepsilon = \beta[\mu - \eta_p] + \eta_n. \tag{12}$$

This error term will be negatively correlated with the right-hand-side variable in (10), $PR[\Delta P/P]$, for two reasons. First, η_p and $PR[\Delta P/P]$ are positively correlated from (7). This is the classic errors-in-variables problem. Second, from (4) and (6), $\mu = \Delta d/d - \Delta\delta/\delta$ will be negatively correlated with $\Delta P/P$, and therefore negatively correlated with $PR[\Delta P/P]$. Thus, OLS estimates of β will be biased toward zero. Because the portion of the error term that is correlated with $PR[\Delta P/P]$ is multiplied by the slope β, however, there will

be no biases in OLS estimates under the null hypothesis that $\beta = 0$. Israel, Ofer, and Siegel (1990) have shown that in this case rejections of the null using standard significance tests are still valid, but the power of the tests may be low. Thus although we can test the no-information hypothesis, we must take care in interpreting the coefficient point estimates.

4. Empirical tests

4.1. Data and sample selection

Our data set consists of a sample of equity-for-debt swaps. The original list of firms and swap characteristics was given to us by John Hand. The sample includes 247 swaps from September 23, 1981 through June 27, 1984.

4.1.1. Swap-announcement dates

The swap-announcement date is defined, as in Hand (1989), as the date the common stock is registered with the Securities and Exchange Commission (SEC). Hand reports that these registrations are typically accompanied by a press release that goes out over the Dow Jones broad tape during trading hours. Some of these press releases are made after trading hours. Thus, we extend the announcement window through date $t(+1)$.

4.1.2. Stock-price data

For each firm in the sample, we attempted to obtain stock-price data from the Center for Research in Security Prices (CRSP) tapes. We eliminated one swap because we could not match the firm with the CRSP data.

4.1.3. Net operating income forecasts

For each firm, we attempted to obtain forecasts of annual sales and operating margin from Value Line for the fiscal year in which the swap occurred. Value Line defines the operating margin as the percentage of sales being converted into income from operations.[12] It defines operating income as income before depreciation charges, interest expenses, income taxes, and extraordinary items. We define the Value Line forecast of net operating income as

$$\text{Forecast of } NOI = (\text{Forecast operating margin}) \times (\text{Forecast sales}).$$

[12]See Bernhard (1987) for a description of the Value Line data.

We define *tb* as the date of the last forecast before the swap-announcement date, unless the forecast release and the swap announcement occur within two days of each other. In that case, we use the previous forecast-release date. Similarly, we define *ta* as the date of the first forecast release after the swap announcement, unless it follows the announcement by less than ten days. In that case, we use the subsequent forecast-announcement date. In all cases, we include only firms for which the forecasts are for the same fiscal year and for which that fiscal year ended after the swap announcement. We eliminate 64 swaps for which we can not find CRSP and Value Line data. All of the forecasts of net operating income are nonnegative.

4.1.4. Confounding events

After matching our original sample with CRSP and Value Line data, we are left with 182 swaps.[13] We then use the *Wall Street Journal Index* to locate swaps for which a confounding event is reported between two days before and five days after the swap-announcement date. We chose this window to encompass both the announcement and control windows. Finally, we read the announcement of each swap in the *Wall Street Journal* to make sure that no other relevant news is reported simultaneously. This leaves us with a clean sample of 125 swaps.

4.2. Descriptive statistics

Table 1 presents characteristics of the swaps for the full sample. Table 2 presents statistics for the variables used in the analysis for the full (panel A) and clean (panel B) samples. For both samples, there is a significant decline in share price within the announcement window, but no apparent change in price in the control window. These results are similar to those reported in studies of leverage-decreasing transactions cited earlier. There is also a significant drop in forecast net operating income. This drop, by itself, is not sufficient evidence that negative information about expected net operating income is being conveyed by a swap. Fried and Givoly (1982) and Elton, Gruber, and Gultekin (1984) have documented that there are secular downward revisions in forecasts of income over time. Thus we test for a positive relation between the size of the stock-price movement around the announcement and the revision in the forecast of net operating income.

[13]We also eliminate one data point that is clearly an outlier. Using regression diagnostics from Belsley, Kuh, and Welsch (1980), we find that this one observation has an influence on the standard error of the slope estimate well outside the acceptable range. Upon investigation, we find that the number printed on the microfiche is not clearly readable.

