North American Journal of Economics and Finance xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

North American Journal of Economics and Finance

journal homepage: www.elsevier.com/locate/najef

Investment-cash flow sensitivity and the Bankruptcy Reform Act of 1978☆

Emmanuel Alanis*, Margot Quijano

Department of Finance and Economics, McCoy College of Business Administration, Texas State University, United States

ARTICLE INFO

JEL classification:
G30
G31

Keywords:
Corporate investment
Cash flow sensitivity
Bankruptcy

ABSTRACT

We exploit a change in bankruptcy law in 1978 in the U.S. as an exogenous shock that increased the cost of external funds for public companies. In a quasi-natural experiment setting, we investigate the impact of an increased cost of debt on the investment-cash flow sensitivity of firms. Our results show that the sensitivity of investment to cash flow increased by one third after 1978, and for a sample of firms likely to be more financially constrained the effect was as high as 80%. Our findings suggest the market value of a dollar in cash holdings increased by 12 cents after the change in law, with a larger effect for financially constrained firms.

1. Introduction

We exploit a change in bankruptcy law in 1978 in the U.S. as an exogenous shock that increased the cost of external funds for public companies. In a quasi-natural experiment setting, we investigate the impact of an increased cost of debt on the investment-cash flow sensitivity of firms.

The interaction between investment and financing decisions is of major importance in corporate finance. In a Miller-Modigliani type world, these two decisions are independent; all positive net present value projects are funded with either internal or external funds, which are perfect substitutes. It is now well understood that issuance costs, agency conflicts, and information problems drive a wedge between the cost of internal and external funds, and make the financing and investment choice interdependent (Stein, 2003).

An important issue that has received much attention in the literature is the sensitivity of investment to internally generated cash flow. If a wedge exists between internal and external funds, it seems natural that firms will use internal cash flow to finance investment as much as possible. However, empirical estimates of the investment-cash flow sensitivity suffer a myriad of challenges. Proxies for the unobservable investment opportunity set of firms are inherently noisy, and cash flow is probably correlated with investment opportunities.

Moreover, previous literature beginning with Fazzari, Glenn Hubbard, and Petersen (1988) has emphasized cross sectional comparisons of investment-cash flow sensitivities under the argument that more financially constrained firms will exhibit a higher sensitivity of investment to cash flow. Kaplan and Zingales (1997) criticize this approach and with a simple one-period model of investment show that the sensitivity may not be monotonically increasing in the degree of financing constraints in the cross section. Furthermore, Kaplan and Zingales (1997) argue that disentangling the effect of financing constraints from other firm-specific factors is challenging in the cross section.

☆ We thank John Holland, Alain Krapl, Jim LeSage, John Wald, and seminar participants at the Financial Management Association annual meeting, Global Finance Conference, and at Texas State University for comments and suggestions. All errors are our own.

* Corresponding author.
E-mail addresses: e.alanis@txstate.edu (E. Alanis), mq11@txstate.edu (M. Quijano).

https://doi.org/10.1016/j.najef.2018.08.004
Received 19 March 2018; Received in revised form 30 July 2018; Accepted 6 August 2018

We study the investment-cash flow sensitivity of firms under a different framework that is able to steer clear of those major criticisms. We exploit a quasi-natural experiment in the Bankruptcy Reform Act (BRA) of 1978 which dramatically altered bankruptcy proceedings in the U.S. by granting debtors substantial bargaining power during the reorganization process (LoPucki, 1995). This landmark reform increased the wedge between internal and external funds for firms, as it made debt more expensive by lowering the rights of creditors under bankruptcy.

We exploit this switch in regulation to study the change in investment-cash flow sensitivity in the time series to an increase in the cost wedge between internal and external funds. We sidestep the Kaplan and Zingales (1997) critique as we are able to control for firm-specific time invariant factors and the faulty proxies for investment opportunities do not bias our results since the BRA did not affect firms' investment opportunities but rather their financing choices.

Using a panel of firms from 1974 to 1982 (excluding 1978 when the reform was signed) we find that the investment-cash flow sensitivity of the average firm increased by about one third after the BRA was enacted. For the average firm in our sample, a one standard deviation increase in cash flow augmented investment by about 25% prior to the bankruptcy code change, and by 35% afterwards.

For a sample of firms more likely to be financially constrained the effect is more dramatic. For firms in the bottom tercile of tangibility the sensitivity of investment to cash flow increased by over 80%. We believe our findings can be interpreted as causal evidence that firms respond to an increase in the cost wedge of external funds by relying more heavily on their internal generated cash flow, and financing constraints play an important role in the investment decision of firms.

We also study if the value assigned by the stock market to cash holdings of firms changed after the BRA. Faulkender and Wang (2006) argue cash reserves allow companies to fund future projects without the need for external funds as well as protect companies from financial distress by allowing them to better absorb negative shocks. Since the BRA turned internal funds more important for investment projects, and at the same time it made financial distress more expensive by imposing larger expected loses on creditors, we investigate if the value of cash increased after the BRA. Using the methodology of Faulkender and Wang (2006), we find that shareholders value one dollar of cash holdings 12 cents higher after the BRA, and for firms likely to be more financially constrained the effect is over 20 cents higher.

The BRA presents an adequate framework for this study since it altered bankruptcy proceeding in profound ways (White, 1983). In particular, the BRA introduced the possibility of strategic default where a firm can file for Chapter 11 protection even though the firm is still solvent. Further, the reform tilted bargaining power toward the shareholders in the reorganization process by granting them an exclusivity period to propose a plan out of bankruptcy, and new voting mechanisms aligned closer the interest of junior debt holders with equity holders (White, 1989). The new bargaining process resulted in more deviations from the Absolute Priority Rule.[1] Larger expected losses after default for creditors coupled with the strategic default possibility resulted in an increase in the cost wedge between internal and external funds for firms.[2]

The BRA impacted the financing choices of firms leaving their investment opportunity set unchanged and thus represents a favorable setting to establish the causal effect of financing constraints on the investment-cash flow sensitivity.

