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Modeling the Effects of ASU 2016-13 Adoption

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Abstract

The paper evaluates the effects of ASU 2016-13 adoption for financial institutions. We use an analytical approach to advise policy makers at the financial accounting standards board (FASB) with new accounting treatment and adjustments to commonly accepted valuation models for cash flow. The findings are the adoption of ASU 2016-13 will cause idiosyncratic volatility. The idiosyncratic volatility is nested in the firm returns in the financial sector. The firm's cash flows were modeled from publicly available data found at the Securities and Exchange Commission. The returns modeled show a significant negative cumulative abnormal return for financial sector equity listings as a whole in the event window, with a recovery period of six months or less, ceretis paribus. The implications of the study show a wider recovery curve for young firms and a shorter recovery curve for mature firms, with no regard to market capitalization.

Keywords: Cash Flow modeling, ASU 2016-13 adoption, Econometric Modeling, Idiosyncratic Returns

1. Introduction

Regulators and public firms are concerned about the welfare of corporate balance sheets with the eminent implementation of ASU 2016-13, *measurement of financial derivatives*. The uncertainty with implementation is the difficulty to measure empirically the effects of Fair Market Value (FMV) adjustment due to new requirements of disclosure within ASU 2016-13. Volumes of studies have been undertaken to properly value the hedges used in regular corporate activities, as an intermediate step between using the hedges and accurately modelling the impact of such hedges on corporate balance sheets, especially financial institutions.

The goal of new accounting standards, such as ASU 2016-13, is to lower the cost of capital (Levitt, 1998). This reasoning is used in many policy discussions as well as many more ubiquitous statements. An interpretation of Levitt's statement is that the cost of capital summaries the impact of disclosures on corporate welfare, such as retained earnings analysis secures the going concern assumption. The study openly examines this interpretation.

Additionally, the relationship between proposed FASB initiatives and cost of capital, there is a gap between the empirical evidence and theoretical research. While empirical finding son the relationship have been unclear, as surveyed by Healy and Palepu (2001) and Leuz and Wysocki (2007), most theoretical research examine a competitive pure exchange economy and predicted disclosure quality reduces the cost of capital. Most recent research, Gao (2010), Dutta & Nezlobin (2017), predict inconsistent signals to future cash flow creation from disclosures. These studies influence the question, motivation, and optimization techniques in this study.

In review, two questions are addressed. What are the effects of ASU 2016-13 implementation upon loanable funds? Second, to what degree does the ASU 2016-13 implementation affect corporate welfare? First, an economy is constructed in which ASU 2016-13 implementation will affect corporate welfare through shocks to retained earnings. This economy differs from prior economy creation used by Gao (2010) through the use of

multiple product outlays, particularly financial services. In Gao (2010) and Dutta & Nezbolin (2017), the economy is created using single product influence. The conditions necessary for sufficient observation are identified under which disclosure reduce cost of capital and improve corporate welfare. Finally, these conditions are compared to show equivalence.

The results serve as an admonishment of the utility of cost of capital as a representation of risk premium. A single risk averse CFO will react to the changes demanded by ASU 2016-13 with short-term focus, thus causing cost of capital to increase instead of the preference of lower cost of capital. These observations are reflected in prior research studies such as Hadar and Russell, 1969. In these settings, reasonable expectations include that the cost of capital would move in parallel with the loanable funds rates. As the environment is modeled with more complexity, in which the cost of capital is influenced by required accounting changes causing the current investors to sell the investment. This sell causes the cost of capital to increase as the market value decreases. When accounting changes affect the cost of capital, the loanable funds rate is affected inversely.

An additional complexity of the environment used in this study are the effects of the information disclosure to the market contained in the accounting change. An accounting change such as ASU 2016-13 may influence investors' valuation models, which finally affects the firm's investment decisions. The firm's investment decisions affect the cost of capital for the firm as the sum of future cash flows, Ƒ. Moreover, ultimately, the firm's cash flow choices directly affect the firm's investment choices from a predictive perspective. If an investment class meets its expectations, then a similar investment will be chosen in the concurrent period for excess cash flow distribution. The effects of disclosure have been evaluated in prior literature (Gao, 2010), the findings include that disclosure reduces the uncertainty in stock price through marginal profitability of the trade, thus increasing the price of the trade by decreasing the cost of capital. In a pure economy, a higher price implies lower cost of capital, and thus increased accounting disclosures decreased the cost of capital. However, the effects upon cost of capital by accounting disclosures in an equilibrium economy are uncertain.

