THE ECONOMIC TRADE-OFFS IN THE FAIR VALUE DEBATE

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ABSTRACT

In this paper, I provide two general insights that are useful in evaluating the economic trade-offs of alternative accounting measurement rules. First, when there are multiple imperfections in the world, restricting a strict subset may not always improve welfare. Second, a firm is not a black box that operates independently of the measurement environment. Measuring a firm's operations affects the firm's actions that, in turn, influence the underlying distribution of cash flows being measured.

Using these two insights, I discuss the economic consequences of accounting measurement rules that strive for greater transparency. In particular, I will focus on the costs and benefits of fair value accounting and its implications for financial stability.

I. INTRODUCTION

Why should accounting measurement rules matter? Accounting is just a veil that leaves the economic fundamentals of a firm unaffected, and is indeed often viewed as nothing more than a set of arcane measurement rules that do not affect the underlying cash flows of a firm. Put differently, measuring a firm's operations using accounting measurement rule *X* versus accounting measurement rule *Y* is sometimes viewed as being equivalent to measuring the temperature of an object using either the Celsius scale or the Fahrenheit scale. This line of reasoning makes sense in a perfect world, a world that economists would call a first-best world. For example, when it comes to the debate surrounding accounting measurement issues—such as the extent to which assets and liabilities on a balance sheet should be measured at market prices—it is important to keep in mind that firms do not operate in a first-best world. In such a world, the markets would be completely frictionless so that assets would trade in fully liquid markets and perverse incentives would not exist. In a first-best world, accounting measurement would be irrelevant because reliable market prices would be readily availa-

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ble to all. Just as accounting is irrelevant in such a world, so would talk of establishing and enforcing accounting standards. Accounting measurement is relevant only because we live in an imperfect world where markets are not always fully liquid, firms' decision makers may have private information that cannot be readily disclosed to outsiders, and decision makers' incentives may be distorted. In this second-best world, it is important to understand how the nature of those imperfections speaks to the appropriate policy responses. Therefore, when we debate issues regarding accounting, it is important to be clear on the nature and consequences of the imperfections.

My research on accounting measurement issues has generated the following insights that are useful in evaluating the policy implications of alternative accounting measurement rules:

(1) In a second-best world, i.e., a world in which there are several imperfections, simply removing just one of these imperfections may not be welfare-improving. It is possible that removing just one of the imperfections magnifies the negative effects of the other imperfections to the detriment of overall welfare. For example, simply moving to a fair value measurement regime to reduce information asymmetry between insiders and outsiders, without addressing the other imperfections in the market such as incomplete and illiquid markets, may not guarantee a welfare improvement.

(2) Second, a firm is not a black box that somehow operates independently of the measurement environment and mechanistically produces probability distributions of underlying cash flows. Measuring a firm's operations affects the firm's actions that, in turn, affect the underlying distribution of cash flows. In other words, measuring a firm's cash flows changes the very cash flows that one is seeking to measure. Thus, accounting measurements can have substantial real effects. Understanding these effects is essential to address the policy implications of alternative accounting measurement rules.

These two general insights are useful in evaluating the economic trade-offs of alternative accounting measurement rules. Over the years, accounting standard setters such as the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) have argued for measurement policies that would result in higher transparency of mandatory disclosures. Therefore, I will use these insights to discuss accounting measurement rules that strive for greater transparency. Higher transparency may be achieved in a variety of ways. *Fair value accounting or mark-to-market accounting* might be just one way (and perhaps the most controversial way) of achieving higher transparency.[1] A second

[1] Throughout the paper, I will use the phrases mark-to-market accounting or fair value accounting synonymously. While mark-to-market accounting is the use of observable market prices to measure

way might be to increase the frequency of mandatory accounting reports. A third way of achieving higher transparency might be to increase the precision in measuring and disclosing a firm's operations in its financial statements. Because all three preceding measurement issues deal with attempts to increase transparency, the insights underlying them are also very similar. Therefore, before investigating the costs and benefits of fair value accounting and its implication for financial stability, I will discuss the issues surrounding both higher frequency and higher precision disclosures.