Our paper contributes to the broad literature on corporate investment and financing frictions. In their seminal study Fazzari et al. (1988) find that the investment rate of firms is sensitive to cash flow, violating the Miller-Modigliani assumption, and firms that ex-ante seem to be more financially constrained have higher investment-cash flow sensitivity. Several papers question this interpretation, such as Kaplan and Zingales (1997) and Erickson and Whited (2000). More recently, Chen and Chen (2012) show that the average investment-cash flow sensitivity seems to be declining through the years, and they interpret this as evidence that this sensitivity does not reflect financing constraints. Choi, Chung, and Liu (2018) show that the investment-cash flow sensitivity can be impacted by variables unrelated to financing constraints, such as CEO characteristics.

Other empirical studies, however, find firms respond to cash flow shortfalls by reducing investment. Rauh (2006) uses deficits in pension assets in a regression discontinuity design and finds that firms reduce investment by about 60 cents for every dollar in mandated pension contributions. Almeida and Campello (2007) find that investment-cash flow sensitivities correlate with firm's tangible assets, suggesting firms with less pledgeable assets are more dependent on internal cash flow.

Prior literature has documented other factors that can influence the investment-cash flow sensitivity. Malmendier and Tate (2005) show that personal traits of a company's chief executive officer (CEO), such as overconfidence, can affect their sensitivity. Choi et al. (2018) expand on their analysis to document that a CEO's prior successes in firm operations can also impact the investment-cash flow sensitivity. Our paper remains silent about these other factors that can affect the investment-cash flow sensitivity; however, by exploiting the passage of the BRA as a quasi-natural experiment, our identification relies on the change created by the law. Our findings are robust to these other factors unless they also suffered a sharp effect around the same time as the BRA. It is unclear to us that this would be the case.

Our findings in this paper contribute to this literature by showing that an increase in the cost wedge between internal and external funds increase the investment-cash flow sensitivity. Our setup allows for a causal interpretation of our results and lets us sidestep common empirical criticisms in this literature.

[1] Under Absolute Priority Rule (APR) distributions in bankruptcy must follow strict priority. Senior claimants must be made whole before junior claims can receive any distributions, and residual claimants, such as common shareholders, only receive a distribution if all other classes have been paid in full.

[2] It is possible firms may switch to more equity financing after the BRA due to an increased in the cost of debt, but this would still represent an increase in the wedge between internal and external funds.

The rest of this paper is organized as follows. Section 2 describes the BRA and its main innovations in bankruptcy law. Section 3 presents a simple one-period model of investment similar to the one in Kaplan and Zingales (1997) and shows how an increase in the cost of external funds affects the investment-cash flow sensitivity. Section 4 describes our methodology while our empirical results are contained in Section 5, then we provide some concluding remarks in Section 6.

2. The Bankruptcy Reform Act of 1978

On November 6, 1978, President Jimmy Carter signed the BRA into law, replacing as of October 1, 1979, the Chandler Act of 1938. Posner (1997) explains that bankruptcy law under the Chandler Act was cumbersome and ambiguous, and for this reason creditors and bankruptcy lawyers lobbied for a reform of the bankruptcy code.

The legislative history of the BRA spanned more than a decade, and as Klee (1979b) explains, the political process was quite contentious. The House of Representatives initially voted down the bill that would become the BRA. Even two weeks before the president signed the BRA into law, the chairman of the Securities and Exchange Commission (Harold M. Williams) and the Chief Justice of the Supreme Court (Warren Burger), in his role as chairman of the Judicial Conference of the United States, urged the president to veto the law. Due to the complexity of the codification and uncertainty of the political process even very close to the actual passage of the law, it was hard for economic agents to foresee all effects of the reform.

Liquidation proceedings were for the most part unchanged by the BRA, but reorganization under Chapter 11 was amended considerably (White, 1983). There are several procedures for formulating a reorganization plan that differ considerably from the pre-1978 bankruptcy code (see Klee, 1979a; White, 1983).

First, under Chapter 11 the debtor-in-possession maintains control of the firm's operations and management enjoys a 120 day exclusivity period to propose a reorganization plan for the company's assets and claims. In principle, the exclusivity period was limited to 120 days to prevent equity holders from abusing it to dilute creditor claims. In practice, extensions to this exclusivity period were very commonly observed. Kerkman (1987) states that creditor rights implemented in the law were poorly enforced by bankruptcy judges, while LoPucki (1983) notes that judges were reluctant to terminate exclusivity periods and debtors were successful in dictating the terms of the reorganization to creditors.

Second, under the old code, a reorganization plan had to be approved by majority vote of all unsecured creditor classes. In contrast, the BRA requires a different scheme of voting to confirm a reorganization plan. The first is a vote in favor of the plan by a two-thirds majority of holdings by each debt class together with at least one-half in number of debt claimants. For equity, the required voting is two-thirds in amount. As White (1989) mentions, reorganization under the BRA provides for a different division of the firm's assets than Absolute Priority Rule (APR) since every class must have an incentive to vote in favor of the plan.

Third, a novelty of Chapter 11 was the introduction of the"cramdown" reorganization. If no reorganization plan can be agreed upon by debtors and creditors, under cramdown reorganization the firm continues to operate while a buyer is sought for all or part of it as a going concern (Klee, 1979a). Cramdown plans are subject to court–mandated discount rates and usually result in higher transaction costs since the court requires appraisals by outside experts. Since cramdown reorganization is complicated and costly, it is regarded as a disciplinary tool in negotiations.

Fourth, the conditions under which firms can voluntarily file for Chapter 11 were profoundly changed by the BRA. The pre-1978 law required a firm to be insolvent in order to file for bankruptcy. Bradley and Rosenzweig (1992) note that under the BRA a debtor does not require to be insolvent in order to qualify for Chapter 11 protection, and, in fact, a company may file for bankruptcy for any legitimate business purpose. This important change in the law enabled debtors to use the threat of Chapter 11 as a strategic tool against creditors. In terms of the credit risk literature, it created the strategic default where a firm can file for bankruptcy even though its asset value is above the insolvency boundary.

The intention of the BRA was to balance the rights of creditors and debtors. However, debtors were effectively able to use the new bankruptcy legislation to advance their own interests. LoPucki (1995) argues that in retrospective, Chapter 11 gave debtors more control than necessary or appropriate. The exclusive right to propose a reorganization plan combined with the modified voting procedures and the threat of a cramdown placed management and equity holders in a better bargaining position relative to the pre–1978 code. Under the BRA, creditors are more willing to accept a plan that violates absolute priority in favor of equity, or give up part of their claims in out-of-court restructuring to avoid bankruptcy filing altogether.

