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The Fate of Firms: Explaining Mergers and Bankruptcies

*Clas Bergström, Theodore Eisenberg, Stefan Sundgren, and Martin T. Wells**

Using a uniquely complete data set of more than 50,000 observations of approximately 16,000 corporations, we test theories that seek to explain which firms become merger targets and which firms go bankrupt. We find that merger activity is much greater during prosperous periods than during recessions. In bad economic times, firms in industries with high bankruptcy rates are less likely to file for bankruptcy than they are in better years, supporting the market illiquidity arguments made by Shleifer and Vishny (1992). At the firm level, we find that, among poorly performing firms, the likelihood of merger increases with poorer performance, but among better performing firms, the relation is reversed and chances of merger increase with better performance. Such a changing relation has not been detected in prior merger studies. We also find that low-growth, resource-rich firms are prime acquisition targets and that firms' debt capacity relates negatively to the likelihood of a merger. Debt-related variables, leverage and secured debt, play an especially prominent role in distinguishing between which firms merge and which firms go bankrupt.

I. INTRODUCTION

All firms will cease to exist. Bankruptcies and mergers, two ways in which firms terminate, have several similarities. Both transfer control of corporate

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resources to new owners. Both can enhance value in the face of inefficient performance. Mergers may increase the combined value of the target and acquiring firms because the combined firm exploits operating and financial synergies, or corrects managerial failures (see Jarrell et al. 1988; Jensen & Ruback 1983 for reviews of the merger literature). A bankrupt firm's assets can be transferred to more productive uses or the firm's organizational structure can be changed so that the firm can continue to operate (see John 1993; Jones 1987; Wruck 1990 for reviews of the bankruptcy literature).

Industrywide and economywide conditions can affect the rates of both forms of restructuring. Shleifer and Vishny (1992) point out that in recessions many asset buyers are credit constrained and cannot pay the full value of assets. Sellers may try to postpone transfer of the firm until markets become more liquid, thereby reducing merger activity. During recessions, firms may resist liquidating bankruptcy while creditors may be more prone to restructure debts, or to reorganize firms to avoid selling in thin markets.

This article investigates the determinants of merger and bankruptcy for the mass of Swedish firms. The main enhancement of prior studies stems from this study's comprehensive sample and simultaneous study of both transitions. The data used are a nearly complete sample of all Swedish firms with 20 or more employees. The sample consists of approximately 16,000 firms, including 1,800 bankruptcies and 1,100 mergers, and covers the years 1990 to 1994.

Four advantages of the sample are worth noting. First, the sample avoids the *sample size and sample bias* issues that attend most studies of firms in transition. Traditional bankruptcy and merger studies must scavenge for firms in transition across many years because, for the large, public firms for which data are readily available, bankruptcy and merger are rare events. Ambrose and Megginson's (1992) study of mergers, for example, used a sample of 169 firms that achieved target status over a six-year period together with 267 nontarget firms. Bankruptcy studies commonly rely on smaller samples gathered over several years: Jones's (1987) literature review notes leading studies that include fewer than 50 bankrupt firms and similar numbers of nonbankrupt controls.

Because bankruptcy and merger are relatively rare events for public firms, gathering a reasonable number of bankrupt or merged firms is difficult. The tendency is to oversample transitional firms and to undersample active, healthy firms. But even large, random subsamples of active firms, analyzed using methodology that accounts for sample size (Palepu 1986), can generate misleading parameter estimates (Bergström et al. 1999). Some

studies reduce sample bias effects by case-control methodology using matched samples. But matched sample results are of questionable validity in uncontrolled, nonexperimental settings (Bergström et al. 1999; Breslow & Day 1980).

Possibly because of the small, biased samples used, results of merger studies vary considerably: Ambrose and Megginson's replication of an earlier study found none of the variables to be significant and that the model had negligible explanatory power (Ambrose & Megginson 1992:584). Shumway (2001) found that accounting variables used in important bankruptcy studies are not statistically significant. Moyer (1977) shows that the predictive ability of bankruptcy models differs greatly between studies.

The second advantage of our sample is that it allows *simultaneous study of both bankruptcies and mergers*. It thus permits studying, in a common sample, factors that affect the likelihood of both transitions. Studying the two transitions in isolation from one another is questionable (Ohlson 1980:111). Both bankruptcy and merger are plausible exit paths for inefficient firms (as are other outcomes not studied here).

Third, this study's near-complete sample of Swedish firms includes *the mass of small and mid-sized firms*. Prior studies focus on public firms. The forces shaping transitions likely differ between large, public and small, private firms. Evidence suggests differences in market reactions to takeovers of public firms and takeovers of private firms (Chang 1998). In addition, public firms may become hostile takeover targets but closely held private firms cannot become such targets. Evidence suggests that different factors drive hostile takeovers and friendly takeovers (Powell 1997). Furthermore, owners are more likely to manage nonpublic firms, implying that agency problems stemming from the separation of ownership and control are less severe. Thus, takeovers intended to replace inefficient management should be less common in small and mid-sized firms. However, agency problems between firms and creditors might be more severe in nonpublic firms, since small and mid-sized firms may be more flexible and thus better able to increase the risk of their investment projects (Grinblat & Titman 1997). As a consequence, access to external capital is probably more constrained for small and mid-sized firms, and thus, financial synergy-based mergers might be more common.¹

¹Nonpublic firms are of importance aside from their difference from public firms. They comprise a substantial part of the economy. For example, in Sweden, the sum of all sales for publicly held firms in 1994 was approximately 986 billion kronor. The sum of sales for

Fourth, the sample's mass of healthy firms allows inclusion of *time-varying* accounting and industry parameters that shape transition choice through both strong and weak economic conditions. The sample studied covers years in which the Swedish economy first staggered and then began to flourish. This enables testing whether industrywide and economywide financial conditions relate to merger and bankruptcy activity. Small, biased samples using transitional firms gathered across lengthy time periods make it difficult to obtain reliable parameter estimates for compact time periods.

A. Summary of Principal Results

The data yield insights into bankruptcy and merger at the economywide, industrywide, and individual-firm levels. Merger activity is much greater in prosperous periods than during recessions. For example, in the recession year 1991, only 1.1 percent (119 of 11,578) of the firms in the sample merged. The corresponding figure for 1994, when the Swedish economy began to flourish, is 4.7 percent (468 of 9,967). These findings support the view that market liquidity influences merger activity (Shleifer & Vishny 1992). Bankruptcies are, as one would expect, more common in a recession year such as 1991 than in a growth year such as 1994. However, we find that in stressed economic times, firms in industries with high bankruptcy rates are less likely to file for bankruptcy than they are in better economic climates. In other words, firms in distressed industries resist liquidating bankruptcy in bad times and flock to it in good times. This result is also consistent with Shleifer and Vishny (1992), who suggest that asset sales are less common during recessions, since the prices received for the assets would be lower.

At the firm level, financial synergy factors help explain mergers. First, we explore whether mergers are more likely if there is a mismatch between the bidder's and the target's growth opportunities and available financial resources. Palepu (1986) suggests that low-growth and cash-rich firms, as well as high-growth and cash-poor firms, are likely merger targets. The results partly support the theory: low-growth and cash-rich firms (firms with high earnings before depreciation in relation to investments) are sig-

Swedish private firms with 20 or more employees for that year was over 1 trillion kronor. These private firms' 604,000 employees exceeded the 525,000 employees working in publicly traded firms.

nificantly more likely to be merger targets. But we find no significant support for the prediction that high-growth and cash-poor firms are likely targets. Second, we find that the likelihood of merger is negatively related to leverage and to whether the firm has used its inventories and receivables as collateral. These results indicate that firms with greater unused debt capacity are more likely to become merger targets. Third, public firms and firms that are members of a corporate group are less likely to merge than are other firms. Within corporate groups, resources can be channeled from resource-rich firms with few growth opportunities to firms with better growth opportunities, which reduces the need for financial synergy-based mergers. Public firms, on the other hand, are under much greater scrutiny than private firms, which likely improves access to external financing for profitable projects.

We also find a more complex relation between firm performance and merger status than prior studies suggest. Prior studies show a negative relation between performance and the likelihood of merger target status (e.g., Ambrose & Megginson 1992). We find that the relation changes sign and becomes positive for highly performing firms.

Section II of this article briefly introduces Swedish insolvency and merger laws and reviews theories of merger and bankruptcy. Section III describes the data, discusses the Swedish economy during the period studied, and provides descriptive statistics exploring the relation between basic financial and accounting features—efficiency, liquidity, and leverage—and firm status. Section IV reports multivariate results; Section V concludes.

II. THE LAW AND ECONOMICS OF FIRM TRANSITIONS

This section first briefly describes Swedish insolvency and merger laws and then reviews the merger and bankruptcy theories that we test empirically.

