The Effect of an Uncertain Government Bailout on the Liquidation/Bankruptcy Decision of Large Firms

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Abstract

This paper attempts to determine how the U.S. government policy of providing a rescue to only some of the distressed, non-bank firms that fail to restructure their debt affects the overall efficiency of the bankruptcy/liquidation procedure. The analysis rests on a simplifying assumption: a government rescue will occur with some probability for any firm that cannot reach an agreement with its creditors in bankruptcy court. Relative to a scenario without government, the policy of supplying an 'uncertain bailout' is shown to provide an ambiguous improvement to efficiency at best; at worst, it allows greater numbers of weak firms to continue operating while provoking more viable firms to liquidate. Several supplementary strategies are shown to be able to mitigate these induced inefficiencies, and the feasibility of these policies is discussed from both an informational and a political economy standpoint.

Corporate rescues for non-bank firms have been a longtime feature of U.S. government policy. Although bailouts awarded to non-bank corporations are often overlooked simply because of the staggering size of the rescue packages for financial services firms, they remain an important and enduring policy feature – not just to those firms that stand to benefit, but to the taxpayers as well. The recent interventions in the U.S. automotive industry, including second-tier parts suppliers, have thus far cost over 25 billion USD.[1] Rescues also occurred for dozens of air carriers after the shock of 9/11 in 2001, for Chrysler in the early 1980s, and for companies such as Lockheed and Penn Central Railroad in the 1970s, with price tags in the billions of dollars in each case.

These bailouts share a common feature: the government only considers publicly owned, distressed companies for a rescue on a case-by-case basis. Bailouts are intended to mitigate the impact of externalities generated by a significant corporate bankruptcy, and each rescue package must be justified in terms of how many jobs it is likely to save and other similar metrics.[2] There are, however, numerous examples where bailouts were not given to bankrupt firms that seemed

[1] "Taking Taxpayers for a Ride," *New York Times*, 30 November 2009, Editorial Section.
[2] For example, see comments made in 2010 by former "car czar" Steve Rattner on the 2009 auto industry bailout.

either large enough or interconnected enough to qualify, such as Enron or ANC Rental Corporation in late 2001.[3] Whether a firm receives a bailout will depend on many shifting political factors, and given any exogenous shock that might catapult a company into financial distress, the government will only decide whether to bail out a firm ex post.[4]

Considering the patchwork history of government rescues for large non-bank firms, a question that remains outstanding in the literature is how these particular firms' liquidation/bankruptcy decision will be affected by their perception that, if they cannot sort out their financial difficulties on their own, a bailout might occur if they are 'lucky.' This paper presents a model of negotiation between a firm – assumed to have large externalities – and its creditors, with the government introduced as a non-strategic player. As in reality, the government in this model acts to prevent the negative repercussions caused by a large corporate bankruptcy. Since all firms in the model are assumed to have significant externalities, the government would like to rescue any firm that files for bankruptcy but that fails to restructure its debt. However, due to the idiosyncratic political environment, the modeled government will bail out a firm only if it is "strategic," which is decided arbitrarily with some positive probability. The government will thus randomize between a bailout and no bailout for any company that is seen to be unable to reach an agreement with its creditors in bankruptcy. This key assumption is an abstraction from reality where, although the rescue might be uncertain up to the point when it actually occurs, it is certainly not random. From the perspective of the firm, there is thus a chance that even if bankruptcy proceedings fail, it might still get a payout. The main goal of this paper is to identify how that perception affects the efficiency of the U.S. bankruptcy system.

The model assumes that efficiencies arise as a result of 'errors' in bankruptcy categorization. For example, an error occurs if a firm that should liquidate is saved instead in bankruptcy court. In order to evaluate the efficiency effects of government intervention on the liquidation/bankruptcy decision of large firms, the model proceeds in three stages. First, the basic strategic environment without government is established. The crucial result from this step of the analysis is that, even without the possibility of a state-sponsored rescue, the bankruptcy procedure is inefficient: some firms that should reorganize instead liquidate, and some firms that should pay their creditors in full instead negotiate down their debt in bankruptcy court. The conclusion that the process is inefficient makes the analysis of the effect of an uncertain rescue non-trivial; that is, if the bankruptcy procedure was already perfectly efficient, then it is obvious that introducing a government intervention could only make things worse.

[3] For additional examples, see Gup (2003).

[4] Faccio et al. provide an analysis of how the probability of a bailout varies with the degree of political connection a publicly traded firm exhibits, using a sample of 450 firms from 35 countries including the United States.

In the next stage of the model, a government rescue is added in the prescribed way. Specifically, the government approves a bailout for the firm if it fails to reorganize, but only with some arbitrary positive probability. Note that the goal of government here is not to maximize the efficiency of the bankruptcy process, but rather to prevent negative externalities by saving firms that fail to renegotiate their debt, as mentioned previously. Even so, regardless of its intent, the policy's effect on the efficiency of the bankruptcy process is the outcome of interest in this paper, and on these grounds, the 'uncertain bailout' is found to be a net negative. The main reason for this efficiency loss is that the prospect of a government rescue is beneficial, not just to firms, but to creditors as well: the potential bailout allows debt holders to drive a relatively harder bargain in bankruptcy court, making a successful negotiation unfeasible for marginal firms. The model, however, shows that the negative efficiency effects of an uncertain government intervention actually become ambiguous if the firms have both high asset values and high operating margins.

The third stage of the model explores how the government might act to correct the induced inefficiencies. In reality, the U.S. federal government has a long history of providing – and denying – bailouts to large corporations. In the model, this history manifests as an irreversible commitment to the policy of the "uncertain rescue." Any attempt to convince firms that there were no more bailouts is assumed to be non-credible. Given that the government cannot alter this strategy or the firms' perception of its credibility, extensions to the model proposed in this section nonetheless suggest that additional strategies can successfully mitigate some of the inefficiencies generated by the irrevocable intervention. Increasing the manager's incentive to either liquidate or to pay creditors in full are efficiency enhancing policies for the government.

The remainder of the paper proceeds as follows. Section 1 touches briefly on the main features and stylized facts of the U.S. bankruptcy system, and examines the literature on the incentives and efficiency costs of the Chapter 11/Chapter 7 procedure. In Section 2, a model of bankruptcy without government intervention is justified, and the inefficiencies in this system are evaluated. Section 3 introduces the key assumption – a government rescue occurs with some probability for all firms that fail to restructure in Chapter 11 – and details both the type and source of the errors brought about by this intervention. Section 4 presents several possibilities for how the government might fix some of the inefficiencies generated by the bailout it has locked itself into, and Section 5 examines the weaknesses of the model and investigates future directions for research.

1. Bankruptcy Procedure and Literature Survey

1 a. Bankruptcy Legal Procedure and a Few Bankruptcy Facts

Since the Bankruptcy Reform Act in 1978, firms in the United States unable to meet their debt obligations have had essentially three options: out-of-court settlement, liquidation under Chapter 7, or Chapter 11 reorganization. Most firms eventually opt for one of the latter two procedures.[5] In Chapter 7, a bankruptcy judge appoints a trustee who shuts down the firm, locates whatever assets have some value, and distributes the proceeds to the creditors, with whatever is left over going to the equity holders. Creditors can force Chapter 7 liquidation with just cause, and since a distressed firm's assets generally cannot cover its debt, this option is unattractive for managers and equity.

Conversely, the purpose of Chapter 11 is to allow a firm to negotiate with its creditors to restructure its debt so that it can remain in business; failure to reach an agreement results in liquidation. When a firm files under Chapter 11, a feature called the automatic stay is implemented, which protects the firm from creditor harassment until a reorganization plan can be formulated. Firms thus have the opportunity to earn profit even while they bargain in court. An added feature of the formal bankruptcy proceedings is the 120 day exclusivity period, during which the firm is given the sole right to propose and file reorganization plans. This interval is often extended by the presiding judge, and even after it has ended, the firm generally retains the role of proposer. In a sample of 144 firms, Carapeto (2005) finds only four cases in which the creditors put forward an accepted reorganization proposal.

The costs of Chapter 11 bankruptcy are manifold and range from litigation costs, which are direct and easy to measure, to the fact that firms operating under the protection of Chapter 11 distort the prices in their industry and the ability of their competitors to borrow. Much of the research in this area has focused on legal fees which the firm and creditors must incur. Such papers are spurred on by shocking examples such as Texaco's 1987 Chapter 11 filing, when the company was estimated to have spent over 500 million (1988) USD on legal fees alone by the time it emerged (Wruck 1990).

