

# The Firm's Reorganization Decision: Empirical Evidence from Canada

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## Abstract

While the bankruptcy framework introduced in the seminal work of Bulow & Shoven, later extended by White, has been the foundation for theoretical work in the area for the last 20 years, it has never been empirically tested. The paper empirically examines the Bulow-Shoven-White framework using micro data on 640 bankrupt firms in Canada. Results are generally supportive of the Bulow-Shoven-White framework: the probability of reorganization increases with the level of free assets, the amount of debt reduction, and firm size while it decreases with the firm's liquidation value. Results also show that the Bulow-Shoven-White framework does not provide a complete picture of the firm's reorganization decision. In particular, the relative size of Crown (government) claims, the legal form of the firm, and the asset/debt ratio are also significant determinants of the reorganization decision.

Keywords: bankruptcy, liquidation, reorganization

JLE Classification: G33, G38

# 1 Introduction

Economists have long known that the real costs of bankruptcy and the increased probability of bankruptcy associated with leverage can influence the optimal capital structure of the firm. As part of this issue, Bulow & Shoven (1978) examine the optimal timing of liquidation in a model that stresses asymmetries in the negotiating and controlling abilities of conflicting classes of creditors. White (1981, 1983, 1989) extends the Bulow & Shoven (1978) model to the decision between liquidation and reorganization. The key assumption of the approach is that a bank lender and the firm's equity holders have the bankruptcy decision power and act in their own joint interest, ignoring the effect of their decision on the remaining set of claimants, the bondholders. The bankruptcy decision of the bank and equity holders is not, therefore, based on maximizing the total value of the firm and can lead to outcomes in which either viable firms are shut down or non-viable firms survive. The models also establish the precise conditions under which bankruptcy occurs, showing that the decision depends not only on the firm's net worth position but also on the maturity structure, priority structure, and ownership of the firm's debt.

While the Bulow-Shoven-White (hereafter, BSW) framework has been the foundation for theoretical work on bankruptcy for the last 20 years, it has never been empirically tested. With the exception of Casey, McGee & Stickney (1986), which analyzes the characteristics distinguishing successful reorganizations from liquidations, the firm's decision between liquidation and reorganization has not been empirically examined.<sup>1</sup> This is surprising in view of the fundamental issues being examined and the unambiguous predictions from the models. The aim of the present paper is, using the BSW framework as a guide, to examine the reorganization decision empirically using micro data on 640 bankrupt firms in Canada. Generally speaking, our results support the BSW models. We find that the probability of reorganization increases with the level of free assets, the amount of debt reduction, and firm size while it decreases with the firm's liquidation value. We also find that the BSW framework does not furnish a complete picture of the firm's reorganization decision. In particular, the

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<sup>1</sup>The sample used by Casey, McGee & Stickney which includes 57 liquidations and 56 successful reorganizations is subject to two serious sampling problems. First, the sample is not representative of the population (firms in reorganization are over-represented) so the estimates should be corrected for choice-based sampling. Second, the use of successfully reorganized firms introduces selection bias. Finally, their empirical analysis is not a real test of White's model (1981, 1983) which examines the choice between liquidation and reorganization and not the issue of success or failure.

relative size of Crown (i.e., government) claims, the legal form of the firm, and the asset/debt ratio are also significant determinants of the reorganization decision.

The paper is organized as follows. Section 2 reviews the predictions generated by the BSW bankruptcy models. Section 3 offers an overview of the liquidation and reorganization procedures under the Canadian Bankruptcy Act. Section 4 describes the data set, which comprises a random sample of 640 insolvent Canadian firms from the period 1977–88, of which 326 undergo liquidation and 314 undergo reorganization. Section 4 also compares characteristics of firms undergoing liquidation to those going through reorganization and examines differences in the characteristics of liquidation and reorganization processes. Section 5 discusses the list of explanatory variables used for econometric analysis. Given the dichotomous nature of the firm’s decision, we use the logit estimation procedure. Because the sample separation between liquidating and reorganizing firms differs from the population separation, estimates are corrected for choice-based sampling.<sup>2</sup> Section 6 presents the results of the empirical analysis and section 7 contains some concluding remarks.

## 2 The Firm’s Reorganization Decision

Bulow & Shoven (1978) examine an insolvent firm’s decision between liquidation and continuance, with a focus on the efficient timing of bankruptcy. White (1981, 1983, 1989) extends the Bulow & Shoven (1978) model to an insolvent firm’s decision between liquidation and reorganization.<sup>3</sup> Broadly speaking, the models examine how conflicts among creditors and asymmetries in their negotiating and controlling abilities can lead to a suboptimal resolution to financial distress.