2.1. BRA and the cost of external financing

Under the BRA, the reorganization value of the firm is the end result of a bargaining process between managers, equity holders, and different classes of creditors. This bargaining game relaxed adherence to APR, which states that distributions in bankruptcy need to make whole senior creditors before junior claimants or equity holders receive any distributions. Several empirical papers document APR violations as a result of the BRA (see Franks & Torous, 1989; Eberhart, Moore, & Roenfeldt, 1990; Weiss, 1990). LoPucki and Whitford (1990) show considerable distributions to equity holders of insolvent large, public companies as a consequence of bankruptcy reorganization. They argue that payments made to equity are not justified by financial or legal considerations but result from the improved bargaining position of equity in Chapter 11. Moreover, Franks and Torous (1989) establish that creditors are willing to accept large APR deviations in distressed exchanges to avoid bankruptcy filing.

As Acharya and Krishnamurthy (2009) note, the BRA made the US bankruptcy code one of the most debtor-friendly codes among advanced economies at the time. The possibility of strategic default combined with larger expected violations of APR after default lead to a higher cost of debt for firms. In structural credit risk models, such as Leland and Toft (1996) and Fan and Sundaresan (2000),

Table 1
Number of bankruptcy filings by year.

Year	Total filings	Chapter 7	Chapter 11
1976	246,549	209,067	3235
1977	214,399	181,194	3046
1978	202,951	168,771	3266
1979	226,476	183,259	3042
1980	210,359	159,346	4119
1981	360,327	265,721	7823
1982	367,858	255,095	14,058
1983	374,726	251,319	21,206

This tables lists the total number of bankruptcy filings, as well as Chapter 7 and Chapter 11 filings, per year. Source: The Administrative Office of the United States Courts – Table F-2.

Table 2
Bond issues around BRA.

	Before BRA			After BRA			
	Mean	Median	Obs.	Mean	Median	Obs.	Avg. Difference
Yield Spread (b.p.)	114.28	98.00	343	185.18	164.00	407	70.90*
Maturity (years)	21.54	20.00	343	20.65	20.00	407	−0.89*
Total Assets (mill.)	2002	1108	343	3696	2204	407	1693*
Leverage	0.40	0.44	343	0.36	0.38	406	−0.04*
Sales Growth	0.19	0.16	266	0.20	0.17	403	0.01

This table presents descriptive statistics for public corporate bonds issued between 1974 and 1982, excluding 1978. *Yield Spread* is the spread in yield to maturity, in basis points, between the corporate bond and a Treasury bond of comparable maturity. *Maturity* is the bond maturity, in years, at issuance. *Total Assets* is the total book value of assets, in millions of real dollars, of the bond issuer. *Leverage* is book leverage, and *Sales Growth* is the one year growth in sales. *Before BRA* represents bonds issued prior to 1978, while *After BRA* represents bonds issued after 1978. The last column represents the average difference between the Before and After period. The superscript * indicates that the difference is significant at the 5% significance level.

allowing for strategic default increases the probability of nonpayment by raising the default boundary. In addition, potentially lower recovery rates after bankruptcy due to APR violations, increases yield spreads on bonds since debtors cannot credibly commit to not engage in strategic default or bargain in bankruptcy.

In Table 1 we present the number of total bankruptcy filings by year, and in specific the number of Chapter 7 (liquidation) and Chapter 11 (reorganization) filings. After the enactment of the BRA, the number of total filings increases sharply and, in particular, the number of reorganization filings grows substantially. This evidence is consistent with more debtors taking advantage of the new bankruptcy regime, especially the opportunity to reorganize under Chapter 11.

As mentioned above, there is ample evidence in the bankruptcy literature of APR violations after the passage of the BRA. Together with the possibility of strategic default, we argue the end result for firms is a higher cost of debt. In Table 2 we show descriptive statistics for public corporate bonds issued around the BRA along with firm characteristics for the issuers. We obtain information from Mergent's Fixed Income Securities Database for all non-convertible, non-asset backed, public corporate bonds with fixed coupon rate issued between 1974 and 1982; firm characteristics are from Compustat. We exclude all observations for 1978 since this is the year when the reform was enacted.

We separate our sample into bonds issued prior to the signing of the BRA, and those issued afterward. We compute the yield spread as the difference between the bond's yield to maturity and the yield on a Treasury bond of comparable maturity.[3] We observe that the yield spreads increase by about 70 basis points on average for bonds issued after the BRA, and this difference is statistically significant at the 5% level from an unpaired t-test.

It is possible that the wider yield spreads are a function of different bond characteristics or riskier issuers in the BRA period. However, we do not observe that in the data. The maturity of the bonds in the period after the BRA signing is about a year shorter on average (equally long on the median), suggesting that the yield spreads did not increase due to a lengthening in bond tenor.

Moreover, firm characteristics suggest that issuers were actually less risky in the post period. Firms that issued bonds after the BRA was signed were on average bigger, with lower leverage, and higher annual sales growth. Evidence in this table suggests that the increase in bond yield spreads was not due to longer bond terms nor riskier issuers. This finding is consistent with an endogenous sample selection, where after the enactment of the BRA the cost of external financing for firms increases and, on average, it is the bigger, safer firms that obtain debt financing.

[3] We use yields on Treasury bonds of 1, 2, 3, 5, 7, 10, 20, and 30 years, and linearly interpolate to complete the rest of the yield curve. The 30 year Treasury bond was first issued on February 1977, prior to this date we use the 20 year Treasury yield for all longer corporate bond maturities.

3. Model

To identify the effect of a change in bankruptcy code on investment, we make use of the simple one-period model from Kaplan and Zingales (1997).

Consider a firm that chooses the level of investment to maximize profits. The return to an investment, I, is given by the production function $f(I)$. The technology $f(\cdot)$ satisfies standard functional assumptions so that $f'(\cdot) > 0$ and $f''(\cdot) < 0$. Investment can be financed with internal funds (W) or external funds (E). For simplicity, set the discount rate to 1.

Due to information or agency problems, assume there is a cost to raising external funds, which we represent as $C(E, \kappa)$ where E is the amount of external funds raised and κ is a measure of the firm's wedge between internal and external costs of funds. We parameterize this cost function as $C(E, \kappa) = \frac{1}{2}\kappa E^2$ so that the cost is convex in the amount of funds raised.

