THE PERFORMANCE OF SWAP USAGE IN THE FOOD PROCESSING INDUSTRY: EVIDENCE FROM THE STOCK MARKET

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The increase in the volatility of interest rates in the 1980s has propelled the development and use of financial innovation to manage interest rate risks. Interest rate swaps are one of these major financial innovations and have experienced the most explosive growth in international markets. In a generic interest rate swap, both parties agree to exchange a series of interest payments without exchanging the underlying principals. The notional amount of interest rate swaps outstanding hit $3.85 trillion by year end 1992, dominating all other major derivative products in the marketplace (GAO, p.187). Several recent surveys, including Bodnar et al, Phillips, and CFO Forum, reveal that interest rate swaps are the most popular derivative contracts used by the U.S. firms.

In the academic literature on swaps, there are two dominant issues, i.e., the reasons for the use of swaps, as reviewed in the following sections, and swap pricing and hedging (Cooper and Mello). Surprisingly, except Brewer et al., few empirical studies have been done to examine how using swaps impacts the performance of end-users, which is a hot regulation policy topic recently complicated by some highly publicized derivative transaction losses. Though interest rate swaps are widely argued to provide benefits to their users, as indicated by various economic rationale of swap usage discussed later in the

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paper, much criticism over swap usage also exists. Critics contend that swaps usage may cause the firm to speculate too much and therefore harmful to the firm's interest. Brewer et al examined the impact of using interest rate futures and swaps on financial performance of depository institutions, finding that volatility of equity returns is negatively related to the involvement in swaps but not to interest rate futures. Their results suggested that the swap usage actually decreased the exposure for risk of depository institutions instead of increasing it. However, because the depository institution may participate in the swap market either as an end-user or a dealer, the impact of swap usage is not yet clear for non-financial firms which are normally end-users.

In this study, we examine both the long-run and short run wealth effect, i.e., the possible long run and short run abnormal stock returns associated with swap usage, in addition to the volatility of stock returns used in Brewer et al. Unlike depository institutions that may use swaps in both assets and liabilities management, firms in a manufacturing industry such as food processing, normally only use generic interest rate swaps in corporate liability management. This is exactly the focus of the academic literature when exploring economic rationale of the use of interest rate swaps. Thus, this empirical test will provide an opportunity to test the validity of a variety of theories in favor of swap usage.

This study employs the most recent advance in long-run event study modeling, which is different from that used by existing conventional (short-run) event studies in the field of agricultural economics. The wealth effect of swap usage is addressed by examining the well defined long-run stock performance indicator (1-5 years) instead of the cumulative abnormal return in most of previous works. The associated new empirical procedure is introduced. In the second section we briefly discuss how firms typically employ interest rate swaps. In the third section we review the various arguments for the economic rationale of using swaps. In the fourth section we present a long run stock performance model. Finally, we discuss the data and empirical results and provide concluding remarks.

Corporate Uses of Interest Rate Swaps

This section reviews the typical use of interest rate swaps by non-financial firms. Though interest rate swaps also can play a role in managing asset or investment portfolio, they are generally used only for financial corporations rather than for non-financial firms. In contrast, interest rate swaps are far more widely used in corporate liability management, which is the focus of this study. The study is also limited to generic (or "plain vanilla") interest rate swaps. More specifically, the discussion centers on the fixed/floating swap in which a fixed payer promises to make periodic payments based on a fixed interest rate to a floating payer, who in turn agrees to make variable payments tied to some short-term interest rates.

Interest rate swaps are highly versatile and cost-effective instruments for managing corporate liabilities. The principal roles of interest rate swaps in corporate liabilities management was summarized by Goodman and Das (p216-221). The typical application of interest rate swaps as a liability management tool can be discussed along the following three aspects.

Synthetic Liability Financing

The synthetic liability swap can help fix the cost of short-term debt or provide a lower interest cost funding over a period.

Synthetic Fixed-rate Debt

If the original bond is a floating rate one, it can be combined with an interest rate swap contract to convert floating payments to fixed. Goodman observes that companies with credit ratings lower than AA can take advantage of opportunities to achieve cheaper fixed-rate financing by using a floating rate debt plus swaps instead of conventional fixed-rate issues.

Synthetic Floating-rate Debt

A fixed rate bond plus a swap contract can create a synthetic floating rate debt. Goodman observes that companies with well-known names and high credit ratings have taken advantage of very inexpensive

fixed rate financing in the Eurobond market.

Locking in the Cost of a Future Borrowing

The major use of swaps centers on altering the character of a current bond issue, but firms also apply interest rate swaps to expected future issuance. The swaps employed for this purpose are the same as regular swaps except for the delay in time when some or all of the swap contract terms come into effect.

