THE DEFERRED DEFAULT PROBLEM OF MYOPIC GOING CONCERN PRACTICE

By

Ren-Raw Chen*
Department of Finance
Fordham University
1790 Broadway, Room 1319
New York, NY 10019

Hsuan-Chu Lin
The Department of Accountancy and Graduate Institute
of Finance and Banking
National Cheng Kung University
No.1, University Road,
Tainan City 701,
Taiwan (R.O.C.)

and

Michael Long
Department of Finance and Economics
Rutgers Business School - Newark & New Brunswick
1 Washington Park
Newark, NJ 07102

August, 2012

*Contact author at rchen@fordham.edu

THE DEFERRED DEFAULT PROBLEM OF MYOPIC GOING CONCERN PRACTICE

Abstract

Myopic going concern practice refers to the current audit going concern opinion that a firm is rewarded a favorable going concern opinion as long as it has the capability to satisfy its upcoming debt obligation. We show, via an *implied wealth transfer problem* introduced in the paper, that such a practice might defer a default threat to a firm especially for which is in serious financial distress. We also develop a model which is able to quantify the severity of the problem and therefore measure this potential default threat. Our model recognizes the importance of accounting information and integrates the advantages of accounting-based and market-based measures. A simple empirical analysis shows that our model could provide great assistance to auditors to lower the rate of Type II error when giving going concern opinions.

THE DEFERRED DEFAULT PROBLEM OF MYOPIC GOING CONCERN PRACTICE

1 Introduction

This paper studies the deferred default problem of the current myopic going concern rules. A myopic going concern audit refers to an audit decision that determines if a firm can survive in a short run of not more than a year by looking at the firm's short term liquidity. For a firm to survive in a short run, the only concern is the firm's ability to meet its immediate cash flow obligations. Such a liquidity-driven audit process ignores the economic nuance of the firm and can come to a different conclusion from an economically-driven default. In a crisis situation as the one we have been experiencing, such a myopic point of view is more conservative as if a firm cannot survive the liquidity squeeze, the firm should default even though it is profitable.[1] However, in a more normal situation where the liquidity squeeze is less eminent, such a myopic audit is less conservative, which is against accounting's Conservatism Principle. We show in this paper via a wealth transfer problem that such a viewpoint has potentially a significant economic impact on the going concern determinant of the firm. Through a multi-period structural form framework, for the first time in the literature, we can further quantify such an economic impact.

When a firm is subject to economic default, it has difficulty to raise capital (equity or debt) and yet it may still have enough cash to pay its near term obligations.[2] Furthermore, to survive in the short run, a firm may liquidate valuable assets (and keep poorer ones) to meet its immediate obligations. Our model studies the default problem in a situation where a firm has enough cash (or liquid assets) to pay for its upcoming debt obligations and yet would have difficulty raising equity capital. In our model, we categorize this situation as *economic default*. The firm will continue to survive and receive a favorable going concern audit for the short run and yet in the long run the firm will ultimately default and suffer an economic cost as the debt holders' value is lost.

Our paper proceeds to first review the requirements and importance of correctly reporting a firm's going concern status (Section 2). We then proceed to review literature with particular emphasis and show a numerical illustration on the wealth transfer (claim

[1] Readers are reminded that prior to its default (or merged into JP Morgan) on March 16, 2008, Bear Stern reported $0.86 EPS quarterly earnings (2008Q1).

[2] We should note that the definition of "default" in this paper is looser than bankruptcy. We regard debt restructuring and firm reorganization (e.g. merger) as failure of current operation and should satisfy by the definition of default.

dilution) problem (Section 3). This is followed with the introduction of the economic default problem and the model we develop to measure this potential threat (Sections 4 and 5). We finish with our empirical analysis that shows how our model helps auditors lower the rate of type II error when giving going concern opinions (Sections 6).

2 Going Concern Status

The importance of a going concern status cannot be over emphasized. Accounting makes the going concern principle the basis for most measurement and valuation concepts such as the historical cost and revenue recognition assumptions. The entire double entry system using historical cost is predicated on the firm being a going concern where the assets' value eventually flows through the income statement to measure performance. Without going concern status, a firm's values are reported basically at their liquidation value. When firms obtain an unexpected qualified going concern opinion, the security markets react with negative abnormal returns (Fleck and Wilson, 1994). Further for firms already having qualified opinions, the market reaction to bankruptcy is much smaller (Chen and Church, 1996).

This brings up the questions of what determines whether a firm should be considered a going concern. The most recent pronouncements on what constitutes a going concern are found in the Statement on Auditing Standards, No. 59 (April, 1988). This authoritative reference provides guidance to the auditor conducting an audit of financial statements in accordance with generally accepted auditing standards (GAAS). It posits, in the second paragraph, that the auditor has "…responsibility to evaluate whether there is substantial doubt about the entity's ability to continue as a going concern for a reasonable period of time, not to exceed one year beyond the date of the financial statements being audited." It notes in paragraph 4, "…the auditor is not responsible for predicting future conditions or events." This safe harbor provision protects the auditor in noting that evaluation of the going concern status is not the primary goal or objective of the audit. The same provision also lays the theoretical basis for liquidity-driven, or myopic, going concern audit.

What we offer is an economic examination of such a practice. Our model is objective in that it makes no *ad hoc* assumptions on accounting information and it takes into account market information (e.g. market cap). Consider paragraph 6 in SAS 59 "Consideration of Conditions and Events," the usual problems that can cause a firm to discontinue operating due to poor performance are presented as factors to consider in determining a going concern status. However, it presents no specific criteria to determine a qualified going-concern.

The implication of these vague statements in defining going concern comes out in empirical studies. For firms that obtain going-concern modified reports, the now Big 4 auditing firms are better at prediction. Geiger, Raghunandan and Dasarath (2006) find these large auditing firms have both a lower rate of Type I errors where modified opinions are rendered to subsequent viable clients and a lower rate of Type II errors where clean opinions are given to subsequent firms that enter bankruptcy as compared to non-Big 4 firms. Further, they found no differences in performance between national second tier and smaller regional firms. With our objective measure hopefully these differences can be eliminated.

Accounting literature has long acknowledged the concept of *economic default*. One of the earliest attempts to determine whether a firm should maintain a going concern status is Altman and McGough (1974).[3] Improving the going concern decision process will increase market efficiency. Under current going concern rules, it provides an early, negative warning signal for firms that obtain qualified opinions on the going concern status. Louwers (1998) considers many factors that might influence a going concern opinion and concludes that traditional financial factors form the basis of auditors' decisions. Hopwood, McKeown and Mutchler (1989) find that the qualified going concern opinion provides incremental explanatory power in the context of a bankruptcy prediction model. Kennedy and Shaw (1991) report that the qualified opinion is a significant variable in explaining bankruptcy resolution (i.e., whether a company that files for bankruptcy eventually liquidates or reorganizes). Another aspect in this area investigates possible reasons that underlie the auditor's error "on the other side." These studies consider the decision to issue a going concern opinion for a company that ultimately files for bankruptcy (McKeown, Mutchler and Hopwood, 1991). Using this approach in a later article, Hopwood, McKeown and Mutchler (1994) find no evidence that auditor's qualified going concern opinions are inferior predictors of bankruptcy compared to traditional statistical models.