The models assume a firm’s claimants can be grouped into three classes: (i) bondholders, which cannot alter or renegotiate the terms of their (unsecured) loans in the event of bankruptcy, (ii) a bank lender, which can alter or renegotiate the terms of its (secured) loan, and (iii) equity holders. In the event of bankruptcy, decisions are taken by a coalition of equity holders and the bank lender in order to maximize the total value of the coalition’s claim. The objective is motivated by the observation that equity holders may be willing to compensate the bank up to the full value of its claim to ensure that the firm stays in operation.<sup>4</sup> Let  $E_b$  and  $B_b$ , respectively, be

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<sup>2</sup>While the sample is split roughly equally between the two procedures, in reality there are roughly 20 business liquidations for every one reorganization proposal in Canada.

<sup>3</sup>White (1994) examines the same decision in the presence of asymmetric information.

<sup>4</sup>Compensation may take many forms such as equity in the firm or a higher interest rate for the

the present value of the equity holders' and the bank's claims in bankruptcy and  $E_c$  and  $B_c$  be the present value of the equity holders' and the bank's claims in continuance. Bankruptcy occurs when the present value of the coalition's claim is greater in bankruptcy than in continuance, i.e.,  $E_b + B_b > E_c + B_c$ . Since the claims of equity holders are worth zero in bankruptcy ( $E_b = 0$ ), bankruptcy occurs if equity holders cannot compensate the bank lender enough to keep the firm in business, i.e.,  $E_c < B_b - B_c$ .

Bulow & Shoven extend their analysis to two periods. The firm faces financial distress in the first period and requires additional funds from the bank in order to pay first-period claims. Using numerical examples, Bulow & Shoven show that 'uneconomic' decisions are possible: the firm may either liquidate despite positive bankruptcy costs or stay in business when its liquidation value exceeds its worth as a going concern.<sup>5</sup> The examples illustrate three key predictions of the model. The probability of continuance:

1. decreases with the value of bondholder claims;
2. increases with the value of cash or free assets at the firm;
3. decreases with the liquidation value of physical assets.

The first result follows from the fact that continuance is more costly for the bank-equity coalition when bondholder claims are high. The second result follows because free assets can be used to secure new loans. The third result follows because a low liquidation value implies losses for the bank, making continuance more attractive for the bank-equity coalition.

Another avenue available to insolvent firms under bankruptcy law is reorganization, wherein a debtor uses the protection of the bankruptcy court in order to submit a financial restructuring plan to its creditors. The Bulow & Shoven model can be interpreted as a special case of the liquidation versus reorganization decision in which unsecured (i.e., bondholder) claims are fully reimbursed.

Following Bulow & Shoven, White (1981, 1983, 1989) considers a two-period model in which the bank's claim has priority over unsecured debt (i.e., bondholder) claims.<sup>6</sup>

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existing loans.

<sup>5</sup>See Fisher and Martel (2000) for an empirical analysis of the extent of uneconomic decisions in court supervised reorganization.

<sup>6</sup>For the purposes of this article, we focus on White (1981). White (1983, 1989) uses the same kind of framework to examine the efficiency properties of the U.S. bankruptcy system.

The liquidation-reorganization decision is assumed to be taken by a coalition of equity holders and the bank in the first period. Under reorganization, first-period earnings are realized with certainty and second-period earnings are random. The reorganization plan provides for a reduction in the face value of bank claims and unsecured debt claims. A necessary condition for reorganization to proceed is that the firm obtains a new (secured) bank loan in order to meet its first-period claims. The value of the new bank loan is equal to the difference between the value of the ‘reduced’ first-period unsecured debt claims and first-period earnings net of reorganization administration costs.

In accordance with the ‘best-interests test’, the bank-equity coalition cannot receive less in reorganization than in liquidation. Thus, White (1981) makes several predictions about the probability of reorganization that hinge on a comparison of the coalition’s return in liquidation and reorganization. Specifically, the probability of reorganization:

1. decreases with the value of unsecured debt (especially tax claims);
2. increases with the value of free assets at the firm;
3. increases with the percentage reduction in unsecured debt claims;
4. decreases with the difference between the transactions costs of reorganization and the transactions costs of liquidation;
5. increases with uncertainty in future earnings;
6. increases with firm size.