Delayed Start Swaps

These are also sometimes known as forward swaps. When a company expects rates to rise but does want to fund itself immediately, it can enter an interest rate swap agreeing to pay the current fixed rate and receive a floating rate. However, the accruals specified in the swap contract begin on a future date. Hence, the delayed start swaps help lock in a fixed cost on a future issuance.

Spread Lock

A spread lock will be used if the firm planning to borrow does not expect rates to rise, but is concerned that credit spreads may widen. The firm can agree to enter into a swap where it specifies spread but delays fixing the base interest rate for a period of up to two or three months. In other words, the firm may choose to fix the base rate anytime within the period. The base rate plus the prespecified swap spread sum up to fixed rate payable on the swap. If rates fall over the near term, i.e., before the firm fixes its rates, the firm is able to take advantage of the decline. A spread lock is most effective when a firm knows it will have to come to market within a relatively short time, for example, two or three months. Note that the spread lock does not hedge the firm's specific credit spread, but rather a general credit spread.

Managing Exposure To Interest Rates

Interest rate swaps can be also used to manage corporate exposure to interest rates by altering the cash flows on an existing liability. In contrast, the above synthetic liability financing is used to reduce the cost of the current debt issuance.

Fixing The Cost Of Floating Rate Liabilities

When a firm is currently borrowing on a floating rate basis and feeling vulnerable to higher rates, it can lock its floating rate debt into a fixed rate through the utilization of interest rate swaps. The borrower can enter into an interest rate swap where it pays a fixed rate and receives a floating rate. The initial swap is then reversed at a later date by the borrower entering another swap where it receives a fixed rate and pays a floating rate. The cost savings result from the differences between the rates payable on the successive swaps.

Converting The Cost Of Fixed Rate Liabilities

A firm that has initially issued fixed debt can also use swaps to convert that debt to a floating rate. In this instance, the borrower initially enters an interest rate swap where it receives a fixed rate and pays floating rate, expecting the current market rate to decline in the future. If the fixed rate declines as expected, the borrower can reverse the initial swap, swapping back into fixed rate funding. This enables the borrower to preserve the value of its below market fixed rate funding even in a declining rate environment. It is particularly attractive when the relevant borrowing cannot be repaid or refinanced, or when pre-payment penalties are applicable and/or the costs associated with refinancing would be significant. It is important to note that this is designed so that the firm can take advantage of an expected fall in rates, but any fall that has already occurred will be built into the swap price.

However, the use of interest rate swaps also involves several kinds of risks. Einzig and Lange pointed out several risks associated with swap usage. These include: (1) basis risk between the experienced cost of floating-rate borrowing and the index used in the swap contract; (2) the credit risk introduced by the counterpart in the swap contract; and (3) the potential liquidity risk when the short term debt is swapped into fixed rate debt.

Theories for Interest Rate Swaps

There are various theories regarding favorable benefits from swap usage. These theories tend to suggest the positive wealth effect of swap usage. However, there are also a few arguments saying there are no or even a negative wealth effect associated with use of interest rate swaps.

Comparative Advantage and Credit Arbitrage

Bicksler and Chen argued that borrowers with higher quality credits have a cost advantage in both the fixed rate and floating rate markets, but have a comparative advantage in the fixed rate market. In contrast, borrowers with lower quality credit have a comparative advantage in borrowing at floating rates. The borrowers with higher quality credit may borrow in the fixed rate market and swap the fixed interest rate stream for a floating rate stream with borrowers of lower quality credit who raise funds at a floating rate. The result is that both parties in the swap are better off and divide between them unambiguous gain from credit arbitrage. However, there is much criticism over the comparative advantage argument. As noted by Arak et al., the comparative advantage argument relies on the assumption that the relative credit risk premium on a floating-rate instrument for a high-rated versus low-rated borrower is less than the relative credit risk premium on a fixed-rate instrument of the equal term. Smith et al. argued that apparent underpricing of floating rate credit risk is essentially the result of overlooking a call option that is embedded in some floating rate agreements. They further claim that accounting for this call option would eliminate the supposed pricing differential, and therefore the motivation of swaps as suggested by the comparative advantage theory. Additionally, Smith et al. argue that any additional apparent savings from synthetic long-term fixed borrowing via a swap can be attributed to the loss of the prepayment option because the firm would typically have this option if it borrowed directly in the long-term fixed rate market. They also note that if any interest rate differential is simply from market inefficiencies, it certainly should not persist for a long time. In this case, the use of swaps to arbitrage would reduce the differential over time, and implies the less use of swaps and shrink of swap markets. The evolvement of swap markets completely contradicts this reasoning.