Nogler (1995) follows companies that receive qualified opinions through their resolution in terms of bankruptcy, liquidation, merger or subsequent receipt of an unqualified opinion. He concludes the error rate quoted in the literature that results from incorrectly giving firms' qualified opinions is too high. More recently in the times of Sarbines-Oxley, Geiger, Raghunandan and Dasaratha (2005) find auditors have grown

[3] They use Altman's Z-score (Altman, 1968) to determine which firms should still receive a going concern opinion in viewing firms in apparent financial distress. Their model predicted 85% correctly. Their approach never made it into the mainline accounting decision process. This possibly results as firms can easily manipulate their accounting ratios that Altman's Z-score uses as its predictors.

more cautious and are issuing more modified going-concern audits even after adjusting for economic conditions of the firms. We feel our objective approach can provide auditors the protection to issue non-biased reports in the current political climate.

Closely akin to the going concern decision is whether the firm is legally solvent. While the going concern decision traditionally focused on whether the firm would continue to operate and hence could use accrual based accounting, the solvency test is directed towards whether the firm is able to pay its debts. As with other factors in business law such as private firm valuation, the law currently requires multiple factors be considered in the solvency decision. Heaton (2007) identifies these as "ability to pay test" which is similar to our measurement, a "balance sheet solvency test" where assets are grater than liabilities, and a "capital adequacy test" where positive book equity exists.

While Heaton (2007) views the "ability to pay test" as probably the best measure of solvency, he never actually defines how it should be determined. Our test provides that measurement. What we require to determine going concern status also requires the ability to pay test is met. Similarly, our approach also measures his "balance sheet solvency test" though slightly modified where the market value of the firm's assets must exceed the value of debt payments due. As to the "capital adequacy solvency test," we can only state that the conceptual capital value is positive when the conditions for our test are met. We feel that our measure is ideal for solvency measures also as it collapse the three tests to a simple single measure.

3 Economic Default and the Wealth Transfer Problem

3.1 Background

Under the perfect market assumption, Modigliani and Miller (1958) showed financing choices should have no impact on the value of the firm. Stiglitz (1974) later generalized this concept. However, the irrelevancy theorem seems unable to consistently explain the complicated capital structures observed in reality. When the perfect capital market assumption is relaxed, various theorems emerge to explain the determinants of the optimal capital structure. This in turn leads to our wealth transfer problem and its solution to determine the firm's going concern status.

The inconsistencies in maximizing both equity holders and debt holders' values form the basis for our defined wealth transfer problem. In the finance literature, Stiglitz (1972) first noted that maximizing firm value and shareholder value are not the same in the presence of possible bankruptcy. Jensen and Meckling (1976) popularized and named these conflicts as agency problems of debt. Viewing the corporate structure as

"nexuses of contracts", Jensen and Meckling (1976) relaxed Modigliani and Miller (1958) assumption of a fixed investment policy where financing choices have no impact on the value of the firm under perfect markets. This creates incentive problems for firm managers resulting in agency costs. Jensen and Meckling argued the existence of optimal capital structure is where the firm minimizes the total agency costs of the firm in trading-off between the agency costs of outside equity and the agency costs of outside debt.

However, relaxing the fixed investment assumption is not a necessary condition to create adverse incentives between equity and debt holders. Black and Scholes (1973 on page 651) noted that the firm could sell its assets and pay a liquidating dividend to its shareholders. However, Fama and Miller (1972) on page 152 stated that bondholders "…could easily have protected against such infringements by a 'me-first' rule…" that basically requires their payment first. Kim, McConnell and Greenwood (1977) empirically tested whether these rules exist in practice using the establishment of captive finance companies as their potential dilution. Their tests showed 'me-first' rules did not exist. Several years later, Malitz (1989) redid their study with more refined empirical techniques. She found firms undertook financial subsidiaries as value increasing investments and not as a claim dilution as this agency problem had come to be known.

Straight claim dilution assumes that the asset base stays constant but debts are increased. The original debt holders see their claim diluted with additional debt being incurred with the same claim on a fixed asset base. This occurs whenever bankruptcy is possible **and** perfect 'me-first' protection is not present. Ho and Sanger (1982) were the first to point out the problem exists with debts of different maturities. However, they never formally valued the effect.

What we introduce is a new approach to examine a potential wealth transfer (claim dilution) problem. Now, instead of borrowing additional funds to dilute the original debt holders' claims, the firm sells assets to meet debt requirements diluting the claim of debts still outstanding. The dilution switches to a multi period situation where different debts are due at different time periods. The reason assets are sold to meet debt payments is that it is the only way the poor performing firm can raise funds to meet its immediate debts. Firms in this situation we feel should receive modified going concern opinions.

While we propose a specific measure for this cut-off, auditing firms are found to empirically follow our idea as Behn, Kaplan and Krumwiede (2001) reported. They looked at publicly available management plans. They found firms planning to issue equity or increase borrowing had a strong link with receiving an unqualified opinion. Firms planning to reduce spending or sell off assets were more likely to receive qualified

audits. This practice is consistent with our proposed measures to obtain a clean or unqualified audit.

3.2 An Illustration

We first start the formal investigation of the implied wealth transfer problem in a multi-period setting. This is crucial to whether a firm is judged as a going concern. Such a wealth transfer problem occurs when the firm should have defaulted as its assets are worth less than its debt outstanding, but the shareholders still have the capability to make the upcoming periodic debt payment continuing to control of the company. We feel that these firms should not receive an unqualified audit since they can no longer issue new equity or new debt even though they might have the cash to pay immediate debt obligations. Firms in this position now usually escape default because the debt holders lack the power to audit and re-evaluate the firm on a current market value basis.

To undertake this measurement, we must first establish an economy where firms operate without the wealth transfer problem. In such an economy, debt and equity holders behave rationally, information flows efficiently, and no arbitrage opportunities exist. As a consequence, defaults in the economy occur optimally at the best interest of both equity and bond holders. Geske (1977, 1979), among others, derived a multi-period capital structure model under the Black-Scholes assumptions that he later expanded. One key implication in the Geske analysis is that debt or interest payments of the firm must be financed by newly raised equity.[4] Lack of the capability to raise equity is equivalent of default.[5]

Unfortunately this ideal economy differs from the reality where the wealth transfer problem between shareholders and debt holders exists. Hence, we derive a model to cope with this wealth transfer problem that exists even without information asymmetry. Furthermore, by comparing with the ideal economy that is free from this problem, we can quantify the economic default problem and estimate the default threat. This allows us to empirically test the significance of this economic default problem and whether a firm should qualify as a going concern.