A. *Swedish Insolvency and Merger Laws*

1. Insolvency Proceedings

Financially distressed Swedish firms that rely on formal legal proceedings use liquidating bankruptcy. A liquidating bankruptcy filing starts with either the debtor or any creditor filing a petition with the court. Once in bankruptcy, one or more trustees take control of the firm. The trustee's basic tasks are to sell the assets and distribute the proceeds to creditors according

to the priority of their claims. Firms can be sold piecemeal but often are sold as going concerns (Strömberg & Thornburn 1996).²

Swedish labor law provides an incentive to file for bankruptcy. The Swedish Wage Guarantee Act (1992) makes the state liable “for the settlement of an employee’s claim to payment from an employer who has been declared bankrupt.” This government subsidy of bankruptcy probably contributes to Sweden’s high business-bankruptcy filing rate. Sweden tends to have a high filing rate compared to other countries in both recession years and in more stable economic years (Eisenberg 1995).

2. Mergers

Mergers of Swedish corporations require shareholder approval. Swedish law requires approval of a merger agreement by a simple majority at a shareholders’ general meeting of the target company.³ The acquiring company’s shareholders must also vote on the merger if more than 5 percent of the target company’s shareholders request such a vote.⁴ Swedish Company Law also includes rules to protect creditors. For example, an auditor must review the financial statements of the combining companies and state whether there is a risk that creditors will suffer losses after the merger. If the auditor

²Swedish liquidating bankruptcy rules have much in common with U.S. Chapter 7, where bankrupt firms’ assets also are sold either piecemeal or as going concerns. See Strömberg and Thornburn (1996) for a more detailed review of the Swedish bankruptcy laws. However, going concern sales of viable businesses are probably more common in Sweden than in the United States because Swedish law contains no reorganization provisions comparable with U.S. Chapter 11. Swedish law provides for compositions (a form of reorganization), but compositions are much rarer in Sweden than are reorganizations in the United States (Eisenberg 1995). For example, in 1994, compositions comprised only 0.46 percent of insolvency filings (Statistics Sweden 1995). The ratio of Chapter 11 filings in relation to total business insolvencies has been much higher in the United States. In 1991, reorganization proceedings comprised about 45 percent of all business filings. During the 1990s, reorganization filings regularly exceeded 24 percent of all business insolvency filings (Eisenberg & Sundgren 1997). The nonuse of Sweden’s composition law may be because only unsecured debt can be written down in a composition. Unanimous consent from secured creditors and priority creditors is needed before their loan terms can be altered. Furthermore, payments to unsecured creditors must exceed 25 percent of the principal amount owed and must be paid within one year after approval of the composition.

³If the target is wholly owned by the acquiring company, the boards of the two companies may enter into a merger agreement.

⁴Swedish Company Law, §§ 14:10–11.

finds such a risk, creditors may challenge the merger.⁵ Swedish law imposes no substantial barriers to the merger of small and mid-size private firms. In particular, Swedish labor law does not impose constraints on mergers. A 1974 proposal that employees participate in merger decisions was rejected and Swedish labor law allows layoffs of workers of merged firms.⁶

B. Merger Theories

Several theories potentially explain firms' transitions from active to merged status. Merger theories include replacement of inefficient management, financial synergies, operating synergies, and tax considerations.

1. Inefficient Management

Manne (1965) emphasizes the market for corporate control and views mergers as a threat if a firm's management lags in performance, either because of inefficiency or because of agency problems. More generally, if one firm's management is more efficient than another firm's, the inefficient firm's performance can be increased if the two firms merge. The need to reorganize a corporate group through, for example, mergers of parents and subsidiaries and subsequent restructuring (Slovin & Sushka 1998), is particularly strong if a firm is performing poorly. Following Healy et al. (1992), Hotchkiss (1995), and other studies, we use an accounting-based industry relative ratio to measure performance. The ratio, *INDUSTRY RELATIVE RETURN ON ASSETS*, is the difference between the firm's prior year's return on assets and the industry's median return on assets in that year. Unless otherwise stated, other accounting and financial variables are also lagged one year relative to the year in which our models predict firm status. A second measure of performance, more closely linked to financial stress and liquidity, is *INTEREST COVERAGE*, defined as the ratio of earnings before interest and depreciation to interest expenses.

⁵Swedish Company Law, § 14:7.

⁶The bulk of the firms studied here are private but it is worth noting that Scandinavian firms have been reported to have weaker shareholder protection than common-law countries and stronger protection than French civil-law countries (La Porta et al. 1998). Rossi and Volpin (2004) found that merger and acquisition activity is significantly greater in countries with stronger shareholder protection and better accounting standards.

2. Financial Synergies

In frictionless capital markets, funds will always be available to firms with positive net present value investment opportunities. Market frictions such as taxes, information asymmetries, and agency problems may, however, explain why funds do not always flow to firms with profitable investment opportunities. These problems decrease if firms belong to a corporate group and have access to an internal capital market, since financial resources can then be channeled from companies with poor growth opportunities to companies with better growth opportunities. We use the dummy variable `MEMBER OF CORPORATE GROUP`, which equals 1 if the company belongs to an industrial group, as the measure of membership in a corporate group.⁷

Financial synergy-based mergers may be more common if there is a mismatch between the bidder's and target's growth opportunities and financial resources (Palepu 1986). This hypothesis implies that two types of firms are likely targets: low-growth, resource-rich firms, and high-growth, resource-poor firms. To measure growth opportunities, we use the variable `CHANGE IN SALES`, calculated as the difference between a firm's prior year's sales and its two-year earlier sales. We employ `FREE CASH FLOW`, calculated as earnings before depreciation of investments in plant and equipment, as a measure of firm resources.⁸ We expect firms with low sales growth and high free cash flow to be merger targets. Similarly, the growth-resource mismatch hypothesis forecasts that firms with high sales growth and low free cash flow are likely merger targets.

Two dummy variables represent these combinations of sales growth and resources. `LOW SALES GROWTH-HIGH FREE CASH FLOW` equals 1 if sales growth is in the bottom quartile of firms and free cash flow is in the top quartile, and `HIGH SALES GROWTH-LOW FREE CASH FLOW` equals 1 if sales growth is in the top quartile and free cash flow is in the bottom quartile. To control for the level of the separate components of the dummy variables, we also include in our models `CHANGE IN SALES` and `FREE CASH FLOW`.

⁷Research suggests possible uncertainty about whether diversifying mergers enhance value. For example, Line and Servaes (1999) find no diversification discount in Germany but a 10 percent discount in Japan and a 15 percent discount in Germany. Graham et al. (2002), who studied firms that expanded through mergers, did not find that combining firms destroys value.

⁸Free cash flow can also be used to forecast agency-related mergers in public firms (Jensen 1986). Because small and mid-sized firms dominate our sample, we do not expect management-shareholder agency issues to play a prominent role in forecasting mergers.

A diversifying merger can also increase the combined debt capacity of two firms because it reduces the variability of earnings, and thus reduces bankruptcy risk for any given level of debt. This, in turn, lowers the firms' cost of capital by lowering the present value of future tax liabilities.⁹

We use three variables as measures of debt capacity. Following Ambrose and Megginson (1992), we use the *FIXED ASSETS RATIO*, measured as the ratio of fixed assets to total assets, as a proxy. If a higher *FIXED ASSETS RATIO* positively correlates with the portion of assets not used as security for loans, we expect the likelihood of merger to increase with higher values of the ratio. Since, however, as discussed below, the *FIXED ASSETS RATIO* also may correlate with how firm specific a firm's assets are, the relation between the ratio and the likelihood of merger is ambiguous.

The variable *FIXED ASSETS RATIO* does not account for the modern use of inventory and receivables as collateral. We therefore use the variable *FLOATING CHARGE* as a measure of debt capacity. It is a one-year lagged dummy variable equal to 1 if the firm has granted a bank a floating charge and 0 otherwise. The floating charge is a nonpossessory security device by which firms can grant a security interest in their inventories, receivables, and other changing assets. The absence of a floating charge implies that the firm has greater debt capacity because it has uncollateralized assets. We therefore expect a negative relation between the likelihood of merger and the presence of a *FLOATING CHARGE*.

Our third measure of debt capacity, *INDUSTRY RELATIVE LEVERAGE*, is the one-year lagged difference between the firm's ratio of total debts to total assets and the industry's median value of total debts to total assets. We expect a negative relation between the likelihood of merger and *INDUSTRY RELATIVE LEVERAGE*.

Public firms may be less likely to merge than private firms because their owners are likely to be more diversified than private owners. This reduces the benefits from further diversification. Furthermore, public firms are under closer scrutiny than private firms, implying that problems stemming from information asymmetries are less severe and that public firms enjoy better access to debt as well as equity financing. Thus, the financial synergies of a merger may be less important for public firms. A dummy variable

⁹A merger might result in increased leverage for other reasons. Before a merger, the acquirer and the target might be underleveraged because managers are more risk averse than shareholders or because of personal tax costs associated with increasing leverage. Merger can increase the firms' debt capacity.

labeled PUBLIC FIRM indicates whether the company is publicly or closely held.

3. Operating Synergies

A company wishing to obtain or add to its production capacity might be able to increase capacity faster or more cheaply by buying a company that produces the product rather than by constructing a plant from scratch. Weston et al. (1990) and Ambrose and Megginson (1992) argue that targets are primarily acquired to increase production rather than debt capacity. Thus, another rationale for including the FIXED ASSETS RATIO relates to operating synergies.