1 b. i Why Firms Use Costly Bankruptcy Procedures

There exists a substantial theoretical literature on how creditors and firms interact in the debt renegotiation process.[6] One of the most pressing issues that economists working in this field have attempted to address is why firms would

[5] Gilson et al. (1990) estimate that only half of firms attempting an out-of-court settlement succeed.

[6] See Chatterjee et al. (1996), "Section I: Theory and Testable Implications" for an overview of this literature.

choose to enter into a costly bankruptcy procedure instead of restructuring their debt outside of court. Theoretical models have generally relied on the presence of asymmetric information about the firm's profitability to explain why they sometimes make this choice. For example, Giammarino (1989) constructs a sequential bargaining environment with one-sided asymmetric information where distressed firms can reorganize using either a costless out-of-court settlement or an expensive Chapter 11 filing. He finds a separating equilibrium where the latter option is chosen since, even though it is costly, there is no other way for the firm owners to reveal their private information credibly on whether the company is able to continue earning profits or not. Here it should be noted that there is no contradiction – in reality or in theory – in assuming that future profitability is private information for publicly traded firms, whose earnings must be made freely available in accordance with the U.S. Security & Exchange Commission guidelines. Immediately after an exogenous shock but before the decision to file for bankruptcy, a skilled and competent manager will have a much better idea of the firm's ability to continue making a profit than will the firm's debtors or the bankruptcy court.

A similar approach to that of Giammarino is taken by White (1994), with the addition that distressed firms can be either efficient or inefficient. Efficient firms should settle quickly in Chapter 11 to maximize joint payoffs, and inefficient ones should liquidate. In her model, Chapter 11 fails at filtering out inefficient firms because managers of each type benefit from appearing to resemble their counterpart, and are willing to pay the costs of bankruptcy, which fall mostly on creditors, to reap the rewards of remaining in control. The most relevant result from this strand of the literature is that a lack of information about a firm's profitability explains why the bankruptcy/liquidation procedure operates with error, and why it often leads to inefficient outcomes.

Conversely, a different class of models exists that examines how the division of value in bankruptcy between the firm and its creditors depends on the unique legal structure of Chapter 11.[7] Baird and Picker (1991) analyze the non-cooperative bargaining outcome in two cases whose conditions are imposed exogenously: "permanent stay" is familiar from Chapter 11 bankruptcy law and requires that creditors be unable to force any claims on the firm. "Full exit" denotes an out-of-court situation where creditors can take the liquidation value of their claims on the firm's assets. The paper finds that, all else equal, the creditors take a lesser share under permanent stay than full exit, and their position worsens as the operating margin of the firm falls.

[7] Baird and Picker (1991) is used as a representative example. See also Bebchuk and Chang (1992) and Schwartz (1993).

1 b. ii Efficiency Effects of Government Intervention

Surprisingly, relatively little work has been done on the effects of government intervention in bankruptcy negotiations. One class of paper considers how the government might facilitate the successful completion of a project when asymmetric information between a manager and creditors with no previous relationship leads to inefficient liquidation. For example, Kasahara (2009) constructs a model where the value and payoff structure of an entrepreneur's project is randomly determined, and uses it to analyze how a government guarantee of creditors' investments affects the possibility that the project will be shut down as a result of coordination failure. In equilibrium, Kasahara's particular brand of intervention will lead to more inefficient liquidations unless the government also furnishes complete information on the realized value of the entrepreneur's stochastic assets.

Kasahara's paper provides an explanation for why government intervention might cause an inefficient procedure to become even more inefficient; however, his model differs fundamentally from this paper's environment in that his government provides a guarantee to creditors ex ante, while the government in this paper furnishes a bailout to firms ex post. In their sovereign debt renegotiation model, Benjamin and Wright (2009) introduce the probability of a transfer from the IMF in each period that bargaining continues – a 'government' that much more closely resembles the one in this paper. The authors find an interesting result: in a country with a fundamentally viable economy, an uncertain bailout will induce the nation to default where otherwise it would have remained solvent. In the corporate bankruptcy scenario, this conclusion suggests that the possibility of a transfer might encourage viable firms to enter bankruptcy in hopes of receiving a bailout, and thereby reduce the efficiency of the bankruptcy procedure.

2. A Model with No Government

Consider a large, publicly traded firm that has encountered some financial distress and which has outstanding debt with a face value of D, currently payable in full. The firm is large enough that its failure would conceivably lead to substantial negative externalities in its industry and in the economy at large. As in Giammarino (1989), I assume that the firm's debt is held entirely by a group of risk-neutral creditors that act in harmony, and that the manager's incentives are perfectly aligned with those of the equity holders.[8] For the remainder of the paper I will thus use "firm" and "manager" interchangeably.

[8] In Giammarino (1989) it is assumed that the firm's equity is held entirely by the manager. Here, I simply assume that since the firm is a large, publicly traded and widely held one, the manager receives most of his compensation as equity and thus has every incentive to act on the equity holders' behalf. This assumption is in contrast to that of White (1994), who assumes that there is some benefit to the manager in remaining in control.

The timing of the game between the firm and its debt holders is as follows: at some $t < 0$, the manager chose to finance an investment in a production technology by taking out a quantity of debt.[9] The production technology utilizes capital whose liquidation value is K, and was invested in by the manager because he was able to earn some profit net of payments on the debt. At time $t = 0$ there is an exogenous shock, which results in a permanent reduction in the firm's profitability. The shock need not be a productivity shock – rather, it could reflect an abrupt change in tastes in the market, the loosening of tariff barriers against imports, etc. The firm's new level of profitability π is drawn from a well behaved distribution given by F, where F has lower bound 0 and upper bound $\prod$. The level of profitability is private information for the manager, although the creditors know the distribution it was drawn from.[10] Moreover, the firm has an additional asset at the time of the shock in the form of cash on hand, Q, which is public information, but which on its own is less than D. I assume that some firms are able to pay the full face value of the debt even after the profitability shock, so:

$$\prod + Q > D \tag{1}$$

At time $t = 1$, immediately after the shock, the manager faces three options. He knows that the creditors have observed the shock but not the firm's new level of profitability, and that there is outstanding debt with value D. The first option is to liquidate voluntarily. If the manager takes this option, then he does not liquidate immediately; rather, he informs the creditors that he cannot pay and then spends Q on litigation to delay the seizure of the firm's assets. During this delay, the manager takes the opportunity to strip some of the capital value of the firm, netting himself a payoff of αK and leaving $(1 - \alpha)K$ for the creditors.[11] Specifically, $\alpha = \alpha(Q)$ and the function α is defined by $\alpha: \mathbf{R}^+ \rightarrow [0, 1)$. This theft takes the form of not replenishing inventory, selling equipment, etc., and is justified in the literature.[12] I rule out the option that liquidating immediately could be optimal by assumption on the parameters. In particular, I assume that $K + Q - D < \alpha K$. A weaker form of this assumption is:

$$K + Q < D \tag{2}$$

The above inequality corresponds to the natural assumption that, regardless of their profitability level, all firms are facing short-run cash flow problems and are unable to pay the face value of their outstanding debt with the value of the assets that they have on hand.

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[9] Of course, a firm could also raise money by issuing equity. There are several reasons a firm would use debt instead of equity to fund a project (see for example, Jensen, 1986), but I put these financing concerns aside.

[10] Actors in the 'background' of the model such as the bankruptcy court also know only the distribution and not the realization of the firm's profitability.

[11] I also assume this delay is short enough that the profit that can be earned during this time is roughly 0.

[12] For example, White (1989) finds that by the time most firms liquidate, their capital has already been mostly stripped, leaving them empty husks.

The second option for the manager is to announce that he is able to pay the debt in full. In this case, the creditors allow the firm to realize its new profit of π and keep its cash-on-hand Q and, in return, receive payment D. By inequality (1) there are some profitability draws for which this action is viable, i.e., the action has a non-negative payoff, and in this case, the manager's payoff is $\pi + Q - D$.

The third and final option the manager can pursue is to choose to bargain. If he selects this alternative, then he spends his cash Q on litigation in bankruptcy court. At time t = 2, he makes a simple debt-exchange offer to the creditors, offering new debt with a value of x in exchange for the debt with value D. At time t = 3, the creditors may choose to accept or reject this offer. If they accept, they will receive the offered x and the firm will be allowed to realize its profits π minus the new value of the debt, x. If the creditors reject, then the bankruptcy court awards debt holders the liquidation value of the firm K and gives the equity holders (i.e., the manager) nothing.[13] Note that 'theft' of capital assets by the manager is no longer feasible at this point in the model, since the cash-on-hand that made 'theft' possible before has already been spent in litigation. Payoffs reached after bargaining are discounted according to $\delta \in (0, 1)$ for reasons that will be explained presently.