II. INCREASING TRANSPARENCY VIA THE FREQUENCY OF MANDATORY FINANCIAL REPORTING

How frequently should publicly traded firms be required to report the results of their operations to the capital market? This is an important policy issue that standard setters must address. In the United States, the frequency of mandatory reporting has risen from annual reporting to semi-annual reporting to quarterly reporting. This last change occurred in 1970. With the current regulatory environment calling for greater accountability and higher transparency of financial information, it is likely there will be pressure on firms to report even more frequently. The benefits to more frequent reporting are more timely information that decreases informational differences across traders in the stock market and, perhaps, facilitates corporate governance. Such reasoning would suggest that by providing more timely information, more frequent reporting would increase price efficiency and is therefore desirable from a policy perspective. However, a recent paper by Gigler, Kanodia, Sapra, and Venugopalan[2] illustrates that this intuition does not go far enough.

To investigate the costs and benefits of a higher frequency of mandatory reporting, Gigler, et al. model the environment of a firm with several market imperfections.[3] First, there is information asymmetry between insiders (i.e., the firm's manager) and outsiders (i.e., investors in the capital market) about the profitability of the underlying projects.[4] The manager has superior information about the profitability of the projects but such information cannot be credibly disclosed to shareholders in the capital market.[5] Second, the firm may invest in either a short-term project or a long-term project but the *nature* of the project, i.e., whether it is short-term or long-

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the value of an asset, fair value accounting is a broader term in the sense that it may use both observable and/or unobservable inputs to measure the value of an asset.

2 Frank Gigler et al., *An Equilibrium Analysis of the Costs and Benefits of More Frequent Fin. Reporting* (The Univ. of Chicago Booth Sch. of Bus., Working Paper, 2009).

3 *Id.* at 6-11.

4 *Id.* at 13.

5 *Id.*

term cannot be credibly disclosed to the capital market.[6] The key differences between the short-term project and the long-term project are as follows. Relative to the short-term project, the long-term project has a higher net present value. However, the short (long) term project generates stochastically higher (lower) cash flows in the early periods and generates stochastically lower (higher) cash flows in the future periods. Given this second-best environment, Gigler, et al. study whether accounting standard setters should increase transparency by mandating a higher frequency of mandatory disclosures.[7]

Gigler, et al. study two mandatory disclosure regimes: a frequent disclosure (FD) regime[8] and an infrequent disclosure (ID) regime.[9] The FD regime differs from the ID as follows: the FD regime discloses the underlying cash flows of a project more frequently than the ID regime.[10] Thus, though the total amount of information disclosed over the life of a project is the same for both regimes, relative to the ID regime, the capital market obtains early information about the underlying cash flows of the project in the FD disclosure.[11] More frequent reporting could indeed alleviate the information asymmetry between insiders and outsiders, thereby making prices more efficient.[12] However, Gigler, et al. show that higher price efficiency does not necessarily increase shareholder welfare.[13] Insight (1) illustrates why this may be the case. Under this model, firms operate in a second-best environment with multiple imperfections: first, insiders have superior information compared to outsiders about their underlying projects and outsiders cannot observe the nature of the project in which the firm has invested. If we treated the firm as a black box so that insiders' decisions are fixed or exogenous, then more frequent disclosure would indeed be desirable from a policy perspective because prices would be more efficient. However, we also know from insight (2) that more frequent disclosure may change the manager's actions by inducing insiders to focus more on short-term results than long-term results. Gigler, et al. show that while more frequent disclosure makes prices more efficient in the sense that they better reflect the underlying cash flows of the firm, they simultaneously induce the manager to engage in short-term projects rather than long-term projects.[14] The more myopic the managers' preferences are, the more likely they will invest in the short-term project. Investing in short-term projects would not necessarily maximize shareholder welfare. Thus, while increasing transparency via

6 *Id*. at 4-13.
7 *Id*. at 38-43.
8 Gigler et al., *supra* note 2, at 17-25.
9 *Id*. at 25-38.
10 *Id*. at 25.
11 *Id*. at 16.
12 *Id*. at 4-5.
13 *Id*. at 44.
14 Gigler et al., *supra* note 2, at 6-11.

more frequent disclosure may indeed make prices more efficient, more frequent disclosure may also induce sub-optimal actions that reduce welfare. Measuring a firm's underlying results more frequently changes the very cash flows that are being measured.