4. Taxes

The Swedish Tax Code contains merger-related provisions that could motivate acquisitions. Firms with accumulated tax losses and tax credits can shelter the positive earnings of merger partners. Hence, at the corporate level, tax benefits arise by allowing the acquiring firm to use past losses of the acquired firm to offset the acquiring firm's current and future profits.¹⁰ This suggests that firms with unused loss carryforwards are likely merger targets. We use a firm's ACCUMULATED LOSSES, measured as the sum of prior earnings, if that sum is negative, as the proxy for the magnitude of loss carryforwards. Within-group losses are effectively deductible by the group. Thus, companies within a corporate group can more efficiently use loss carryforwards, implying that tax-driven mergers are expected to be less likely among firms within a corporate group. This further strengthens the prediction that there is a negative relation between MEMBER OF CORPORATE GROUP and merger likelihood.

5. Industrywide and Economywide Variables

Lambrecht (2004), Melicher et al. (1983), and other studies find that takeovers are highly procyclical. Maksimovic and Phillips (2001) find procyclical sales of assets. Shleifer and Vishny (1992) suggest that the lower liquidity of assets during times of industrywide or economywide recessions

¹⁰After Sweden's Tax Reform Act of 1987, the use of mergers to step up the tax basis of acquired assets is not attractive.

helps explain the pattern: in recessions, many asset buyers are credit constrained and cannot pay the fundamental values of assets. Thus, sellers try to postpone sales until markets become more liquid.

An industry can be financially constrained because firms are unable to meet recurring financial obligations or because firms rely heavily on debt. We use three measures of industrywide financial constraint: median *INDUSTRY INTEREST COVERAGE* (defined as annual median industry earnings before depreciation and financial costs divided by financial costs), median *INDUSTRY LEVERAGE* (defined as annual median industry total debts to total assets), and the *INDUSTRY BANKRUPTCY RATE* (defined as the annual percent of all firms in the industry that filed for bankruptcy). If mergers are less likely when potential bidders are in financial distress, we expect mergers to be negatively related to *INDUSTRY LEVERAGE* and *INDUSTRY BANKRUPTCY RATE*, and positively related to the other industrywide measure. We are interested in industrywide conditions in the year of transition, not in the prior year. Accordingly, these industrywide measures are not lagged. Industry classification is based on the major two-digit categories in the Swedish industrial classification system, except that business services and real estate are three-digit classifications. The 12 specific industry categories used account for over 85 percent of firms in the sample with approximately 15 percent of the firms grouped in a residual 13th category labeled “other industries.”¹¹

We account for the state of the economy by including a dummy variable in the regressions. As described below, the Swedish economy started to sour sometime in 1990 and started to recover sometime in 1993. We define the dummy variable *DECLINING ECONOMY* to equal 1 in 1990, 1991, and 1992 and 0 in 1993 and 1994, and expect that mergers are less likely during years of decline. Precise matching of years and general economic conditions is not essential as we are not trying to pinpoint the moment of downturn and recovery. We only claim that the economy was headed in a worse direction in the first three years of our study than in the last two years. With one exception, models using dummy variables for each year instead of the single vari-

¹¹The 12 specific industry categories are manufacturers of food, beverages, or tobacco; manufacturers of wood and wood products; manufacturers of paper and paper products; manufacturers of chemicals or plastics or petroleum; manufacturers of metal or machinery or equipment; business services; wholesale; construction; transportation; restaurants or hotels; retail; and real estate.

able distinguishing earlier and later time periods do not yield results materially different from those reported here.¹²

Shleifer and Vishny's theory also suggests that markets are particularly illiquid when assets are highly specialized. Since fixed assets generally are more firm specific than current assets, the previously defined ratio of fixed assets to total assets, *FIXED ASSETS RATIO*, measures firm specificity of assets. We expect a negative relation between this variable and the likelihood of becoming a target. We note, however, that this ratio may be a poor proxy for asset specificity. For example, office buildings are fixed assets that may not be highly specialized and inventories, such as raw materials and work in process, are nonfixed assets that often are specialized.

6. Other Firm Characteristics

Prior studies find that merger likelihood decreases with firm size (e.g., Ambrose & Megginson 1992; Cudd & Duggal 2000). To test this hypothesis we include *SALES*, defined as the one-year lag of the log of sales, in the regressions, and expect smaller firms to be more likely to merge.

Finally, we include the company's age, *AGE OF FIRM*, in merger models. Younger firms are more likely to be operated by their founders, and are thus probably less likely to be merger targets. The same founder effect suggests that, in older firms, the heirs are more likely to want to realize on their holdings.

C. Bankruptcy Theories

Bankruptcy theories focus on the likelihood of bankruptcy among active firms as well as on the likelihood of bankruptcy as a resolution of financial distress among firms that have encountered financial difficulties. Among firms in financial distress, Gilson et al. (1990) suggest that the choice between bankruptcy and private debt restructuring depends on two factors: the cost savings of avoiding bankruptcy and the impediments to renegotiations. Impediments to private settlement include holdout problems when the firm's debt is held by many diffuse creditors, informational asymmetry problems that can arise between poorly informed outside creditors and better informed managers, and conflicts of interest between different classes of creditors.

¹²In the merger portion of models using individual year dummy variables, the industry bankruptcy rate variable is negative but not statistically significant.

1. Inefficiency

Several studies suggest that the probability of bankruptcy is a decreasing function of the firm's profitability (e.g., Altman 1968; Altman et al. 1977; Ohlson 1980). Market competition forces inefficient firms to cease their operations. We use the previously defined variables `INDUSTRY RELATIVE RETURN ON ASSETS`, `FREE CASH FLOW`, `INTEREST COVERAGE`, `ACCUMULATED LOSS`, and `CHANGE IN SALES` as measures of firm performance.

2. Leverage

Many studies find that more leveraged firms are more likely to file for bankruptcy (e.g., Altman 1968; Altman et al. 1977; Ohlson 1980). We use `INDUSTRY RELATIVE LEVERAGE` to measure leverage.

3. Industrywide and Economywide Variables

Shleifer and Vishny (1992) suggest that liquidation values are lower during periods of industrywide or economywide recession. Liquidity-constrained potential buyers are unable to bid up to their valuation of firms' assets. Since the costs of selling assets at a low price can be avoided if the firm is reorganized, their theory suggests that the likelihood of a liquidating bankruptcy is lower among firms in distressed industries. Another effect, however, neutralizes or even dominates the preceding effect. Industrywide measures of bankruptcy correlate with the proportion of firms in an industry that are in financial distress. Some financially distressed firms file for bankruptcy. Thus, more firms in financially troubled industries may file for bankruptcy despite special efforts to resist bankruptcy. As in the case of mergers, we use three measures of industrywide financial constraints: `INDUSTRY INTEREST COVERAGE`, `INDUSTRY LEVERAGE`, and the `INDUSTRY BANKRUPTCY RATE`. We compute the industrywide measures for each of the five years studied and for each of our 13 industry groups.

To test one aspect of Shleifer and Vishny's (1992) theory, it is helpful to separate the effects of economywide conditions and industrywide conditions on the likelihood of individual firm bankruptcy. `DECLINING ECONOMY`, our economywide variable, should correlate with increased probability of a bankruptcy filing. We also include an interaction term between `DECLINING ECONOMY` and `INDUSTRY BANKRUPTCY RATE` in the regressions. If firms are more likely to resist bankruptcy in distressed industries during recessions, we expect a negative sign on the interaction term during the years when the Swedish economy was in decline.

Finally, we include a `FIXED ASSETS RATIO` in the regressions, since markets are likely to be particularly thin for specialized assets during recessions, as described above.

4. Informational Asymmetries

If lenders decide to renegotiate instead of pressing for a bankruptcy filing, they may worry about the asset substitution problem. Diamond (1989) suggests that the incentive problems are most severe for borrowers with short track records but are less severe for firms having established a good reputation. We use the `AGE OF FIRM` as a measure, admittedly weak, of the reputation effect. We thus expect `AGE OF FIRM` to be negatively related to the likelihood of bankruptcy.¹³ However, our sample limits some of the possibilities for exploring the relation between age and firm status. All the sample firms have at least 20 employees. Most firms presumably do not originate as firms with so many employees, they must grow to that size.¹⁴ Such growth takes time so we expect the sample firms to be considerably older, on average, than the mass of firms that is not limited by number of employees.

A dummy variable for `PUBLIC FIRM` may serve as a proxy for how well informed creditors are, as described above. As a consequence, information problems may not hamper private debt renegotiations as much for public firms and, therefore, bankruptcy may be a less likely resolution of financial distress.

5. Conflicts Among Creditors

Conflicts among different groups of creditors may hamper private debt renegotiations. Secured creditors that are well protected in bankruptcy have strong incentives to trigger bankruptcy when they fear that continuing oper-

¹³However, using age as a proxy for information asymmetry is ambiguous. One can imagine that a young single-business firm is much more transparent than an older multiple-business company.