Having defined all the parameters and the strategy space of each player, I now define precisely what it means for a firm's action to be inefficient and classify the inefficiencies:

Definition 1: *It is efficient for a firm to liquidate if $\pi < K$; that is, if the profit a firm can earn from using its capital has less value than the capital itself. It is efficient for a firm to continue to operate if $\pi \geq K$. Further, it is inefficient if a firm that could pay its debt in full instead chooses to spend its cash in bankruptcy negotiations.*

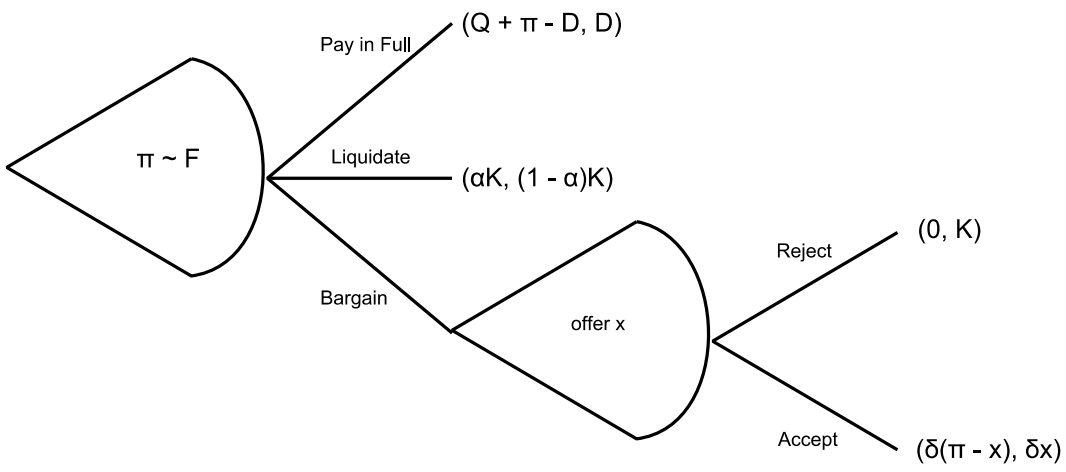
Definition 2: *An error is called Type I if an inefficient firm is saved in bankruptcy negotiations, and is called Type II if an efficient firm is liquidated.[14] An error is called Type III if a firm that could pay its debt in full instead bargains in bankruptcy court.*

The extensive form of this simple model is illustrated in Figure 1; in each pair of payoffs, firm payoffs are listed first.

[13] This bargaining procedure is obviously a far cry from Chapter 11. Although it bears some similarities to the actual legal procedure (firm is sole proposer, court awards liquidation payoffs in case of disagreement), it does not perform Chapter 11's main function; that is, it does not allow a firm to realize profits while in court. In this model, a firm may only realize its profits after it has successfully concluded negotiations with the creditors. This subgame more closely resembles a modern hybrid procedure called the "prepackaged bankruptcy" (see Tashjian et al., 1996).
[14] Here I follow White (1994).

It should be stressed that asymmetric information – the firm's knowledge about its profit post-shock – comes into play in an indirect way only. First, it allows for the type of liquidation strategy described above, where the manager uses available cash on hand to delay the creditors while he strips some of the value from the firm. If creditors and the bankruptcy judge knew the firm's ex post profitability with certainty at the same time as the manager and it turned out to be low, then it is implausible that any judge would deny the creditors' right to seize the firms' assets immediately. Second, since the realization of the firm's type is unknown to the bankruptcy court, it limits that institution's ability to impose outcomes in the case of negotiation failure. If the judge observed ex post profitability, he would certainly make disagreement payoffs dependent on this value; to wit, he would rather sell firms with $\pi > K$ as going concerns, and thus preserve their greater value, than simply liquidate them if he had complete information.

Figure 1: Extensive form game



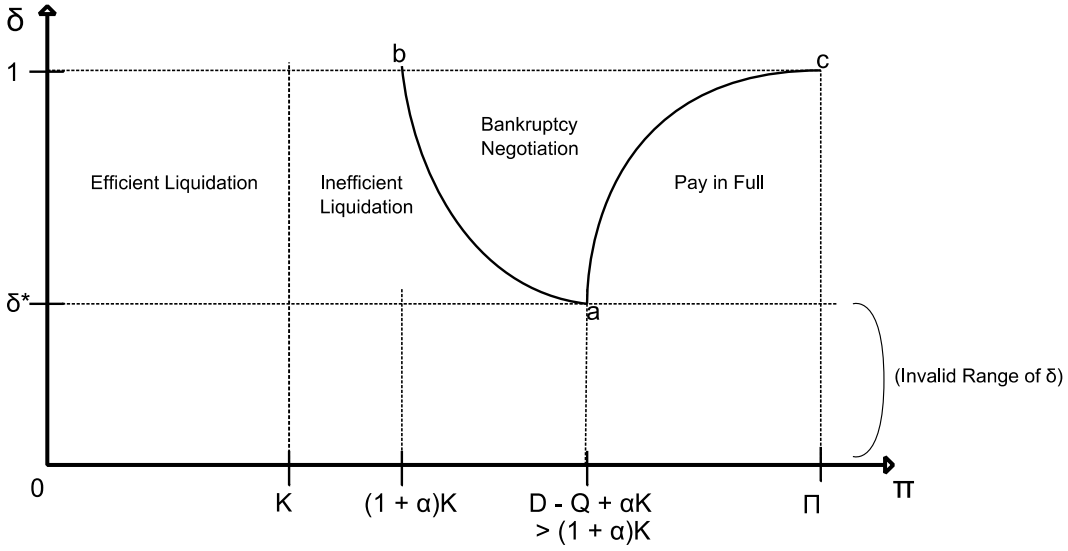
The model is not intended to provide a comprehensive account of all the decisions facing a distressed firm that is contemplating liquidation or bankruptcy. Instead, it serves as a base case that captures key features of bankruptcy negotiations and into which it will be simple to introduce government. Appropriately, the unique equilibrium is easy to solve (see Appendix A for the procedure) and the action a firm takes will depend on its type, π:

- The firm liquidates if $\pi < [1 + \alpha/\delta]K$
- The firm pays the debt in full if $\pi_i > [D - Q - \delta K]/(1 - \delta)$
- The firm chooses to bargain if $[1 + \alpha/\delta]K \leq \pi \leq [D - Q - \delta K]/(1 - \delta)$

Graphing the realization of π against the discount factor δ provides some insight into the behaviour of these equilibria:

Interpret Figure 2 as follows: choose any value of δ such that $\delta \in [\delta^*, 1]$ and draw a horizontal line across the graph from the δ axis for that value. The line will first intersect curve ab at some value B of π and will then intersect curve ac at some value C of π, where $B < C$. For that value of δ, a firm that draws $\pi < B$ will liquidate, a firm that draws $\pi > C$ will pay their debt in full, and a firm that draws $\pi \in [B, C]$ will bargain in bankruptcy court.

Figure 2: Post-shock profitability v. Discount rate



For a cutoff value of the discount rate δ^* (see Appendix B for the derivation and for the proof that $\delta^* \in [0, 1]$) we have that all firm types will either liquidate or pay in full. This value of δ corresponds to an extremely large expected length of delay in bankruptcy. In fact, it is large enough that no type of firm will ever choose to bargain with their creditors, because the length of time it would take to conclude negotiations would obliterate the value of any concessions the firm might be able to extract. Alternatively, one might think of the parameter δ as a

measure of the firm's bargaining power in bankruptcy court: the lower is δ, the more creditors are able to stall the firm, press claims against its assets, and generally just keep it from operating.