The problem we measure to determine going concern status is the situation where the agents who represent the equity holders (managers of the company) continue to

[4] The no-default condition adopted in the Geske model is similar to the safe covenant in debts. Note that the effect that the safe covenant can alleviate the agency problem is similar to accepting Geske's assumption of no default.

[5] One should remember that if the firm can borrow additional money than at least conceptually, it is in a position to raise new equity. The fact that most debt is replaced with new debt does **not** mean that the firm is in default but rather is an indication that it is a going concern.

operate the company when they can no longer issue equity or debt in rational, well functioning capital markets. When the company cannot issue equity, the existing equity must have a null valuable because the new and old equity shares must bear the same price. However, the fact that the existing equity continues to trade in the marketplace with a positive price indicates that the equity holders successfully have escaped default and have transferred value from the debt holders to themselves. This condition, which we will show later, is equivalent to the call value of the firm being larger than the debt payment (coupon and principal) due at the upcoming payment date, but not as large as the value of all future debts owed. However, in reality, many companies continue to operate as long as the asset value is greater than the debt payments due since the debt holders lack the ability to audit and force re-evaluation of the firm and traditional auditors continuing to view firm in this situation as going concerns.

Our simple numerical example demonstrates the multi-period wealth transfer problem. Suppose a company has two zero coupon debts, one and two years to maturity and each has $100 face value. Also suppose the assets are currently worth $400 and the debts are together worth $170 on present value basis. This is graphically represented by the following balance sheet:[6]

Balance Sheet
as of year 0

assets	400	Maturity $t=1$ debt	90
		Maturity $t=2$ debt	80
		Equity	130
total	400	Total	400

note: both debts have face values of $100

First, assume that one year later, the asset grows to $450 and the firm faces the first debt payment of $100. The firm at this time should raise equity to pay for the first debt so that the asset value will not have to be decreased. The asset value after paying off the first debt is still $450. Assume that at this time ($t=1$), the second debt, now only a year from maturity, has a value of $90. As a result, the equity should be $360 (= $450 – $90) that includes $100 new equity and $260 old equity. The balance sheet becomes:

Balance Sheet
as of year 1 before payment of first debt

assets	450	Maturity $t=1$ debt	100

[6] We assume the risk free rate to be about 10%. Since the company is extremely solvent, both debts are roughly priced at the risk free rate.

		Maturity $t = 2$ debt	90
		Equity	260
total	450	Total	450

Balance Sheet
at year 1 after payment of first debt

assets	450	maturity $t = 2$ debt	90
		old equity	260
		new equity	100
total	450	Total	450

note: issue new equity to pay for the first debt

Now, instead of the assets being worth \$450, suppose that the firm made some bad investment decisions and the asset's value drops to \$150. A bad economy and lower asset value imposes a higher default risk on the second debt so it is priced lower at \$75. Hence, the resulting equity value of old equity and of the "should be raised" equity, or debt due plus net equity, drops to \$75 (150 – \$75 = \$100 – \$25)[7]. The firm, as in the previous case, would like to raise equity to pay off the first debt. But the new equity value needs to be \$100 to retire the debt due which creates a clear contradiction. This means that the new equity owner pays \$100 in cash but in return receives a portion of \$75. No rational investor would invest equity in this firm.

Since the firm cannot raise equity capital to continue its operation, it should not be considered a going concern from the economic default perspective. There is a point where the potential new equity owner is indifferent and this is the going concern breakeven point for the company. Suppose the (break-even) asset value in one year is falls to \$186.01. At this asset value, the second debt is worth \$86. Consequently, the

[7] Actually, the balance sheet before the payment of first debt should be:

Balance Sheet
as of year 1 before payment of first debt

assets	150	maturity $t = 1$ debt	100
		maturity $t = 2$ debt	75
		old equity	-25
total	150	total	150

new equity owner has $100 and the old equity has $0.01. And we know that the default point is $186.[8]

Balance Sheet
as of year 1 before payment of first debt

assets	186.01	one-year debt	100
		two-year debt	86
		Equity	0.01
total	186.01	Total	186.01

Balance Sheet
as of year 1 after payment of first debt

assets	186.01	two-year debt	86
		old equity	0.01
		new equity	100
total	186.01	Total	186.01

note: issue new equity to pay for the first debt

Figure 1 shows the relationships between the market value of debt (two-year debt at year 1) and market value of equity in previous examples.

Place Figure 1 Here

We can clearly see that any asset value lower than $186 will cause default and should require other than a going concern opinion. However, with $186 of assets, the company can pay the first debt due and continue to operate. One could also consider selling assets to pay off the first debt without raising any new equity. However, this approach to claim dilution would cause the second debt to drop significantly in value as the following chart demonstrates:

Balance Sheet
as of year 1 before payment of first debt

Assets	186	one-year debt	100
		two-year debt	86

[8] This value is precisely the "implied strike price" in the Geske model. We should notice that $186.01 ≈ $186 in this example. We leave a minor amount, $0.01, to old equity holders in order to make this example more reasonable.

		Equity	0
total	186	Total	186

Balance Sheet
as of year 1 after payment of first debt

assets	86	two-year debt	76
		old equity	10
total	86	Total	86

note: selling asset to pay for the first debt

The reason is that the equity immediately has an option value at the cost of the remaining debt. In the above hypothetical tables, we assume $10 is transferred from debt to equity. At $t = 0$, the debt holders know about this even when there is no information asymmetry. As a result, they will pay less for the debt.

Usually, the company will roll over old debt to new debt instead of issuing equity. In the case of extreme solvency, this is not a problem. But in the case of near default, as described above, we have:

Balance Sheet
as of year 1 before payment of first debt

assets	186.01	one-year debt	100
		two-year debt	86
		Equity	0.01
total	186.01	Total	186.01

Balance Sheet
as of year 1 after payment of first debt

assets	186.01	two-year debt	86
		new debt	100
		old equity	0.01
total	186.01	Total	186.01

note: issue new debt to pay for the first debt

The principal of the new debt can be extremely high to reflect the very risky situation in order to get a $100 to retire the first issue. Because the existing debt matures earlier (and hence has a higher seniority) its value should be the same whether there is

new equity or debt. The equity will give a different claim whether new equity is raised or new debt is issued. With new equity the original equity will return a small portion after the second debt issue is repaid. With new debt, the original equity will get the entire return if the asset value increases after both debt issues are repaid. In the equilibrium, the original equity value should return to 0.01. It should not matter if the funds come from new equity or new debt at just over break-even point. Either way, the result holds and the old equity holders have a $0.01 value.

Under the current measurement for going concern status, companies will usually receive a going concern opinion when their asset values are at $186 and probably at $150. The companies continue to survive and operate. Now at $150 value, the company is not able to raise capital, but it is certainly able to pay the debt with its assets and leave the second debt with $50. Under this condition, the junior debt will be worth less than $50, possibly very little since debt holders do not have the safe covenant to prevent managers/shareholders from selling assets to pay the senior debt. The transferring of wealth from debt owner to equity owner is what we define as the wealth transfer problem. As long as the company spends assets to pay the earlier maturing debt, the later maturing debt holders will be hurt and shareholders will benefit.