¹⁴We find, for example, that only about 1 percent of the sample firms that merge or go bankrupt do so within one year of their creation. We would not expect such a low percentage of very young firms in a sample that included firms smaller than those in our sample. Conditional on filing for bankruptcy, those that failed sooner tended to be more leveraged, smaller, and less likely to be in a corporate group than firms that took longer to fail. Conditional on being a merger target, firms that merged at a younger age tended to be less leveraged, smaller, and have fewer fixed assets than firms that took longer to merge.

ations threatens their collateral (Bergström et al. 2002). The existence of a FLOATING CHARGE is used as a measure of how secured creditors are, and we expect a positive relation between the likelihood of bankruptcy and the existence of a floating charge. A further justification for including FLOATING CHARGE in bankruptcy models can be derived from Rajan and Winton (1995). Their model suggests that banks, in order to balance the need to monitor with concern about liquidating too many firms, should take collateral only from relatively poorly performing firms.

6. Other Firm Characteristics

Prior studies suggest that the likelihood of bankruptcy correlates negatively with firm size (e.g., Altman et al. 1977; Ohlson 1980). We use sales as the measure of size. We also include MEMBER OF CORPORATE GROUP in our bankruptcy model. The potential cross-subsidies that allow poorly performing firms to drain resources from better performing members of a group should reduce the likelihood of bankruptcy.

Table 1 summarizes the variables used in our merger and bankruptcy models and their expected signs.

III. DATA AND UNIVARIATE RESULTS

This section describes the sample, provides historical perspective on the 1990–1994 sample period, and presents summary evidence on economy-wide, industrywide, and firm-level results. It then reports univariate results.

A. Sample Selection and Economic Context

The sample covers the years 1990 to 1994 and includes all firms with 20 or more employees in the database of UpplysningsCentralen AB (UC), the largest Swedish credit bureau.¹⁵ The accounting data in UC's files come

¹⁵We exclude from the analysis the few firms that exit the sample due to voluntary liquidation or for unknown reasons. The workforce of some firms in the sample fell below our 20-employee threshold during some of the years studied. We include observations for an active firm for years in which the firm has fewer than 20 employees only if the firm has more than 20 employees in some year from 1990 to 1994 and the firm has at least 15 employees in the year in question. For years of bankruptcy or merger, we include firms if they have the requisite number of employees in the prior year because years of bankruptcy or merger are associated with missing or less accurate employee and other data. For firms with 20 or more employees in at least one year, missing values for the number of employees in other years are interpolated based on the firm's sales to determine eligibility of the observation for inclusion in the sample.

Table 1: Independent Variables and Their Relation to Merger and Bankruptcy Hypotheses

Variable	Definition	Merger Hypothesis	Bankruptcy Hypothesis	Predicted Sign	
				Merger	Bankruptcy
<i>Firm-Level Variables</i>				Merger	Bankruptcy
ACCUMULATED LOSSES (log)	Sum of prior years' earnings (if negative)	Tax reasons	Performance	-	-
AGE OF FIRM	Age of firm in 1,000s of days	Founder effects	Incentive problems	+	-
CHANGE IN SALES	Current year's sales minus previous year's sales (log)	Financial synergies	Performance	?	-
FIXED ASSETS RATIO	Ratio of fixed assets to total assets	Financial and operating synergies/specialized assets	Specialized assets	?	-
FLOATING CHARGE	Dummy variable = 1 if the firm has issued a floating charge	Financial synergies	Conflicts of interest between different classes of creditors	-	+
FREE CASH FLOW	Ratio of earnings before interest to investments in plant and equipment	Financial synergies	Performance	?	-
HIGH SALES GROWTH-LOW FREE CASH FLOW	Dummy variable = 1 if sales growth is in top quartile and free cash flow is in bottom quartile	Financial synergies	n.a.	+	?
INDUSTRY RELATIVE LEVERAGE	Ratio of firm's total debt to assets less industry median ratio	Financial synergies	Leverage	-	+
INDUSTRY RELATIVE RETURN ON ASSETS	Firm's return on assets less industry median return on assets	Performance	Performance	-	-

Table 1: Continued

<i>Variable</i>	<i>Definition</i>	<i>Merger Hypothesis</i>	<i>Bankruptcy Hypothesis</i>	<i>Predicted Sign</i>	
INTEREST COVERAGE	Ratio of earnings before interest and depreciation to interest expenses	Performance, leverage	Performance, leverage	?	-
LOW SALES GROWTH-HIGH FREE CASH FLOW	Dummy variable = 1 if sales growth is in bottom quartile and free cash flow is in top quartile	Financial synergies	n.a.	+	?
MEMBER OF CORPORATE GROUP	Dummy variable = 1 if member of corporate group	Financial synergies/ taxes	Cross-subsidies between firms in a corporate group	-	-
PUBLIC FIRM	Dummy variable = 1 if public firm	Financial synergies	Informational asymmetries	-	-
SALES (log)	Net sales	Prior empirical evidence	Prior empirical evidence	-	-
<i>Industrywide, Economywide Variables</i>					
INDUSTRY LEVERAGE	Industry's median ratio of total debt to assets	Industry constraints	Industry constraints, viability of firms in the industry	-	?
INDUSTRY INTEREST COVERAGE	Industry's median ratio of earnings before interest and depreciation to interest expenses	Industry constraints	Industry constraints, viability of firms in the industry	+	?
INDUSTRY BANKRUPTCY RATE	Ratio of number of bankruptcies to total number of firms in the industry	Industry constraints	Industry constraints, viability of firms in the industry	-	?
DECLINING ECONOMY	Dummy variable = 1 for years 1990, 1991, 1992	Economy constraints	Economy constraints	-	+

Table 2: Swedish Gross Domestic Product Growth, 1986–1998

<i>Year</i>	<i>% GDP Growth</i>	<i>Year</i>	<i>% GDP Growth</i>
1986	2.1	1993	-2.2
1987	3.1	1994	3.3
1988	2.3	1995	3.9
1989	2.4	1996	1.3
1990	1.4	1997	1.8
1991	-1.1	1998	3.3
1992	-1.4		

SOURCE: Statistics Sweden.

from annual financial statements that every Swedish corporation must file. UC supplements these data with information from a public file (Företaginteckningsregistret) as to whether a firm has granted a creditor a floating charge. This is also an official government source. Data about firm transitions—mergers and bankruptcies—come from the Patent and Registration Office and Statistics Sweden. The government also maintains these data sources.

Our empirical results must be interpreted against a background of changes in the Swedish economy. Sweden deregulated its financial markets in the late 1980s. This occurred during an economic expansion that, together with a tax system that favored borrowing, led to a huge credit expansion and a real estate boom. In the early 1990s, Sweden enacted major tax reform legislation that favored savings. This occurred in the midst of a weakening economy and a strong commitment by the central bank to curb inflation. The inflation rate fell rapidly, resulting in a sharp increase in real interest rates and a crash in the real estate industry.

Thus, during the early years covered by this study, the Swedish economy turned sour and suffered a deep recession. Table 2 provides historical data for the period 1986–1998. The gross domestic product (GDP) growth rate began to decrease in 1990 and recovered by 1994. Annual GDP growth was 1.4 percent during 1990, -1.1 percent during 1991, -1.4 percent during 1992, -2.2 percent during 1993, and 3.3 percent during 1994. Unemployment followed the same pattern as GDP.

Figure 1 compares GDP growth with year-earlier quarters. It shows that the economy's turn for the worse probably began in early 1990. By the end of 1990, GDP growth over year-earlier quarters had all but ceased, and the

Figure 1: Percent Swedish GDP growth over year-earlier quarter.



economy was in a downward spiral. In 1993, the pattern of increasing GDP declines ceased and the economy showed positive GDP growth over year-earlier quarters beginning in late 1993.

B. Sample Characteristics

Panel A of Table 3 shows firm status by year for our sample. Active firms comprise 52,601 observations of 14,880 firms covering 1990 to 1994.¹⁶ There

¹⁶New firms may enter the sample after 1990 so not all firms need have existed in 1990. By introducing a dummy variable equal to 1 for companies incorporated during the sample period and equal to 0 for firms incorporated before 1990, we tested whether the firms entering our sample from 1990–1994 bias the results. This dummy variable was not significant. We also compared firm status by year for firms that were incorporated in the sampling period with firms that were registered before 1990. No significant differences in merger and bankruptcy rates were found.