Proposition 1: *Interpret the parameter δ as bargaining power of the manager in bankruptcy court. Then increasing the bargaining power of the manager has an ambiguous effect on the overall efficiency of the bankruptcy procedure.*

Proof: As δ increases from δ*, marginal firm types from both ends of the spectrum – both the weaker ones that would have liquidated, and the strong ones that would have paid in full – find it more fruitful to bargain. Because $D - Q + \alpha K > K$ by inequality (2), it is efficiency enhancing for all the weaker firms to bargain instead of liquidating because they are more valuable as going concerns. Conversely, the stronger firms that are attracted to bargaining by a higher value of δ will now waste their cash-on-hand Q on litigation fees where before that money would have been retained by the firm or creditors. The exact gains or losses to efficiency will depend on the distribution F from which π is drawn. Without assuming anything more about this distribution, we can only conclude that the net efficiency effect is ambiguous. ■

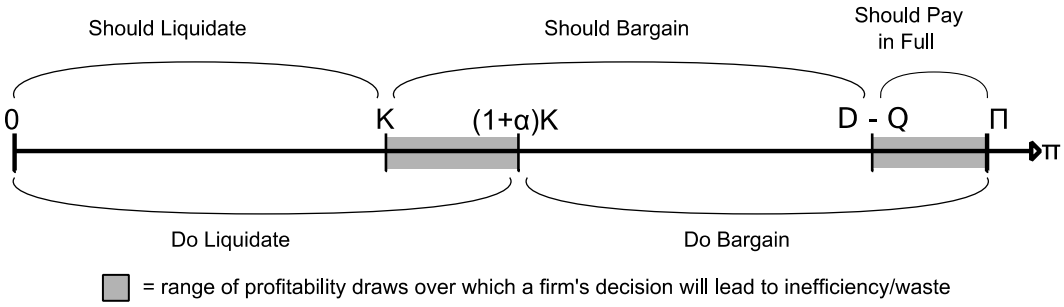
As previously mentioned, Chapter 11 contains a provision called the automatic stay, where creditors are unable to force claims on any of the debtor firm's assets as long as negotiations are in progress. Given that firms are generally granted an indefinite amount of time by bankruptcy judges to be the sole proposer of reorganization plans, Chapter 11 as presently constituted thus grants almost all bargaining power to the firm manager. Therefore, for the remainder of the paper we assume $\delta = 1$. This equality is also consistent with the interpretation of δ as delay: the automatic stay allows a firm to realize its stream of profits right away since its assets are protected, so there is no need to discount the payoff.

Proposition 2: *In the case where the firm has all of the bargaining power in bankruptcy court* ($\delta = 1$)*, the bankruptcy procedure generates Type I and Type III errors (see Definition 2.)*

Proof: Consider the horizontal line corresponding to $\delta = 1$ in Figure 2, and which is illustrated below as a continuum line in Figure 3. Here we observe that the bankruptcy procedure is inefficient for two reasons. First, there exists a range of types $\pi \in [K, (1 + \alpha)K)$ that should renegotiate and settle in Chapter 11 but which are instead liquidated. Errors occur in this case because creditors do not internalize the value of the manager's outside option αK, where in essence the manager is able to "steal" some of the liquidation value of the firm. Second, there are a range of types that could pay their creditors in full – those with π large enough that $Q + \pi > D$ – but who instead choose to enter into Chapter 11 negotiations. The categorization error arises because the firm is able to capitalize on the bankruptcy court's inability to differentiate between profitability types, whereas the inefficiency reflects the fact that the firm's cash on hand, Q, is wasted

on paying litigation fees that could have been avoided. ■

Figure 3: Equilibrium Firm Decisions with δ = 1



3. Model with an Irrevocably Committed Government

Now we proceed to the key feature of the model. Consider the previous environment, but with an added caveat: based on a long history of similar actions, the government has made a credible commitment to rescue distressed firms for which Chapter 11 negotiation has broken down, i.e., the creditors have rejected the debt exchange offer. However, before the government will rescue a firm, it must first decide that that firm fulfills the criterion of being "strategic." Every firm in this model is large and has substantial externalities, and the government would thus like to bail out any firm that fails in Chapter 11. Yet due to shifting political and popular opinion, not every firm will be designated as "strategic." As previously elaborated on in the introduction, I approximate the uncertain, case-by-case nature of each bailout by assuming that in the event of negotiation failure, the firm will be called "strategic" – and will thus be rescued – only with some positive probability $q \in (0, 1)$.

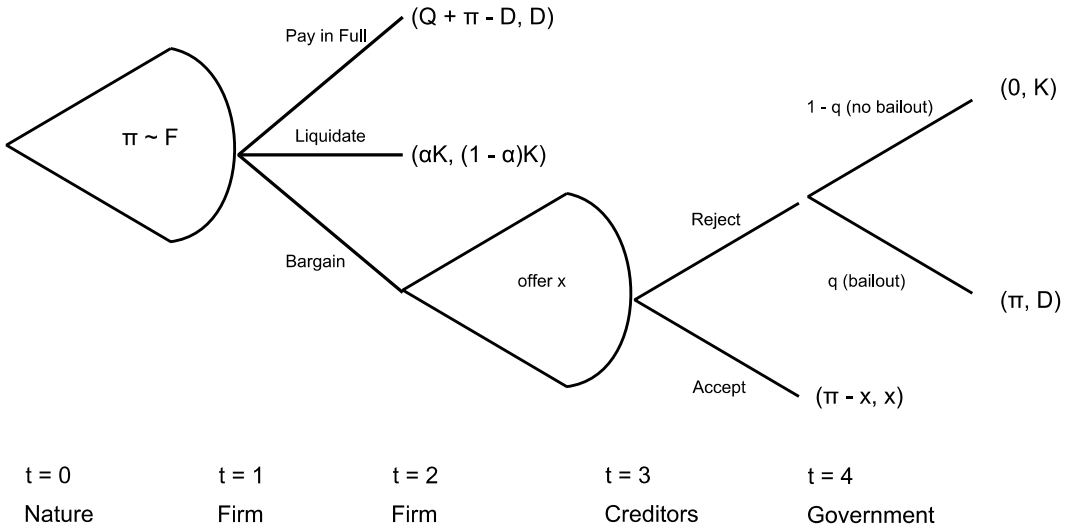
Note that the government will randomize over any firm that fails to restructure in Chapter 11, regardless of profitability type.[15] The government does not want to save completely non-viable firms; however, since firm type is private information, it cannot observe which firms making unsuccessful Chapter 11 offers should be allowed to die. It does have one discriminatory tool in its arsenal: if a firm decides to liquidate instead of filing for Chapter 11, then the government can interpret this action as a signal that even though the firm has substantial externalities, its potential for profit is simply too low to make saving it, even with some random probability, a worthwhile prospect.[16] Specifically, the extended

[15] One might already anticipate that this policy will be a failure on efficiency grounds from the discussion of White (1994), who finds that just because a firm files for Chapter 11, does not necessarily mean that it is efficient (i.e., worth saving).

[16] The assumption that the government interprets liquidation as a signal that the firm is not worth

form of the game now appears as follows:

Figure 4: Extensive form game with government



If the manager's offer is rejected in Chapter 11, then with exogenous probability q the government will call the firm "strategic" and execute a rescue in the following manner: the firm will be allowed to realize its profits π, and the debt holders will be paid in full and receive D. What is assumed to happen is that the government provides the firm with an infusion of cash – either by making loan guarantees, buying equity at favourable prices, etc. – which the firm is obligated to spend on meeting its debt obligations. Thus, although the bailout goes entirely to the firm, cash with value D is earmarked to go directly to the creditors. Paying its creditors in full allows for a successful conclusion of the negotiations, and the firm is then allowed to realize its profits through operations. With probability 1 – q, the previous rejection outcome will hold. Obviously this formulation of the bailout is an extremely generous one, and this assumption should be kept in mind when considering the results. The unique equilibrium is again fairly simple to solve (see Appendix C) and yields the following outcomes depending on parameter values:

- If $Q + (1 - q)K \leq (1 - q)D$, then
  - Firm liquidates if $\pi < (\alpha/q)K$
  - Firm *settles in Chapter 11* if $\pi \geq [K + q(D - K)]/(1 - q)$
  - The firm chooses to bargain, but makes any one of a continuum of unreasonable offers which the creditor will reject, $x \in [0, qD + (1 - q)K)$, if we have that $(\alpha/q)K \leq \pi < [K + q(D - K)]/(1 - q)$
- If $Q + (1 - q)K > (1 - q)D$, then

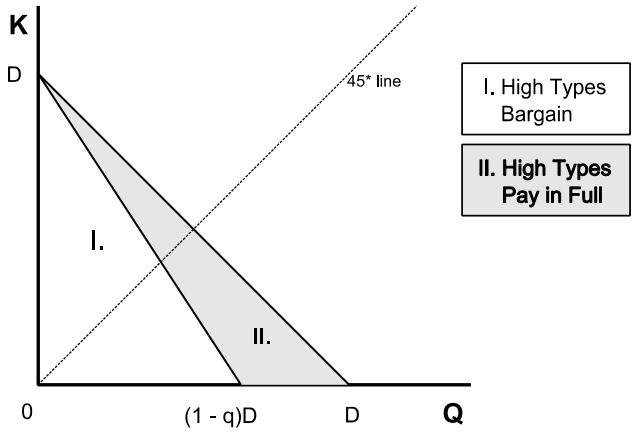
bailing out, even if it has externalities, is well-justified (Gup 2003).