The general plot of the equity value and asset value is shown below in Figure 2. Using our previous example, the going concern break point is $186. Now, Figure 3 is an expanded Figure 2 to show how the wealth transfer problem is caused.

Place Figure 2 Here

Place Figure 3 Here

We note that at the due date of the first debt, the company faces a decision whether to pay the debt obligation. This is a compound option question in that if the company decides to pay, the company continues to survive much like exercising the compound option to keep the option alive. The company's survival criterion relies upon whether the company can raise new equity capital. In this analysis, the technical condition of staying solvent is that the company must use new equity to pay for the upcoming due debt payout. If such new equity conceptually cannot be raised, then the company should go bankrupt. Interestingly, this condition translates into another equivalent condition that the market value of the assets of the company must stay above the market value of the liabilities at the moment of the coupon. This condition is

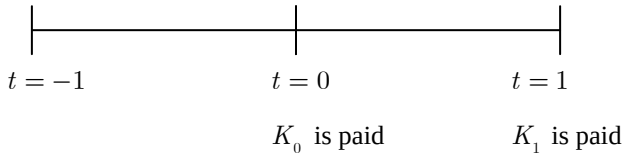
regarded as the no-arbitrage condition and should be the breakeven point in value for receiving a clean going concern audit.

The wealth transfer problem is measured to determine the going concern status resulting from the difference between the definitions of default to force immediate bankruptcy in reality versus the usually larger asset value required in this study. The character of this newly defined economic default condition provides us a new and more conservative perspective to determine when a firm has sufficient value to be considered a going concern.

4 The Amount of Transferred Wealth – Solved and Measured

We now derive a model to explain *the implied wealth transfer problem* in a two-period framework. The resulting model in an option framework shows when the firm has "worthless" equity. In this situation, the only way that immediate debt payments can be paid is through drawing down its assets. These can be either excess liquidity or selling assets. Under our proposed going concern criteria, a firm in this situation should not receive a clean going-concern opinion. It is no longer a going-concern but rather a slowly liquidating firm and should be reported as such.

Consider the following two-period setting: $t = -1, 0, 1$ where $t = 0$ is the current time, as the following diagram demonstrates:



The company owes a coupon bond starting from period $t = -1$ where K_0 is the coupon at $t = 0$ and K_1 is the bond redemption value at $t = 1$. The total asset value at both times is represented by A_0 and A_1 respectively.

At $t = 0$, the company faces an exercise decision. The company will pay the coupon to stay alive only if new equity can be raised. If the company survives, then it must be true that under the Black-Scholes and Merton theory, the equity is an exercised call option. If we adopt the log normal process for the asset value in a risk neutral world:

(1) $$\frac{dA_t}{A_t} = rdt + \sigma dW_t$$

where r is the risk free rate, σ is the volatility, and W_t is the Wiener process.[9] This assumption is roughly realistic and can be easily generalized. The above assumption leads to a Black-Scholes-Merton result for the equity:

$$\begin{aligned} E_0 &= C(A_0, K_1, r, \sigma, h) \\ &= e^{-rh}\mathbb{E}_0[\max\{A_1 - K_1, 0\}] \\ &= A_0 N(d + \sigma\sqrt{h}) - e^{-rh} K_1 N(d) \end{aligned} \tag{2}$$

where

$$d = \frac{\ln A_0 - \ln K_1 + (r - \frac{1}{2}\sigma^2)h}{\sigma\sqrt{h}},$$

and $\mathbb{E}_0[\cdot]$ is the risk neutral expectation conditional on information available at time $t = 0$, A_0 is the asset price at time $t = 0$, and h is the time distance between time $t = 0$ and $t = 1$ which is also assumed to be the same time distance between $t = -1$ and $t = 0$.

The debt value after the coupon is therefore:

$$\begin{aligned} D_0 &= A_0 - E_0 \\ &= A_0[1 - N(d + \sigma\sqrt{h})] + e^{-rh} K_1 N(d) \end{aligned} \tag{3}$$

If the new equity is raised to pay for the coupon, then there is no reduction in asset value. In the balance sheet, it is simply a transfer from debt to equity by the amount of coupon. The total asset value should not be changed. The following table helps to understand the before/after- coupon condition more clearly:

	Before Paying K_0	After Paying K_0
Equity	$E_0 - K_0$	E_0
Debt	$D_0 + K_0 = A_0 - E_0 + K_0$	$D_0 = A_0 - E_0$
Total Asset	A_0	A_0

Note that, as explained in the previous section, if the firm is solvent, it must be that K_0 is financed by new equity and E_0 is the total of new and old equity. The default condition is $E_0 - K_0 > 0$ which can be re-written as:

[9] This is known as the risk neutral process of the stock price. Note that the expected return of the stock does not appear in the equation.

$$\begin{cases} E_0 - K_0 > 0 \\ A_0 - D_0 - K_0 > 0 \\ A_0 - K_0 > D_0 \end{cases}$$

or the asset value, after paying K_0, should be greater than the debt value. But note the debt value is a fraction of the asset value. Hence, it is never possible that the asset value can be lower than the remaining debt after paying K_0. The only way to allow for this condition is to pay the debt obligation with new equity so that the asset value is unchanged. This idea is identical to the brilliant insight of the equivalent condition used in Geske (1977) that provides the no-arbitrage condition for default.

The value of assets at time $t = 0$, A_0, determines the value of the existing equity. If A_0 is large enough to avoid default, then the equity value E_0 after coupon being paid must equal the call value. As A_0 drops, E_0 drops. If A_0 is too small due to poor prior period investments, and the call option value is less than the coupon amount, i.e. $E_0 < K_0$, then it implies that the old equity value is *negative*, and the company should not receive going concern audit.[10] In that situation, the company cannot raise new equity. If the company cannot raise new equity, it must be the result of the old equity having no value since the old and new equity must be valued on the same basis.

Note that there exists a critical asset value, $\overline{A}_0$, such that $E_0 - K_0 = 0$. This is the economic default point of asset value for the firm. The firm should not receive going concern audit if its asset value drops below this critical value.

In the case of no safe covenant on regulating managers/shareholders from selling assets to meet debt obligations, a firm only defaults when it lacks enough assets[11] to make the coupon payment, or a firm defaults when $A_0 < K_0$. Since $A_0 > E_0$ by definition, it is perceivable that a firm can continue to operate when $E_0 < K_0 < A_0$. Under such a situation, the *conceptual* equity value is negative as we have shown in the previous section. This creates the implied wealth transfer problem that we now study.

If there is no such safe covenant and the actual default condition of a firm is $A_0 < K_0$, the equity value under this situation can be computed as (compared with equation (2)):

[10] In reality, the market equity value surely is always greater than zero. Here, the "negative" value of the equity is conceptual as in the example we provide in Note 7, meaning the company should declare default in this condition.