Agency cost

Wall and Wall and Pringle have argued that the use of interest rate swaps may reduce agency cost. Interest rate volatility can increase the risk of financial distress. If financial distress is costly (which is often argued) or the management regards it as intolerable misbehavior, the management will have an incentive to mitigate such risks. The normal way to minimize the risk of future financial distress is to fund long-term investment with long-term, fixed-rate debt, and the short-term investment with short-term debt. But long-term lending carries substantial risks from an outside investor's viewpoint. Particularly, after a low-rated borrower issues long-term debt, there is an incentive to make the firm riskier at the expense of the bondholders (Wall). Bondholders would like to monitor the management's discretion to make sure there will be no default in the debt. Agency costs, however, are ultimately borne by the borrower, mostly through higher interest rates. Wall observed that synthetic fixed-rate financing should discourage management from pursuing risky investment strategies. Because the firm issues short-term debt and swaps into fixed payments, the firm is monitored each period as it enters the short-term debt market and consequently is not required to pay the long-term premium for agency cost. Thus, the use of interest rate swaps should lower agency costs. Note that interest rate swaps do make it possible for firms to reduce financing cost, according to Wall's or Wall and Pringle's theory, but it results from lower agency cost and not from arbitrage.

Signaling

Arak et al and Timan analyzed the function of interest rate swaps from the perspective of asymmetric information. They argued that the use of interest rate swaps should reduce the unfavorable consequences of asymmetric information. In the case of asymmetric information, borrowers have to signal information to lenders about their financial conditions because outside investors cannot perfectly distinguish safe firms from risky ones. Risky firms prefer long term debt over short term debt in order to

lock in funding cost for a long time before their financial condition deteriorates. If the safer firms also borrow long-term loans, they may be pooled incorrectly with other risky firms, and may be charged a higher default risk premium and thus a higher interest rate. Hence, safe firms may signal that they do not expect their condition to deteriorate in the future by employing a short- term funding strategy, and at the same time, taking on liquidity risk that they may not be able to roll over the short-term borrowing. Swaps are then used to hedge firms' cash flows from short-term borrowing and immunize them from market (rate) risk. Timan hypothesized that lower-rated borrowers with an optimistic outlook can achieve the benefits of short-term borrowing, without the higher expected costs of financial distress, by borrowing short-term and swapping a floating-rate obligee for a fixed-rate obligation. On the other hand, borrowers with very high credit ratings may issue a long-term debt and swap for a floating-rate debt to share the gains.

Kuprianov noted that the basic logic of the signaling argument runs closely parallel to that of an agency cost argument. The borrowers in Timan's model are argued to choose short-term financing in order to signal management's belief that the firm is in good credit condition. However, the act of taking on short-term debt mitigates incentives to take on added risk once the firm receives loans, which is similar to the prediction of Wall's model.

Wealth Transfer

There are also a few arguments against the benefits of using swaps, particularly from the perspective of shareholders. Turnbull argued that interest rate swaps are a zero-sum game in the absence of market imperfections and swap externalities. If this zero-sum game is of the fair game type, i.e., the probability of gaining and losing is half to half, it may suggest that the expected gain in wealth of firms using swaps is zero. As a result, the expected stock abnormal return particularly associated with the use of swaps is zero. Cooper and Mello argued that in the common case of risky swaps, i.e., swaps with default risk, any swap usage usually results in a wealth transfer to the debt holders of the firm using swaps under

the perfect market condition. This immediately suggests a negative wealth effect for shareholders. Cooper and Mello further pointed out that this conclusion holds when the firm uses synthetic financing to transform the floating rate debt to a fixed rate debt. If the swap is covenanted at the same time the floating rate is issued, there will be no wealth effect and the shareholders will be indifferent to whether the firm uses swaps or not. They also pointed out that the agency cost effect, as presented in Wall and Wall and Pringle, may still exist and can be an extra benefit source to shareholders despite the possible negative wealth effect. They were also aware that if there exists pricing inefficiency between the floating rate and fixed debt markets, the synthetic financing through swaps could have a positive wealth effect. However, pricing inefficiency may prevail in the early stages of swap markets, and arbitrageurs have gradually diminished the window of the opportunity. Thus, in the context of long run stock performance, an abnormal return from the use of swaps may not be expected.

Long-Run Event Study Model

Many recent studies on major corporate events or decisions analyze the long run behavior of post-event stock return performance. In these studies, the stock returns are tracked for a long period of time following the event. Conventional event studies focus on the characteristics of abnormal returns measured on a particular day or, at the most, cumulated over several months. In contrast, the long run performance studies focus on annual, or up to five-year return. The recent literature suggests existence of delayed stock price reaction to some events, with an abnormal performance apparently persisting for years following events.