Table 3: Firm Status by Year and Interest Coverage Status, 1990–1994

Year	Firm Status			Total
	Active	Bankrupt	Merged	
<i>A. All Firms</i>				
1990	11,264 (94.08)	631 (5.27)	78 (0.65)	11,973 (100)
1991	10,794 (93.23)	665 (5.74)	119 (1.03)	11,578 (100)
1992	10,670 (95.60)	295 (2.64)	196 (1.76)	11,161 (100)
1993	10,437 (96.52)	131 (1.21)	245 (2.27)	10,813 (100)
1994	9,436 (94.67)	63 (0.63)	468 (4.70)	9,967 (100)
Total	52,601 (94.79)	1,785 (3.21)	1,106 (1.99)	55,492 (100)
<i>B. Firms with Interest Coverage < 1</i>				
1990	411 (88.77)	50 (10.80)	2 (0.43)	463 (100)
1991	561 (85.52)	86 (13.11)	9 (1.37)	656 (100)
1992	632 (90.16)	46 (6.56)	23 (3.28)	701 (100)
1993	791 (94.39)	23 (2.74)	24 (2.86)	838 (100)
1994	477 (90.17)	14 (2.65)	38 (7.18)	529 (100)
Total	2,872 (90.12)	219 (6.87)	96 (3.01)	3,187 (100)

NOTE: Firm status as active, bankrupt, or merged for 55,492 observations of 15,828 Swedish corporations with 20 or more employees, 1990 to 1994. Panel A includes all firms. Panel B is limited to firms with an interest coverage ratio less than 1. The percent of firms in each status in each year is shown in parentheses. Chi-squared probabilities for Panels A and B are less than 10^{-17} . Chi-squared probabilities for active firm rates compared with bankrupt firms rates, and for active firm rates compared with merged firm rates, are all less than 0.001.

are also 1,785 bankrupt firms and 1,106 merged firms in the sample.¹⁷ Strikingly high bankruptcy rates, over 5 percent in 1990 and 1991, decrease to less than 1 percent by 1994. Merger rates show the opposite trend, with almost none in years with high bankruptcy rates, and a rate approaching 5

¹⁷Firms that ultimately merge or go bankrupt are categorized as active in the years prior to their merger or bankruptcy. Missing data disproportionately occur in bankrupt firms and occur

percent in 1994. Consistent with the procyclical movement of merger activity found in the United States, the relation between merger activity and business failure is negative in Table 3.

Panel B of Table 3 shows firm status by year for those firms with interest coverage of less than 1. Definitions of financial distress frequently use interest coverage ratios (e.g., Asquith et al. 1994; Hoshi et al. 1990). The panel shows that, in this comprehensive sample, the vast bulk of merger targets and bankrupt firms do not satisfy conventional definitions of low interest coverage. Limiting the sample to firms with interest coverage of less than 1 would reduce the sample to less than 13 percent of the bankrupt firms and less than 9 percent of the merged firms.¹⁸

For each year, our three industrywide measures, *INDUSTRY INTEREST COVERAGE*, *INDUSTRY LEVERAGE*, and *INDUSTRY BANKRUPTCY RATE*, show substantial and statistically significant (beyond $p = 0.001$ in each year) interindustry effects. We also find substantial and significant within-industry time effects. Bankruptcy rates differ significantly over time for each of the industry groups other than food, beverage, and tobacco manufacturing. Median interest coverage varies significantly over time for every industry except real estate. Leverage varies significantly over time for nine of the thirteen industry groups. For example, 1990 bankruptcy rates ranged from 2.9 percent for food, beverage, and tobacco manufacturers to 19.2 percent for real estate firms. Although the real estate bankruptcy rate declined to 4.5 percent by 1994, it was still the highest rate of any industry for that year.

in approximate proportion to their frequency for merged firms. Our sample therefore overrepresents active firms. In the regression models presented below, we account for this oversampling by weighting active, merged, and bankrupt firms by the inverse of the probability of their being included in the sample. Weights are based on the number of firms in each status with missing and nonmissing data. We deem a firm to have nonmissing data if its accounting report contains a figure for the basic accounting measure, firm sales. Nonmissing data are present for 89.4 percent of active firms, 91.0 percent of merged firms, and 66.0 percent of bankrupt firms.

¹⁸We note an ambiguity regarding the precise year of firm bankruptcy filings. Firms often do not file the required accounting data for the year preceding a bankruptcy filing. For firms known to have filed for bankruptcy, we designate the year of bankruptcy to be the year following the last full year of reporting. Some firms therefore will be deemed to have filed for bankruptcy one year earlier than they actually filed for bankruptcy. To be conservative about time effects, we limit the economywide variable *DECLINING ECONOMY* to two values, 1 for the early years of the study and 0 for the later years. Figure 1 suggests that the economy was headed in a worse direction during the study's earlier years than during its later years.

Median industrywide interest coverage ratios vary in 1990 from 1.725 for real estate firms to 3.931 for manufacturers of metal, machinery, or equipment. In 1994, interest coverage ratios vary from 1.478 for real estate firms to 9.382 for the same manufacturing group.

1. Firm-Level Characteristics and Univariate Results

Table 4 shifts the focus to the individual firm level from the economywide and industrywide levels. Table 4 provides summary statistics about the variables that Section II's theoretical discussion suggests influence bankruptcy and merger.

Table 4 shows an overall negative correlation between one-year lagged *INDUSTRY RELATIVE RETURN ON ASSETS* and merger-target status. This correlation is, however, the net result of a positive correlation between performance and merger for highly performing firms, and a negative correlation for poorly performing firms. Of firms in the bottom quartile of *INDUSTRY RELATIVE RETURN ON ASSETS*, merger targets tend to underperform active firms. Merged firms in this quartile have mean and median *INDUSTRY RELATIVE RETURN ON ASSETS* of -0.331 and -0.152 , respectively. The comparable figures for active firms in this quartile are -0.221 and -0.116 , respectively. For firms in the top three quartiles of *INDUSTRY RELATIVE RETURN ON ASSETS*, merger targets tend to outperform active firms. Merger targets in these quartiles have mean and median *INDUSTRY RELATIVE RETURN ON ASSETS* of 0.104 and 0.045 , respectively. The comparable figures for active firms in these quartiles are 0.054 and 0.023 , respectively. Table 4's penultimate column shows that these active firm-merged firm differences are highly statistically significant for both quartile groups.

Figure 2 confirms this relation between merger-target status and *INDUSTRY RELATIVE RETURN ON ASSETS*. Using kernel density estimates (Wand & Jones 1995), it displays the distributions of merged firms' and active firms' *INDUSTRY RELATIVE RETURN ON ASSETS*. It shows that the merged firms' distribution is noticeably flatter, with greater concentrations of both highly performing firms and of poorly performing firms.

IV. MULTIVARIATE RESULTS

The data are amenable to analysis using multinomial logit models for a complex survey design. In the design, the data have been stratified by indus-

Table 4: Descriptive Statistics by Firm Status, Swedish Corporations, 1990–1994

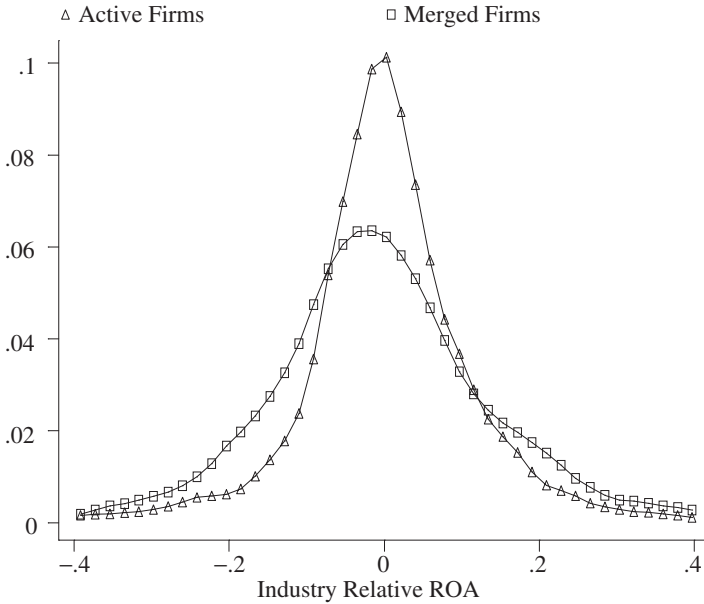
Variable	Active Firms			Bankrupt Firms			Merged Firms			Significance of Differences Between			
	Mean	Median	N	Mean	Median	N	Mean	Median	N	Active & Bankrupt	Active & Merged	Bankrupt & Merged	Active & Bankrupt & Merged
<i>Financial Ratios Lagged One Year</i>													
Return on assets	0.069	0.077	14,871	0.017	0.046	1,769	0.025	0.062	1,093	0.000	0.000	0.000	0.529
Leverage	0.734	0.764	14,870	0.849	0.873	1,770	0.645	0.695	1,094	0.000	0.000	0.000	0.000
Interest coverage	37.710	3.255	14,496	9.330	1.761	1,726	49.299	3.105	1,006	0.000	0.000	0.022	0.000
<i>Industry Relative Ratios Lagged One Year</i>													
Return on assets	-0.009	0.000	14,871	-0.057	-0.029	1,769	-0.054	-0.018	1,093	0.000	0.000	0.000	0.808
Return on assets bottom quartile	-0.221	-0.116	3,391	-0.227	-0.138	646	-0.331	-0.152	395	0.648	0.000	0.000	0.000
Return on assets top 3 quartiles	0.054	0.023	11,480	0.041	0.012	1,123	0.104	0.045	697	0.001	0.000	0.000	0.000
Leverage	-0.022	0.006	14,870	0.079	0.101	1,770	-0.114	-0.064	1,094	0.000	0.000	0.000	0.000
<i>Other Firm Characteristics</i>													
Floating charge dummy	0.671	1.000	14,880	0.767	1.000	1,770	0.503	1.000	1,095	0.000	0.000	0.000	0.000
Accumulated loss exists dummy	0.183	0.000	14,880	0.266	0.000	1,770	0.212	0.000	1,095	0.000	0.000	0.018	0.001
Accumulated loss (log)	-1.003	0.000	14,880	-1.507	0.000	1,770	-1.287	0.000	1,095	0.000	0.000	0.000	0.039
Free cash flow	2.474	3.251	12,795	0.725	4.443	1,014	3.507	6.890	970	0.000	0.000	0.000	0.000
Change in sales (% change in log sales)	0.041	0.000	13,645	0.042	-0.003	1,145	-0.015	-0.007	1,019	0.647	0.000	0.000	0.000