Table 1

Descriptive statistics for a sample of 182 equity-for-debt swaps. The sample period extends from September 23, 1981 through June 27, 1984.

Variable	Mean	Std. dev.	Minimum	Maximum
Announcement date	—	—	9/23/81	6/27/84
Swap size[a] (millions)	$25.31	$27.60	$0.59	$173.97
Total face value of debt swapped (millions)	$33.67	$36.28	$1.10	$197.50
Swap size as a percentage of firm size[b]	1.69%	1.41%	0.06%	7.03%
Shares swapped as a percentage of shares outstanding	2.13%	2.23%	0.03%	14.76%

[a]Swap size equals the number of shares swapped times the price received by the investment bank, plus the cash paid.

[b]Firm size equals market value of equity plus book value of long-term debt.

4.3. Regression results

Table 3 presents results for the estimation of the main eq. (10) for both the full and clean samples, as well as results from the estimation of the control eq. (11) for both samples. The slope estimates for (10) are given in regressions I and II. They are 0.6503 for the full sample and 1.0370 for the clean sample. Whereas the one-tailed P-value of the slope estimate for the full sample is 0.0592, it is equal to 0.0131 for the clean sample. Both results are inconsistent with the no-information hypothesis.[14] Further, it is clear from the control regressions III and IV that spurious positive correlation between $PR[\Delta P/P]$ and $PR[\Delta NOI^e/NOI^e]$ is not likely to be a problem.[15] The slope estimates for both the full and clean samples are insignificant. The P-values for the slope estimates are 0.7627 and 0.2672 for the full and clean samples.

The results in regressions I through IV indicate that analysts' revisions of NOI forecasts and the change in stock price surrounding a swap announcement are positively correlated. Such a positive correlation is inconsistent with

[14]Instead of regressing the percentage change in forecast on the percentage change in price, Lys and Sivaramakrishnan (1988) regress the change in forecast divided by price on the percentage change in price. With their regression, the predicted value of the slope is d for a permanent change and approximately unity for a transitory change. Using our clean data and measures of cash flow, we obtain a slope estimate of 0.2303 for this regression with a one-tailed p-value of 0.0856. Although these results are not as strong as for our regression, they do not suggest that our results are driven by our specification.

[15]Although it would be appropriate to test for the difference in coefficients for the announcement-window and control-window regressions, it is not clear what are the properties of the standard test statistics with the severe errors-in-variables problem discussed earlier.

Table 2

Summary statistics for percentage changes in stock price and forecast net operating income surrounding equity-for-debt swaps in the period September 23, 1981 through June 27, 1984 (*t*-statistics in parentheses).

Variable	Mean	Std. dev.	Minimum	Maximum
Panel A. Full sample: 182 observations				
Percentage change[a] in stock price (announcement window)	−1.28% (−4.99)	3.46%	−8.94%	11.98%
Percentage change[b] in stock price (control window)	0.11% (0.52)	2.96%	−8.45%	9.22%
Percentage change in[c] forecast *NOI* (short term)	−5.88% (−4.07)	19.46%	−100.00%	60.28%
Panel B. Clean sample: 125 observations[d,e]				
Percentage change[a] in stock price (announcement window)	−1.57% (−5.28)	3.33%	−8.94%	11.98%
Percentage change[b] in stock price (control window)	0.03% (0.13)	2.88%	−6.88%	9.22%
Percentage change in[c] forecast *NOI* (short term)	−3.88% (−2.47)	17.58%	−55.75%	60.28%
Panel C. Clean sample (long-term forecasts): 80 observations[d,g]				
Percentage change[a] in stock price (announcement window)	−2.02% (−5.92)	3.05%	−8.43%	8.45%
Percentage change[b] in stock price (control window)	0.22% (0.70)	2.84%	−5.30%	9.22%
Percentage change in[f] forecast *NOI* (long term)	3.38% (3.03)	9.99%	−13.04%	36.36%
Panel D. Clean sample (observations 1–62): 62 observations[d,e]				
Percentage change[a] in stock price (announcement window)	−1.93% (−4.89)	3.10%	−8.94%	5.28%
Percentage change[b] in stock price (control window)	−0.18% (−0.51)	2.71%	−6.88%	7.31%
Percentage change in[c] forecast *NOI* (short term)	−7.06% (−4.29)	12.96%	−35.09%	43.06%