Most of past studies aiming at long run performance of events suffer the flawed methodology, which is most manifested by two recent simulation studies with actual data, i.e., Barber and Lyon, and Kothari and Warner. Long run event studies involve many related considerations that do not arise or are less important with conventional short horizon studies (Kothari and Warner). Here, we review major

progress in the long run event study literature.

The common procedure for the conventional or short run event study model starts with detecting the abnormal return for a firm in a particular event month t. Here, we take monthly data as an illustration, since it is most often used in the long run event studies. The abnormal return (AR) in the event month t for ith sample firm is determined by the difference of the actual return (R) and the expected value of the return (E(R)).

$$AR_{it} = R_{it} - E(R_{it}) \qquad (1)$$

Once we calculate the abnormal return for an individual sample firm, we may draw the conclusion based on the equally-weighted arithmetic average of the abnormal returns across all the sample firms.

$$\overline{AR_{it}} = \frac{1}{n}\sum_{i=1}^{n} AR_{it} \qquad (2)$$

The decision rule is simple: If $\overline{AR_{it}} > 0$, we conclude that a positive wealth effect is associated with the concerned event, and that it implies an increase in shareholders' wealth for the firms experiencing the event. Alternatively, if $\overline{AR_{it}} < 0$, we conclude a negative wealth effect, and that it implies a loss in shareholder's wealth for the firms experiencing the event.

Because the nonzero value of $\overline{AR_{it}}$ may not necessarily suggest that the value is statistically different from zero, we should employ t-test statistics to make sure the estimated abnormal return really exist. This requires t test statistics that are significant at a given significance level.

The above procedure has been extended to the long-run event study as follows. To draw the conclusion, many researchers simply cumulate the abnormal returns (CAR) for each sample firm over long

time intervals (T months) after the event month t, i.e.,

$$CAR_{it} = \sum_{t=1}^{T} AR_{it} \qquad (3)$$

and then they calculate the average of $CAR_{it}s$ across all the sample firms ,i.e.,

$$\overline{CAR_{it}} = \frac{1}{n}\sum_{i=1}^{n} CAR_{it} \qquad (4)$$

or they simply cumulate the following equally-weighted average abnormal return over the long time intervals to draw the similar conclusion.

$$\overline{CAR_t} = \sum_{t=1}^{T} \overline{AR_{it}} \qquad (5)$$

The t test statistics is

$$t_{CAR} = \overline{CAR_{it}} / (\sigma(CAR_{it}) / \sqrt{n}) \qquad (6)$$

where n is the number of sample firms, and $\sigma(\,)$ is the operator of standard errors.

More recently, some researchers defined buy and hold abnormal return (BHAR) as an alternative definition for abnormal returns used in long run event studies. However, it was not clear which of these two definitions should be at least conceptually superior. The mathematical notation of the BHAR and its t test statistics is as follows:

$$BHAR_{it} = \prod_{t=1}^{T}(1 + R_{it}) - \prod_{t=1}^{T}(1 + E(R_{it})) \qquad (7)$$

$$t_{BHAR} = \overline{BHAR_{it}} / (\sigma(BHAR_{it}) / \sqrt{n}) \qquad (8)$$

The drawbacks and future improvements of most previous long run event studies can summarized as the following three issues.

1. The definition of long run abnormal returns: BHAR versus CAR..

The use of buy-and-hold abnormal returns should be conceptually favorable relative to cumulative abnormal return (e.g., Conrad and Kaul; Barber and Lyon). As noted by Barber and Lyon, a test of the null hypothesis that the 12-month CAR is zero is equivalent to a test of the null hypothesis that the mean monthly abnormal return of sample firms is equal to zero. Hence, CAR procedure is essentially of a short horizon concept. To test the null hypothesis that the mean annual abnormal return is equal to zero, a researcher should use the annual BHAR. Conrad and Kaul argued that cumulating single-period returns over long intervals implicitly amounts to rebalancing the portfolios to each weight each month, and that the buy and hold return measure has an additional advantage of minimizing transaction costs. It was also found that CAR is a biased predictor of long run BHAR. The differences between CARs and BHARs result from the effect of monthly compounding; CARs ignore compounding, but BHARs include the effect of compounding. Particularly, the positive bias of CAR against BHAR will be greater if BHAR is less than or equal to zero. But the positive bias will approach zero and eventually turn into negative when BHARs become increasingly positive.