Contributions of the Study

The main contributions of the study is tripartite. First, the study models the effects to financial institutions balance sheets of the ASU 2016-13 linking potential disclosures with cost of capital, an extension of Gao's 2010 work on disclosure quality and cost of capital. Second, the study links the effects of ASU 2016-13 on financial institution balance sheets to the measure M2 or loanable funds rate. The last contribution of the study is to guide the discourse on policy initiatives and expected results, from a constrained utility function.

The analysis is steeped in a setting of imperfect competition with variables not supporting this setting are dummied to observe the effect on the financial services sector balance sheets. Most investor's believe that the portfolio chosen for them will yield expected returns beyond the market, thus ignoring illiquidity and negative yielding debts (Batchelor, 2016). Instead, in models of perfect competition, the optimal proportion which competitors can change the price is not shown (Samuelson, 1954). The above reasoning is the basis for choosing an imperfect competition setting. This setting was used to mediate the issue of homoscedasticity in perfect competition models. The imperfect competition model enhances the connection between disclosures and cost of capital.

Organization of the Study

The second section of the paper discusses related literature and assumptions used in the model. The third section of the paper develops the model and studies the effect of ASU 2016-13 upon demand deposits in the United States. The fourth section examines the empirical implications of the results. The fifth section concludes the study with recommendations for further research using the model developed in the third section.

2. Literature Review and Development of Assumptions

This section discusses the two assumptions used in the model, imperfect competition, policy implications of disclosure and entropy. The study links the cost of capital, an important construct in accounting, to the broad economic literature on the intended effects of regulation. The regulation is the recently proposed ASU 2016-13 from the financial accounting standards board (FASB) due to take effect in 2020. The central result about the role of information in a capital market is that the combination pure exchange, constant absolute risk aversion (CARA), and perfect competition assumes all the available information is consumed and related to the current equity price. Other research introduces the consumption of private information (Diamond, 1985), which reduces imperfect competition (Kyle, 1985), or incorporates entropy calculation in allocation of equity prices (Pele, Lazar, and Dufour, 2017). This study examines the effect of ASU 2016-13 upon demand deposits, through an analysis of the effects of proposed constraints on M2.

The focus on the effects of constraining financial institutions ability to loan required the first assumption: imperfect competition. The reason for imperfect competition is the limited sample of equities affected by the potential accounting change. With a controlled setting, the research can be extended to other areas of the economy. The model is constrained to an imperfect market. Reasoning is ASU 2016-13 may be consumed in equity prices prior to the effective date, during the implementation period, or after the additional cost of non-compliance is assessed in market valuation. With the open adoption sequence, the effects of the regulation cannot be constrained, thus the measurement of effects happens through imperfect competition at the individual equity level. In addition to the opaque nature of adoption, the early adopters will get the benefit of adoption, measureable as lower volatility at inception date. The lower the volatility, the smaller the cumulative abnormal return curve. In models of imperfect competition, regulation reduces the cost of capital and potentially enhance investor welfare.

The second assumption used in the model is that policy initiatives have an effect on disclosure. This notion is used in imperfect competition (Varecchia, 2017). Additional assumptions used in the imperfect competition model is a limited number of cases for evaluation. In the current series, we limit the sample to financial services companies, fitting the constraints of the assumption. The final assumption used in the imperfect model is the existence of information entropy. For the intent of the study, an overview of primary and other employment is created to match the employment of standards writers and primary income sources. This comparison will create an evaluative template for separation of duties. The template is based on prior research used in workflow processes of Zhang, Zhange, and Wang, 2004.

The literature, as to so far, tested the effects of financial policy changes upon corporate cash flows (Zao, 2010). The oeuvre of this research is to advance the theory that policy has an innately negative effect on corporate cash flows. The research diverted from the models built by Zao, 2010 by using an imperfect competition model. This action effectively ties the

policy makers to the financial institutions, effectively demonstrating the employers of the policy writers have access to the information contained in the policy thus increasing information entropy (Pele, Lazar, & Dufour, 2017). The effects upon cash flows are modeled using three lemmas similar to Zao, 2010 and Varecchia, 2017. Unlike the aforementioned studies, the lemmas measure the magnitude of the policy change upon M2, instead of micro level cash flow. The effects are measured through the delta of the market interest rate (Ohlin, 1937). Thus, the microeconometric fulcrum of this study is the delta of the market interest rate. This effect is measured by observed effect, proofs provided in the appendices, by the delta of financial institution cash flows. Few researchers, including Bhamra and Shim (2017), Luciano, Regis, and Vigna (2012) discuss this empirical asset-pricing anomaly to the measurement of the magnitude effects of intercorporate policy changes upon cash flows.