[11] We assume perfect liquidity so all assets can be regarded as cash.

$$
\begin{aligned}
E_0^* &= C((A_0 - K_0)^+, K_1, r, \sigma, h) \\
&= \begin{cases} e^{-rh}\mathbb{E}_0[((A_0 - K_0)e^{(r-0.5\sigma^2)h+\sigma\sqrt{h}z} - K_1)^+] & A_0 > K_0 \\ 0 & A_0 \le K_0 \end{cases} \\
&= \begin{cases} (A_0 - K_0)N(d^* + \sigma\sqrt{h}) - e^{-rh}K_1 N(d^*) & A_0 > K_0 \\ 0 & A_0 \le K_0 \end{cases}
\end{aligned} \tag{4}
$$

where

$$d^* = \frac{\ln(A_0 - K_0) - \ln K_1 + (r - \frac{1}{2}\sigma^2)h}{\sigma\sqrt{h}}.$$

The amount of the wealth transferring from debt holders to shareholders (TW) in our model is measured as $TW = E_0^* - E_0$ and is shown in Figure 4.

Place Figure 4 Here

5 The Going Concern Decision

Before understanding how the economic default idea introduced in this study can be applied on the going concern decision, we need to understand an important characteristic of this model. As shown in Figure 4, the wealth transfer problem results from the difference of two distinct default points, K_0 and $\bar{A}_0$, and the amount of the wealth transferring from debt holders to shareholders is measured as the difference of two measures of equity values, E_0^* and E_0. $\bar{A}_0$ is defined as the "should be correct default point" (the economic default point) in our model. Any firm with its asset value lower than $\bar{A}_0$ should considered in default. The equity measure E_0^* is always larger than E_0 because E_0 is the equity value when a firm is facing a stricter default condition $\bar{A}_0$ where the firm is prohibited from selling its assets to meet debt obligations. However, as the asset value increases, E_0^* and E_0 converges and TW approaches zero (shown as point Z in Figure 4) since increasing firm solvency mitigates its implied wealth transfer problem. Therefore, the maximum transferred wealth (MTW) will always happen at $\bar{A}_0$ since the transferred wealth is a decreasing function of asset value starting from the right hand side of $\bar{A}_0$.

Consequently, when a firm has no solvency problem from being solvent enough and facing no default risk, the wealth transfer problem is so minor and therefore can be ignored. The transferred wealth will not exist in this case. However, if solvency is a

problem for a firm, the wealth transfer problem occurs, and transferred wealth appears. It is this situation our model provides an objective measure to determine going concern status.

Our decision criterion for a firm to obtain a going concern opinion is that the asset value of the firm A is greater than $\bar{A}$ which is the model implied default barrier. Only in this situation can the firm be sure to have enough value to make its payments over the next year through either issuing new equity or raising additional debt to retire the debt coming due. Any lower firm value (lower than $\bar{A}$) will require the firm to sell off its assets to the determinant of other debts outstanding and be lucky that a positive outcome occurs. This keeps us within the current guidelines on a going concern opinion looking out over the next year.

Many firms have managed to successfully exit from not having a going concern status. Our rule does not say the firm is facing immediate legal bankruptcy, but only that it cannot pay its bills and debts through the normal operating procedures. It is a more conservative, objective measure of when a firm must sell its assets to survive. This is why we view firms in this situation as not going concerns.

If the going concern rules are modified to allow qualifications or warnings in going concern opinions, our $E^* - E$ term quantifies the transferred wealth providing an objective measure. It gives the default prediction in dollar terms that is similar to the function of Z-score to determine the prediction of default over the next year. Furthermore, we can transfer this measure into a more objective ratio for measuring the default prediction as well. According to our model, an implied unique maximum transferred wealth can be obtained in each condition. Then the "economic going concern index" (EGCI) based on our defined economic default concept can be defined as:

$$EGCI = \frac{E^* - E}{\max(E^* - E\ )} = \frac{TW}{MTW}. \tag{5}$$

As shown in Figure 4, TW is the incurred implied transferred wealth and MTW, the maximum implied transferred wealth, appears at the default point $\bar{A}$. Dividing TW by MTW informs us how close the current financial condition of a firm is to its economic default point. The higher that the ratio becomes gives a higher default concern facing the firm. In summary, this ratio would provide helpful information to the users of financial statements as to the chances that the firm can continue indefinitely as it is currently structured.

6 Empirical Examination

In this section, we provide a simple empirical examination by comparing our model's capability of detecting the default threat with the Z-score model and the Black-Scholes-Merton (BSM) model, the most popular accounting-based measure and market-based measure respectively. We also compare the three models' performances with the auditors' going concern opinions (GCO) to show how our model provides great assistance to auditors to lower the rate of Type II error when giving going concern opinions.

6.1 Data Selection

We define our default firms as the delisting firms in Compustat which the reason for deletion is either "bankruptcy" or "liquidation" from 2000 to 2011. The reasons for deletion for delisting firms can be several. For example, "acquisition and merger" is a major reason for deletion. However, since this study emphasizes on the economic default, we believe that delisting firms because of bankruptcy and liquidation meet our economic default meaning most. After excluding the firms that with SIC code 60-67 (finance, insurance, and real estate) and that with incomplete data for measure computation, we eventually obtain 161 firm-year observations.

Panel A of Table 1 shows the sample statistics by industry and delisting reasons. Total sample contains 56 bankrupt firms and 105 liquidation firms. Most our sample locates on manufacturing including 28 bankrupt firms and 37 liquidation firms, while least our sample is in wholesale trade including 4 bankrupt firms and 4 liquidation firms. Panel B of Table 1 provides several sample firms' accounting measures which are generally used for measuring corporate credit. Without surprise, most firms are in loss conditions. According to the mean and median current ratios (6.5474 and 1.3918 respectively) and quick ratios (6.2020 and 0.8832 respectively) of sample firms, short-run liquidity does not seem to be the major problem for their default. However, it seems that long-run solvency is. Mean and median debt ratios (0.8579 and 0.7064) show that the leverage levels of sample firms are high. Approximately do one-quarter of sample firms even bear negative equity book values.

Place Table 1 Here

For these 161 firms, we compute the Z-scores and Black-Scholes-Merton probabilities (BSM-Prob) by collecting necessary data from Compustat, CRSP, and Datastream databases. Following Hillegeist, Keating, Cram, and Lundstedt (2004), we

use the logistic cumulative distribution function to convert the original Altman's (1968) Z-scores into Z-probabilities (Z-Prob) for the simplicity of later comparison. However, different from Hillegeist, Keating, Cram, and Lundstedt (2004), the BSM probabilities calculated in this study are simply the original BSM risk-neutral default probabilities without considering any dividend payout. We believe that this calculation difference would not influence our major results because most firms filing bankruptcy or liquidation are not capable to issue dividends. We also collect the auditors' going concern opinions of our sample firms from Compustat. Since the database does not provide complete information for all our sample firms about this part, we only obtain 142 firm-year observations for GCO.