Table 2 (continued)

Variable	Mean	Std. dev.	Minimum	Maximum
Panel E. Clean sample (observations 63–125): 63 observations[d,e]				
Percentage change[a] in stock price (announcement window)	−1.23% (−2.76)	3.54%	−8.43%	11.98%
Percentage change[b] in stock price (control window)	0.24% (0.63)	3.05%	−5.29%	9.22%
Percentage change in[c] forecast *NOI* (short term)	−0.74% (−0.28)	20.81%	−55.75%	60.28%

[a]Percentage change in stock price in a window starting two days before the swap announcement and ending one day after the announcement.

[b]Percentage change in stock price in a window starting two days after the swap announcement and ending five days after the announcement.

[c]Percentage change in Value Line forecast of annual *NOI* for the first available fiscal year after the swap announcement. It is taken from the last forecast before the announcement through the first forecast after the announcement. Forecasts are reported quarterly.

[d]This sample excludes observations for which there is a confounding event in a seven-day window starting two days before the swap announcement and ending five days after the announcement.

[e]This sample includes all observations for which there was a short-term forecast available.

[f]Percentage change in Value Line forecast of average annual *NOI* for the third through the fifth fiscal year after the swap announcement. It is taken from the last forecast before the announcement through the first forecast after the announcement. Forecasts are reported quarterly.

[g]This sample includes all observations for which a long-term forecast is available.

the hypothesis that forecasts of net operating income are not revised following swap announcements. Thus, analysts revise their forecasts of *NOI* after a swap announcement and these revisions are consistent with the observed change in equity values. This evidence supports the hypothesis that some portion of the price drop surrounding announcements of these swaps is caused by the release of bad news about the level of firm cash flows.

An alternative explanation for our results is that analysts simply adjust their forecasts on the basis of movements in the stock price. Thus, the swap may convey no information, but the drop in stock price surrounding a swap may cause analysts to revise their forecasts downward. Our control regression makes this explanation look implausible.

4.3.1. Regression diagnostics

To validate our regression results, we run a number of diagnostic tests. First, we check for the presence of conditional heteroskedasticity. Table 3 reports results for the White (1980) test, which allow us to accept the null

Table 3

Ordinary-least-squares regressions testing for a positive relation between the relative change in stock price surrounding announcement of an equity-for-debt swap and the relative change in the forecast of net operating income surrounding the announcement. A positive relation is consistent with the hypothesis that announcements of equity-for-debt swaps convey information about expected cash flows. The entire sample consists of equity-for-debt swaps from September 23, 1981 through June 27, 1984.

Regression		Constant[a]	Slope[a]	R-square	Chi-square[b]
I.	Full sample[c,d]	−0.0504	0.6503	0.0134	0.8413
	Short-term forecast	(0.0153)	(0.4163)		(0.6566)
	(n = 182)	(0.0010)	(0.0592)		
II.	Clean sample[c,e]	−0.0225	1.0370	0.0386	0.5122
	Short-term forecast	(0.0171)	(0.4664)		(0.7741)
	(n = 125)	(0.1901)	(0.0131)		
III.	Full sample control[d,f]	−0.0584	−0.3499	0.0028	0.3562
	Short-term forecast	(0.0145)	(0.4893)		(0.8369)
	(n = 182)	(0.0001)	(0.7627)		
IV.	Clean sample control[e,f]	−0.0389	0.3412	0.0031	0.4344
	Short-term forecast	(0.0158)	(0.5493)		(0.8052)
	(n = 125)	(0.0136)	(0.2672)		
V.	Clean sample[c,g]	0.0317	−0.1026	0.0010	1.8776
	Long-term forecast	(0.0135)	(0.3702)		(0.3911)
	(n = 80)	(0.0213)	(0.6088)		
VI.	Clean sample[c,e,h]	−0.0634	0.3747	0.0080	0.7043
	Short-term forecast	(0.0195)	(0.5375)		(0.7032)
	(observations 1–62)	(0.0019)	(0.2442)		
VII.	Clean sample[c,e,h]	0.0096	1.3803	0.0551	1.3951
	Short-term forecast	(0.0272)	(0.7320)		(0.4978)
	(observations 63–125)	(0.7267)	(0.0320)		

[a]The first number in parentheses below the coefficient estimate is the standard error. The second number in parentheses is the one-tailed p-value.