- Firm liquidates if $\pi < (\alpha/q)K$
- Firm *pays its debt in full* if $\pi \geq (D - Q)/(1 - q)$
- The firm chooses to bargain, but makes any one of a continuum of unreasonable offers which the creditor will reject, $x \in [0, qD + (1 - q)K)$, if we have that
  $(\alpha/q)K \leq \pi < (D - Q)/(1 - q)$

Note that to derive these equilibria, I assume that the fraction of capital that the manager can appropriate is less than the probability of a bailout, that is, $\alpha < q$. It makes sense for α to be quite small: since α depends on how long the creditors can be stalled, and since I assume in Section 2 that this time interval is short enough that the firm earns roughly zero profit before it elapses, then it would be internally inconsistent to take α large. Moreover, it also makes sense for q to be fairly large since, in the history of U.S. bailouts of non-bank firms, a majority of those that have made legitimate bids for a bailout have succeeded.[17]

So it should be clear that there are two distinct continua of equilibria, determined by whether or not the inequality $Q + (1 - q)K > (1 - q)D$ holds. Figure 5 illustrates how this inequality interacts with the short term asset constraint assumed in the beginning of the model, $K + Q < D$, where the debt D and probability of bailout q are both held constant while the liquidation value of capital K and the quantity of cash-on-hand Q are allowed to vary. The triangle given by DD0 describes every combination of capital and cash-on-hand that this model is applicable to, based on inequality (2).

Figure 5: Cash-on-hand Q v. Capital Value K



Case I: $Q + (1 - q)K \leq (1 - q)D$

Suppose $Q + (1 - q)K > (1 - q)D$ does not hold; that is to say, $Q + (1 - q)K \leq (1 - q)D$. This scenario corresponds to the area of the graph marked "High Types Bargain" and Figure 6 below. I first show that in this case, the government bailout is unambiguously detrimental from an efficiency standpoint.

[17] See again Gup (2003).

Proposition 3: *For firms with values of cash-on-hand and capital such that Q + (1 – q)K ≤ (1 – q)D, the prospect of a government bailout unambiguously decreases the efficiency of the bankruptcy procedure relative to the case where there is no government.*

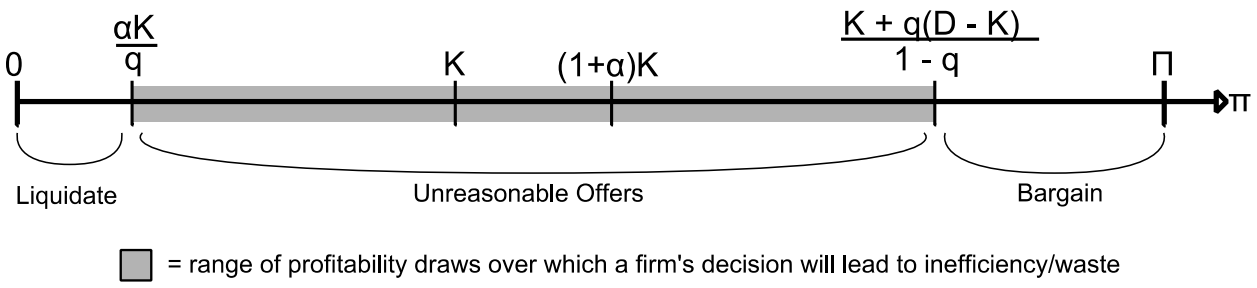
Proof: Consider the case with no government. Firms with $\pi < (1 + \alpha)K$ choose to liquidate, and firms with $\pi < K$ should liquidate, so any firm with $\pi \in [K, (1 + \alpha)K]$ is liquidating inefficiently. The length of the interval over which there are inefficient liquidations is thus αK. Now, consider the introduction of government, and suppose $Q + (1 – q)K \leq (1 – q)D$. Notice that since $K < D$ by (2) and $\alpha < q$, we have that:

$$(1 + \alpha)K < [K + q(D – K)]/(1 – q) \qquad (3)$$

So for firms that should continue to operate ($\pi > K$) any firm with $\pi \in [K, \{K + q(D – K)\}/(1 – q)]$ is entering bankruptcy court and making an unreasonable offer in hopes of receiving a bailout. The length of the interval over which there are failed offers from firms is $qD/(1 – q)$. Of those firms whose offers fail, $(1 – q)$ will not receive a bailout and will be liquidated. So the length of the interval over which there are inefficient liquidations in the case with government is qD, and since $K < D$ and $\alpha < q$ we have that $\alpha K < qD$. Without knowing anything about the distribution G that π is drawn from, it has nonetheless been shown that the probability of an inefficient liquidation in the case with government is higher than the case without, and the result is proven. ■

In fact, the above proof does the bare minimum to show that this case with government leads to greater inefficiency. As can be seen in the continuum line below, there is a whole range of firms with $\pi < K$ that should liquidate but which instead make unreasonable offers in bankruptcy court. A fraction q of such firms will be saved by a bailout, leading to a number of Type I errors where previously none existed. Furthermore, by inequality (3) there are firm types that will angle for a bailout where previously they would have been able to bargain successfully with their creditors. This fact compounds the waste of the type explored in the proof, as these firms not only sacrifice Q in litigation, but now also potentially require government funds to operate.

Figure 6: Equilibrium Firm Decisions with Government in Case I



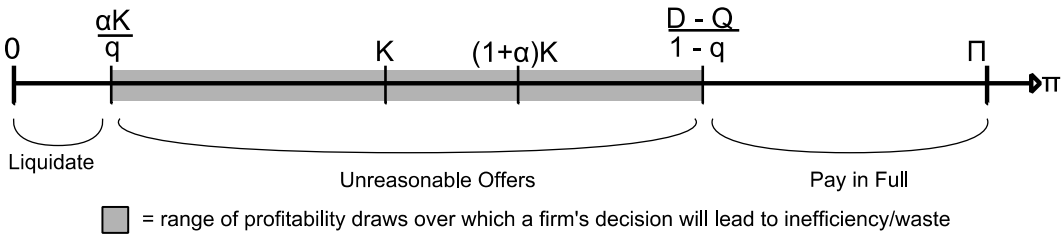
Apart from the mathematical result, it is helpful to understand why the government bailout has decreased efficiency by examining firms' changing incentives. In Case I, we are in a range of firms whose total assets just after the shock, K + Q, are much less than D, and where a large fraction of the value of those assets is tied up in capital. High type firms – those with the potential for large profits even after the shock – find it fruitful to bargain and make reasonable offers instead of paying their debt in full, while mid-range firms make unreasonable offers to try and secure a bailout and low types liquidate.

Intuitively, the high type firms with K + Q much lower than D are responding to competing incentives: since their value of Q is relatively low, it is less costly to sacrifice the cash-on-hand by entering into bargaining as opposed to simply paying the debt and keeping Q. However, they choose to bargain in spite of, not because of, the high liquidation value of their capital, since a higher K means creditors have a greater minimum acceptable offer in bankruptcy court. Mid-range profitability firms are responding to the fact that the possibility of a bailout has raised the creditors' minimum acceptable payoff in bankruptcy negotiations: where previously it would have been optimal to bargain with their creditors, these firms can now no longer afford to pursue such a strategy. Since mid-range firms certainly cannot afford to pay their creditors in full, the fact that their profitability is still fairly good means that attempting to secure a bailout is their only viable option. Although firms are responding optimally to the prospect of the government bailout, the net effect of this policy is to increase the waste and categorization errors in the bankruptcy procedure.

Case II: $Q + (1 - q)K > (1 - q)D$

Case II corresponds to the area of the KQ graph marked "High Types Pay in Full" and the continuum line below (Figure 7.) Firms for which Case II is true are ones with fairly high liquidation values of capital and large quantities of cash-on-hand, such that K + Q is only marginally less than the value of debt, D.

Figure 7: Equilibrium Firm Decisions with Government in Case II



Proposition 4: *For firms with values of cash-on-hand and capital such that $Q + (1 - q)K > (1 - q)D$, the government bailout has ambiguous efficiency effects relative to the case where there is no government.*

Proof: This proof proceeds in a similar manner as that of Proposition 3. See Appendix D. ■

The result that firms with high values of cash-on-hand – that is, firms with a large operating margin – perform better in this bankruptcy scenario is somewhat unsurprising, given the literature.[18] What is surprising is why exactly Case II is potentially more efficient than the base case without government, and why it is certainly more efficient than the outcomes for firms with asset values that place them in Case I. The analysis of mid-range profitability firms' incentives is similar to Case I: the increased disagreement payoff for creditors in bankruptcy court allows them to drive a harder bargain, eliminating successful negotiation as a viable tactic for these firms and leaving an uncertain bailout as the only worthwhile option. However, for firms with high potential profitability, this increased disagreement payoff for creditors pushes them over a threshold: possessing high values of Q (implying a steep cost of bankruptcy litigation) and high values of K (leading to a high minimum payoff for creditors even in the base case), these firms now find it best simply to avoid bankruptcy negotiations entirely and pay in full. Before, these firms would have wasted their cash-on-hand in bargaining; now, they choose to retain it, decreasing the wastefulness of the bankruptcy procedure. Depending on the distribution F from which profitability is drawn, these savings could easily be enough to offset the increased Type I and Type II inefficiencies induced by the government intervention.