The first two results mimic the first two results of Bulow & Shoven (1978). Result 3 is explained by the fact that a lower repayment of debt claims makes reorganization more attractive to the bank-equity coalition. Result 4 rests on the fact that administration costs must be paid before all other claims, implying that lower reorganization costs benefit the coalition and increase the probability that the firm chooses reorganization. Result 5 follows from the fact that future losses are typically borne by unsecured debt holders while future gains go to the bank-equity coalition. Result 6 follows from the presumption that large firms are more likely to have outstanding bonds. Bonds have a larger potential for debt reduction, which is attractive for the coalition.

The Bulow and Shoven framework is appropriate for firms that use bonds and bank financing. However, the vast majority of firms in the economy, and particularly firms

in financial distress, have a simpler capital structure. For example, in the data set discussed below, the ratio of unsecured (ordinary and preferred) claims to total debts is about 80% for liquidating firms and 68% for reorganizing firms. Moreover, none of the firms in the sample issued bonds as part of their capital structure.<sup>7</sup> An obvious extension to the original BS model would allow for these types of claims and the different priorities associated with them. The Bulow and Shoven (1978) model would then converge to one that would predict the probability of reorganization decreases with the value of unsecured claims. The sensitivity of reorganization to unsecured claims would be especially pronounced in the case of tax claims, which benefit from preferred status.

### 3 Canadian Bankruptcy Law

The Canadian Bankruptcy Act (BA) offers two alternatives to insolvent debtors: bankruptcy (liquidation) and reorganization.<sup>8</sup> Filing for bankruptcy triggers a ‘stay’ that freezes all unsecured creditors’ rights against a firm’s assets. A trustee, selected by petitioning creditors, takes possession of the debtor’s assets, sells them and distributes the proceeds among creditors following an allocation schedule set out in section 136 of the Bankruptcy Act. The BA identifies two broad classes of creditors: ‘secured’ creditors, defined as persons holding a mortgage, charge, lien or security interest against the property of the debtor, and ‘unsecured’ creditors, who are persons not falling into the first category. Secured creditors, as a rule, are not subject to the stay provisions and can enforce their liens against the debtor’s assets at any time. Unsecured creditors are further subdivided into ‘preferred’ creditors, who receive priority in the distribution of the debtor’s assets, and ‘ordinary’ creditors.

An alternative avenue for insolvent debtors is to file a ‘proposal’ pursuant to Part III of the Act.<sup>9</sup> The filing of a proposal also triggers a stay freezing unsecured creditors’ rights against the firm’s assets. Secured creditors are not bound by the stay

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<sup>7</sup>This is explained by the fact that Canadian insolvency law offers a separate procedure, the Companies’ Creditors Arrangement Act, for firms with outstanding secured or unsecured bonds under a trust deed.

<sup>8</sup>Because our empirical analysis covers the 1977–88 period, the current section discusses bankruptcy process prior to the amendments which came into effect in December 1992 with the Bankruptcy and Insolvency Act.

<sup>9</sup>As mentioned above, some firms will use the Companies’ Creditors Arrangements Act.

and may realize or deal with their security in the event of default by the debtor.<sup>10</sup> In practice, plans provide for secured claims to be paid in accordance with existing arrangements between the debtor and secured creditors. By law, preferred claims must be paid in full before any claims of ordinary creditors are settled. Typically, ordinary creditors are offered a partial payment of their original claims. The original management team usually remains in control of the firm, supervised by a committee of inspectors that stays in place for the period covered by the proposal.

In order for a proposal to be accepted, it must receive approval by a three-quarters majority in value terms and a simple majority in number terms of the proven claims of unsecured creditors voting.<sup>11</sup> Secured creditors are not entitled to vote on a proposal unless their security is partially covered, in which case they may vote for the unsecured portion of their claim.<sup>12</sup> If accepted, a proposal must be confirmed by the bankruptcy court.<sup>13</sup> If the proposal is rejected, the debtor immediately enters into liquidation.

## 4 Data

Every bankruptcy liquidation and reorganization proposal filed under the BA is lodged with one of the 15 regional bankruptcy offices of the Department of Industry and Science. The files used in our study originate from the Montreal and Toronto regional offices during the period 1977–88.<sup>14</sup> We selected a random sample of 1,000 bankruptcy files, comprising 500 commercial liquidations and 500 commercial reorganization proposals.<sup>15</sup> The data set on bankrupt firms was compiled directly from the individual bankruptcy files. Owing to insufficient information and missing or

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<sup>10</sup>Since 1992, the rights of secured creditors are stayed for 30 days when a firm files a ‘notice of intention’ to file a proposal.