III. INCREASING TRANSPARENCY VIA INCREASED PRECISION

Accounting measurements have an aura of precision, but in reality, the only asset of a firm that can be measured precisely is the firm's cash balance. Any departure from cash accounting is necessarily based on judgments, estimates, and conventions that may not fully capture the economic facts. At best, accounting provides outsiders with a noisy representation of a firm's operations and the economic events that affect the firm's value. Thus, should accounting disclosures be made as precise as possible? This is another fundamental question that standard setters must address in their attempts to increase transparency.

To answer this question, Kanodia, Singh, and Spero[15] study the economic consequences of imprecision in the measurement of a firm's investment level. Kanodia, et al. model the environment of a firm using three dates.[16] At an initial date, the firm chooses the level of investment that generates cash flows in the future. Before all the future cash flows from the investment are realized, the firm is sold to the capital market at some interim date so that the payoffs from the investment consist of both the short-term cash flows realized from the investment and the market price from selling the firm in the capital market. Note that the market price of the firm at the interim date captures the capital market's expectations of the future cash flows from the investment. Therefore, the short-term cash flows capture the short-term return from the investment while the market price captures the long-term return from the investment.

In a first-best world, a world in which there is no information asymmetry between insiders and outsiders, the firm would choose the investment level that maximizes both the short-term and the long-term return. Stated differently, the firm would choose the level of investment that sets the marginal cost of investment equal to its marginal short-term return plus its marginal long-term return.[17] In such a world, the higher the profitability of the firm's investment, the larger the level of first-best investment.

Kanodia, et al. model a firm environment with two sources of information asymmetry.[18] First, insiders are likely to possess superior information

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15 Chandra Kanodia et al., *Imprecision in Acct. Measurement: Can it be Value Enhancing?*, 43 J. ACC. RES. 487 (2005), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=275668.

16 *Id*. at 18-21.

17 *Id*. at 8.

18 *Id*. at 9-13.

about firm-specific profitability that affects the distribution of future cash flows from the firm's investment.[19] Much of the information about firm-specific profitability is non-verifiable so that it cannot be credibly disclosed to outsiders. Second, accountants and auditors exert much effort into separating a firm's cash outflows between investments and operating expenses. Such separation is subjective and prone to random errors.[20] Therefore, even a well-intentioned accountant cannot measure and disclose a firm's true investment level precisely. Kanodia, et al. assume that the firm's investment level is measured and disclosed with measurement noise.[21] Given a second-best environment, should the firm's investment level be measured and disclosed as precisely as possible? Put another way, should the firm's investment level be made as transparent as possible to outsiders? Once again, casual intuition would suggest that removing all measurement noise from investment would be desirable. However, we will use the two insights discussed above to examine the economic trade-offs of increasing measurement precision.

Before employing the two insights, I will discuss two simple settings. In each of these settings, only one of the two sources of information asymmetry previously described is present. First, I will consider a setting in which the profitability of the firm's investment is known to outsiders but the accounting system measures the firm's actual investment level imprecisely. Next, I will discuss a setting in which the profitability of the firm's investment is private information to insiders, but the firm's investment can now be measured and reported perfectly by the accounting system. Finally, using the intuition gleaned from these two settings, I will analyze a more realistic setting where both sources of information asymmetry are present.

A. *Known Profitability; Imprecise Measurement*

Consider the first setting in which the profitability of the firm's investment is observable to outsiders but the firm's investment is measured and disclosed with noise. Kanodia, et al. assume that, on average, an accounting report's measurement process of the firm's investment is higher when the firm's true investment is higher, and that the accounting report is free of bias.[22] In order to assess the value of the firm, investors need information about both the firm's true investment, which is observed with noise, and its profitability, which is publicly known. Using this information, investors can form beliefs about the firm's expected future cash flows.[23] Giv-

19 *Id.* at 9, 11.

20 *Id.* at 1.

21 Kanodia et al., *supra* note 15, at 6.

22 *Id.* at 18.