An additional interesting result can be obtained by speculating on how successful a government intervention would appear in Case I and Case II to an outside observer, such as a concerned citizen. To such an individual, the government might appear to be doing a greater amount of good in Case I relative to Case II, since it seems to be taking more decisive action: a greater fraction of viable firms are being saved by a bailout in Case I, and more firms are successfully bargaining after entering bankruptcy court. Firms that file for bankruptcy and emerge successfully, and viable firms that are saved by a government bailout after a failed bid, are likely to attract much positive attention in the media. Conversely, in Case II, the uncertain government intervention is inducing many profitable firms simply to pay their bills quietly as usual – the best outcome from an efficiency standpoint, but not one that is likely to make headlines. Thus, the most efficiency-enhancing aspect of the government bailout in Case II is also the feature that might lead outside observers to call the policy ineffective.

4. Further Government Intervention

The government in my environment made repeated, credible revelations of its willingness to bail out firms in the past, and so can be counted on to continue to provide relief to distressed firms that fail to restructure in Chapter 11 in the

[18] Denis and Rodgers (2007) conclude that those firms which have high operating margins relative to their industry are not only more likely to emerge from Chapter 11 as a going concern, but do so more quickly than the industry average.

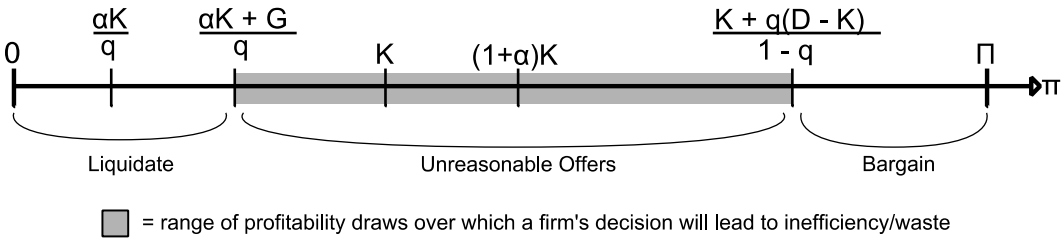
future – even though this policy has been shown to be ambiguous at best from an efficiency standpoint. However, it still has leeway to interfere in the liquidation/bankruptcy decision in other ways in order to fix the inefficiencies created by the prospect of a bailout. Given that a government rescue will occur with positive probability as specified, this section of the paper suggests several additional ways the government might intervene in bankruptcy negotiations, and evaluates them on the grounds of both efficiency and feasibility.

4 a. Money to Liquidate (or, "Golden Parachute")

One obvious way of mitigating the Type I errors brought about by the prospect of a bailout is by exogenously "pumping up" the manager's liquidation payoff, in order to induce more weak firms that previously would have filed for bankruptcy – and made an unreasonable offer – to liquidate instead, as they should. If this government sponsored "golden parachute" is attractive to firms with $\pi < K$, it might be efficiency enhancing: it falls to a modified version of the model with government bailout to provide definite answers.

Without solving the model yet again, if the government provides a sum of money G to any manager willing to liquidate, then the continuum of firm types now appears as illustrated in Figure 8.

Figure 8: Equilibrium Firm Decisions with Golden Parachute



Note that I have used the Case I continuum here, but since the area of interest is below K, this policy is equally applicable to Case II firms. So indeed, more companies are liquidating (all firms with $\pi < [\alpha K + G]/q$ which is greater than $\alpha K/q$ for all positive G), and with proper calibration of G it will be the case that all firms that should liquidate ($\pi < K$) do liquidate. The value of G that accomplishes this task is easy to calculate; simply equate $[\alpha K + G]/q$ and K to find $G^* = (q - \alpha)K$, which is positive since we assume that $\alpha < q$.

Proposition 5: *Without making any assumptions on the distribution F from which π is drawn, the Golden Parachute policy will lead to a net gain in efficiency.*

Proof: The net gain in efficiency is easy to see: prior to the Golden Parachute, a fraction q of firms with $\pi < K$ that made unreasonable offers in bankruptcy would have been saved; now none of those firms will be saved. All the Type I errors will thus be eliminated. ■

From an efficiency standpoint, it should be clear that this policy definitely will be an improvement relative to the scenario with just an uncertain government bailout: all non-viable firms ($\pi < K$) are liquidating as they should. It should be noted that the government is also saving the money it would have spent (with probability q) on those firms if they had failed to reorganize in Chapter 11, so one might conclude that there is less unnecessary spending. However, firms that were efficiently liquidating before ($\pi < \alpha K/q$) are now happily collecting the government handout of G*, so the golden parachute does generate some pure waste.

Proposition 6: *Assuming that $\pi \sim F$ is drawn from a uniform distribution, the Golden Parachute policy will lead to a net reduction in wasteful government spending.*[19]

Proof: Assuming F is uniform, the expense of this policy is G* x K (the amount of the handout multiplied by the range of firms that receive it), which comes out to $(q - \alpha)K^2$. Conversely, without the golden parachute the government would have spent $(K - \alpha K/q) \times qD$ bailing out a fraction q of firms with $\pi < K$ that refused to liquidate; simplifying, this expression becomes $(q - \alpha)KD$ which is greater than $(q - \alpha)K^2$ since $K < D$. So despite the new source of waste, the government is indeed saving money if one imposes this strict restriction on the distribution F. ■

Efficiency gains and (distribution contingent) waste reductions aside, one must ask whether or not this odd payment is feasible to implement. The answer is 'yes' from an informational standpoint: in order to calibrate G, the government only needs the values q, α and K to set the handout, none of which are private information.[20] It is less feasible from a political economy perspective: the government reduces the number of Type I error firms by increasing the quantity of liquidated firms, and although Type I efficiency costs are substantial, they are effectively "hidden" from the public as nonviable firms are allowed to limp along with no one the wiser. Conversely, liquidation leads to side effects like job loss that are publicly visible and politically distasteful, so it is unclear whether such a policy could ever be enacted.

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[19] Government spending is called "wasteful" here if the government uses its cash to rescue a firm that would be better off liquidated, or spends its cash on firms that do not then choose to make more efficient equilibrium decisions as a result of the spending.

[20] One might claim that α is not public information; however, one can get a reasonable estimate of it by observing how well managers in the past were able to strip the assets of their firms before liquidating in the past. See White (1989.) A similar approach of looking at historical precedents would yield an estimate for q.

Intuitively, this "golden parachute" is essentially a payment for information: since the government cannot tell non-viable firms from viable ones, it instead offers an unconditional lump of cash to managers that liquidate, trusting that only those whose type is low enough will take the option, which in this model they do. A further problem with this policy is easy to see if one takes a step back from the strictures of the model and considers not just firms that are hit by an exogenous shock, but other firms in the economy as well. Firms that are only marginally profitable but that were not hit by a shock may find it optimal to take the golden parachute and liquidate, leading to Type II inefficiencies where before none existed. In the model, it is assumed that even though government cannot observe the realization of the profitability shock, it is still aware of the firms that have been hit. Thus, if the government only considers giving a handout to firms that it sees have received a shock, one can ignore the problem of marginal non-shock firms grabbing the parachute and liquidating. However, in reality it is doubtful that the government can perfectly discern how a macroeconomic shock will affect any particular company's profitability. Conditioning a handout on this observation might therefore not be feasible.

4 b. Money to Pay Debt in Full

While the golden parachute is certainly effective in this model, it is not at all politically palatable. Furthermore, it is not clear that it could even be feasibly implemented, given that the government must observe exactly which companies were hit by any exogenous shock or else risk inducing a flood of Type I errors. A similar idea is offering money (some quantity V) to viable firms that are currently wasting time and money in Chapter 11 – either by negotiating when they could pay their debt in full, or by entering the process and hoping for a bailout – to pay their creditors in full and simply avoid bargaining altogether. This policy is undeniably easier to implement from a political economy perspective, yet whether it is efficiency enhancing is unclear. Unlike the Golden Parachute, a lump sum transfer to strong firms will have different effects depending on whether we are in Case I or Case II, since we are now attempting to siphon firms from the upper end of the spectrum instead of the lower end.