[b]Chi-square test to determine whether there is conditional heteroskedasticity. The number in parentheses below the statistic is the p-value.

[c]The dependent variable is the relative change in the Value Line forecast of annual *NOI* for the first available fiscal year after the swap announcement. It is taken from the last forecast before the announcement through the first forecast after the announcement, with the forecasts reported quarterly. The independent variable is the relative change in the stock price for a three-day window starting two days before the announcement and ending one day after the announcement.

[d]This sample also includes observations for which there is a confounding event in a seven-day window starting two days before the swap announcement and ending five days after the announcement.

[e]This sample excludes observations for which there is a confounding event in a seven-day window starting two days before the swap announcement and ending five days after the announcement.

[f]The dependent variable is the relative change in the Value Line forecast of annual *NOI* for the first available fiscal year after the swap announcement. It is taken from the last forecast before the announcement through the first forecast after the announcement, with the forecasts reported quarterly. The independent variable is the relative change in the stock price for a three-day window starting two days after the announcement and ending five days after the announcement. This regression tests for spurious correlation for regressions I and II.

[g]The dependent variable is the relative change in the Value Line forecast of average annual *NOI* for the third through the fifth fiscal years after the swap announcement. It is taken from the last forecast before the announcement through the first forecast after the announcement, with the forecasts reported quarterly. The independent variable is the relative change in the stock price for a three-day window starting two days before the announcement and ending one day after the announcement. This regression tests whether the information conveyed by the swap is permanent or transitory.

[h]Observations are ranked by date. Regressions VI and VII test whether analysts updated their expected levels of cash flows differently early and later in the sample period. Observations 1–62 span the period from September 23, 1981 through September 10, 1982. Observations 63–125 span the period from September 14, 1982 through June 27, 1984.

hypothesis of conditional homoskedasticity of the error terms. Second, we check for the presence of cross-sectional correlation among the error terms. Although our regression is cross-sectional, our sample of swap announcements spans less than three years. Because the measured change in *NOI* forecasts around a given announcement spans at least three months, there will be temporal overlap of the error terms in (10) for observations whose announcement dates are within a few months of each other. If common economic events cause updates in forecasts of *NOI*, then this temporal overlap may cause cross-sectional correlation among the error terms. This would cause our standard errors to be understated and could reverse our finding of a significant β. We therefore rank observations by swap-announcement dates and examine autocorrelations of the estimated residuals. This should provide a measure of the correlation of the errors of observations that are most likely to be correlated. We conclude that cross-sectional correlation of the error terms is not an important problem. Finally, we run a battery of diagnostics tests for influential observations, using the tests suggested by Belsley, Kuh, and Welsch (1980). These tests are not able to detect any influential observations for either the full sample of 182 or the clean sample of 125.

4.3.2. Economic interpretation of coefficient estimates

We can use our theoretical results to place broad restrictions on the value of the regression coefficient and thus test our specification. Eq. (9) shows that if changes in expected net operating income are permanent, β should equal one. If the changes are expected to be transitory, β should equal $1/d$. The value of $1/d$ should be close to the price–earnings ratios of the firms. Thus, a value of β in the neighborhood of 10–20 would be expected. For the contaminated sample, the estimated value of β is close to one. Unfortunately, we cannot conclude that changes in expected levels of net operating income released by swaps are permanent. As discussed earlier, the point estimate of β is likely to be biased toward zero. In fact, it may be severely

biased. The downward bias arises from a standard errors-in-variables problem due to mismeasurement of $\Delta P/P$ and from the correlation between $\Delta P/P$ and μ. If we concentrate on the pure errors-in-variables problem, and thus derive a conservative estimate of the bias, we know that