Table 4: Continued

Variable	Significance of Differences Between											
	Active Firms			Bankrupt Firms			Merged Firms			Active & Bankrupt & Merged		
	Mean	Median	N	Mean	Median	N	Mean	Median	N	Active & Bankrupt	Active & Merged	Bankrupt & Merged
Low sales growth-high free cash flow dummy	0.074	0.000	12,795	0.057	0.000	1,014	0.152	0.000	970	0.000	0.000	0.000
High sales growth-low free cash flow dummy	0.050	0.000	12,795	0.065	0.000	1,014	0.028	0.000	970	0.000	0.000	0.000
Sales (log)	10.597	10.553	14,880	10.229	10.244	1,770	10.381	10.618	1,095	0.000	0.000	0.016
Assets (log)	10.070	9.904	14,871	9.688	9.629	1,770	10.037	9.912	1,094	0.000	0.518	0.000
Fixed assets ratio	0.324	0.28	14,871	0.307	0.243	1,770	0.321	0.264	1,094	0.004	0.731	0.145
Age of firm (1,000s of days)	8.378	7.022	14,880	6.985	6.012	1,770	9.477	8.057	1,095	0.000	0.000	0.000
Public firm dummy	0.133	0.000	14,880	0.001	0.000	1,770	0.064	0.000	1,095	0.000	0.000	0.000
Member of corporate group dummy	0.296	0.000	14,880	0.275	0.000	1,770	0.151	0.000	1,095	0.000	0.000	0.000

NOTE: Descriptive statistics on 55,492 observations of 15,828 Swedish corporations, 1990 to 1994, divided by active, bankrupt, or merged status. Active firms comprise 52,601 observations of 14,880 firms. The three right-hand columns use t tests in the case of continuous variables, and chi-squared tests in the case of dummy variables, to test the significance of the differences among variables by the three firm statuses (active, bankrupt, merged). The financial ratios are based on data from the year prior to merger or bankruptcy. We compute one-year lagged industry relative return on assets and industry relative leverage ratios by subtracting the industrywide median value of the ratio, calculated each year, from the firm's ratio for the year. We also use one-year lagged observations of firm interest coverage, floating charge, accumulated loss, free cash flow, change in sales (log), sales, and the fixed assets ratio. At the individual-firm level, low and high extreme values of the financial ratio variables are truncated to equal the 0.25 and 99.75 percentiles, respectively. For change in sales, the upper truncation is at the 99th percentile. No truncation of the fixed assets ratio occurs. (Shumway's (2001) bankruptcy study truncated financial ratios at the 1st and 99th percentiles.) We adjust for inflation using the United Nations' monthly bulletin of statistics and data from Statistics Sweden.

Figure 2: Kernel density estimates, distributions of industry relative return on assets by firm status.



NOTE: Kernel density estimates of the distributions of industry relative return on assets for 14,871 active firms and 1,092 merged firms. For active firms observed in more than one year, a firm-level average is computed before the density estimates.

try and cluster sampled by firm.¹⁹ We let (h, i, j) index the firms in the sample, where $h = 1, \dots, L$ are 13 industry strata,²⁰ $i = 1, \dots, N_h$ are the different firms in each industry h , and $j = 1, \dots, M_{hi}$ are the individual yearly observations of each firm i . The regression coefficients $\beta = (\beta_1, \beta_2)^T$ are the

¹⁹Shumway (2001) presents evidence for using hazard models in bankruptcy prediction. He points out that one of the problems with traditional bankruptcy models, discriminant analysis and classical cross-sectional logit-type models, is their inability to incorporate time varying covariates. A hazard rate model may be more appropriate if the length of the panel observations is long enough to assure that the observations are recorded in continuous time. This is not the case with the data we have, which comprise yearly data covering 1990–1994. Therefore, we use a panel data logit model. These estimates have a clearer interpretation than the change in the log hazard ratio for a unit increase in an independent variable than one obtains from a hazard rate regression model. An additional possible problem for hazard rate regression models in this context is that the censoring rate is very heavy and is possibly dependent on the survival time, which may lead to invalid inferences (see Kalbfleish & Prentice 1980).

²⁰See note 11, supra, for information about the industry strata.

parameters that we wish to estimate, where β_1 represents the vector of parameters in the multinomial logit regression comparing bankrupt firms to active firms and β_2 represents the vector of parameters comparing merged firms to active firms. Active firms are the dependent variable's reference category with respect to which the β are estimated. β is defined with respect to an outcome variable Y_{hij} and a row vector of explanatory variables X_{hij} . Assume that (Y_{hij}, X_{hij}) are related via a multinomial logit regression model. Let $l(\beta; Y_{hij}, X_{hij})$ be the associated log likelihood under this model. We define the parameter β by the vector estimating equation

$$G(\beta) = \sum_{h=1}^L \sum_{i=1}^{N_h} \sum_{j=1}^{M_{hi}} S(\beta; Y_{hij}, X_{hij}) = 0 \quad (1)$$

where $S = \partial l / \partial \beta$ is the first derivative of $l(\beta; Y_{hij}, X_{hij})$ with respect to β . The coefficients are computed via standard likelihood techniques and the t statistics are computed using Taylor series-based weighted likelihood standard errors (see Wolter 1985), adjusted for the complex design.

Table 5 reports four multinomial logit models. They vary two factors. First, they differ in the industrywide measures used to proxy for industry conditions. All models include `INDUSTRY BANKRUPTCY RATE` as an explanatory variable. Models 3 and 4 also include `INDUSTRY INTEREST COVERAGE` and `INDUSTRY LEVERAGE` as explanatory variables. Second, the models differ in the firm-level explanatory variables used. Models 1 and 3 do not include `FREE CASH FLOW`, `CHANGE IN SALES`, or the two growth-resource mismatch dummy variables computed from these two variables. This is because each of these firm-level variables requires two prior years of data.

The real estate industry's crash and extreme performance—for example, bankruptcy rates for real estate firms in the sample reached 24.1 percent in 1991—warrants using a real estate dummy variable in the models. We have run models similar to those in Table 5 on each industry individually and Table 5's results are not a consequence of conditions in one or a few industries.

A. Firm-Level Results

1. Firm Performance

Table 5 shows several firm-level results. Consider first the relation between `INDUSTRY RELATIVE RETURN ON ASSETS` and the likelihood of a merger. To account for Table 4's interquartile effects between merger and `INDUSTRY`

Table 5: Multinomial Logit Models of Merger and Bankruptcy, Swedish Corporations, 20 or More Employees, 1990–1994

Variable	Model 1		Model 2		Model 3		Model 4	
	Bankrupt	Merged	Bankrupt	Merged	Bankrupt	Merged	Bankrupt	Merged
<i>Firm-Level Accounting Ratios</i>								
Return on assets interaction	—	-1.127 (-4.422)	—	-1.062 (-3.871)	—	-1.106 (-4.288)	—	-1.030 (-3.689)
Bottom quartile return on assets dummy	—	0.484 (5.864)	—	0.448 (5.078)	—	0.477 (5.789)	—	0.440 (4.995)
Industry relative return on assets	-0.501 (-4.279)	0.640 (2.977)	-0.530 (-3.849)	0.681 (2.976)	-0.505 (-4.294)	0.609 (2.795)	-0.528 (-3.813)	0.640 (2.740)
Industry relative leverage	2.610 (11.626)	-1.456 (-8.966)	2.350 (9.165)	-1.147 (-6.277)	2.606 (11.548)	-1.490 (-9.119)	2.359 (9.139)	-1.184 (-6.443)
Interest coverage (square root)	-0.100	-0.012	-0.154	-0.010	-0.102	-0.013	-0.156	-0.012
<i>Other Firm Characteristics</i>								
Floating charge dummy	0.316 (4.589)	-0.930 (-12.850)	0.401 (4.033)	-0.971 (-12.491)	0.318 (4.606)	-0.917 (-12.470)	0.406 (4.059)	-0.953 (-12.031)
Accumulated loss (log)	-0.038 (-2.982)	-0.027 (-1.893)	-0.041 (-2.617)	-0.022 (-1.472)	-0.039 (-2.992)	-0.027 (-1.907)	-0.040 (-2.583)	-0.022 (-1.506)
Free cash flow	—	—	-0.011 (-1.831)	0.007 (1.187)	—	—	-0.010 (-1.825)	0.008 (1.225)
Change in sales (% change in log sales)	—	—	0.612 (1.525)	-1.557 (-3.600)	—	—	0.605 (1.505)	-1.607 (-3.653)
High free cash-low sales	—	—	0.286 (1.782)	0.562 (4.899)	—	—	0.289 (1.798)	0.555 (4.840)
Low free cash-high sales	—	—	0.091 (0.514)	-0.024 (-0.099)	—	—	0.090 (0.507)	-0.021 (-0.088)
Sales (log)	-0.160 (-8.863)	0.028 (1.303)	-0.172 (-6.987)	0.076 (2.534)	-0.158 (-8.695)	0.034 (1.525)	-0.170 (-6.825)	0.086 (2.760)
Fixed assets ratio	-0.618 (-5.072)	-0.097 (-0.663)	-0.652 (-4.099)	0.024 (0.156)	-0.612 (-5.020)	-0.111 (-0.755)	-0.653 (-4.100)	0.010 (0.065)