CARs also have serious statistical drawback. Conrad and Kaul argued that by cumulating short term returns over long periods CARs cumulate the upward bias in a single period, which implies measurement errors in observed prices due to bid-ask errors, nonsynchronous trading, and/or price discreteness. Thus, CARs represents substantial spurious long term returns. On the other hand, buy and hold return measurement always contains only a constant bias as that in a single period's return. For example, to examine 12 months performance, CARs may have 12 times bias of buy and hold return

measurement.

2. Selection of Benchmark: the expected return models.

Long-horizon results are potentially very sensitive to the assumed model to generate expected returns since the variation in expected return estimates across different benchmark models can be large over a long time horizon (Kothari and Warner). There are three methods used most often to estimate the expected value of long run return, i.e., a reference portfolio approach, a control firm approach, and an application of an asset pricing model. However, Barber and Lyon, and Kothari and Warner, highlight the problems associated with calculating long-run abnormal returns using either a reference portfolio approach and an application of asset pricing model. Barber and Lyon document that the control firm approach can be robust to virtually all sampling situations and always yields well-specified t statistics.

A. Reference portfolio approach. The reference portfolio approach used in the previous long run event studies sorts all sample firms into several reference portfolios, based on their size or book-to-market ratio, or a combination of both, and then averages returns across all securities in a particular reference portfolio to yield the benchmark for each security within the portfolio. Another common reference portfolio is the CRSP equally weighted market index. The value-weighted market index, such as S&P 500, often is inappropriately used for comparison because the event studies are designed to give equal weight to all sample observations. Barber and Lyon argued that the use of reference portfolios to calculate either cumulative or buy-and-hold abnormal returns is subject to the the new listing bias, the rebalancing bias, and the skewness bias.

B. Control firm approach. In this approach, sample firms are matched to a control firm on the basis of specified firm characteristics. As argued by Barber and Lyon, in calculating buy-and-hold return, the control firm approach eliminates the new listing bias (because both the sample and control firm must be listed in the event month), the rebalancing bias (because both the sample and control firm returns are calculated without rebalancing), and the skewness bias (because the sample the control firms are equally

likely to experience large positive returns).

The size effect on the expected stock returns has been well documented. Also, we need to control the book-to-market effects in selecting a control firm. Many firms going public are growth stocks, and thus have relatively low book-to-market ratios (Loughran and Ritter). And the firms with low book-to-market ratios have had low returns. Fama and French (1992) argue that firm size and book-to-market ratio are the only two identifed factors which effectively explain stock returns and that combination of these two factors can largely capture cross-sectional variations in the stock returns.

In their simulation, Barber and Lyon identify that only the control firm approach yield well-specified t test statistics in detecting the long run abnormal return. They match the sample firms with the bench firms on both size and book-to-market. They recommend that the researcher should first identify all firms with a market value of equity between 70% and 130% of the market value of equity of the sample firm, and then from this set of firms, they choose the firm with the book-to-market ratio closest to that of the sample. Other variations on the matching method, such as filtering on book-to-market and then matching on size, also work well, but not as well as the recommended way.

C. Asset Pricing Model. Four commonly used asset pricing models in the conventional short run event studies are examined in Kothari and Warner to serve the purpose of long run event studies. These models are as follows.

(a) Market-adjusted model.

$$AR_{it} = R_{it} - R_{mt} \qquad (9)$$

where R_{it} is the monthly return in month t and R_{mt} is the monthly return on the CRSP equally-weighted index in month t.

(b) Market model.

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \qquad (10)$$

where α_i and β_i are market model parameter estimates.

(c) CAPM.

$$AR_{it} = R_{it} - R_{ft} - \beta_i (R_{mt} - R_{ft}) \qquad (11)$$

where β_i is from the CAPM regression model and β_{ft} is the one-month T-bill return used as a proxy for the risk-free return.

(d) Fama-French (1993) three-factor model.

$$AR_{it} = R_{it} - R_{ft} - \beta_{i1} (R_{mt} - R_{ft}) - \beta_{i2} HML_t - \beta_{i3} SMB_t \qquad (12)$$

where β_{i1}, β_{i2}, and β_{i3} are estimated. HML_t and SMB_t are the Fama-French book-to-market and size factor returns. The construction of size and book-to-market factors is similar to that in Fama and French.

The first three models have been extensively used for many years. The Fama-French (1993) three-factor model is a typical asset pricing model used in many recent long-run event studies. Kothari and Warner found all four of these models yield misleading t test statistics.