Bharma and Shim (2017) discuss the effects of option pricing in the wake of idiosyncratic events. The results of the study show that the cumulative abnormal return and the recovery from the event in question are sharper and more pronounced for younger firms. While mature firms experience a shorter response to idiosyncratic events. The curve of abnormal return is of applicable interest for the development of this study. The integral under the curve for abnormal return in this study provided pronounced detail for usage in the current study. When calculating the integral values under the curve, we discovered the value of integration under the curve for forecasted values. We use the triple integration to forecast the recovery period for the event in question, please see Lemma 2. From this paper, we developed the final assumption used in this analytical accounting research project. Assumption 2: when operating in an imperfect competition environment the triple integral functions forecasts the equity value.

Atichison and Brown (1967) inform this work with the lognormal distribution to minimize error, reduce the number of Lemmas, and realize the use of the select models when data becomes available. With this realization we defer, “The very instant that I saw you did my heart fly to your service; there resides, to make me slave to it; and for your sake am I this patient log-man” (Shakespeare, 1610). With Shakespeare covered we move onto the development of the two Lemmas for testing the effects of cash flow changes caused by ASU 2016-13 adoption. In section three, the lemmas are developed and tested, the variables are examined, and the implications for loanable funds are described.

3. Methodology

Research Questions and Hypotheses

The research questions are how does the adoption of ASU 2016-13 affect the cash flows of financial services firms? Moreover, what effect, if any, does the change in cash flow accounting have upon loanable funds?

H_0: There is no variance to cash flows caused by ASU 2016-13 adoption for financial services firms’ cash flow accounting and loanable funds.

H_{A1}: There is a non-stationary variance in cash flows in financial services firms’ caused by ASU 2016-13 adoption.

The Model and Equilibrium

This section describes the parameters of, the requisite for, and determinates of the model. The model is an adoption, then trading model that allows advance adoption of revenue recognition to influence the firm investment philosophy. After we solve for the unique

equilibrium, three properties are discussed pertaining to equilibrium and the examination of idiosyncratic events created by the new standards influencing distribution of cash flow.

The Model

A large economy is studied to allow for risk sharing incentives (Domar and Musgrave, 1943) in a competitive market. The effects upon cash flows is measured through the observation of risky assets. The measurement of the risky asset class is a finite measure, as the measurement is limited to financial services companies (FSC). The number of investors and risky assets could be infinite. Using the rationale developed and proved in Gao (2010), the model is informed by on a per capita basis without the loss of simplification. The risky assets (assets influenced by the change in cash flows) of a representative firm are readily tradable between current and new investors, maker and taker respectively after advance adoption of ASU 2016-13. As informed by prior literature, there is a risk-free asset, which trades as numeraire to represent no return.

Lemma 1

$$\int_0^1 (Fd(1-t/t)+g(s/1-s)=dt-gt \quad (1)$$

The first Lemma described the interactions between cash flow in prior periods of operation and the effects of proposed changes in cash flow using ASU2016-13 guidance including advanced recoup of earnings from long term contracts formerly treated as completed contract method, now required to be treated as percentage of completion. The first lemma modeled the expected rate (dt – gt) of decrease of cash flow available for loanable funds for financial institutions by treating the rate of change as a derivative of changes in available for sale securities (t) and short-term payables (s). The model predicts the effects on cash flows available for loan production ultimately influencing the loanable funds rate.

The results of Lemma 1 include an inverse relationship between delta of loanable funds and cost of capital. Cost of capital, in this context, is the capital available for loan (the primary function of the banking system). A review of ASU 2016-13 provides the effects of revenue recognition for Financial Services Organizations (FSO). The FSOs may observe a small increase in first year loanable funds reflected in the recognition of the delta completed contract revenues. These revenues are reflected in the cash flow changes year over year, but not the loanable funds rate. The ASU 2016-13 also addresses inconsistencies in revenue recognition due to governmental fund transfers, long-term contract recognition, and measurement of credit losses (FASB, 2016). Lemma 1 included the effects to cash flows by the delta of revaluation of financial instruments, Ceretis Paribas. Please see appendix A for the proof of Lemma 1.