23 *Id.* at 2.

en that the firm's true investment is unobservable, outsiders would try to infer the firm's true investment from the noisy accounting report. It might seem that the effect of the measurement noise on the firm's investment would be marginal. However, in order to determine the effect of the measurement noise, it is crucial to understand the inferential process that the capital market must make if beliefs are to be formed rationally.

The sensitivity of the equilibrium market price to the accounting report depends entirely on the information that outsiders can extract from it. But, because the profitability of the firm's investment is known to investors in the capital market, Kanodia, et al. show that outsiders can perfectly anticipate the firm's investment.[24] Given such perfect anticipation, the noisy accounting measurement report about the firm's investment conveys no incremental information.[25] Therefore, the equilibrium market price that prevails in the capital market cannot depend on the accounting report.[26] Consequently, the firm's choice of investment only affects the short-term return from the investment but not the long-term return. Thus, the real effect of the noise on the firm's return is that it "induces the firm to invest myopically" because the firm's investment choice maximizes only its short-term return to investment but not its long-term return.[27] If the marginal effect of investment on long-term return is large, the magnitude of the underinvestment would be substantial.[28]

Of course, the market is rational and is not fooled by cutting back of investment from the first-best level. The market correctly anticipates myopic investments "and prices the firm accordingly."[29] In turn, the firm optimally responds to market pricing and invests myopically.[30] The intuition for why the accounting report is ignored is that, given their knowledge of the firm's profitability, investors in the capital market believe they can step in the shoes of the firm's insiders and solve the investment problem of the firm.[31] Thus, the capital market rationally believes that it perfectly knows the firm's investment even though it cannot actually see the firm's investment.[32] When the market observes an accounting report of the firm's investment that does not coincide with its perfect anticipation, it attributes the difference to measurement noise and ignores the accounting report.[33] The firm is thus trapped in a bad equilibrium.[34]

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24 *Id*. at 3.
25 *Id*. at 3, 10, 23.
26 *Id*. at 3, 10.
27 Kanodia et al., *supra* note 15, at 10, 23.
28 *Id*.
29 *Id*. at 3.
30 *Id*. at 10.
31 *Id*. at 11.
32 *Id*. at 3.
33 Kanodia et al., *supra* note 15, at 3, 10.
34 *Id*. at 3.

B. *Unknown Profitability; Precise Measurement*

I will now turn to the second setting, in which the firm's true investment can be measured perfectly, but the profitability of the firm's investment is private information to insiders. By assumption, outsiders now perfectly observe the firm's true investment, but outsiders also know that the firm chooses investment in light of profitability that is not known. Thus, in forming beliefs about the future cash flows of the firm's true investment, outsiders must necessarily make inferences about the profitability that must have been observed by insiders when they chose the investment.[35] Thus, in addition to affecting the distribution of cash flows, the firm's investment acquires an informational role.[36]

In a first-best world, the firm's investment level is increasing in its profitability. Therefore, it is rational for outsiders to believe that the larger the firm's investment level, the higher the profitability of the firm's investment must be. Thus, insiders are induced to rationally over-invest to maximize the price of the firm.[37] Clearly, such overinvestment is inefficient. But given the market's beliefs about the firm's investments, the firm is once again trapped in a bad equilibrium.[38] Thus, in the first setting where the profitability of the firm's investment is known, imprecise measurement of the firm's investment induces the firm to under-invest.[39] On the other hand, when the profitability of the firm's investment is privately known to the firm's insiders, perfect measurement of the firm's investment induces the firm to over-invest.[40]

C. *Profitability Unknown; Imprecise Measurement*

Taken together, these two settings imply that perhaps some ignorance of the firm's profitability and some imprecision in the measurement of investment may actually improve the equilibrium and sustain investment levels closer to the first-best level. Kanodia, et al. show that an optimal level of imprecision indeed exists that sustains the first-best level of investment.[41] This result is once again consistent with both insights (1) and (2). Given that there is some imprecision in measuring the firm's investment, perfectly measuring and disclosing the firm's profitability is not desirable. Similarly, if there is some ignorance about the firm's profitability, perfectly measuring

35 *Id.*
36 *Id.*
37 *Id.* at 3, 13.
38 *Id.* at 13.
39 Kanodia et al., *supra* note 15, at 13.
40 *Id.* at 13, 23.
41 *Id.* at 17.