<sup>11</sup>The 1992 amendments lowered the claims criterion to two-thirds of the value of unsecured claims.

<sup>12</sup>Since 1992, a debtor may include secured creditors in a proposal. Secured creditors covered by a proposal can either vote in favor of the proposal or opt out by rejecting it. Secured creditors not covered by the proposal may realize their security in the event of a default.

<sup>13</sup>Since 1992, there are two necessary other conditions for confirmation. First, the proposal must provide for the full repayment of claims for source deductions within six months of confirmation. Second, wage claims (for a maximum of \$2,000 per worker) must be fully repaid upon confirmation.

<sup>14</sup>Toronto and Montreal together account for roughly 75 percent of all business bankruptcies filed in Canada.

<sup>15</sup>Random sampling was carried out using the Systematic Random Sampling Procedure. The sample is chosen to be representative of the regional distribution of bankruptcies over time for the Montreal and Toronto offices. See Martel (1994) and Fisher & Martel (1999) for a detailed description of the data.

incomplete files, the final sample contains 640 bankruptcies: 326 commercial liquidations and 314 commercial reorganizations. The Montreal office is the source of 228 liquidations and 219 reorganization files; the remaining 98 liquidations and 95 reorganizations come from the Toronto office.

The overwhelming majority of firms in the sample are privately owned: there are only 10 firms in reorganization with publicly traded shares and none of the liquidating firms are publicly owned. Of the 314 reorganizing firms, 258 are incorporated; the remaining 56 are proprietorships or partnerships. Of the 326 liquidating firms, 106 are incorporated and 220 are proprietorships or partnerships.

Tables 1 and 2 display the financial characteristics of reorganizing and liquidating firms respectively. Firms in reorganization have average assets of \$2.5 million and average debts of \$2.9 million; firms in liquidation average \$66,000 in assets and \$220,300 in debts.<sup>16</sup> As might be expected, the financial variables are highly skewed: e.g., while the mean asset value for reorganizing firms is \$2.5 million, more than 75 percent of the firms have less than \$1.25 million in assets. For firms in liquidation, nearly 85 percent have an asset value less than \$100,000 and 98 percent of the firms have assets less than \$500,000. In terms of total debt, the data indicate that 55 percent of liquidating firms have debt lower than \$100,000 and that 92 percent of firms have debts lower than \$500,000. The conclusion is that bankrupt firms are 'small' and that liquidating firms are, on average, smaller than reorganizing firms. The size difference between the two groups of firms is also reflected in the number of creditors. There are roughly 98 creditors affected by the average reorganization proposal compared with about 26 creditors in the average liquidation case.

Not surprisingly, firms filing for protection under the BA are in a precarious financial position. Firms in reorganization have a mean asset/debt ratio of 57 percent. Firms in liquidation are in an even worse financial position, with a mean asset/debt ratio of just 21 percent.

Reorganizing firms rely more on secured financing than liquidating firms. About 82 percent of reorganization proposals involve some secured claims compared with 48 percent of the liquidation cases. Secured debt represents 30 percent of total debt for reorganizing firms and about 18 percent for liquidating firms. Moreover, on average, one-fifth of the total debt of reorganizing firms is owed to a single secured creditor,

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<sup>16</sup>All dollar figures in the text are second-quarter 1997 Canadian dollars, deflated by the GDP deflator (Cansim Series Number D20556). For comparison, the second-quarter 1997 average noon spot exchange rate was C\$1.00=US\$0.72.

suggesting that individual secured creditors may have a significant amount of bargaining power over firms attempting to renegotiate loans. On the whole, bankrupt firms have only a handful of secured creditors. This is entirely consistent with the Bulow & Shoven (1978) assumption that the reorganization decision is made by a small coalition involving a secured lender.

Secured debt represents around 50 percent of the assets for reorganizing firms, indicating that there is some room for these firms to negotiate new secured loans. Conditional on positive secured claims, the median value for the secured debt/asset ratio is 99 percent for liquidating firms. Firms opting for liquidation, therefore, have little or no assets left to use as security against new loans. Lastly, as a percentage of total debt, Crown (i.e., federal, provincial, or municipal government) claims are lower for firms in reorganization (4.4 percent) than for those in liquidation (12 percent).