$$\text{plim}\, \beta_{\text{ols}} = (1 - \gamma)\beta, \tag{13}$$

where

$$\gamma = \frac{\text{var}\{\eta_p\}}{\text{var}\{PR[\Delta P/P]\}}.$$

We can estimate γ, as suggested by Israel, Ofer, and Siegel (1990), by taking the ratio of the variance of the relative change in stock price in the control window to the variance of the relative change in stock price in the announcement window, $\text{var}\{PR[\Delta P/P]_c\}/\text{var}\{PR[\Delta P/P]\}$. This ratio equals 0.732 and 0.824 for the full and clean samples. Thus the error-in-variables bias, $1/(1-\gamma)$, would be a factor 3.731 and 5.682 for the full and clean samples. Applying these adjustments to the parameter estimates (and assuming that the pure errors-in-variables bias is dominant) yields adjusted estimates of $(0.6503) \times (3.731) = 2.426$ for the full sample and $(1.0370) \times (5.682) = 5.892$ for the clean sample. Including the bias due to the correlation between $\Delta P/P$ and μ would increase these point estimates even more. Our point estimates do not violate the broad restrictions suggested by our theory and provide no evidence against our specification. They do not, however, provide reliable evidence about whether the information conveyed by swap announcements is about transitory or permanent changes in earnings. We discuss evidence on this issue in the next section.

4.3.3. Transitory vs. permanent change in cash-flow expectations

Because we use revisions in short-term forecasts in our regressions, we have already provided evidence consistent with the hypothesis that analysts update their expectations of nearby cash flows following a swap announcement. To test whether they also update their expectations of more distant cash flows, we repeat our tests using analysts' forecasts of cash flows three to five years out.[16]

In addition to publishing forecasts for the nearest (available) fiscal year, Value Line publishes average forecasts for the three-year period starting with the third fiscal year out. Regression V of table 3 is of the revision of this long-term forecast on the change in stock price surrounding the swap announcement, for the clean sample.[17] The smaller sample size of 80 (instead

[16] We thank the referee for suggesting this test.

[17] Results for the sample including confounding events are similar.

of 125) reflects data availability. Panel C of table 2 presents summary statistics for the variables used in the regression.

The insignificant regression coefficient on the change in stock price provides no evidence that analysts update their long-term forecasts of cash flows following a swap announcement. Combined with our earlier positive findings for short-term forecasts, this indicates that swap announcements convey information about transitory, rather than permanent, changes in cash flow expectations.

4.3.4. Subsample results

One of the major differences between this paper and Lys and Sivaramakrishnan (1988) is that whereas we find a significant relation between changes in analysts' forecasts of cash flows and stock-price changes around swap announcements, they find none. We have discussed earlier how our use of net operating income is more appropriate than their use of adjusted earnings per share. Another difference is that our sample period extends beyond theirs. A possible explanation for the divergence in results is that Value Line only began updating its forecasts of cash flows in the latter part of the sample period. Equity-for-debt swaps were a financial innovation, and it may have taken time for Value Line to realize the information content of the swaps.[18]

Regressions VI and VII are for two subperiods. Regression VI uses the first 62 observations and regression VII the next 63 observations of the clean sample.[19] Panels D and E of table 2 present summary statistics for the variables used in regressions VI and VII. We find no significant relation between revisions in forecasts and price changes for the first 62 swaps, but we do find a significant relation for the next 63 observations.[20] Theses results can be evidence of a learning process, in which Value Line took some time to discover that swaps convey information about cash flows.

5. Conclusion

In this paper, we test whether announcements of equity-for-debt swaps convey information about the expected cash flows of the firm. If they do, we

[18]We thank Tom Lys for suggesting this possibility.

[19]We divide the sample in half for two reasons. First, the Lys and Sivaramakrishnan (1988) sample includes some swaps that we do not include. Second, we do not want to bias the power of the regressions by using different numbers of observations in each. Lys and Sivaramakrishnan's sample extends from August 1981 through April 1983. Using this period, we do not find any significant results.

[20]Although it would be appropriate to test for the difference in coefficients for regressions VI and VII, it is not clear what are the properties of the standard test statistics with the severe errors-in-variables problem discussed earlier.

should observe that analysts revise their expectations of firm cash flows following these announcements. Furthermore, if stock-price reactions to swap announcements capture the value of the information conveyed, these forecast revisions should be positively correlated with the stock-price reactions. We document a positive correlation between revisions in Value Line forecasts of net operating income and stock-price reactions to swap announcements. Thus our evidence is consistent with the hypothesis that announcements of equity-for-debt swaps convey information about the expected level of cash flows of the firm. We also present evidence consistent with the hypothesis that the information conveyed by the swap announcement is about transitory, not permanent, changes in expected cash flows. Finally, we provide evidence consistent with the hypothesis that Value Line did not initially recognize the information content of swaps, but after observing them over time started updating its cash-flow forecasts following swap announcements.