and disclosing the firm's investment is not desirable.[42] Removing just one of these two sources of information asymmetry without addressing the other source would affect the market's expectations of future cash flows in such a way that the firm invests sub-optimally. Kanodia, et al. show that the greater the degree of information asymmetry regarding the information underlying insiders' actions, the greater should be the tolerance for imprecision in measuring and reporting those actions.[43]

IV. INCREASING TRANSPARENCY VIA FAIR VALUE ACCOUNTING

We are now ready to tackle the third and most contentious issue dealing with transparency, namely, the extent to which items on a balance sheet should be measured at market prices. At face value, the case for fair value accounting seems very strong. The use of market prices to measure a firm's operations would better inform outsiders about firms' underlying risks and therefore allow them to take corrective actions on firms' decisions. This disciplining effect should, in turn, lead to better resource allocation in the economy. But the preceding examples suggest that, unless we understand the market imperfections that firms face and the environments they operate in, such arguments ultimately fail.

Financial institutions have been the most vocal opponents of fair value accounting; therefore, it is important to understand the environment in which they operate. Financial institutions have assets such as long-term loans, privately placed notes, mortgage-backed securities, corporate bonds, and structured derivative products on their balance sheets. These assets are not standardized and do not trade in deep and liquid markets. Instead, they are similar to many types of assets that trade primarily through over-the-counter markets where prices are determined via bilateral trading and matching processes. Finding the fair value of such assets is a very different exercise from simply reading off the competitive price in a deep and liquid market. Hypothetical prices of a loan portfolio, for example, could be constructed from stochastic discount rates implied by recent transactions of comparable loans. In fact, when banks and insurance companies complain about fair value accounting, they do not have liquid assets such as currency futures in mind. Rather, they consider what they regard as the possibility of letting the tail wag the dog by valuing huge portfolios using a tiny, unrepresentative set of transactions that may have been executed by trades with very different motives and time horizons.

Standard setters have argued that the use of fair value accounting would go a long way towards alleviating the information asymmetry between insiders and outsiders. But given that the assets of financial institu-

42 *Id*.

43 *Id*. at 23.

tions trade in markets with imperfect environments such as illiquid and incomplete markets, insight (1) tells us that it is not obvious whether removing information asymmetry via fair value accounting is desirable. In fact, one key issue surrounding the debate on fair value accounting for illiquid assets is how the behavior of financial institutions is affected by imperfections in the markets where their assets are traded. Financial institutions frequently observe that fair value accounting injects *artificial volatility* into prices. One explanation for this could be that the fundamentals themselves are volatile, meaning that the transaction prices appropriately reflect this fundamental volatility. However, artificial volatility probably refers to volatility above and beyond fundamentals.

Insight (2) implies that prices play a double-edged role in the economy. Not only do prices reflect the underlying fundamentals, but they also influence the actions of financial institutions that, in turn, affect prices. This is illustrated in Figure 1. Measuring a financial institution's assets using market prices may affect the financial institution's actions, which in turn, may affect the underlying distribution of cash flows being measured.

Figure 1 shows the possibility of the emergence of a feedback loop whereby anticipation of short-term price movements may change the behavior of financial institutions in such a way as to further amplify these price movements. The more sensitive financial institutions are to short-term price changes, the stronger the potential feedback effect. The feedback effect implies that reliance on market prices may distort those market prices, leading to artificial volatility. This phenomenon is sometimes called endogenous risk, because it results from a feedback loop created within a system as opposed to exogenous risk, which would be created from a shock outside a system.

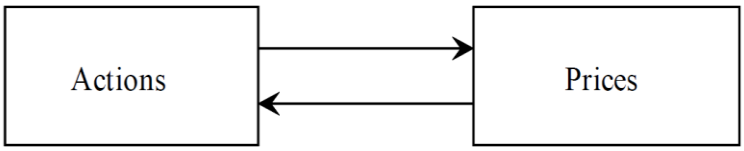

Figure 1: The Dual Role of Prices

To further understand the notion of endogenous risk, I will take an example from engineering by drawing on the lessons from the Millennium Bridge in London.[44] Some readers may wonder why a bridge is relevant for accounting policy, but the case of the Millennium Bridge offers a classic

[44] This example is drawn from Danielsson and Shin, who used the Millennium Bridge analogy to discuss a wider range of issues on financial stability. Jon Danielsson & Hyun Song Shin, *Endogenous Risk* (2002), *in* MODERN RISK MGMT.: A HISTORY (Peter Field ed., Risk Books 2003), *available at* http://hyunsongshin.org/www/risk1.pdf.

study of exactly the sort of market failure that is at the center of the fair value debate.