Tables 3 and 4 display characteristics of the reorganization and liquidation processes respectively. The mean length of the reorganization process is just over three years; the median is around two-and-a-half years.<sup>17</sup> The liquidation process takes an average of 818 days, or 318 days less than the mean time taken to complete reorganization.<sup>18</sup>

On average, ordinary creditors of reorganizing firms are offered 38.2 cents per dollar of claims. More than 90 percent of the payments are made by installment (i.e., payments one month or more after court confirmation). The typical proposal reimburses creditors within 14 months in three installments. As shown in Table 4, creditors of liquidating firms are much worse off. Ordinary creditors receive an average of 2.5 cents per dollar of claims in liquidation. Preferred creditors, who are fully reimbursed in reorganization, receive 23.2 cents per dollar of claims. Ordinary creditors receive nothing in 77 percent of the liquidations; preferred creditors receive nothing in 53 percent of the liquidations.

Lastly, administration costs average \$48,400 for reorganization files and \$6,200 for liquidation files. The largest component of administration costs in reorganization is the fee paid to the bankruptcy trustee, which typically accounts for 69 percent of the costs.<sup>19</sup> For the liquidation files, trustees' fees account for 80 percent of total administration costs. Administration costs are relatively small relative to total debt:

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<sup>17</sup>Time in reorganization is the time between the filing date and the discharge of the debtor from bankruptcy by the court.

<sup>18</sup>Time in bankruptcy is the time between the filing date and the trustee's discharge date.

<sup>19</sup>Unlike the U.S. Bankruptcy Code, a trustee is mandatory for all bankruptcies filed under the BA.

for both reorganization and liquidation files, they amount to less than 5 percent of debt.

## 5 Empirical Implementation

The BSW models are ‘reduced-form’ in the sense that the behaviour of agents is not determined by utility (or profit) functions and there is no attempt to provide, say, a game-theoretic foundation for the cooperative behaviour of the bank-equity coalition. An empirical assessment of the BSW models, therefore, is bound to follow a reduced-form approach. Consider the following depiction of the firm’s bankruptcy choice:

$$C_i = \begin{cases} 1 & \text{if firm chooses reorganization,} \\ 0 & \text{if firm chooses liquidation.} \end{cases}$$

We use the logit estimation procedure to estimate the probability of bankruptcy choice:

$$C_i = \frac{1}{1 + \exp(-x_i'\beta)}, \quad i = 1, \dots, N$$

where  $x_i$  is a vector of explanatory variables for the  $i$ -th bankruptcy and  $\beta$  is a vector of coefficients to be estimated.<sup>20</sup> There are 3 predictions from Bulow & Shoven (1978) and 6 predictions from White (1981). However, since the first two predictions from White are simply restated from Bulow & Shoven, the BSW approach yields 7 predictions to be tested. Thus, the BSW framework suggests the following list of 7 variables that should impact the bankruptcy decision: the value of unsecured claims, the value of free assets, the liquidation value of assets for secured creditors, the reduction (or ‘cut-back’) in debt claims, the difference in transactions costs between liquidation and reorganization, uncertainty of the firm’s earning prospects, and the size of the firm.

The value of unsecured claims, the value of free assets and the firm size variables are computed directly from the bankruptcy data set. The remaining 4 variables are not directly observed and have to be approximated. The Data Appendix gives details of definitions and calculations for all the variables. The liquidation value of assets for secured creditors is defined as the value of lien assets divided by secured claims. We proxy uncertainty in the firm’s earnings prospects by the change in the unemployment

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<sup>20</sup>We also estimated the models using the probit procedure and the results were virtually identical.

rate over the 6 months prior to filing for bankruptcy. Measuring debt reduction and transactions costs is complicated by the fact that values are only partially observed: for reorganization files, the values under liquidation are not observed, and for liquidation files, the values under reorganization are not observed. For example, while the amount debt reduction is listed in a reorganization plan, it is not observed for a liquidation file. Hence, the amount of debt reduction under reorganization must be imputed for the liquidation files. To get around the problem, we assume that the amount of debt reduction is a function of a number of firm-specific financial variables and use a regression to predict the missing values.

The case of transaction costs is even more complicated. Not only do we have to impute the transactions costs of reorganization for the liquidation files and vice versa, but transactions costs are only partially observed in either case. Transactions costs are the sum of direct costs, such as fees paid to lawyers and trustees, and indirect costs, such as the value of lost management time and lost accounts receivable that are not collected due to bankruptcy. Direct costs are observed in the data set in the form of administration costs but indirect costs are not.<sup>21</sup> We assume that direct costs are positively correlated with indirect costs, and use administration costs as a proxy for the total transactions costs of bankruptcy. Again, regression is used to predict missing values for the bankruptcy route not chosen by the firm.