6.2 GCI Computation

This section explains how we calculate the EGCI. The amount of transferred wealth in our model is defined as the difference of the two equity (option) measures. The first is the measure of equity value when the firm is allowed to sell assets to meet debt obligations of current period (E^*) and the second is the measure of equity value when the firm is prohibited from selling assets to meet debt obligations of current period (E). These option values are a function of the following six variables:

$$(6) \qquad TW = E^*(A_0, K_0, K_1, r, \sigma, h) - E(A_0, K_0, K_1, r, \sigma, h),$$

where A is the asset value of the firm, K_0 is the debt and interest expense payouts of current period, K_1 is the debt payout due at the next period, r is the risk-free rate, σ is the volatility of asset value, and h is the measure time period.

The specific definitions of six variables are defined as the following. The debt and interest expense payouts of current period, K_0, is defined as interest expenses at current period plus current liabilities from last period. Here we assume that the firms will immediately face the interest payment at current period and total current liabilities from last period which are due at this period. The measurement of K_1 is total liabilities of current period. Similarly, we assume that total liabilities of current period will be due at the next period. The asset value A and asset volatility σ are estimated from Black-Scholes-Merton equation and Ito's lemma by matching up the market capital (market value of equity) and stock price volatility. Data above and risk-free rate r are all collected from the Compustat, CRSP, and Datastream databases. The measure time period h is 1 year since the going concern decision is made every year.

6.3 Empirical Results

Panel A-1 of Table 2 shows the Type II error results of all 161 observations under Z-probabilities, BSM probabilities, and EGCIs. Following the original Altman's (1968) suggestion, we use two cutoff points, Z = 1.81 and 3, for Z-probabilities 14.06% and 4.74% respectively after conversion. For BSM probabilities, we pick 0.2% and 25% as cutoff points because the average cumulative default rates of Baa and Caa rating bonds in Moody's credit reports are approximately these two numbers. The EGCI column provides only one cutoff standard, 100% ▯ EGCI > 0, meaning that the firms' current asset values fall into the warning zone according to Figure 4.

Place Table 2 Here

In Panel A-1 of Table 2, EGCI outperforms Z-Prob and BSM-Prob by resulting in the lowest rate of Type II error 10.56% despite different cutoff points. The result also supports the findings of Hillegeist, Keating, Cram, and Lundstedt (2004) that BSM-Prob performs better than Z-Prob if we separate the comparison into a relatively loose level (25.47% < 29.19%) and a relatively strict level (13.66% < 19.88%). We further examine these models' performances on sample firms delisted for different reasons. Panel A-2 shows the examination results for 56 bankrupt firms, while Panel A-3 shows those of 105 liquidations firms. The two panels show similar patterns as in Panel A-1: EGCI performs the best among the three measures, and BSM-Prob still performs relatively better than Z-Prob in either the relative loose level or the relative strict level. In Panel B-1 of Table 2, we add the aforementioned auditors' going concern opinions for further comparison. The rate of Type II error 47.89% of GCO is the highest comparing with other measures'. We also separate 142 sample firms with GCO data into 42 bankrupt firms and 100 liquidation firms and show the examination results in Panel B-2 and Panel B-3 respectively. The rates of Type II error of GCOs in the two panels are always the highest (35.71% and 53.00% respectively). As for the performances of the three measures, the findings are similar to those in Panel A as well.

In summary, there are several important empirical findings exhibited in this section. First, according to our empirical results, the auditors' going concern opinions do bear quite high rates of Type II error comparing to the three measures. This finding somehow supports the conclusion of Louwers (1998) that traditional financial factors form the basis of auditors' decisions and implies that these models could help auditors when giving going concern opinions. Second, our empirical results show that BSM-Prob

performs relatively better than Z-Prob in all conditions which supports the conclusion of Hillegeist, Keating, Cram, and Lundstedt (2004). Third, EGCI is always the one that results in the lowest rate of Type II error in the comparison. Therefore, we believe that our model, a hybrid, is able to recognize the importance of accounting information and integrate the advantages of an accounting-based model and a market-based model. Last but interestingly, our empirical results show that GCO and the three measures unanimously perform much better in detecting bankrupt firms than in detecting liquidation firms.

7 Conclusion

In this paper, we explore the deferred default problem of the current myopic going concern practice. The myopic going concern decision that is motivated by liquidity-driven default is not consistent with accounting's Conservatism Principle. This paper defines *economic default* via an implied wealth transfer problem that follows the multi-period structural form framework. We present an objective measure (Economic Going Concern Index, or EGCI) for those firms that we feel should **not** receive a clean audit per their going concern status. While they might have assets available to make currently due debt payments, there is almost no chance of them making all their future required payments.

Given that our model can quantitatively measure the potential transferred wealth, we use the EGCI measure to examine the going concern status of sample firms which are delisted due to either bankruptcy or liquidation during the period 2010-2010. Although Hillegeist, Keating, Cram, and Lundstedt (2004) show that the BSM market-based measure provides significantly more information than the accounting-based measures and recommend that researchers use BSM-Prob when assessing the probability of bankruptcy, this study provides an alternative choice. Our empirical results show that EGCI measure outperforms popular Z-score and Black-Scholes-Merton measure in the comparison. We believe that our model, a hybrid, which is able to recognize the importance of accounting information and integrate the advantages of an accounting-based model and a market-based model, could provide great assistance to auditors to lower Type II error when making going concern opinions.

References

Altman, E. I. (1968), "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," *The Journal of Finance* 23, 589-609.

Altman, E. I. And T. McGough (1974), "Evaluation of a Company as a Going Concern," *Journal of Accountancy* 138, 50-57.

Behn, B. K., S. E. Kaplan, and K. R. Krunwiede (2001), "Further Evidence on the Auditor's Going-Concern Report: The Influence of Management Plans," *Auditing: A Journal of Practice and Theory* 20, 13-29.

Black, F. and M. Scholes (1973), "The Pricing of Options and Corporate Liabilities", *Journal of Political Economy* 81, 637-654.

Chen, K. and B. Church (1996), "Going Concern Opinions and the Market Reaction to Bankruptcy Filings," *The Accounting Review* 71, 117-128.

Crosbie, P. and J. Bohn, (2003), "Modeling default risk," *Moody's KMV Working Paper*.

DeAngelo, H., L. DeAngelo, and K. Wruck (2002), "Asset Liquidity, Debt Covenants, and Managerial Discretion in Financial Distress: The Collapse of L.A. Gear," *Journal of Financial Economics* 64, 3-34.

Fama, E. and M. Miller (1972), *The Theory of Finance*, Holt, Rhinehart and Winston.

Fleck, S. and E. Wilson (1994), "The Incremental Information Content of the Going-Concern Opinion," *Journal of Accounting, Auditing, and Finance* 9, 149-166.