I consider here a very 'brute force' policy that attempts to induce all firms that should continue to operate ($\pi \geq K$) to pay the face value of their debt in full. The policy is one that not only attempts to prevent viable firms from attempting to secure a bailout, but also keeps firms that would have concluded a successful debt exchange offer from wasting their cash-on-hand Q in bankruptcy court. In this way, the strategy's goal is not just to fix the inefficiencies generated by the uncertain government bailout, but also the original Type III errors observed in the base case without government.

Proposition 7: *A policy of providing money to all viable firms so that they can pay their debt in full is efficiency enhancing in both Case I and Case II.*

Proof: Suppose we have the optimal transfer value V* that induces all viable firms ($\pi \geq K$) to continue operating (see Appendix E.) In Case I, all viable firms were either (1) bargaining or (2) shooting for a bailout; now, they are all paying their debt in full, saving Q for firms choosing either (1) or (2). Furthermore, not every firm that tried to secure a bailout would have been successful, meaning that there were Type II errors involved in making decision (2) – this source of inefficiency has now also been eliminated due to the transfer V*. In Case II, all viable firms were either (1) paying in full or (2) shooting for a bailout. As in Case I, inefficiencies are being prevented for firms making decision (2). Firms choosing to pay in full do not change their strategy in response to V*, so there is no efficiency gain or loss from these types. ■

Proposition 8: *A policy of providing money to all viable firms so that they can pay their debt in full leads to more wasteful government spending in Case II relative to Case I.*

Proof: This statement follows as a simple corollary to Proposition 7. All firms in Case I that receive V* make efficiency enhancing changes to their strategies. In Case II, the firms that were already paying in full simply take the handout and do not alter their strategy; there is no efficiency benefit in giving these firms V*. ■

As with the Golden Parachute policy, this strategy of announcing that any firm wishing to pay its debt in full qualifies for a subsidy from the government is feasible from an informational standpoint. The government is able to identify α and q; moreover, K and Q are public knowledge so that finding firms' cutoff values and then adjusting them by setting V* is not terribly difficult. Conversely, from a political economy perspective it is not clear whether this transfer is acceptable. Offering money to firms that are seen to have been hit by a shock might be appealing to some constituents, but others might want to see 'proof' that a company actually needs the government's help to pay its creditors. Since the firm cannot make credible claims about its profitability level, the only option for signaling that it does require help in this model is filing for Chapter 11. One might then consider a policy whereby the government provides a certain transfer to every company that chooses to enter bankruptcy negotiation only. This strategy, however, then starts to resemble the original bailout, and it seems unreasonable to suggest that one can fix the efficiency effects of one generous policy with a similar, but even more charitable, policy.

4 c. Alter $\alpha = \alpha(Q)$ by Changing Debt-Holder Protection (or, "Crime Pays")

A large source of inefficiencies in the first iteration of the model in Section 2 (without government) stems from managers' outside option in liquidation. Recall that if they decide to liquidate, mangers first announce that they are currently unable to pay their debts, then use Q to delay the seizure of the firm's assets in court and to 'steal' a fraction $\alpha = \alpha(Q)$ of the value of the capital. As previously

mentioned, this theft is not the literal carrying off of company equipment, but rather takes the form of not replenishing inventory, selling equipment, etc. Implicit in this strategy for managers is the assumption that it takes time for creditors to coordinate their suit against the firm, and that the longer it takes them to do so, the more opportunity the manager has to extract value on behalf of equity. Since the government has the power to change the bankruptcy and liquidation laws, it also has the ability to adjust how much time must elapse before the creditors are allowed to seize the firm's assets. Therefore, it seems plausible that altering the shape of $\alpha = \alpha(Q)$ to make it harder (or easier) to 'steal' through costless legislation might be an efficiency enhancing move.

I continue to assume that $\alpha < q$ in this section. It makes sense that the government would never purposefully raise α above q, since to do so would induce some viable firms to liquidate inefficiently. Making it easier for the manager to appropriate value from the firm's capital is extremely simple in the model: simply increase α while still ensuring that it is less than q.

Proposition 9: *For any given value of Q, increasing the fraction α that Q allows the manager to 'steal' will reduce Type I inefficiencies.*

Proof: Take some particular value of Q (say, Q*) that satisfies inequality (2); then there is a unique $\alpha^* = \alpha(Q^*)$. With no change in α^*, only firms with $\pi < (\alpha^*/q)K$ will choose to liquidate (in both Case I and Case II) while firms with $\pi \in [(\alpha^*/q)K, K]$ may be rescued by the government with probability q, leading to a Type I inefficiency. Moving $\alpha^* \rightarrow q$ will bring $(\alpha^*/q)K \rightarrow K$, so that in the limit all firms with profitability $\pi < K$ will now choose to liquidate and none have the potential to be rescued, eliminating all Type I errors. ■

Moreover, it should be clear that by raising the fraction of the capital value that any given Q allows the manager to 'steal,' the government is reducing wasteful spending. Weak firms that previously were making failed offers in bankruptcy court in hopes of a rescue received a bailout with probability q; obviously, such bailouts cost the government money. With those firms no longer choosing to enter Chapter 11, the government is saving the cash it would otherwise have spent saving unprofitable firms. Conversely, making it more difficult to 'steal' will have the opposite effect, inducing nonviable firms to take the next best option in Case I and Case II, which is to gun for a rescue in bankruptcy court. As one might expect, this move would increase both wasteful government spending and the number of inefficient Type I liquidations.

Although it is certainly true that making it easier for managers to ransack the capital value of their firms is not the most politically feasible option for improving efficiency in bankruptcy negotiations, in this model it is unambiguously effective. However, given the minimal literature on the subject of theft prior to liquidation and the sensitive moral and political issues involved, this

final policy recommendation is best taken as speculative food for thought rather than as a legitimate and serious strategy.

5. Conclusion

This paper has attempted to determine how the U.S. government policy of providing a rescue to only some of the large, non-bank firms that fail to restructure their debt affects the overall efficiency of the bankruptcy/liquidation procedure. Results from the theoretical model constructed suggest that this 'uncertain bailout' policy will certainly lead to more inefficiencies among firms with weak asset values, but may lead to an efficiency gain for firms with strong asset values.

For those firms with a low value of capital and a minimal quantity of cash on hand, the potential bailout will not induce high profitability types to deviate from wasting cash in bankruptcy court. Furthermore, the rescue will lead lower profitability types to be inefficiently saved more often than in the case without government, implying that the bailout has unequivocal negative effects for low asset value firms.

Conversely, for firms that have been hit by a shock to profitability but that nonetheless have valuable capital and substantial operating margins, the prospect of government intervention may or may not lead to a net gain in efficiency. This result is due to the fact that high profitability types will now avoid the wasteful bankruptcy procedure altogether, but that among firms whose post-shock profitability is not high, more of such weak firms – relative to the case without government – will be allowed to continue to operate, even though it would be more efficient to have them liquidated.

Given that any government claim that there will be no more bailouts is non-credible, this paper suggests three ways that the government can mitigate some of the induced inefficiencies from the uncertain rescue. These policies either induce managers to liquidate, or encourage more firms to pay their creditors in full. Each of these three strategies has problems from a political economy standpoint, and since the model is quite simple, they should all be treated with caution.

There are numerous ways in which the model could yield richer results with greater predictive power. Further gains in estimating the net efficiency effects of the uncertain government bailout could be made by determining the empirical relationship between a firm's value of capital and its cash-on-hand at the time of a shock. With this information, it should be possible to approximate a joint probability distribution of K and Q. One could then observe how often Case II can be expected to occur relative to Case I. Since Case II might lead to efficiency gains for the bankruptcy process while Case I always leads to a loss, determining what proportion of firms are in the Case II scenario will allow estimates of whether the uncertain government bailout is beneficial or detrimental to efficiency on the whole.

In addition, anecdotal evidence suggests that firms in the U.S. will often actively try to solicit a bailout by sending representatives to the federal government to make the company's case, even as the managers continue to negotiate with the firm's creditors. A worthy avenue for future research would thus allow firms to influence the probability of receiving a rescue through their post-shock actions – implying that the uncertain bailout would no longer be quite so uncertain.

References

Bebchuk, L. A., and H. F. Chang. 1992. Bargaining and the division of value in corporate reorganization. *Journal of Law, Economics and Organization* 8 (2): 253-279.

Baird, D. G., and R. C. Picker. 1991. A simple noncooperative bargaining model of corporate reorganizations. *The Journal of Legal Studies* 20 (2): 311-349.

Benjamin, D., and M. L. J. Wright. 2009. Recovery before redemption: A theory of delays in sovereign debt renegotiations. Working Paper. Available at SSRN: http://ssrn.com/abstract=1392539

Carapeto, M. 2005. Bankruptcy bargaining with outside options and strategic delay. *Journal of Corporate Finance* 11 (4): 736-746.