The firm chooses its investment level I to maximize

$$\max_I f(I) - I - \frac{1}{2}\kappa E^2, \text{ subject to} \tag{1}$$

$$I \leqslant W + E \tag{2}$$

The first-order condition to this problem is given by

$$f'(I) = 1 + \kappa(I - W) \tag{3}$$

The effect of internal funds on investment can be obtained by implicit differentiation of (3),

$$\frac{\partial I}{\partial W} = \frac{\kappa}{\kappa - f''} > 0 \tag{4}$$

Under imperfect capital markets where $\kappa > 0$, investments are sensitive to internal funds. In a Miller-Modigliani world, where $\kappa = 0$, they are not.

Kaplan and Zingales (1997) show that while financially constrained firms should be sensitive to internal cash flow – and financially unconstrained firms should not –, it is not necessarily true that the magnitude of the sensitivity increases in the degree of financing constraint.

We argue that the Bankruptcy Reform Act of 1978 represents a quasi-exogenous change in κ, the cost wedge between internal and external funds. The change in investment-cash flow sensitivity with respect to an increase in the cost wedge is given by the cross partial derivative,

$$\begin{aligned} \frac{\partial^2 I}{\partial W \partial \kappa} &= \frac{1}{\kappa - f''} - \frac{\kappa}{(\kappa - f'')^2} \\ &= \frac{-f''}{(\kappa - f'')^2} > 0 \end{aligned} \tag{5}$$

In our empirical analysis we test if the investment-cash flow sensitivity is raised after the change in bankruptcy code. By exploiting the BRA as a quasi-natural experiment, we believe our setup is clear of the Kaplan and Zingales (1997) critique. The exogenous change allows us to better disentangle the effect of financing constraints from a firm-specific effect on the level of investment. Moreover, the change in sensitivity after the enactment of the act can be reasonably attributed to a change in financial constraints, as shown in Eq. (5).

4. Empirical specification and sample selection

The sample period for our empirical analyses ranges from 1974 to 1982. We drop all observations for 1978 since this was the year when the BRA was signed into law, so our sample comprises four years before and after the change in bankruptcy code.[4]

Annual accounting data is from Compustat's North America database. We drop all firm-years that have negative total assets (Compustat item *at*), sales (*sale*), or capital stock (*ppent*). We exclude financial firms (SIC code 6000-6999), regulated utilities (SIC 4900-4999), and public service firms (SIC greater that 9000). We discard firm-years with real asset or sales growth of over 100%. A firm is included only if it has data in the period before and after the bankruptcy reform. Our final sample comprises 17,837 firm-year observations.

4.1. Methodology

Fazzari et al. (1988) and Kaplan and Zingales (1997) represent the seminal empirical studies in the investment-cash flow sensitivity literature. We follow these papers and estimate corporate investment as a function of investment opportunities and cash flow. To estimate the impact of the BRA on investment, we create an indicator variable and allow the impact of investment opportunities and cash flow to differ in the periods before and after the BRA signing. We estimate the model

[4] Our results remain qualitatively similar if we use three or five year before and after the law change.

$$\frac{I_{t+1,i}}{K_{t,i}} = \eta_{t+1} + \alpha_i + \beta_1 Q_{t,i} + \beta_2 \frac{CF_{t+1,i}}{K_{t,i}} + \beta_3 Q_{t,i} \times After + \beta_4 \frac{CF_{t+1,i}}{K_{t,i}} \times After + \varepsilon_{t+1,i} \quad (6)$$

where I is investment, K is the capital stock, investment opportunities are represented by Q, CF is cash flow, and *After* is an indicator variable equal to 1 after 1978.

Previous literature has estimated the impact of financing constraints on investment by comparing the cash flow coefficient β_2 cross sectionally between groups of firms more or less likely to be constrained. Kaplan and Zingales (1997) criticize this approach as uninformative and use their one-period model to show that the magnitude of cash flow coefficient may not increase monotonically with financing constraints in the cross section. We sidestep this issue by exploiting the BRA as an exogenous shock to the cost of external financing and find its impact on the cash flow coefficient in the time series. Moreover, we are able to control for time invariant unobserved firm characteristics by including a firm fixed effect (α_i). As Kaplan and Zingales (1997) note, in cross sectional estimation the effect of financing constraints may be entangled with firm-specific time invariant effects since the latter are slow moving through time as well.[5]

Our simple model in Section 3 shows that an increase in the cost of external funds should raise the investment-cash flow sensitivity as a consequence of tighter financing constraints. Thus, our relevant test is for β_4 to be positive.

We define the rate of investment as the ratio of capital expenditures (*capx*) minus the sales of property, plant, and equipment (*sppe*) to the firm's start of period capital stock (lag of *ppent*). Cash flow is defined as the ratio of income before extraordinary items (*ib*) plus depreciation (*dp*) to the start period capital stock. Our proxy for investment opportunities is Tobin's q defined as the market-to-book ratio of assets. We note that given our time period, unlike recent papers such as Lewellen and Lewellen (2016), we are not able to use accounting variables from the Statement of Cash Flows and instead rely on the Balance Sheet and Income Statement.

Table 3 presents descriptive statistics for our main variables. Variables are winsorized at the 1% tails of the distribution to lessen the impact of outliers. Firms in our sample are large on average sales close to a billion in real dollars, though the distribution is largely skewed. Firm's annual investment rate is on average 24% of their capital stock, and Tobin's q is larger than unity at the mean, suggesting valuable investment opportunities. Our sample of firm–years has a payout rate (dividends plus repurchases over net income) of 39% on average, though at the first quartile the payout rate is close to zero.

5. Results

Table 4 presents estimation results of Eq. (6). As benchmark, in model 1 we do not interact the cash flow and Tobin's q with our indicator variable for the period after the bankruptcy code change. Results are in line with previous literature. The coefficient for Tobin's q is positive and statistically significant, suggesting firms with valuable growth opportunities invest more.

The coefficient for cash flow is positive and statistically significant. The point estimate is comparable to previous literature, Baker, Stein, and Wurgler (2003) report investment-cash flow sensitivities around 0.15 for a panel of firms from 1980 to 1999, while Rauh (2006) reports estimates of 0.11. Our estimates suggest that a firm with one more dollar in cash flow will increase its investment by about 0.18.