Empirical analysis of financial reorganization [Fisher & Martel (1995), Martel (1998)] suggests that the list of variables supplied by the BSW approach may not provide a comprehensive description of the bankruptcy decision. These results show the nature of unsecured debt, the firm's financial health, and the firm's legal form impact the outcome of reorganization. To the extent that these effects are widely known among trustees and accountants in the bankruptcy profession, one would reasonably expect them to influence a firm's reorganization decision. Therefore, the following are added to the list of explanatory variables: the ratio of Crown claims to total debt, a dummy variable reflecting the legal form of the firm, and the asset/debt ratio.

The additional explanatory variables are justified as follows. Crown claims are known to have a significantly negative effect on the acceptance probability [Fisher & Martel (1995)] and on the success probability [Martel (1998)] of a reorganization plan. Large Crown claims may be interpreted by creditors as a signal of recurrent financial problems at a firm (e.g., large outstanding tax claims may indicate ongoing cash man-

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<sup>21</sup>This is a feature of many studies of bankruptcy: indirect costs are notoriously difficult to measure.

agement difficulties), reducing creditors' confidence that the reorganization plan will succeed. The full repayment of Crown claims is a condition for court approval of a reorganization plan under the BA. The higher Crown claims, the greater the financial burden on a cash-constrained reorganizing firm, the less likely that the plan will succeed, and the less likely it will be accepted by creditors. In sum, it seems reasonable to allow for the possibility that Crown claims will affect the reorganization decision. Fisher & Martel (1995) also find that plans filed by incorporated businesses—as opposed to proprietorships or partnerships—are significantly more likely to be accepted by creditors. Corporations, therefore, may be expected to be more likely to choose reorganization than other types of firm. The asset/debt ratio is found by Martel (1998) to positively affect the probability that a reorganization plan is successful.

Despite the wealth of firm-level information in the data set, there are some effects we are unable to control. For example, some industries may have more asset specificity than others, which may systematically affect the choice between liquidation and reorganization across industries. We investigate whether the industry of the bankrupt firm has any effect on the reorganization decision by including (16) industry dummy variables in estimation. We examine whether the year of filing has any effect on bankruptcy choice by including (11) yearly dummy variables in estimation. Lastly, a recent article on bankruptcy practice in Canada suggests that bankruptcy trustees may advise clients differently in the province of Quebec compared with other Canadian provinces.<sup>22</sup> Because Montreal is in Quebec and Toronto is not, we investigate whether the city of filing has any effect on bankruptcy choice.

Since the sample separation (326 liquidations and 314 reorganizations) differs from the population separation, the estimates are corrected for choice-based sampling under the assumption that 4.41 percent of bankrupt firms opt for reorganization and 95.59 percent opt for liquidation. The choice of weights reflects the observed distribution of reorganization and liquidation cases over the sample period.<sup>23</sup> Table 5 lists some descriptive statistics for the explanatory variables separately for the liquidation and reorganization subsamples. Several differences between the subsamples are apparent, especially in the case of firm size (measured by assets), the extent of the corporate form, and the asset/debt ratio.

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<sup>22</sup>See “Quebec is Bankruptcy Hub”, *The Globe and Mail*, May 3, 1999, page B3.

<sup>23</sup>See Manski & Lerman (1977) for a description of choice-based sampling techniques.

## 6 Results

Table 6 displays the results from various specifications of the empirical model. The base model, shown in column (1), includes only the explanatory variables implicated by the BSW framework. Column (2) adds the three explanatory variables suggested by studies of the creditors' reorganization decision [Fisher & Martel (1995), Martel (1998)]. The remaining columns in the table investigate the role of year and industry effects.

Note that the BSW explanatory variables are jointly significant at the 1 percent level, having a  $\chi^2$ -statistic of 78.949.<sup>24</sup> With the exception of the constant term, three variables are statistically significant at the 5 percent level in the base model. Moreover, every one of the variables has the effect predicted by the BSW models. Free assets, the amount of debt reduction in reorganization, and the firm's size all have a significantly positive effect on the probability firms choose reorganization over liquidation. The proportion of unsecured debt has a significant negative effect on the probability of reorganization. This is consistent with the BSW prediction that reorganization is less likely in firms with more unsecured debt because higher debt makes reorganization more costly for the bank-equity coalition.