Table 5: Continued

Variable	Model 1		Model 2		Model 3		Model 4	
	Bankrupt	Merged	Bankrupt	Merged	Bankrupt	Merged	Bankrupt	Merged
Age of firm (1,000s of days)	-0.018 (-3.794)	0.008 (1.719)	-0.021 (-3.380)	0.001 (0.116)	-0.018 (-3.724)	0.008 (1.719)	-0.020 (-3.270)	0.001 (0.158)
Public firm dummy	-4.187 (-5.855)	-1.368 (-9.502)	-3.628 (-5.051)	-1.374 (-8.997)	-4.191 (-5.863)	-1.383 (-9.611)	-3.632 (-5.058)	-1.392 (-9.125)
Member of corporate group dummy	0.074 (1.166)	-0.848 (-9.075)	0.035 (0.415)	-0.901 (-8.996)	0.070 (1.097)	-0.858 (-9.174)	0.032 (0.382)	-0.913 (-9.087)
<i>Industry & Economy Characteristics</i>								
Real estate dummy	-0.271 (-1.516)	2.286 (12.374)	-0.387 (-1.429)	2.021 (10.511)	-0.197 (-1.032)	2.415 (11.370)	-0.348 (-1.229)	2.154 (9.556)
Industry bankruptcy rate	44.721 (8.713)	-30.504 (-6.222)	46.747 (8.310)	-27.143 (-5.573)	46.366 (8.737)	-24.008 (-4.474)	46.866 (7.980)	-19.921 (-3.785)
Industry interest coverage	—	—	—	—	0.043 (1.118)	0.078 (2.726)	0.023 (0.483)	0.091 (3.114)
Industry leverage	—	—	—	—	-0.041 (-0.077)	-0.699 (-0.922)	0.339 (0.489)	-0.662 (-0.801)
Declining economy × industry bankruptcy rate	-27.832	24.748	-30.568	24.204	-29.633	18.455	-30.987	17.353
Declining economy	(-5.673)	(5.286)	(-5.844)	(5.119)	(-5.844)	(3.576)	(-5.705)	(3.417)
	1.013	-1.505	1.104	-1.441	1.116	-1.252	1.150	-1.161
	(6.740)	(-11.573)	(6.877)	(-10.636)	(6.437)	(-7.713)	(6.196)	(-7.100)
Number of observations	51,026		37,474		51,026		37,474	
Number of firms	15,277		13,191		15,277		13,191	
F test probability	0.00000		0.00000		0.00000		0.00000	

NOTE: Multinomial logit estimates with industry-level strata and firm-level clustering. The dependent variable can be active, merged, or bankrupt. Active serves as the reference category. The bottom quartile ROA dummy variable is based on industry relative return on assets. The return on assets interaction term equals the product of the bottom quartile ROA dummy variable and industry relative return on assets. Since there is no reason to believe a return on assets interquartile effect should exist for bankruptcy, we constrain these coefficients to equal 0 for bankruptcy as an outcome. The declining economy dummy variable-industry bankruptcy rate interaction term examines how the relation between industry bankruptcy rates and the likelihood of merger or bankruptcy varies across periods of economic decline and periods of economic turnaround. Models 1 and 3 include data for 1990 to 1994. Models 2 and 4 include variables that require two-year lags and therefore exclude data for 1990. *t* statistics are in parentheses.

RELATIVE RETURN ON ASSETS, we include in the merger equations a BOTTOM QUARTILE DUMMY variable. It equals 1 if a firm's INDUSTRY RELATIVE RETURN ON ASSETS is in the lowest quartile of industry relative return on assets and 0 otherwise. The dummy variable adjusts the intercept of the merger estimates to reflect Table 4's interquartile effects. To adjust the slope, we include in the merger models an INTERACTION TERM between the BOTTOM QUARTILE DUMMY and INDUSTRY RELATIVE RETURN ON ASSETS. Thus the variable INDUSTRY RELATIVE RETURN ON ASSETS reflects the relation between merger and performance for the highest three quartiles of firms. The INTERACTION TERM reflects the difference between the bottom quartile and the top three quartiles of firms.

The coefficient of INDUSTRY RELATIVE RETURN ON ASSETS is positive and significant in all regressions, indicating that highly performing firms are more likely to merge than are other firms. The INTERACTION TERM is negative and significant at or beyond the 0.01 level in all regressions. Thus, significant interquartile differences exist in the relation between firm performance and the likelihood of merger. To explore the relation between merger and performance in the bottom quartile of firms, we test the hypothesis that the coefficients for the INTERACTION TERM and the INDUSTRY RELATIVE RETURN ON ASSETS sum to 0. One can reject this hypothesis in all equations at or beyond the 0.01 level. Thus, among poorly performing firms, those with the poorest performance tend to merge rather than continue as active firms.

The performance effects are far from trivial. Using average values of the variables, for firms in the top three quartiles of performance, a 10 percent increase in INDUSTRY RELATIVE RETURN ON ASSETS corresponds to approximately a 3.8 percent increase in the probability of merger. (This and other size estimates are based on Model 1 in Table 5.) For firms in the bottom performing quartile, a 10 percent increase in INDUSTRY RELATIVE RETURN ON ASSETS corresponds to approximately a 2.7 percent decrease in the probability of merger.

That the likelihood of merger correlates positively with performance for the upper three quartiles of performance contradicts the predictions by Manne (1965), and also suggests the need to reevaluate some prior empirical evidence. Palepu (1986) and Ambrose and Megginson (1992) used the average excess stock market return as a measure of performance and found that it strongly and negatively relates to the likelihood of becoming a target. These studies did not explore whether results differ for different quartiles of performance. Our results suggest that a more complex relation between

performance and merger-target status might be masked by not accounting for the tendency of highly performing firms to be targets.

As expected, *INDUSTRY RELATIVE RETURN ON ASSETS* also correlates with bankruptcy. The correlation is negative and significant in all models. This is consistent with the evidence in several prior studies (e.g., Ohlson 1980).

2. Growth-Resource Mismatches

Table 5 confirms the positive relation between *LOW SALES GROWTH-HIGH FREE CASH FLOW* and subsequent merger status. The second growth-resource mismatch dummy variable, *HIGH SALES GROWTH-LOW FREE CASH FLOW*, has a positive but insignificant sign. This contrasts with Table 4's finding that this dummy variable had a lower value for merged firms than for active firms. Thus the positive signs on both growth-resource mismatch dummy variables are more consistent with theories of internal capital markets than are the results reported in Table 4. The first dummy variable's significance supports the popular notion that a mismatch between growth opportunities and available resources drives mergers.

Furthermore, in both merger models containing *CHANGE IN SALES*, Models 2 and 4, the coefficient for the variable is negative and significantly different from 0 at the 0.01 level. The fact that merger correlates negatively with sales growth suggests that targets are not acquired for the sales growth opportunities. This negative correlation is consistent with Palepu's finding, and further supports the view that targets typically are low-growth firms.

3. Debt Capacity

In all models, *INDUSTRY RELATIVE LEVERAGE* is negatively correlated with merger and the effect is highly significant and large. A 10 percent increase in *INDUSTRY RELATIVE LEVERAGE* reduces merger probability by approximately 8.5 percent. Similarly, the *FLOATING CHARGE* dummy variable is negatively and significantly correlated with merger status, implying that firms with no floating charge are more likely to merge. The presence of a floating charge reduces merger likelihood by approximately 1.32 percent. The presence of a floating charge leaves less room for the acquiring firm to grant security to finance acquisitions or future projects of the combined firm. These results are consistent with the notion that mergers are used to expand debt capacity and with Palepu (1986) and Asquith et al. (1994).

Table 5 shows that the likelihood of becoming a target correlates negatively with being a *MEMBER OF CORPORATE GROUP*. Membership in a cor-

porate group may reduce the likelihood of a financial synergy-based merger because a cash-constrained member of a group with high growth opportunities can obtain contributions from other firms in its group that generate more cash but have poorer growth opportunities. Tax-driven mergers are also expected to be less common for members of a corporate group, as discussed above.