Geiger, M. A., K. Raghunandan, and D. V. Dasaratha (2005), "Recent Changes in the Association between Bankruptcy and Prior Audit Opinions," *Auditing: A Journal of Practice and Theory* 24, 21-35.

Geiger, M. A., K. Raghunandan, and D. V. Dasaratha (2006), "Audit Firm Size and Going-Concern Reporting Accuracy," *Accounting Horizons* 20, 1-17.

Geske, R. (1977), "The Valuation of Corporate Liabilities as Compound Options," *Journal of Financial and Quantitative Analysis* 12, 541-552.

Geske, R. (1979), "The Valuation of Compound Options", *Journal of Financial Economics* 7, 63-81.

Heaton, J. (2007), "Solvency tests", *The business lawyer* 62, 983-1006.

Hillegeist, S. A., E. K. Keating, D. P. Cram, and K. G. Lundstedt (2004), "Assessing the Probability of Bankruptcy," *Review of Accounting Studies* 9, 5-34.

Ho, T. and R. Sanger (1982), "Bond Indenture Provisions and the Risk of Corporate Debt," *Journal of Financial Economics* 10, 375-406.

Hopwood, W., J. McKeown and J. Mutchler (1989), "A Test of the Incremental Explanatory Power of Opinions Qualified for Consistency and Uncertainty," *Accounting Review* 64, 28-48.

Hopwood, W., J. McKeown and J. Mutchler (1994), "A Reexamination of Auditor Versus Model Accuracy with the Context of the Going-Concern Opinion Decison," *Contemporary Accounting Research* 11, 409-431.

Jensen, M. C. and W. H. Meckling (1976), "Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure", *Journal of Financial Economics* 3, 305-360.

Kennedy, D. and W. Shaw (1991), "Evaluating Financial Distress Resolution Using Prior Period Audit Opinions," *Contemporary Accounting Research* 8, 97-114.

Kim, E. H., J. J. McConnell and P. R. Greenwood (1977), "Capital Structure Rearrangements and Me-First Rules In Efficient Capital Markets," *Journal of Finance* 32, 789-810.

Louwers, T.J. (1998), "The Relationship between Going-Concern Opinions and the Auditor's Loss Function," *Journal of Accounting Research* 36, 143-156.

Malitz, I. (1989), "A Re-Examination of the Wealth Expropriation Hypothesis: The Case of Captive Finance Subsidiaries," *Journal of Finance* 44, 1039-1047.

McKeown, J., J. Mutchler, and W. Hopwood (1991), "Towards an Explanation of Auditor Failure to Modify the Audit Opinion of Bankrupt Companies," *Auditing: A Journal of Practice and Theory* (Supplement) 10, 1-13.

Merton, R.C. (1974), "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates", *Journal of Finance* 29, 449-470.

Modigliani, F. and M. Miller (1958), "The Cost of Capital, Corporation Finance, and the Theory of Investment", *American Economic Review* 48, 261-297.

Nogler, G. (1995), "The Resolution of Auditor Going Concern Opinions," *Auditing: A Journal of Practice and Theory* 14, 54-73.

Stiglitz, J. E. (1972), "Some Aspects of the Pure Theory of Corporate Finance: Bankrupties and Takeovers," *Bell Journal of Economics and Management Science* 3, 458-482.

Stiglitz, J. E. (1974), "On the Irrelevance of Corporate Financial Policy", *American Economic Review* 64, 784-793.

Table 1: Sample Statistics

Panel A: Sample Statistics by Industry and Delisting Reason

SIC	Industry	Bankruptcy	Liquidation	N
10-14	Mining	6	3	9
20-39	Manufacturing	28	37	65
40-49	Transportation, Communications, Electric, Gas & Sanitary Services	3	9	12
50-51	Wholesale Trade	4	4	8
52-59	Retail Trade	6	9	15
70-89	Services	8	25	33
91-99	Public Administration	1	18	19
Total		56	105	161

Panel B: EBIT and General Used Accounting Credit Ratios of Sample Firms

	Mean	25^{th} Percentile	Median	75^{th} Percentile
EBIT	-32.1773	-22.5080	-8.0210	-0.6810
Current Ratio	6.5474	0.6393	1.3918	2.5936
Quick Ratio	6.2020	0.3646	0.8832	2.1939
Debt Ratio	0.8597	0.2874	0.7064	1.0027

Table 2: Type II Error Rate under Different Measures

Panel A-1: Total Sample (N=161)						
Measure	Z-Prob		BSM-Prob		EGCI	
Cutoff	Z<1.81	Z<3	>25%	>0.2%	>0	
Rate of Type II Error	29.19%	19.88%	25.47%	13.66%	10.56%	
Panel A-2: Total Bankrupt Firms (N=56)						
Measure	Z-Prob		BSM-Prob		EGCI	
Cutoff	Z<1.81	Z<3	>25%	>0.2%	>0	
Rate of Type II Error	16.07%	3.57%	10.71%	1.79%	0.00%	
Panel A-3: Total Liquidation Firms (N=105)						
Measure	Z-Prob		BSM-Prob		EGCI	
Cutoff	Z<1.81	Z<3	>25%	>0.2%	>0	
Rate of Type II Error	36.19%	28.57%	33.33%	20.00%	16.19%	

Panel B-1: Sample with Going Concern Opinion Data (N=142)						
Measure	Z-Prob		BSM-Prob		EGCI	GCO
Cutoff	Z<1.81	Z<3	>25%	>0.2%	>0	
Rate of Type II Error	30.28%	21.83%	26.76%	14.79%	11.27%	47.89%
Panel B-2: Bankrupt Firms with Going Concern Opinion Data (N=42)						
Measure	Z-Prob		BSM-Prob		EGCI	GCO
Cutoff	Z<1.81	Z<3	>25%	>0.2%	>0	
Rate of Type II Error	14.29%	4.76%	9.52%	2.38%	0.00%	35.71%
Panel B-3: Liquidation Firms with Going Concern Opinion Data (N=100)						
Measure	Z-Prob		BSM-Prob		EGCI	GCO
Cutoff	Z<1.81	Z<3	>25%	>0.2%	>0	
Rate of Type II Error	37.00%	29.00%	34.00%	20.00%	16.00%	53.00%

Figure 1: Market Value of Debt vs. Market Value of Asset

Figure 1 shows the relationships between the market value of the due in two years at year 1 just prior the paying of the other debt due for increasing market values of equity. An equity value of $186 is the cut-off default value.