Many readers will be familiar with the Millennium Bridge in London. As the name suggests, the bridge was part of the Millennium celebrations in the year 2000. It is a pedestrian bridge that used an innovative lateral suspension design, built without the tall supporting columns that are more familiar with other suspension bridges. The designer's vision was that of a blade of light across the Thames. The Queen opened the bridge on a sunny day in June 2000, and the press attended in force. Many thousands of people turned up to savor the occasion. However, within moments of the bridge's opening, it began to shake violently. The shaking was so severe that many pedestrians clung on to the side-rails. The BBC's news website posted some illustrative video news clips.[45] The bridge was closed soon after its opening and remained closed for more than eighteen months.

When engineers used shaking machines to send vibrations through the bridge, they found that horizontal shaking at one hertz (that is, at one cycle per second) set off the wobble observed on the opening day. This was an important clue, since normal walking pace is around two strides per second, meaning that a person walking is on her left foot every other second. And, because a person's legs are slightly apart, the body sways from side to side when one walks. Readers who have ever been on a rope bridge will need no convincing on this score.

But why should this be a problem? We all know that soldiers should break step before they cross a bridge. The pedestrians on the bridge were not soldiers. In any case, for thousands of pedestrians walking at random, one person's sway to the left should be cancelled out by another's sway to the right. If anything, the principle of diversification suggests that having many people on the bridge is the best way of cancelling out the sideways forces on the bridge.

Or, to put it another way, what is the probability that a thousand people walking at random would end up walking exactly in step, and remaining in lockstep thereafter? It is tempting to say close to zero. After all, if each person's step were an independent event, then the probability of everyone walking in step would be the product of many small numbers—giving us a probability close to zero.

However, we have to take into account the way that people react to their environment. Pedestrians on the bridge reacted to how the bridge was moving. When the bridge moved from under one's feet, it was a natural reaction to adjust one's stance to regain balance. But here is the catch. When the bridge moves, everyone adjusted their stance at the same time. This synchronized movement pushed the bridge that the people were standing on, and made the bridge move even more. This, in turn, made the

45 *Millennium Bridge*, BBC NEWS (2005), *available at* http://news.bbc.co.uk/hi/english/static/in_depth/uk/2000/millennium_bridge/default.stm.

people adjust their stance more drastically, and so on. In other words, the wobble of the bridge fed on itself. So, the wobble continued and became stronger even though the initial shock (say, a small gust of wind) had long passed.

What does all this have to do with fair value accounting and financial markets? Financial markets are the supreme example of an environment where individuals react to what's happening around them, and where individuals' actions affect the outcomes themselves. The pedestrians on the Millennium Bridge were analogous to financial institutions reacting to price changes, and the movements in the bridge itself were analogous to price changes in the market. So, under the right conditions, price changes will elicit reactions from the banks, which move prices, which elicit further reactions, and so on. Financial development has meant that banks and other financial institutions are now are at the cutting edge of price-sensitive incentive schemes and price-sensitive risk-management systems. Fair value accounting ensures that any price change shows up immediately on the balance sheet. Figure 2 illustrates this phenomenon—when the bridge moves, banks adjust their stance more than they used to, and fair value accounting ensures that they all do so at the same time.