3. Statistical Test Statistics.

As indicated previously, the parametric test (e.g., t test) statistics usually serve to detect whether the long-run abnormal return is statistically significant. However, as argued by Kothari and Warner, nonparametric tests seem like a promising alternative to the parametric procedures because they appear to have fewer potential problems. Conclusions based on these procedures seem less likely to be due to misspecification. Particularly, bootstrap procedures can be used to address biases in both the measure of abnormal returns and the standard deviation. Simple nonparametric sign tests are also sometimes used in long-run studies, but they can still suffer from some of the difficulties of parametric procedures. To yield correct specification, the nonparametric tests must be designed to explicitly take the skewness of buy-and-

hold abnormal return into consideration. Bootstrap-type procedures may be useful to assess the degree of skewness under the null hypothesis.

Barber and Lyon point out the null hypothesis may carry different implications for parametric and nonparametric tests. In the case of nonparametric Wilcoxon signed-rank test statistics, the null hypothesis is that the median abnormal return is equal to zero, different from the null hypothesis of the t test that the mean long run abnormal return is zero. Tests of the latter do not allow us to make any conclusion about whether or not the median firm is able to take advantage of a window of opportunity, because a mean BHAR may be driven by unusually large abnormal return for a few sample firms.

Thus far, no (published) simulation work has been conducted to study the usefulness of nonparametric tests, except the Wilcoxon signed-rank test by Barber and Lyon. They found that the size/book-to-market control firm method yields well-specified Wilcoxon test statistics in the all sampling situations, whether in the case of CAR or BHAR. With the size/book-to-market matched control firm method, the power of Wilcoxon test is higher than the t tests, which is evidence for the perception in Kothari and Warner.

Empirical Results

In this section, we examine the long run performance of using interest rate swaps, taking advantage of the most recent advance in long run event study methodology.

The data is retrieved in the following way. First, among the firms whose primary business are in food processing industry (i.e., with primary SIC code 20), we identified the swap users by searching the quarterly SEC filing record from 1988 to 1995 (Before 1990, there was only one time reporting available). The users list is in the appendix. From this users list, we deleted the firms (1) that are not listed in the CRSP data; (2) that the relevant information about the size and book-to market is missing in COMPUSTAT. This left 32 firms for this study (the twelve 1996 firms in the appendix are not used in this

study with the focus on the long run horizons). The event month for each swap user is set by the month they first reported the use of interest rate swaps to the SEC, i.e., the disclosure month. Before 1994, no legal requirement was imposed on firms to report using swaps as well as other financial derivatives.

Given the reported event months for each firm that engaged in the use of swaps, appropriate matching firms were found so that a long run performance study could be conducted. Firms were matched as described by Barber and Lyon, who indicated that matches based on size and market to book yield test statistics which are well specified in regards to theoretical rejection rates of the null hypothesis of no abnormal returns in the event sample. Several requirements were set a priori to identify those match firms. First, potential matches, just like all firms in the event sample, must be listed and reported in full for a period of one year prior to the event month and 3 years following the event month on COMPUSTAT. Second, firms must be cross listed on the CRSP tapes for the same time span. So, a search for firms on the COMPUSTAT tapes were conducted among firms from the same industry defined by the same two digit SIC classification. We first identified all firms in the same industry with a market value of equity between 70% and 130% of the market value of equity of the sample firm, and then from this set of firms, we chose the firm with the book-to-market ratio closest to the that of the sample.

Note that (1) a match firm identified within the same food processing industry may yield more precise expected returns if the industry effect exists and accounts for part of cross sectional variation of stock returns; (2) the food processing industry is a large industry with more than 200 public firms, which may help guarantee the enough close approximation of normal distribution of abnormal returns.

We retrieved the monthly returns for the 32 firms and their match firms. We first examine the long run performance of using interest rate swaps. Using the following formula,

$$BHAR_{it} = \prod_{t=1}^{T}(1+R_{it}) - \prod_{t=1}^{T}(1+E(R_{it})) \qquad \text{(T= -12, 12, 24, 36)} \quad (13)$$

We calculates the abnormal return for each swap user ith firm 12 months before, 12 months after, 24 months after, and 36 months after the event month. The buy and hold abnormal return is determined by examining the difference between monthly compounded buy and hold returns for each swap user and the match firm. We then average the $BHAR_{it}$ across all the swap users in the sample. The result is reported in the Table 1. Though, the BHARs are positive, which indicates the positive wealth effect in the long run, the t test statistics suggest that they all are not significantly different from zero. Thus, there is no long run wealth effect for swap usage during the three years after the disclosure month.