Chatterjee, S., U. S. Dhillon, and G. G. Ramirez. 1996. Resolution of financial distress: Debt restructurings via chapter 11, prepackaged bankruptcies, and workouts. *Financial Management* 25 (1): 5-18.

Denis, Diane K., and Kimberly J. Rodgers. 2007. Chapter 11: Duration, outcome, and post-reorganization performance. *Journal of Financial and Quantitative Analysis* 42, (1): 101-118.

Giammarino, R. M. (1989). The resolution of financial distress. *The Review of Financial Studies* 2 (1): 25-47.

Gilson, S. C., J. Kose, and L. H. P. Lang. 1990. Troubled debt restructurings: An empirical study of private reorganization of firms in default. *Journal of Financial Economics* 27 (2): 315-353.

Gup, B. E. 2003. *Too big to fail: Policies and practices in government bailouts*. Westport, CT: Praeger.

Jensen, M. 1986. Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 76 (2): 323-329.

Kasahara, T. 2009. Coordination failure among multiple lenders and the role and effects of public policy. *Journal of Financial Stability* 5 (2): 183-198.

Schwartz, A. 1993. Bankruptcy workouts and debt contracts. *Journal of Law and Economics.* 36 (1), 595-632.

Tashjian, Elizabeth, Ronald C. Lease, and John J. McConnell. 1996. An empirical analysis of prepackaged bankruptcies. *Journal of Financial Economics* 40 (1): 135-162.

White, M. J. 1989. The Corporate bankruptcy decision. *Journal of Economic Perspectives* 3: 129-151.

White, M. J. 1994. Corporate bankruptcy as a filtering device: Chapter 11 reorganizations and out-of-court debt restructurings. *Journal of Law, Economics, and Organization* 10 (2): 268-295.

Wruck, K. H. 1990. Financial distress, reorganization, and organizational efficiency. *Journal of Financial Economics, 27*(2): 419-444.

Appendix A: Solving the case without government

- Debt holders will accept any offer x as long as $x \geq K$, and reject any x such that $x < K$.
- Knowing this rule, the firm will offer $x = K$ to maximize $\pi - x$ if it chooses to bargain.
- The firm will thus opt for negotiation as long as
  - $\delta(\pi - K) \geq \alpha K$ and
  - $\delta(\pi - K) \geq Q + \pi - D$
- Which simplifies to
  - $\pi \geq [1 + \alpha/\delta]K$ and
  - $\pi \leq [D - Q - \delta K]/(1 - \delta)$
- So there are three different unique equilibria possible based on the realization of firm type:
  - The firm liquidates if $\pi < [1 + \alpha/\delta]K$
  - The firm pays the debt in full if $\pi > [D - Q - \delta K]/(1 - \delta)$
  - The firm chooses to bargain if $[1 + \alpha/\delta]K \leq \pi \leq [D - Q - \delta K]/(1 - \delta)$

Appendix B: Deriving the cutoff value of δ in Figure 2.

- The cutoff value of δ will occur exactly where firms are indifferent between liquidating and bargaining.
- So set $[1 + \alpha/\delta^*]K = [D - Q - \delta^* K]/(1 - \delta^*)$
- Solving for δ algebraically, we get that
  - $\delta^* = (1 + \alpha)K/[D - Q + \alpha K]$
- This number is greater than zero since $D > Q$ by assumption.
- Now $K + Q < D$ implies that $D - Q > K$. So then
  - $\delta^* < (1 + \alpha)K/[K + \alpha K] = 1$
- So we have the value for δ^*, and can be sure that as long as inequality (2) is assumed to hold, it will be between 0 and 1 for any values of the parameters D, Q, K and α.

Appendix C: Solving the case with government

- Since q is exogenous and we assume both managers and debt holders to be risk neutral, the bailout subgame collapses into one set of payoffs in expected value.
- That is, rejection will net the firm $q\pi$ and the debt holders $qD + (1 - q)K$
- So if the debt holders accept the offer they receive x, and if they reject, they get $qD + (1 - q)K$
- The debt holders' rule is thus
  - Accept if $x \geq qD + (1 - q)K$
  - Reject if $x < qD + (1 - q)K$
- Now, firm payoffs depend on the size of their offer, assuming they have chosen to bargain.
  - If $x \geq qD + (1 - q)K$, receive $\pi - x$
  - If $x < qD + (1 - q)K$, receive $q\pi$
- Since the payoff from any $x > qD + (1 - q)K$ is strictly dominated by the equality, the firm offers $x = qD + (1 - q)K$ iff
  - $\pi - [qD + (1 - q)K] \geq q\pi$
    $(1 - q)\pi \geq qD + (1 - q)K$
    $\pi \geq [K + q(D - K)]/(1 - q)$
- And offers $x < qD + (1 - q)K$ iff
  - $\pi < [K + q(D - K)]/(1 - q)$

At this stage in the analysis we add an additional restriction on the parameters: we assume that the fraction of capital that the manager can appropriate is less than the probability of a bailout, that is, $\alpha < q$.

- Now, if $\pi \geq [K + q(D - K)]/(1 - q)$, will the firm ever liquidate?
  - Liquidate if $\alpha K \geq \pi - [qD + (1 - q)K]$
  - Rearranged, liquidate if $\pi \leq (1 + \alpha)K + q(D - K)$
  - Equating $[K + q(D - K)]/(1 - q)$ and $(1 + \alpha)K + q(D - K)$ leads to $(\alpha - q - q\alpha)K = q^2(D - K)$ which is impossible since $\alpha < q$ but $D > K$
- If $\pi < [K + q(D - K)]/(1 - q)$, will the firm ever liquidate?
  - Liquidate if $\alpha K \geq q\pi$
  - Rearranged, liquidate if $\pi \leq (\alpha/q)K$
  - And $(\alpha/q)K < [K + q(D - K)]/(1 - q)$, so there is no contradiction
- However, we still must consider whether or not any firm will choose to pay in full
- If $\pi \geq [K + q(D - K)]/(1 - q)$, will the firm pay in full?
  - Pay in full if $Q + \pi - D \geq \pi - [qD + (1 - q)K]$
  - Rearranged, pay in full if $Q + (1 - q)K \geq (1 - q)D$, which is exogenous and may or may not be true
- If $\pi < [K + q(D - K)]/(1 - q)$, will the firm pay in full?
  - Pay in full if $Q + \pi - D \geq q\pi$
  - Rearranged, pay in full if $\pi \geq (D - Q)/(1 - q)$
  - And it will be the case that $(D - Q)/(1 - q) < [K + q(D - K)]/(1 - q)$ if and only if $Q + (1 - q)K > (1 - q)D$

Appendix D: Proof of proposition 4.
By $K < D$ and $\alpha < q$, it is once more the case that the new upper cutoff value is quite high relative to the upper cutoff in the base case:
$(1 + \alpha)K < [D - Q]/(1 - q)$

So among firms with $\pi > K$, firms with $\pi \in [K, \{D - Q\}/(1 - q)]$ are attempting to shoot for a bailout by making unreasonable offers in bankruptcy court. The length of the interval of viable firms make unreasonable offers is $[D - Q - (1 - q)K]/(1 - q)$, and the length of the interval of viable firms that is liquidated is thus $D - Q - (1 - q)K$. By the inequality unique to Case II, $D - Q - (1 - q)K > qD$. As before, $qD > \alpha K$, so there is a greater probability in the case with government that a firm with $\pi > K$ will get liquidated.

However, it is also the case here that high range firms are now being induced to pay in full, where before they would have chosen to bargain. Every firm that chooses "pay in full" instead of "bargain" will save the cash-on-hand value, Q. Without knowing more about the distribution F from which π is drawn, it is impossible to say whether these savings outweigh the efficiency losses from the increased number of efficient firms that are liquidated (and the increased number of inefficient firms that are saved.)

Appendix E: Deriving the optimal transfer value for inducing all viable firms to pay in full (see Proposition 7.)

- Let V be the value of the transfer.
- Assume that $Q + V + (1 - q)K \geq (1 - q)D$.
  - This assumption is automatically true for Case II (since $Q + (1 - q)K \geq (1 - q)D$ implies that $Q + V + (1 - q)K \geq (1 - q)D$)
  - It will also be consistent for Case I, where $Q + (1 - q)K < (1 - q)D$
- Given the assumption, firms with $\pi > [D - (Q + V)]/(1 - q)$ will choose to pay in full.
- Then equate $[D - (Q + V)]/(1 - q) = K$ to find V*
  - Rearranging, $V^* = D - Q - (1 - q)K > 0$ by inequality (2)

Note that even though the value in terms of parameters is the same for both Case I and Case II , V* is actually larger in Case I than in Case II