In a Miller-Modigliani framework with perfect information, internal cash flow should not have an impact on investment, all that would be relevant are investment opportunities. All positive net present value projects would be undertaken, either with internal or external funds. Fazzari et al. (1988) argue the positive cash flow coefficient represents financing frictions. On the other hand, Erickson and Whited (2000) question this interpretation, they argue that the proxy for the unobservable investment opportunities – the market-to-book ratio of assets – has substantial amount of noise. It seems reasonable that firms with better investment projects also have higher cash flows, and the positive coefficient for cash flow may actually reflect such better investment opportunity set.

In our framework, the noise contained in the proxy for investment opportunities should not bias our results as long as the signal-to-noise ratio in Tobin's q is uncorrelated with the change in bankruptcy law. Given that the BRA is largely exogenous to firms' potential investment projects, we believe our estimates should reflect firms' response to tighter financial conditions.

In model 2 of Table 4 we allow for the impact of Tobin's q and cash flow to be different after the signing of the BRA. The interaction between cash flow and the indicator for years after the BRA is positive and statistically significant at the 1% level. We interpret this increase in the investment-cash flow sensitivity to be a result of the BRA which increased the cost of external funds. The economic significance of the estimates is nontrivial, the point estimate indicates that the investment-cash flow sensitivity increases by about one third after the BRA. Before the change in bankruptcy code, one standard deviation increase in cash flow would increase investment for the average firm by 25%; after the BRA, a one standard deviation increase in cash flow raises investment for the average firm by 35%.

The sensitivity of investment to Tobin's q is unchanged after the bankruptcy code change. We believe this provides indirect evidence that the BRA did not affect the investment opportunity set of firms, but rather only the cost of external funds.

In model 3 we estimate Eq. (6) with a different proxy for investment opportunities used by other studies, such as Fazzari et al. (1988). This proxy is referred to as Macro q in Chava and Sudheer (2008) or q^{FHP} in Erickson and Whited (2012). This proxy measures investment opportunities in the capital stock, while the market-to-book ratio does for total assets.

q^{FHP} is constructed as the sum of the book value of debt plus the market value of equity minus the book value of current assets, all

[5] Choi et al. (2018) document that CEO characteristics, such as overconfidence or prior successes in firm operations, can impact the investment-cash flow sensitivity in both financially constrained and unconstrained firms. Our fixed effects estimation controls for these unobserved characteristics as long as they remain invariant during the BRA.

Table 3
Summary statistics.

	Mean	Median	Std. Dev.	25^{th}	75^{th}	Observations
Sales	998.59	178.87	4002.65	62.51	570.56	17,837
Investment	0.24	0.19	0.20	0.11	0.30	17,837
Cash flow	0.39	0.31	0.40	0.19	0.49	17,837
Tobin's q	1.11	0.92	0.65	0.78	1.19	17,837
Tangibility	0.56	0.57	0.07	0.53	0.60	17,651
Payout ratio	0.39	0.24	4.43	0.03	0.42	17,837

This table presents descriptive statistics for variables used in this study. The sample period is from 1974 to 1982 and all firm observations for 1978 are dropped. *Sales* (Compustat item *sale*) are in millions of real dollars. *Investment* is the ratio of capital expenditures (*capx*) minus sales of property, plant, and equipment (*sppe*) to the start of period capital stock (*ppent*). *Cash flow* is the ratio of income before extraordinary items (*ib*) plus depreciation (*dp*) to the start of period capital stock. *Tobin's q* is the market value of assets (*at* + *csho*prcc_f-ceq-txdb*) to the book value of assets (*at*). *Tangibility* is the expected liquidation value of assets computed as Almeida and Campello (2007). The *Payout ratio* is the ratio of common and preferred dividends (*dv* + *dvp*) plus stock repurchases (*prstkc*) to income before extraordinary items (*ib*). All dollar figures are deflated by the Consumer Price Index.

Table 4
Effect of bankruptcy change on investment.

	Model 1		Model 2		Model 3	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
Cash Flow	0.178^{**}	(17.30)	0.155^{**}	(12.77)	0.164^{**}	(13.82)
Tobin's q	0.056^{**}	(11.81)	0.057^{**}	(11.05)		
q^{FHP}					0.004^{**}	(3.28)
Cash flow × After			0.055^{**}	(4.06)	0.053^{**}	(4.09)
Tobin's q × After			−0.004	(−0.58)		
q^{FHP} × After					−0.001	(−0.37)
Year Effects	Yes		Yes		Yes	
Firm Effects	Yes		Yes		Yes	
R^2	0.12		0.13		0.12	
Observations	17,837		17,837		17,648	

This table presents regression results analyzing the impact of the Bankruptcy Reform Act of 1978 on investment. Estimates are from the investment regression $\frac{I_{t+1,i}}{K_{t,i}} = \eta_t + \alpha_i + \beta_1 Q_{t,i} + \beta_2 \frac{CF_{t+1,i}}{K_{t,i}} + \beta_3 Q_{t,i} \times After + \beta_3 \frac{CF_{t+1,i}}{K_{t,i}} \times After + \varepsilon_{t+1,i}$, where $I_{t+1,i}$ is investment, $Q_{t,i}$ is Tobin's q or q^{FHP}, $CF_{t+1,i}$ is firm cash flow, $K_{t,i}$ is the capital stock, *After* is a dummy variable equal to 1 for years after 1978. The sample period is from 1974 to 1982 and all firm observations for 1978 are dropped. Variable definitions are presented in Table 3. Heteroskedasticity robust t-statistics clustered at the firm level are in parentheses. The superscripts ** and * indicate significance at the 1% and 5% level, respectively.

divided by the capital stock. Erickson and Whited (2000) argue that q^{FHP} contains a lower noise-to-signal ratio. In addition, by using q^{FHP} we are normalizing all variables by the same deflator, the capital stock. However, as Erickson and Whited (2012) note, q^{FHP} has two undesirable features. It does not account for intangible assets and, more importantly, it is not bounded to be positive. In our sample, we find some firm – years with a negative value of q^{FHP} – obviously inconsistent with the investment opportunity set. For this reason we prefer to use the market-to-book ratio as our primary measure but present q^{FHP} as a robustness check.

We observe similar results in model 3. The investment-cash flow sensitivity grows after the bankruptcy law change, the effect is statistically significant at the 1% level and the quantitative result is mostly unchanged.

In unreported results, we repeat our analysis when we also exclude observations from 1977, in the event firms had already formed expectations about the signing of the BRA and changed their corporate policies earlier. Our results are quantitatively unchanged.