However, it is possible that the information about swap usage was already absorbed by the market before the disclosure month of swap usage. Before 1994, some firms may report their using swaps some time after they started using swaps. To address this concern, we also examined the stock performance one year before the disclosure month. The BHAR is negative, but is still not significantly different from zero. We argue that the selection of one year before is good enough to address the concern, since the market is not strong form efficient, and rather semi-strong or weak form efficient. The belief in the market efficiency implies that the privately known information of swap usage does not affect the stock performance, and only when the publicly announced or historical information of swap usage may affect the stock performance. On the other hand, it is very unlikely that a firm is reluctant to report the use of the swap to SEC if other major sources already reveal the information as long as one year. In sum, there is no evidence for long run wealth effect associated with the use of swaps in Table 1.

The possible risk change associated with the use of the swaps is also of interest, because the interest rate swaps are for managing the financial risk. The risk proxy used here is for the total risk, i.e., the variance or standard error of equity returns. We examined the annual total risk on average for four years, i.e., the last year before, the first year after, the second year, after, and the third year after. The result is reported in the Table 2. Compared with the risk for the same group of swap users in the last year before, in the first year after they have a slightly larger risk , and in the second and third year after they

have a slightly smaller total risk. However, the statistical test suggests the risk over these four years are not changed. We also reported the total risk for the match firm group over these four years. The differences between the swap users and the match firms is negligible, too. The results suggest that there is no effect of risk shift on the firms using swaps. The result is different from what Brewer et al reported. This may be because of the different sensitivity of financial firms and non-financial firms to the use of swaps. Particularly, most of the assets for financial firms, such as loans, may be sensitive to the use of swap usage, but not for non-financial firms. This probably bring the additional source of sensitivity of financial firm shareholders' equity to the use of swaps. The additional effects on the equity returns for financial firms may account for the difference between our finding and Brewer et al.

We also addressed the possible short run wealth effect associated with the use of the swaps. We use the formula

$$AR_{it} = R_{it} - R_{mt} \quad (T=-12, ...0, ..., 12) \qquad (14)$$

to calculate the monthly abnormal return for swap users, for12 months before and 12 months after the disclosure month. The benchmark is still the match firm. The short run event study using monthly data will detect the possible market reaction to the swap usage for one month. The results are reported in Table 3. Again, we do not find any significant wealth effect for swap usage in terms of monthly return. However, this cannot empirically exclude the possibility of wealth effect of swap usage using daily data. The event study using daily data may help capture the market reaction to swap usage lasting several days (no more than one month).

Conclusion

Using monthly data, we failed to find any significant long run and short run wealth effect associated with swap usage, nor did we find the risk shift of equity return. This suggests that the use of

the swap is an endogenous decision for the firm value. This finding is consistent with Turnbull and Cooper and Mello.

Table 1. The Buy and Hold Abnormal Return (BHAR) for Firms using Swaps (%)

	The mean of BHAR	The Standard Error	t-statistics
1 year before	-4.20	5.23	0.80
1 year after	7.52	7.00	1.07
2 year after	7.40	9.04	0.82
3 year after	3.94	12.8	0.31

Table 2. The Comparison of Total Risk of Sample Firms and Match Firms Over the Time (the squared root of the mean of variances, %)

	Swap Users	Match Firms
1st year before	7.40	7.68
1st year after	7.93	7.62
2nd year after	6.70	6.82
3rd year after	6.87	6.91

Table 3. The Monthly Abnormal Returns around the disclosure time of swap usage (1 year before and 1 year after) (n=32)

E(AR)	SD
----------One Year Before----------	
0.003194	0.019198
-0.01651	0.012292
-0.02361	0.0173
-0.02173	0.013692
0.016789	0.014785
-0.00352	0.023821
0.002161	0.017067
-0.0067	0.016662
0.007433	0.021534
-0.00434	0.012262
0.02482	0.016321
-0.0103	0.014128
----------One Year after----------	
0.017108	0.018715
0.005515	0.012256
0.003759	0.014924
-0.00773	0.017997
-0.00857	0.017073
0.016976	0.017244
0.021485	0.020827
0.0022	0.017455
-2.4E-05	0.016167
-0.01709	0.026375
-0.00427	0.016512
-0.01779	0.02446

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Appendix Interest Rate Swap Users in Food Processing Industry (SIC Code 20)

This appendix reports the interest rate swap users in food processing industry with two-digit SIC code 20, in the order of the time when they first disclosed the swap usage to the SEC.