Column (2) shows that including the three additional variables to control for the effect of creditor voting on reorganization has the effect of sharply decreasing the significance level of unsecured claims and the extra cost of reorganization and increasing the significance level of the liquidation return to secured creditors. At the same time, the corporation dummy and the asset/debt ratio are strongly significant and Crown claims is weakly significant.<sup>25</sup> The  $p$ -value from the exclusion test in column (2) indicates that the three additional variables are jointly significant at the 5 percent level. The specification in column (2), therefore, is the maintained model for the remaining estimates.

The effect of the corporation dummy indicates that corporations are more likely to favor reorganization. This is consistent with the Fisher & Martel (1995) finding that reorganization plans from corporations are more likely to be accepted by unsecured creditors. Similarly, the asset/debt ratio is known to increase the probability a reorganization plan is successful [Martel (1998)], which would explain why creditors would favour plans with a high ratio and, in turn, why managers of firms with

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<sup>24</sup>The critical value is 18.475 with 7 degrees of freedom.

<sup>25</sup>Replacing Crown claims with preferred claims had no significant impact on the results.

high asset/debt ratios are more likely to choose reorganization. The effect of Crown claims is consistent with the fact that larger Crown claims reduce the coalition payoff in reorganization since such claims must be fully repaid upon confirmation.

Columns (3), (4), and (5) indicate that neither the year effects nor the industry effects are close to being jointly significant. Generally speaking, the addition of fixed effects tends to increase the size of the estimated coefficients for the key explanatory variables, but this sometimes comes at the cost of increasing the corresponding standard errors (not reported in the table). Nonetheless, comparing all six columns of coefficient estimates, the estimates are remarkably stable quantitatively and qualitatively. By all measures, therefore, the logit model of bankruptcy choice appears to be well estimated and robust to alternative specifications.

Only two of the industry fixed effect coefficients in column (5) are larger than their respective standard errors.<sup>26</sup> The two industry variables are added to the list of column (2) variables, leading to the final model shown in column (6). By and large, the estimates support the BSW predictions. More free assets and larger debt reduction increase the probability reorganization is chosen and more unsecured debt and a higher liquidation return to secured creditors decrease the probability.<sup>27</sup> The change in the unemployment rate in the six months prior to bankruptcy filing, which is a proxy for uncertainty in the firms' earnings prospects, is not statistically significant.<sup>28</sup>

The estimates also indicate that extending the BSW framework adds explanatory power to the empirical model of the reorganization decision. Crown claims, the legal form of the firm, and the asset/debt ratio are significant determinants of the reorganization decision. The implication is that—contrary to Modigliani-Miller theorems—neither the firm's reorganization decision nor the value of a firm are independent of the type of unsecured debt issued. Our results suggest managers (or trustees advising managers) are aware that higher Crown claims make acceptance of a reorganization plan by unsecured creditors less likely. Everything else being equal, a lower probability of acceptance makes reorganization less attractive and liquidation more attractive. The distribution of unsecured debt between Crown claims and other

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<sup>26</sup>The industries are electrical and electronic products (including computers) and education, health and social services. Firms in both industries are significantly more likely to opt for reorganization.

<sup>27</sup>Casey, McGee & Stickney (1986) also find that the probability of successful reorganization increases with the percentage of free assets.

<sup>28</sup>Two alternative measures of uncertainty—the level of the unemployment rate at the time of bankruptcy filing and the Monetary Conditions Index (a measure of monetary policy)—proved to be similarly insignificant.

unsecured claims, therefore, has an impact on the reorganization decision. The result can be interpreted as an extension, within the class of unsecured claims, of the Bulow & Shoven (1978) prediction that continuance is less likely for higher bondholder claims. In this case, higher Crown claims increase the cost of reorganization to the bank-equity coalition

## 7 Conclusion

According to Modigliani-Miller (1958, 1963) analysis, bankruptcy is optimal when a firm's net worth is negative. Bulow & Shoven (1978) and White (1981, 1983, 1989) extended this analysis by introducing claimants that have asymmetric negotiating and controlling abilities. They show that the bankruptcy decision depends on variables other than a firm's net worth. In particular, the maturity and ownership structure of debt and the composition of a firm's asset affects the bankruptcy decision.