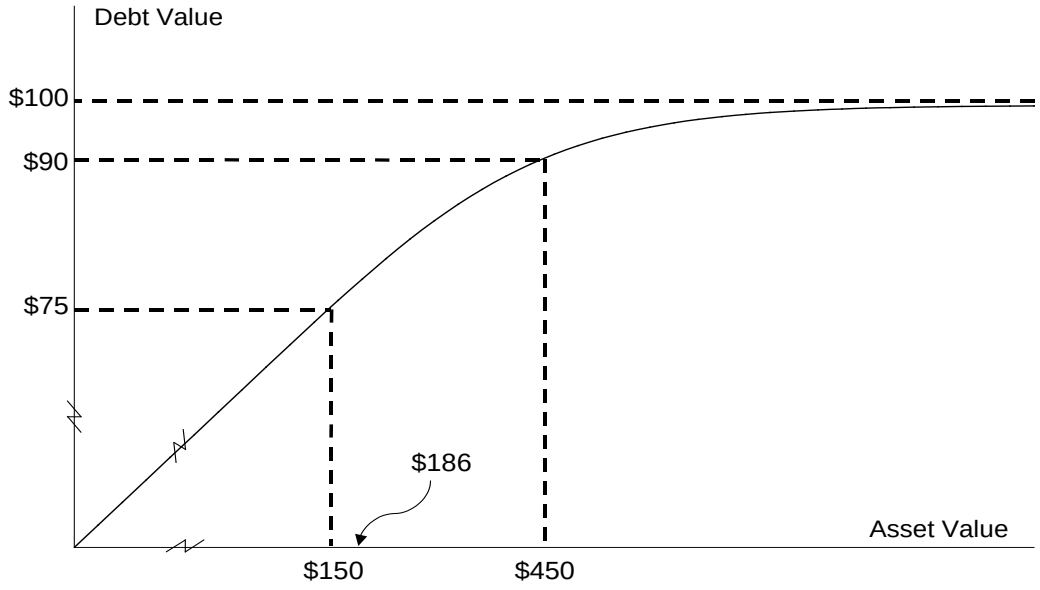


Figure 2: Equity Value vs. Asset Value under the Economic Default

Figure 2 gives a plot of the equity value versus asset value for the example of a breakeven point at time 1 of $186 under the economic default.

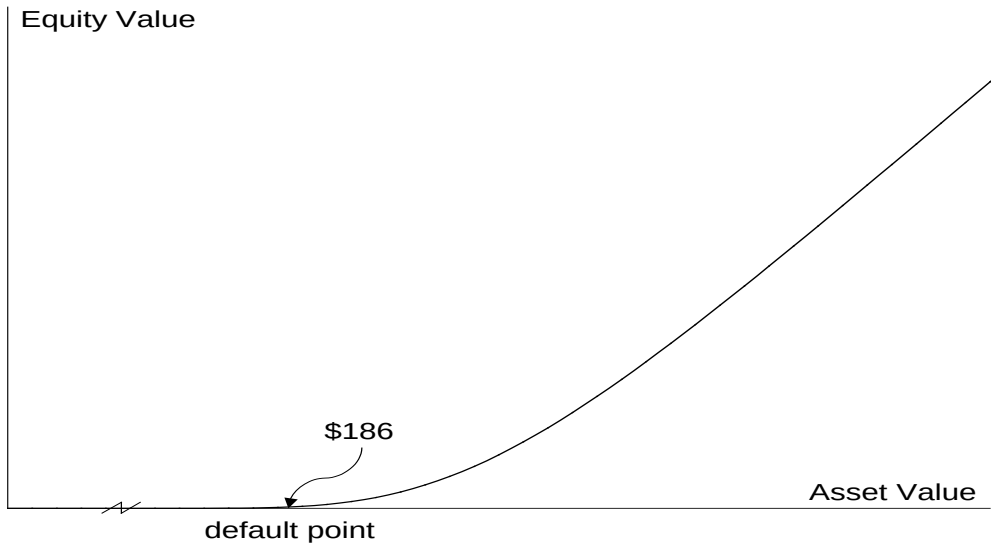


Figure 3: Default Difference - Cause of the Implied Wealth Transfer Problem

Figure 3 gives a plot of the equity value versus asset value for the example with a breakeven point at time 1 of $186 under the economic default that is expanded to show how the implied wealth transfer problem is caused. At extremely low levels of asset value, the firm cannot make payment due at time 1 and will default under both economic and regular default definitions. At high levels of asset value, the firm survives under both definitions. In the intermediate range of asset values, the firm is default under the economic default definition and still surviving under the regular default definition. In this intermediate range, the firm is having enough value to pay off the maturing debt, but value is less than the total amount owed. This intermediate range (default difference) is also cause of the implied wealth transfer problem investigated in our study.

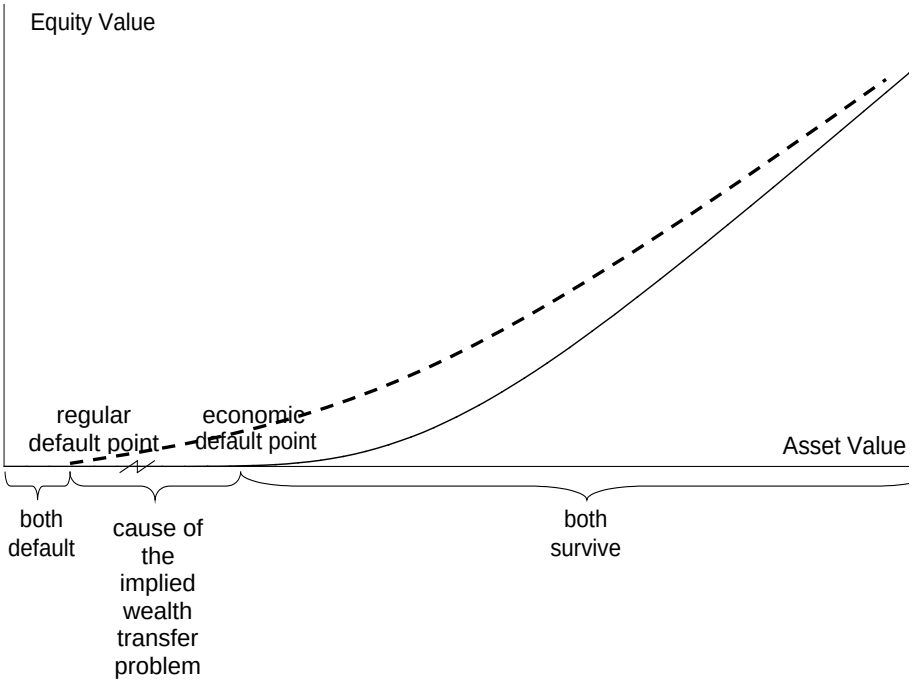


Figure 4: Transferred Wealth (TW) and Economic Going Concern Index (EGCI)

Figure 4 exhibits the complete framework of our model. The amount of transferred wealth (TW) in our model is measured as $TW = E_0^* - E_0$ which is defined in Equations (4) and (2) respectively. Under the definition of economic default, for each case, we can find the breakeven asset value $\overline{A}_0$ which bears the maximum transferred wealth (MTW). The economic going concern index $EGCI$ in our study is defined as $\frac{TW}{MTW}$.