5.1. Cross sectional measures of financing constraints

In this section we look at cross sectional differences between firms and investigate if the increase in cost of external funds from the BRA affected some type of firms more than others.

We split our sample by firm characteristics that suggest a firm may be financially constrained or face difficulties accessing debt markets. There is no observable firm characteristic that can show unequivocally a firm is financially constrained, thus, we follow previous literature and use three variables that can proxy for financial constraints and analyze the overall evidence.

We first segment by tangibility as defined by Almeida and Campello (2007) who explain that in the event of default, tangible assets usually have higher recovery rates; moreover, borrowers can pledge them outright as collateral to access the debt market. Thus, firms with higher tangibility may have easier access to debt markets.

We use the payout rate as a measure of possible financing constraints following previous literature. Fazzari et al. (1988) argue that firms with high payout rates can reduce their distributions to shareholders in case they need more internal funds.

Table 5
Bankruptcy law change and investment for different financing constraint groups.

	Low Tangibility		High Tangibility		Low Payout		High Payout		Low Constraints Index		High Constraints Index	
	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value
Cash Flow	0.110**	(4.25)	0.160**	(8.50)	0.162**	(9.78)	0.156**	(5.85)	0.239**	(10.44)	0.167**	(11.51)
Tobin's *q*	0.084**	(6.88)	0.044**	(6.31)	0.068**	(7.41)	0.043**	(5.39)	0.051**	(6.60)	0.083**	(6.33)
Cash flow × After	0.093**	(4.06)	0.030	(1.36)	0.056**	(2.81)	0.030	(1.02)	−0.028	(−1.02)	0.055**	(3.09)
Tobin's *q* × After	−0.016	(−1.06)	−0.009	(−0.83)	−0.014	(−1.41)	0.011	(0.85)	0.059	(1.45)	−0.020	(−1.71)
Year Effects	Yes		Yes		Yes		Yes		Yes		Yes	
Firm Effects	Yes		Yes		Yes		Yes		Yes		Yes	
R^2	0.11		0.12		0.15		0.12		0.17		0.15	
Observations	5884		5883		5951		5939		6265		5770	

This table presents regression results analyzing the impact of the Bankruptcy Reform Act of 1978 on the investment rates of different group of firms. We segment our sample of firm-years into low (bottom tercile) and high (top tercile) levels of tangibility, payout rate, and the Size-Age financing constraints index of Hadlock and Pierce (2010). In each subsample we estimate the investment regression $\frac{I_{t+1,i}}{K_{t,i}} = \eta_t + \alpha_i + \beta_1 Q_{t,i} + \beta_2 \frac{CF_{t+1,i}}{K_{t,i}} + \beta_3 Q_{t,i} \times After + \beta_3 \frac{CF_{t+1,i}}{K_{t,i}} \times After + \varepsilon_{t+1,i}$, where $I_{t+1,i}$ is investment, $Q_{t,i}$ is Tobin's *q*, $CF_{t+1,i}$ is firm cash flow, $K_{t,i}$ is the capital stock, *After* is a dummy variable equal to 1 for years after 1978. The sample period is from 1974 to 1982 and all firm observations for 1978 are dropped. Variable definitions are presented in Table 3. Heteroskedasticity robust *t*-statistics clustered at the firm level are in parentheses. The superscripts ** and * indicate significance at the 1% and 5% level, respectively.

Last, we also utilize the Size-Age index of financing constraints constructed by Hadlock and Pierce (2010), who analyze regulatory filings and argue that a nonlinear combination of firm size and company age can predict constraints.

We divide our sample into terciles of tangibility, payout rate, and the Size-Age index. We estimate Eq. (6) on the bottom and top tercile. We expect that for firms with low tangibility, low payout rate, or high Size-Age index, the investment-cash flow sensitivity should increase markedly after the BRA, since these firms will find it harder to access external debt financing. For firms in the top third of tangibility, payout rate, or the bottom third of the Size-Age index we expect the effect to be irrelevant.

Regression results are presented in Table 5. The effect for firms in the low tangibility tercile is quite strong, the investment-cash flow sensitivity increases by over 80% in the period after the bankruptcy code change and the estimate is highly significant. For firms in the top tercile, the interaction is not statistically significant suggesting the sensitivity is the same before and after the BRA. This result is in line with Almeida and Campello (2007), even with the increase in external debt financing, firms with large tangible assets can pledge these as collateral to issue secure debt.

We find similar results when we divide our sample by the payout rate. For firms in the bottom payout tercile, the investment-cash flow sensitivity increases after the BRA by about a third and the effect is statistically significant at the 1% level. For firms in the top tercile, the point estimate also suggests an increase in the cash flow sensitivity after the BRA but the coefficient is not significant. The findings for the Size-Age index are equivalent, where it is only the group facing the high constraints that observe an increase in their investment-cash flow sensitivity after the BRA.

Overall, our results indicate that for firms with characteristics associated with financial constraints the effect of the BRA on their investment-cash flow sensitivity was much stronger.

5.2. BRA and the value of cash

Faulkender and Wang (2006) study the value the stock market places on corporate cash holdings. They argue large cash reserves allow companies to fund projects without having to access external debt markets, as well as reduce distress costs since companies can better absorb negative shocks; on the other hand, cash reserves can incentivize empire building and wasteful spendings. Since the BRA affected the external cost of financing and distress costs, we investigate if the value of corporate cash holdings also changed after the bankruptcy law change.

We follow the methodology of Faulkender and Wang (2006) to estimate the value the stock market places on corporate cash holdings. For every firm in our sample we compute its annual stock return including dividends and subtract the return of its matched 25 Fama-French size and book-to-market portfolio.[6] We then regress the firm's excess return on the annual change of a set of firm variables. As Faulkender and Wang (2006) we include the changes in cash holdings, earnings, net assets, research and development expenditures, interest expense, and dividends; as well as contemporaneous market leverage, the lag of cash holdings, and net financing (issuance minus retirements of equity and debt). All variables, except market leverage, are divided by the start of the year market capitalization.

We interact the change in cash holdings with the indicator variable for the signing of the BRA. We expect that after the change in bankruptcy law, the stock market will value cash holdings higher since the new bankruptcy code made it more expensive for firms to access external funds.