Lemma 2

The second Lemma engaged the exogenous influences of the market in investor reaction to cash flow deltas. The ASU 2016-13 proposed fair value adjustments to all phases of investments. Lemma 2 models the shock and idiosyncratic response of the market to the publicly traded equities of financial services firms.

$$\Delta P = \int_0^1 (Fd(1-t/s)+g(1-s/t) \quad (2)$$

The change in P represents the proposed shock to the equity value upon recognition of the fair market value loss in the current period, T. The proposed loss follows an idiosyncratic loss from a SEC violation. Anywhere from 2.5 to 15% of the common stock value upon

announcement. This result will mirror the results of Bhamra and Shim's paper on Stochastic idiosyncratic cash flow risk (2016). The second lemma includes two additional properties (1) the idiosyncratic risk factor for each firm's returns is also a risk factor for the firm's idiosyncratic volatility. (2) Systemic risk factors (not factored in the first lemma) are risk factors for the firm's idiosyncratic volatility. These properties provide boundaries for idiosyncratic result projection within the constraints of the delta in price equation aforementioned. Thus, the proposition of Lemma 2 becomes the return of the financial firm's equity is dependent upon properties (1) and (2) holding in testing. The dynamics of the abnormal return are as follows.

$$dR^{a}_{kt} = \sigma^{sys}_{E}\, d\beta + n^{id}_{Lx\pi} \quad (3)$$

The second part of the proposition references the negative return from cash flows in the subsequent periods. This leads to idiosyncratic abnormal results observed as the result of subsequent events (i.e. restatements, revenue recognition issues, and proper expense realization). After consideration of this abnormal return within the measurement period, the longer run return of the basket of equities needs consideration. Considering the current basket of financial firms, dynamic pricing asset pricing models are used to satisfy the remaining properties of the current proposition found within this study. The considerations for equilibrium are discussed in the next section, and then the results of the second Lemma are considered prior to the display of Lemma 3.

Considerations for Equilibrium

The equilibrium of the model is dependent upon three properties (1) young firms are not considered in the adoption of ASU 2016-13 as the magnitude of effects upon young firm's may be more profound than is useful for the model. (2) Real growth options are considered as an attributed portion of the firm's equity performance, not as an econometric assumption that as production grows so does the threshold of capacity (Bhamra, Shim, 2017). (3) Further, the model considered results fitting a lognormal distribution of the stocks prior year returns. With these properties outlined, the model is further developed in the next section.

Lemma 3

The third Lemma turned toward the model implied returns. The return on an individual equity found in the basket of equities is independent of the production capacity, as aforementioned, as the value of the firm is a constant in the following equation. The return implied is found in the assets in place.

$$\mathbf{dR_a = \dot{\Gamma} + f \tan L(p) a^{s'ys}} \quad (4)$$

$$\mathbf{dRA = 1 + \left(\frac{c}{\beta \Leftarrow r} - n\right)} \quad (5)$$

As seen above, the model can generate results consistent with the positive independent returns of the base model of valuation mentioned in Lemma 1. In addition, meeting the propositions in Lemma 2, the model considers mature corporations and real growth options, normally designated as organic growth rather than acquisition growth. In addition, Lemma 3 considers abnormal return attributed to cash flow accounting shock in early adoption of ASU 2016-13.

Model Predictions

First, the lemmas combined product is the prediction from the empirical tests in this section. With returns consistent with the results from the positive results model (Duffee, 1995). Second, derived from the addition of Lemma 2, the model isolated the highest magnitude variable. The variable is discrete, presenting a percentage delta applicable to each company level statistic.

Third, the systemic volatility is higher when real options are present Silvestrov (2014). This is explained simply through the increased liquidity produced with the options trade. The mechanics of the options trade includes an assignment of a number of shares attached to each options contract normally 100 shares per contract for each contract call or put. The underlying asset, in this example equity, then exchanged at the expiration of the contract, thus creating abnormal liquidity.