1988 September

1. Coca Cola Co. (CUSIP No. 0001912161)

2. Golden Poultry Company Inc. (CUSIP No. 0003811511)

3. Ralston Purina Co. (CUSIP No. 0007512771)

1988 November

4. Interstate Bakeries Corp. (CUSIP No. 0004607230)

1989 October

1. Central Soya Co. Inc. (CUSIP No. 0001551771)

2. Kraft (CUSIP No. 0005009021)

3. PepsiCo (CUSIP No. 0007134481)

1990 October

1. Borden Inc. (CUSIP No. 000995991)

2. Coca Cola Enterprises Inc. (CUSIP No. 0001912191)

3. General Mills Inc. (CUSIP No. 0003703341)

4. Quaker Oats Co. (CUSIP No. 0007474021)

5. San Carlos Milling Co. Inc. (CUSIP No. 0007971510)

1991 January

1. IBC Holding Corp(CUSIP No. NA; Ticker No. D. IDM)

2. Sara Lee Corp(CUSIP No. 0008031111)

1991 March (0)

1991 July

3. Campbell Soup Co. (CUSIP No. 0001344290)

4. Chiquita Brands International Inc. (CUSIP No. 0001700321)

5. CPC International Inc. (CUSIP No. 0001261491)

6. Philip Morris Companies Inc. (CUSIP No. 0007181541)

7. Savannah Foods & Industries Inc. (CUSIP No. 0008047951)

8. Whiteman Corp(CUSIP No. 00096647K1)

1991 September (0)

1991 October

9. Bass P L C(CUSIP No. 0000699041)

10. Unilever N V(CUSIP No. 0009047841)

1991 December

11. Brown Forman(CUSIP No. 0001156371)

12. Conagra Inc. (CUSIP No. 0002058871)

13. Seagram Co. Ltd. (CUSIP No. 0008118500)

14. Unilever PLC(CUSIP No. 0009047670)

1992 January (0)

1992 April (0)

1992 July (0)

1992 October

1. Imperial Holly Corp(CUSIP No. 0004528351)

1993 January (0)

1993 April (0)

1993 July

1. Anheuser Busch Cos Inc. (CUSIP No. 0000352291)

2. Coca Cola Bottling Co, Consolidated. (CUSIP No. 0001910981)

3. IBP Inc. (CUSIP No. 0004492231)

1993 October

4. H J Heinz Co. (CUSIP No. 0004230741)

1994 January (0)

1994 April

1. Golden Kist Inc. (CUSIP No. NA; Ticker No. D. GCW)

2. Grand Metropolitan PLC(CUSIP No. 0003860911)

1994 July

3. Doskocil Companies Inc. (CUSIP No. 0002584861)

4. Dr. Pepper Seven Up Companies Inc. (CUSIP No.0002561311)

5. Dr. Pepper Seven Up Corp. (CUSIP No. 0002561241)

6. John B. Sanfilippo &Son Inc. (CUSIP No. 0008004221)

7. Valhi Inc. (CUSIP No. 0009189051)

1995 January

1. Flowers Industries Inc. (CUSIP No. 0003434961)

2. LVMH Moet Hennessy Louis Vuitton(CUSIP No. 0005024411)

3. R C ARBY S Corp(CUSIP No. NA; Ticker No. D. RBJ)

4. Specialty Foods Acquisition Corp. (CUSIP No. NA; Ticker No. D. SZS)

5. Tomkins PLC(CUSIP No. 0008900301)

6. Tootsie Roll Industries Inc. (CUSIP No. 0008905161)

1995 February

7. Penwest LTD. (CUSIP No. 0007097521)

1995 April

1995 July

8. Pan-American Beverage Inc. (CUSIP No. 00069829W1)

9. Texas Bottling Group Inc. (CUSIP No. 0008822181)

1995 October

10. Coca Cola Bottling Group Southwest Inc. (CUSIP No. 0001911751)

1996 January

1. CBR Brewing Co Inc. (CUSIP No. NA; Ticker No. BLUE)

2. Grupo Industrial Maseca Sa De Cv Gimsa(CUSIP No. 0004004881)

3. Specialty Foods Corp. (CUSIP No. 0008474999)

1996 April

4. Ralcorp Holding Inc. (CUSIP No. 0007510251)

1996 July

5. Dreyer S Grand Ice Cream Inc. (CUSIP No. 0002618781)

6. Foodbrands America Inc. (CUSIP No. 0003448221)

7. Hershey Foods Corp(CUSIP No. 0004278661)

8. Kellogg Co. (CUSIP No. 0004878361)

9. Nabisco Holding Corp(CUSIP No. 0006295261)

10. RJR Nabisco Holdings Corp(CUSIP No. 00074960K1)

1996 October

11. Andina Bottling Co Inc. (CUSIP No. 00029081P1)

12. Buenos Aires Bottling Co Inc. (CUSIP No. 0001194241)