Debt-related factors play a substantial role in routing firms to bankruptcy. In all models, *INDUSTRY RELATIVE LEVERAGE* is positively correlated with bankrupt status. A 10 percent increase in *INDUSTRY RELATIVE LEVERAGE* corresponds to a 7.0 percent increase in the probability of bankruptcy. Similarly, the *FLOATING CHARGE* dummy variable is positively and significantly correlated with bankrupt status. The positive relation between secured debt (measured with the floating charge dummy) and bankruptcy is consistent with Asquith *et al.*'s (1994) findings. The positive relation between leverage and bankruptcy is also consistent with prior evidence (e.g., Altman 1968; Altman *et al.* 1977; Ohlson 1980).

4. Fixed Assets Ratio

Section II's discussion suggested an ambiguous relation between the *FIXED ASSETS RATIO* and merger-target status. Consistent with that discussion, no significant relation between the ratio and merger status is found in Table 5. Theory is less ambiguous about the relation between bankruptcy and the *FIXED ASSETS RATIO*. Shleifer and Vishny (1992) suggest that markets for firm-specific assets are particularly illiquid. If the *FIXED ASSETS RATIO* correlates positively with how firm specific assets are, one expects a negative relation between bankruptcy and the ratio. Table 5 shows a such a relation.

5. Other Firm Characteristics

As noted above, Swedish tax law creates a potential tax benefit by allowing acquiring firms to offset current and future profits with accumulated losses of acquired firms. Thus, tax-driven acquisitions should be more likely to occur if the target has higher deductible losses. We use *ACCUMULATED LOSS* as a proxy for tax losses and, as expected, the coefficients are negative: smaller accumulated losses decrease the likelihood of a merger. The coefficients are significantly different from 0 at the 0.05 level in the full-sample regressions and are in the same direction in the models using one less year's data.

Table 5 also shows that firm size, measured by SALES (log), correlates negatively with bankruptcy. A possible explanation is that creditors are better informed about the qualities of larger firms and their managers. With larger sums at stake, creditors have a greater incentive to monitor firms prior to default. Other results indicating that informational asymmetry problems may drive distressed firms into liquidation bankruptcy are that public firms and older firms are significantly less likely to file for bankruptcy than are private firms and younger firms.

Considering mergers, the results indicate a weak positive relation between the likelihood of merger and firm size. This contrasts with most prior studies, which report a negative relation between size and merger likelihood.²¹

The likelihood of becoming a target also correlates negatively with being a PUBLIC FIRM. Owners of public firms, on average, may be better diversified than owners of private firms, implying that diversification-driven mergers are less common among public firms. Public companies also have better access to capital markets, suggesting that mergers based on financial synergy are not so important to them.

B. Industrywide and Economywide Results

All models in Table 5 include INDUSTRY BANKRUPTCY RATE as an industrywide measure to proxy for industry conditions.²² In addition, the models include the DECLINING ECONOMY dummy variable to account for the economywide effect as well as an interaction term between INDUSTRY BANKRUPTCY RATE and DECLINING ECONOMY. Given the presence of the interaction terms, the coefficient for INDUSTRY BANKRUPTCY RATE captures the relation between industrywide bankruptcy rates and firm status for the years designated recovery years. Models 3 and 4 also include the industrywide measures INDUSTRY INTEREST COVERAGE and INDUSTRY LEVERAGE.

²¹Palepu (1986) and Ambrose and Megginson (1992) find a negative correlation between size and the likelihood of merger, and Powell (1997) finds a positive correlation between size and hostile takeovers and a negative correlation between size and friendly takeovers.

²²In a smaller sample, using the industrywide bankruptcy rate to help explain individual firms' bankruptcy probability would present a potentially serious endogeneity problem. In our sample, each industry has at least several hundred observations so this problem is minimized. In addition, the coefficients on the firm-level variables do not materially change in models that exclude the industrywide bankruptcy rate.

In every model, for the recovery years, a positive correlation exists between INDUSTRY BANKRUPTCY RATE and the likelihood of individual firm bankruptcy. A negative correlation exists between the bankruptcy rate and the likelihood of merger for such years. The table also shows that INDUSTRY INTEREST COVERAGE correlates positively with merged status in Models 3 and 4. Not surprisingly, the coefficient for DECLINING ECONOMY shows that bankruptcy is more likely in a period of decline than in a period of recovery.

In the merger results, the DECLINING ECONOMY coefficient suggests that worse economywide conditions correlate with decreasing likelihood of merger. The finding that merger activity is procyclical is consistent with Melicher *et al.* (1983) and supports Shleifer and Vishny's (1992) theory. Mergers' decreasing likelihood during industry recessions is surprising unless one accounts for asset liquidity. If potential buyers lack enough internal funds and are credit constrained, they may be unable to bid up to their valuation of the assets. As a consequence, sellers will try to postpone selling until potential acquirers are more liquid.

Table 5's INDUSTRY BANKRUPTCY RATE-DECLINING ECONOMY interaction term explores whether the relation between individual firm bankruptcy and industrywide bankruptcy rates changes between declining and recovering economic conditions. In Model 1, for example, the coefficient for the interaction term is negative and significant. Compared to recovery years, and holding other factors constant, firms were less likely to file for bankruptcy the higher the industrywide bankruptcy rate applicable to the firm. Hence, the interaction term suggests that in bad economic times, firms in industries with high bankruptcy rates are less likely to file for bankruptcy than they are in recovery periods. In recovery periods, firms in industries with high bankruptcy rates are more likely to file for bankruptcy than they are in declining economic times. In other words, firms in distressed industries resist bankruptcy in bad times and flock to it in good times.

The effect is not small. During the period of economic recovery, a 1 percent increase in the industrywide bankruptcy rate corresponds to a 1.19 percent increase in individual firms' probability of filing for bankruptcy. During the period of economic decline, a 1 percent increase in a firm's industrywide bankruptcy rate corresponds to only a 0.33 percent increase in a firm's probability of filing for bankruptcy. These findings support Shleifer and Vishny's (1992) prediction that, during periods of economic decline, the likelihood of a liquidating bankruptcy is relatively lower for industries in financial distress.

The interaction term also yields results bearing on mergers. If firms in an industry are potential buyers but lack financial resources during recessions, one might expect mergers to be less likely in industries with relatively high bankruptcy rates during a recession. Surprisingly, the coefficient for the `INDUSTRY BANKRUPTCY RATE-DECLINING ECONOMY` interaction term is positive and significant. Compared to recovery years, and holding other factors constant, firms were more likely to merge the higher the industry-wide bankruptcy rate applicable to the firm. The interaction term suggests that in bad economic times, firms in industries with high bankruptcy rates are more likely to merge than they are in recovery periods. In recovery periods, firms in industries with high bankruptcy rates are less likely to merge than they are in declining economic times. Firms in distressed industries flock to merger in bad times and resist it in good times. One possible explanation for this result is that financially distressed firms are more likely to merge than to file for bankruptcy. Bankruptcy costs may be particularly high if the industry or the economy is financially distressed, which increases the incentive to negotiate a merger rather than to incur the high bankruptcy costs (Haugen & Senbet 1978; Shleifer & Vishny 1992).

As a check on the robustness of our results, we have run the same models without firms from the most depressed industry, real estate, and the results do not differ materially from those reported here.

C. Routing Between Merger and Bankruptcy

To explore the routing of firms between merger and bankruptcy, we test the hypotheses that each explanatory variable in Model 1 differs significantly between merger and bankruptcy outcomes. The differences between all variables except accumulated losses are statistically significant. Table 5's models thus provide evidence about the routing of firms between merger and bankruptcy. At the firm level, debt-related variables play an especially prominent role in distinguishing between which firms merge and which go bankrupt. Firms with high leverage and floating charges tend to go bankrupt. Those with low leverage and no floating charge tend to merge.

V. CONCLUSION

This article presents evidence about the forces influencing mergers and bankruptcy for a comprehensive sample of predominantly small and mid-sized Swedish firms covering the period 1990 to 1994. This period includes

years of a recession as well as years of recovery. The sample includes almost all Swedish firms with 20 or more employees.

Several results show how firm-specific and industrywide factors influence the likelihood of merger and bankruptcy. Merger activity is much greater in prosperous periods than during recessions. This result corresponds with prior evidence reported by Becketti (1986) and others. A possible reason for this is that market liquidity influences merger activity. Shleifer and Vishny's (1992) illiquidity arguments are verified in that bankruptcy is less likely in industries with high bankruptcy rates during bad economic times than during normal economic times. Firms in distressed industries resist liquidating bankruptcy in bad times and flock to it during good times.

At the firm level, we find that financial synergy-based factors help explain mergers for the class of firms studied here. In a test of the hypothesis that a mismatch between a firm's growth opportunities explains mergers, we find that resource-rich firms and firms with low-growth opportunities are likely to become merger targets. Furthermore, debt capacity, leverage, and whether a firm belongs to a corporate group are significant predictors of mergers.

The relation between firm performance and merger status is more complex than prior studies suggest. Among poorly performing firms, merger likelihood increases with lower performance. Among better performing firms, merger likelihood increases with better performance. Prior studies primarily show a negative relation between merger and performance.

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