The Combined Model

$$\mathrm{dRA} > \frac{(\mathrm{C_t}+1)}{(\mathrm{Ct})} - (\mathrm{Ct} - 1) \qquad (6)$$

As mentioned above the model takes form as a simple inequality to expose the abnormal return attributed to the cash flow shock. The ordinary least squares approach allowed the forecasted means comparison to take shape. The combined model will result in the capture of any moments of entropy on the limited dependent variable; cash flows.

4. Discussion

This section discusses the two assumptions of the model, (1) the abnormal return will be positive for the equity value, and (2) the model uses only mature corporations. The cost of capital is a topic with vast literatures developed as a construct of accounting, to the broad economic literature on the efficiency of disclosure quality, which is the intersection of research where this paper fits. The positive abnormal return is steeped in the increase revenue recognized in the period of adoption. This period of adoption may change the cost of capital for all following periods. The additional cost of debt should be offset by the decreased cost of equity.

4.1 The Mechanics

The early adoption or adoption of the ASU 2016-13 guidance will materially change the recognition of income derived from long-term contracts, Prior guidance for long-term contracts was sparse, at best. Regarding early adoptions of each company as codified logic for accounting mechanics. With the new guidance, the long-term contract derived income is recognized in the year service is delivered, also including prior years income which was deferred until the contract is completed (commonly called completion of contract method). Depending on the contract, this adoption may increase revenue materially.

4.2 The Investment Effect

The focus of the investment effects on early adoption is material. The guidance (ASU 2016-13) may cause an abnormal return for the equity price exists if there is perfect competition in the equity market. This is underlying in the positive abnormal return assumption in the model. If the current investor is in the equity keep the equity after disclosure, then the investment decision will reflect the weighted average of the preferences of the current and new investors (Gao, 2008). However, if the current investor's and the new investors have dissimilar access to the information, then the forced sell assumption will not hold. However,

the variance becomes part of the normal curve by the forced sell found in the real growth option assignments mentioned in the mechanics section.

4.3 Contributions

By studying the investment effect of ASU 2016-13 adoption, this study contributes to the vast literature focusing upon effects of regulation. As to so far, the literature has not developed a model applicable to any cash flow variance. This research completes that task. The connections created in this research study include the cost of capital and cash flow variance, the idiosyncratic variance attributed to regulation, and cash flow variance and investor welfare. The next section discusses the empirical implications of the regulation model. Concluding the research study with recommendations for future research.

5. Empirical Implications

With the understanding that cost of capital is synchronously tied to the weighted average cost of capital, the model aforementioned provides potential theoretical explanation for the mixed empirical evidence on the relation between regulatory pronouncements and cash flows. The relationship between regulatory pronouncements and the cash flows is as follows:

$$E(\mathbb{R} > \phi^{x}x) = \beta_{j\pi\mathbb{N}i}$$

Where $\beta_{j\pi\mathbb{N}i}$ is the vector of known reactions characteristics and $\mathbb{R} > \phi^{x}x$ is a measure of magnitude of effect on the entity. The naming convention for this measure is tsunami and thorn to borrow from Wings of Fire, my oldest son's current favorite book series. The model uses a few assumptions including a negative correlation between pronounced post event and an immediate positive correlation to the market return. Further, the implications of the research project are a framework for potential regulatory scrutiny. This framework can be applied to all regulatory events if coded to the effects upon cash flows.

These effects range in a multivariate function including an increase to immediate booked revenue, accelerated expenses, and deferral of tax obligations. Each of the aforementioned areas addressed a function of cash flow, operating, investing, and financing. The magnitude of change for each area will be measured inside of the framework of the model. The expectation for magnitude effects is ordered as operating, investing, and financial in a decreasing order of magnitude.

6. Recommendations

This study examined the potential effects of regulatory changes to revenue recognition upon cash flows for publicly corporations. In addition, the study created a model for use in estimating the impact of regulatory changes of any kind on cash flows of multiple sized companies. The recommendation for future research is to adjust the model after the pronouncements become statutory regulations. Test the differences and start the scientific process over again in application to other financial presentations than statements of cash flows. The model, if it creates value can be applied to other government initiatives, such as tax policy changes.

The issues with the model are the qualification that all parameters of the model need to be set as suggested in this work. The researcher has not applied the model to any other regulatory pronouncements outside of accounting revenue recognition changes. The future research includes the development of parameters using post adoption datasets. Using event study models to test the estimations made in this paper.

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