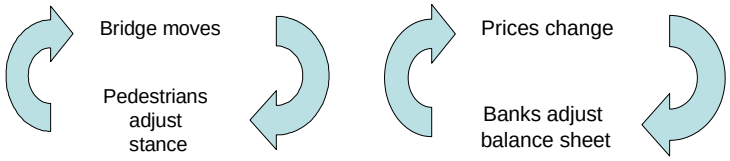

Figure 2: The Feedback Effect

When such feedback effects are strong, banks' decisions are based on the second-guessing of others' decisions rather than on the basis of perceived fundamentals. The current financial crisis is a case in point. When liquidity started drying up during the crisis, some banks started selling their illiquid loans, in turn, putting downward pressure on prices. Anticipating this fall in prices, other banks started selling their loans in order to preempt the downward pressure. Thus prices spiraled down even further, which led more banks to sell their loans, and so on. When the feedback effects become very severe, prices of assets fall, reflecting the amount of cash (liquidity) available to buyers in the market rather than fundamentals. This phenomenon is known as liquidity pricing.[46] Liquidity pricing implies that the price of an asset is the ratio of the amount of cash seeking to purchase that asset to the available supply of the asset. Formally, liquidity pricing

46 Haresh Sapra, *Do Acct. Measurement Systems Matter? A Discussion of Mark-to-Mkt. and Liquidity Pricing*, 45 J. ACC. ECON. 379, 380, 382 (2008).

implies that the price P of an asset that generates a stochastic future return R, which can be written as:

$$P = \min[\frac{\gamma}{L}, E(R)]$$

Where y denotes the amount of liquidity available in the market, L denotes the supply of the asset, and $E(.)$ denotes the expectations operator. Figure 3 illustrates the phenomenon of liquidity pricing. When there is excess liquidity (say $y > y^*$), the usual risk-neutral pricing rule applies, so the risk-neutral price equals the expected future return, $E(R)$. However, when there is a liquidity shortage (say $y > y^*$), there is liquidity pricing because price only depends on the amount of liquidity y available. Liquidity pricing, in turn, implies that the lower the amount of available liquidity y, the lower the price P of the asset.

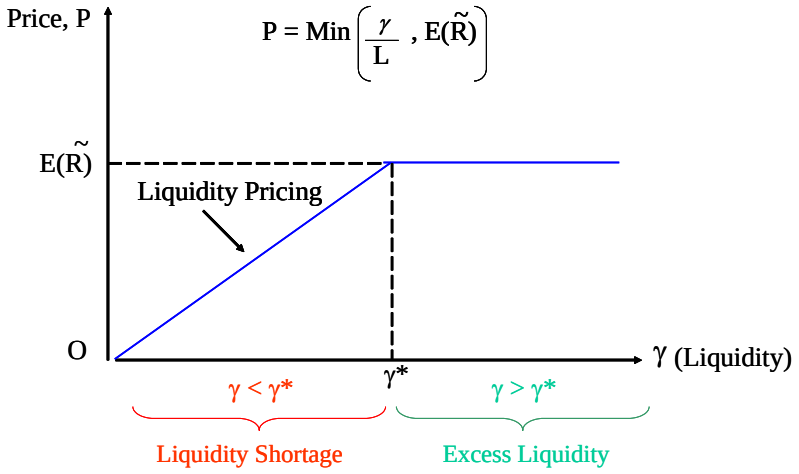

Figure 3: The Phenomenon of Liquidity Pricing

A. *The Plantin, Sapra, and Shin Model*

Plantin, Sapra, and Shin[47] formally studied the interactions between the feedback effect and the accounting measurement regime. More specifically, Plantin, et al. asked the following question: In a world of market imperfections, such as illiquid and incomplete markets, what are the real effects of a historical cost measurement regime versus a fair value measurement regime?

47 Guillaume Plantin et al., *Marking to Mkt.: Panacea or Pandora's Box?*, 46 J. ACC. RES. 435 (2008), *available* at http://www3.interscience.wiley.com/cgi-bin/fulltext/119391683/HTMLSTART.

1. Introduction

Plantin, et al. formulated a model (PSS Model) of financial institutions that maximize the book value of their portfolio of loans by either holding on to the portfolio or selling it. "The fundamental trade-off [in their model] can be described as follows."[48] The historical cost regime measures the portfolio at the price at which it was originated in the past, and therefore "accounting values are insensitive to more recent price signals."[49] Plantin, et al. show that "this lack of sensitivity to price signals induces inefficient" decisions because the measurement regime does not reflect the most recent fundamental value of the assets.[50] The fair value regime overcomes this price distortion by extracting the information conveyed by market prices but Plantin, et al. illustrate that in doing so, the use of fair value accounting distorts the very information that is being used.[51] This price distortion, in turn, leads to inefficient decisions.[52] The choice between historical cost and fair value accounting, therefore, boils down to either relying on the obsolete information of the historical cost regime or the distorted version of current information of the fair value regime.[53] The ideal of having an undistorted, true picture of the fundamentals is unattainable.