We present regression results in Table 6. Model 1 repeats the baseline estimation from Faulkender and Wang (2006) and we

[6] We obtain returns for the 25 size and book-to-market portfolios from professor Ken French's website.

Table 6
Bankruptcy law change and the value of cash.

	Model 1		Model 2	
	Estimate	*t*-value	Estimate	*t*-value
Δ Cash	0.359**	(10.81)	0.309**	(8.24)
Δ Cash × After			0.119*	(2.11)
Δ Earnings	0.381**	(12.25)	0.382**	(12.26)
Δ Net Assets	0.025**	(3.11)	0.025**	(3.13)
Δ R&D	0.593**	(3.57)	0.587**	(3.54)
Δ Interest Expense	−0.625**	(−5.31)	−0.622**	(−5.31)
Δ Dividends	1.199**	(2.75)	1.203**	(2.77)
Lag of Cash	0.261**	(9.04)	0.261**	(9.01)
Leverage	−0.532**	(−26.18)	−0.531**	(−26.20)
Net Financing	0.071*	(2.14)	0.071*	(2.15)
R^2	0.18		0.18	
Observations	14,915		14,915	

This table presents regression results analyzing the impact of the Bankruptcy Reform Act of 1978 on the market value of annual changes in cash holdings. We regress the firm's annual stock return in excess of its matched size and book to market benchmark portfolio on changes in firm characteristics over the fiscal year. All variables except *Leverage* and the excess stock return are deflated by the lagged market value of equity. *Cash* is cash plus marketable securities, *After* is a dummy variable equal to 1 for years after 1978. *Earnings* is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits, and *Net Assets* is total assets minus cash holdings. *Dividends* are measured as common dividends paid, *Leverage* is market leverage, and *Net Financing* is the total equity issuance minus repurchases plus debt issuance minus debt redemption, *R&D* is set to zero if missing. ΔX is compact notation for the 1-year change, $X_t - X_{t-1}$. The sample period is from 1974 to 1982 and all firm observations for 1978 are dropped. Heteroskedasticity robust *t*-statistics clustered at the firm level are in parentheses. The superscripts ** and * indicate significance at the 1% and 5% level, respectively.

obtain comparable results. We find that a one dollar change in cash holdings is valued by the market at about 36 cents, while Faulkender and Wang (2006) find shareholders value a dollar of cash holdings at about 75 cents. We believe the difference in estimates is explained by tax rates. Faulkender and Wang (2006) explain that shareholders probably value cash holdings at less than their face value since if companies distribute their holdings as dividends then shareholders must pay income taxes on the amount received. During most of our sample period the top income tax bracket was 70%, while the sample of Faulkender and Wang (2006) runs from 1972 to 2001, when the income tax bracket was progressively lowered from a high of 70% to a low of 28%.

In model 2 we interact the change in cash holdings with the indicator for BRA. The point estimate is positive and statistically significant at the 5% level. After the signing of the new bankruptcy law, the value of a dollar of cash holdings increases from 31 to 43 cents. This result is consistent with our previous findings, after the BRA the value of internal funds increase since they allow firms to keep funding their investment projects.

We next divide our sample again into terciles by tangibility and payout rate, and then we estimate the market value of cash holdings for each sample. We expect that for firms in the bottom tercile the market value of cash holdings after the BRA increases by a

Table 7
Bankruptcy law change and the value of cash for different financing constraint groups.

	Low Tangibility		High Tangibility		Low Payout		High Payout	
	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value
Δ Cash	0.243**	(3.61)	0.303**	(4.73)	0.291**	(4.49)	0.309**	(5.28)
Δ Cash × After	0.236*	(2.36)	0.064	(0.77)	0.215*	(2.26)	0.106	(1.07)
Δ Earnings	0.277**	(7.74)	0.500**	(4.96)	0.321**	(9.39)	0.551**	(8.24)
Δ Net Assets	0.008	(0.76)	0.053**	(2.88)	0.020*	(2.03)	0.010	(0.54)
Δ R&D	0.669**	(2.65)	1.016**	(2.83)	0.509*	(2.10)	−0.116	(−0.27)
Δ Interest Expense	−0.379**	(−2.88)	−0.995**	(−2.99)	−0.728**	(−5.40)	−1.069**	(−5.19)
Δ Dividends	0.511	(1.61)	2.185**	(2.58)	0.442	(1.77)	2.454*	(2.29)
Lag of Cash	0.488**	(9.33)	0.185**	(4.51)	0.275**	(5.14)	0.233**	(6.67)
Leverage	−0.821**	(−21.89)	−0.423**	(−11.23)	−0.696**	(−19.62)	−0.328**	(−10.00)
Net Financing	0.082*	(2.07)	0.083	(1.15)	0.142**	(2.90)	0.042	(1.09)
R_2	0.22		0.20		0.21		0.17	
Observations	4889		4808		4752		5069	

This table presents regression results analyzing the impact of the Bankruptcy Reform Act of 1978 on the market value of annual changes in cash holdings for a different subsamples of firms. We segment our sample of firm-years into low (bottom third of distribution) and high (top third of distribution) levels of tangibility and payout rate. In each group we regress the firm's annual stock return in excess of its matched size and book to market benchmark portfolio on changes in firm characteristics over the fiscal year. Variable definitions are in Table 6. The sample period is from 1974 to 1982 and all firm observations for 1978 are dropped. Heteroskedasticity robust *t*-statistics clustered at the firm level are in parentheses. The superscripts ** and * indicate significance at the 1% and 5% level, respectively.

larger amount, since these are the firms more likely to be financially constrained.

We present estimation results in Table 7. For low tangibility firms the value of cash doubles after the BRA, from 24 cents on the dollar to 48 cents. For the sample of firms with high tangibility the market value of cash did not change after the BRA. This estimates are consistent with the findings in Table 5, where firms with high tangibility are better positioned to still access external debt markets after the change in bankruptcy code.

We obtain similar results when we split our sample by payout rate. For the firms in the bottom tercile of payout rate the value shareholders attach to cash increases significantly after the BRA, while the effect is not statistically significant for firms in the top tercile.

Findings in this section support the view that the bankruptcy law change of 1978 increases the cost of external financing and consequently made firms rely and value more their internally generated funds.

6. Conclusion

We exploit the Bankruptcy Reform Act of 1978 in the U.S. as an exogenous shock that increased the cost of external funds for public companies. In a quasi-natural experiment setting, we find that the investment-cash flow sensitivity of firms increased after the reform.