References

Asquith, Paul and David W. Mullins, 1986, Equity issues and stock price dilution, Journal of Financial Economics 15, 61–89.

Belsley, David A., Edwin Kuh, and Roy E. Welsch, 1980, Regression diagnostics: Identifying influential data and sources of colinearity (Wiley, New York, NY).

Bernhard, Arnold, 1987, How to use the Value Line investment survey: A subscriber's guide (Value Line Investment Survey, New York, NY).

Bruner, Robert F., 1986, Toward explaining the enigma of equity-for-debt swaps, Unpublished working paper (Darden School, University of Virginia, Charlottesville, VA).

Dann, Larry, Ronald Masulis, and David Mayers, 1989, Tests of earnings information in capital structure announcements, Unpublished working paper (Cox School of Management, Southern Methodist University, Dallas, TX).

Defeo, Victor J., Richard A. Lambert, and David F. Larker, 1989, Executive compensation effects of equity for debt swaps, Accounting Review 64, 201–227.

Eckbo, B. Espen, 1986, Valuation effects of corporate debt offerings, Journal of Financial Economics 15, 119–153.

Elton, Edwin J., Martin J. Gruber, and Mustafa N. Gultekin, 1984, Professional expectations: Accuracy and diagnosis of errors, Journal of Financial and Quantitative Analysis 19, 351–364.

Finnerty, John D., 1985, Stock-for-debt swaps and shareholder returns, Financial Management 14, 5–17.

Fried, Dov and Dan Givoly, 1982, Financial analysts' forecasts of earnings: A better surrogate for earnings expectations, Journal of Accounting and Economics 4, 85–107.

Hand, John, 1989, Did firms undertake debt-equity swaps for an accounting paper profit or true financial gain?, Accounting Review 64, 587–623.

Healy, Paul and Krishna Palepu, 1989, Earnings and risk changes surrounding primary stock offers, Unpublished working paper (Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA).

Israel, Ronen, Aharon R. Ofer, and Daniel R. Siegel, 1990, The use of changes in equity value as a measure of the information content of announcements of changes in financial policy, Journal of Business and Economic Statistics 8, forthcoming.

Jain, Prem, 1988, Equity issues and changes in expectations of earnings by financial analysts, Unpublished working paper (Wharton School, University of Pennsylvania, Philadelphia, PA).

Lys, Thomas and Konduru Sivaramakrishnan, 1988, Earnings expectations and capital restructurings: The case of equity-for-debt swaps, Journal of Accounting Research 29, 273–299.
Masulis, Ronald W., 1980, The effect of capital structure change on security prices: A study of exchange offers, Journal of Financial Economics 8, 139–177.
Masulis, Ronald W., 1983, The impact of capital structure change on firm value: Some estimates, Journal of Finance 35, 305–319.
Mikkelson, Wayne H., 1981, Convertible calls and security returns, Journal of Financial Economics 9, 237–264.
Mikkelson, Wayne H. and Megan M. Partch, 1986, Valuation effects of security offerings and the issuance process, Journal of Financial Economics, 15, 31–60.
Modigliani, Franco and Merton H. Miller, 1958, The cost of capital, corporation finance, and the theory of investment, American Economic Review 48, 261–297.
Ofer, Aharon R. and Ashok Natarajan, 1987, Convertible call policies: An empirical analysis of an information signalling hypothesis, Journal of Financial Economics 19, 91–108.
Ofer, Aharon R. and Daniel R. Siegel, 1987, Corporate financial policy, information, and market expectations, Journal of Finance 42, 889–911.
Rogers, Ronald C. and James E. Owers, 1985, Equity for debt exchanges and stockholder wealth, Financial Management 14, 18–26.
Ross, Stephen A., 1977, The determination of financial structure: The incentive-signalling approach, Bell Journal of Economics and Management Science 8, 23–40.
White, Halbert, 1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, Econometrica 48, 817–838.