We address in the paper something that arguably should have been done a long time ago: empirically test the predictions of the Bulow-Shoven-White model of a firm's reorganization decision. We find support for the predictions using a unique data set of firms undergoing reorganization and liquidation in Canada. However, we also find there are factors affecting the reorganization decision that are not taken into account in the basic model. In particular, larger Crown claims increase the likelihood that liquidation is chosen over reorganization, higher asset/debt ratios increase the likelihood that reorganization is chosen, and the legal form of the firm is also an important predictor of the bankruptcy choice. Previous empirical work has shown that these factors have an impact at other stages of the bankruptcy process, suggesting that rational debtors are forward-looking and integrate these elements into their decision process at the time of bankruptcy.

# Data Appendix

This appendix discusses separately each variable used in the empirical analysis.

1. Unsecured claims. For the purposes of estimation, unsecured claims are expressed as a proportion of total debt:  $(D^O + D^P)/D$ , where  $D^O$  is the debt of ordinary creditors,  $D^P$  is the debt of preferred creditors, and  $D$  is total debt.
2. Free assets. Let  $A$  be the total assets of the firm and  $S$  be the total secured debt. Then free assets are defined:

$$A^F = \frac{A - S}{A}$$

which is simply the proportion of assets that are unencumbered. We impose the restriction  $0 \leq A^F \leq 1$ .

3. Liquidation return to secured creditors. First, we estimate the market value of unencumbered (lien) assets,  $A^L$ . Let  $r^O$  be the return to ordinary creditors and  $r^P$  the return to preferred creditors. By definition, the return to ordinary creditors is:

$$r^O = \frac{\gamma A - A^L - r^P(D^P + C)}{D - A^L - D^P - C}$$

where  $\gamma$  is the market/book value ratio,  $C$  is the (direct) administration cost of bankruptcy, which has priority over all preferred claims, and  $(D - A^L - D^P - C)$  is the debt of ordinary creditors. Solving the equation for  $A^L$ :

$$A^L = \frac{A - (D^P + C)(r^P - r^O) - r^O D}{1 - r^O}$$

Assuming  $\gamma = 0.75$ , we construct values for  $A^L$  using information from the data set on  $r^O$  and  $r^P$ . (See Tables 3 and 4. In accordance with the section 136 of the BA,  $r^P = 1$  for reorganization files.) If the value of secured claims is less than the value of lien assets, the liquidation return to secured creditors,  $r^S = 1$ , otherwise:

$$r^S = \frac{A^L}{S} + r^O \left(1 - \frac{A^L}{S}\right)$$

4. Debt reduction in reorganization. For reorganization files, the amount of debt reduction is implicitly part of the reorganization plan, given by one minus the return to ordinary creditors ( $1 - r^O$ ). For the liquidation files, the potential debt reduction under reorganization must be estimated. For the reorganization files,  $r^O$  is regressed on the square-root, the level, the square, and the cube of real assets, real debt, real secured debt, real preferred debt, the asset/debt ratio, and the total number of creditors. Using the coefficients from this equation together with the values of the right-hand side variables for the liquidation files, we estimate a return to ordinary creditors under reorganization. One minus the estimated return is the estimate of debt reduction.
5. Extra cost of reorganization. Administration costs are regressed on total debt, the total number of creditors, and the asset/debt ratio separately for the reorganization and the liquidation subsamples. Using the liquidation subsample regression coefficients, predicted values are generated for the reorganization files, which are used as the estimates of the cost those files would have incurred under liquidation. Similarly, the reorganization subsample regression coefficients are used to predict values for the liquidation files to estimate the cost those files would have incurred under reorganization. For each file, the reorganization cost minus the liquidation cost measures the extra cost of reorganization.
6. Change in unemployment rate. The change in the unemployment rate between the month the bankruptcy is filed and six months prior to that date.
7. Log of real assets. Total assets are measured in millions of constant dollars.
8. Crown claims. The variable is simply defined as  $D^C/D$  where  $D^C$  is total Crown debt. Crown debt is a subset of preferred debt  $D^P$ .
9. Corporation dummy. The variable takes the value of 1 if bankrupt firm is incorporated, and 0 otherwise.
10. Asset/debt ratio,  $A/D$ .
11. Montreal dummy. The variable takes the value of 1 if bankrupt firm files in Montreal, and 0 otherwise.
12. Year dummies. The data are from the period 1977–88. The year with the most observations, 1982, is the omitted category.

13. Industry dummies. There are 16 industries identified in the data and a group of firms for which the industry falls into more than one category or industry cannot be determined, resulting in 17 groups altogether. The industry with the most observations, construction, is the omitted category.

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