The BRA introduced the possibility of strategic default by debtors, as well granted shareholders more bargaining power in the reorganization process of firms under Chapter 11 which resulted in more frequent and larger deviations from Absolute Priority Rule in bankruptcy. Acharya and Krishnamurthy (2009) note the BRA made the U.S. bankruptcy code more debtor–friendly that other developed economies at the time. Given this exogenous increase in risk to creditors, firms faced a shift in their cost of external funds.

For the typical firm in our sample, the investment sensitivity to internally generated cash flow increased by one third after the BRA, though the effect is much stronger for firms likely to be more financially constrained. Firms in the bottom tercile of tangibility – relatively lacking assets they can pledge as collateral for debt – increase their sensitivity by over 80%.

Moreover, the value assigned by shareholders to cash holdings of firms also increased after the BRA. Faulkender and Wang (2006) argue cash reserves allow companies to fund future projects without the need for external funds and protects them from financial distress by allowing them to better absorb negative shocks. Since the BRA turned internal funds more important for investment projects, and at the same time it made financial distress more expensive by imposing larger expected loses on creditors, we investigate if the value of cash increased after the BRA. Using the methodology of Faulkender and Wang (2006), we find that shareholders value one dollar of cash holdings 12 cents higher after the BRA, and for firms likely to be more financially constrained the effect is over 20 cents higher.

Our study contributes to the literature by showing that investment-cash flow sensitivities do respond to financing constraints. The quasi-natural experiment setup suggests our findings have a causal interpretation and allows us to steer clear of common shortcomings of empirical studies of corporate investment.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, athttps://doi.org/10.1016/j.najef.2018.08.004.

References

Acharya, V. V., & Subramanian, K. (2009). Bankruptcy codes and innovation. *Review of Financial Studies, 22*, 4949–4988.
Almeida, H., & Campello, M. (2007). Financial constraints, asset tangibility, and corporate investment. *Review of Financial Studies, 20*, 1429–1460.
Baker, M., Stein, J., & Wurgler, J. (2003). When does the market matter? Stock prices and the investment of equity-dependent firms. *Quarterly Journal of Economics, 118*, 969–1005.
Bradley, M., & Rosenzweig, M. (1992). The untenable case for Chapter 11. *Yale Law Journal, 101*, 1043–1095.
Chava, S., & Roberts, M. R. (2008). How does Financing Impact Investment? *The Role of Debt Covenant Violations, Journal of Finance, 63*, 2085–2121.
Chen, H., & Chen, S. (2012). Investment-cash flow sensitivity cannot be a good measure of financial constraints: Evidence from the time series. *Journal of Financial Economics, 103*, 393410.
Choi, P. M. S., Chung, C. Y., & Liu, C. (2018). Self-attribution of overconfident CEOs and asymmetric investment-cash flow sensitivity. *North American Journal of Economics and Finance* forthcoming.
Eberhart, A. C., Moore, W. T., & Roenfeldt, R. L. (1990). Security pricing and deviations from Absolute Priority Rule in bankruptcy proceedings. *Journal of Finance, 45*, 1457–1469.
Erickson, T., & Whited, T. M. (2000). Measurement errors and the relationship between investment and q. *Journal of Political Economy, 108*, 1027–1057.
Erickson, T., & Whited, T. M. (2012). Treating measurement error in Tobin's *q*. *Review of Financial Studies, 25*, 1286–1329.
Fan, H., & Sundaresan, S. M. (2000). Debt valuation, renegotiation, and optimal dividend policy. *Review of Financial Studies, 13*, 1057–1099.
Faulkender, M., & Wang, R. (2006). Corporate financial policy and the value of cash. *Journal of Finance, 61*, 1957–1990.
Fazzari, S. M., Glenn Hubbard, R., & Petersen, B. C. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity, 1*, 141–195.
Franks, J. R., & Torous, W. (1989). An empirical investigation of U.S. firms in reorganization. *Journal of Finance, 44*, 747–769.
Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *Review of Financial Studies, 23*, 1909–1940.
Kaplan, S. N., & Zingales, L. (1997). Do investment–cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics, 112*, 169–215.
Kerkman, J. R. (1987). The debtor in full control: A case for adoption of the trustee system. *Marquette Law Review, 70*, 159–209.
Klee, K. (1979a). All you ever wanted to know about cram down under the new bankruptcy code. *American Bankruptcy Law Journal, 53*, 133–171.
Klee, K. (1979b). Legislative history of the new bankruptcy law. *DePaul Law Review, 28*, 941–960.
Leland, H. E., & Toft, K. B. (1996). Optimal capital structure, endogenous bankruptcy, and the term structure of credit spreads. *Journal of Finance, 51*, 987–1019.

Lewellen, J., & Lewellen, K. (2016). Investment and cash flow: New evidence. *Journal of Financial and Quantitative Analysis, 51*, 1135–1164.
LoPucki, L. M. (1983). Debtor in full control: System failure under Chapter 11 of the bankruptcy code. *American Bankruptcy Law Journal, 57*, 99–126.
LoPucki, L. M. (1995). Chapter 11: An agenda for basic reform. *American Bankruptcy Law Journal, 69*, 573–582.
LoPucki, L. M., & Whitford, W. C. (1990). Bargaining over equity's share in the bankruptcy reorganization of large, publicly held companies. *University of Pennsylvania Law Review, 139*, 125–196.
Malmendier, U., & Tate, G. (2005). CEO overconfidence and corporate investment. *Journal of Finance, 60*, 2661–2700.
Posner, E. A. (1997). The political economy of the Bankruptcy Reform Act of 1978. *Michigan Law Review, 96*, 47–126.
Rauh, J. (2006). Investment and financing constraints: Evidence from the funding of corporate pension plans. *Journal of Finance, 61*, 33–71.
Stein, J. C. (2003). Agency, information and corporate investment. In G. Constantinides, M. Harris, & R. Stulz (Eds.). *Handbook of the economics of finance*. Amsterdam: North Holland.
Weiss, L. A. (1990). Bankruptcy resolution. *Journal of Financial Economics, 27*, 285–314.
White, M. J. (1983). Bankruptcy costs and the new bankruptcy code. *Journal of Finance, 38*, 477–488.
White, M. J. (1989). The corporate bankruptcy decision. *Journal of Economics Perspectives, 3*, 129–151.