In order to understand the above trade-off, I will first discuss the basic ingredients of the PSS Model.

> There are three dates in the environment, indexed by $t \in \{0, 1, 2\}$. There is a continuum of financial institutions (FIs) with unit mass. For notational simplicity, FIs are *ex ante* identical. At date 0, each FI holds a loan portfolio. This portfolio originated in the past with a value v_0 . . . At date 0, the single future cash flow generated by the portfolio, or its fundamental value . . . , is known to all the FIs and equal to v. However, there is uncertainty about the date at which each portfolio pays off. It may pay off either at date 1 with probability 1- d, or at date 2 with probability d. Most loans generate cash flows with uncertain timing due to prepayment risk, and this is one way to interpret d. More broadly, we can interpret d as a measure of the duration of the portfolio.[54]

Financial institutions care about the book values of their portfolios because they face minimum capital requirements. So, Plantin, et al. "assume that each manager aims to maximize the expected date-1 accounting value of the portfolio."[55] The main friction in the model is that even though FIs know the fundamental value v of the portfolio, they cannot credibly com-

48 *Id*. at 438.
49 *Id*. at 438.
50 *Id*.
51 *Id*. at 437.
52 *Id*. at 438.
53 Plantin et al., *supra* note 47, at 438.
54 *Id*. at 441.
55 *Id*.

municate v to outsiders and, therefore, cannot use it to value the asset.[56] Thus, the date-1 book value depends on the prevailing accounting measurement regime.[57] Plantin, et al. studied two measurement regimes: historical cost and fair value.[58]

In the case of a historical cost regime, the estimate of v is given by its initial value v_0. In the fair value regime, the book value "is in principle the market price at the reporting date."[59]

> However, a crucial problem for assets such as loan portfolios is that easily observable market prices do not exist in practice. Such assets do not trade in the centralized order-processing markets that normally handle homogeneous assets. Instead, secondary fixed-income markets are over-the-counter OTC markets in which trade is conducted through costly search and bilateral negotiations. Thus, in order to compute the 'fair value' of a loan portfolio, one needs to calibrate a valuation model with appropriate credit spreads. In practice, spreads are inferred from the most liquid credit market—the credit derivative market. But even in this market, transaction prices are very sensitive to liquidity effects.[60]

To account for this illiquidity of the loan portfolio in their model, Plantin, et al. "assume that the price p of the portfolio that one obtains from a valuation model calibrated with observed yield spreads is given by

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56 *Id.*

57 *Id.*

58 *Id.*

59 Plantin et al., *supra* note 47, at 441.

60 *Id.* SFAS 157, Fair Value Measurements, defines fair value as the price that would be received for an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. To estimate the fair values of assets and liabilities, SFAS 157 uses a Fair Value Hierarchy. The hierarchy describes three levels of inputs to measurement models:

> Level 1. The preferred inputs to valuation efforts are quoted prices in active markets for identical assets or liabilities. Information at this level is based on direct observations of transactions involving the same assets and liabilities, not assumptions, and thus offers superior reliability.
>
> Level 2. FASB acknowledged that active markets for identical assets and liabilities are relatively uncommon and, even when they do exist, they may be too thin to provide reliable information. To deal with this shortage of direct data, the board provided a second level of inputs that can be applied in three situations. The first involves less-active markets for identical assets and liabilities; this category is ranked lower because the market consensus about value may not be strong. The second arises when the owned assets and owed liabilities are similar to, but not the same as, those traded in a market. In this case, the reporting company has to make some assumptions about what the fair value of the reported items might be in a market. The third situation exists when no active or less-active markets exist for similar assets and liabilities, but some observable market data is sufficiently applicable to the reported items to allow the fair values to be estimated.
>
> Level 3. If inputs from levels 1 and 2 are not available, FASB acknowledges that fair value measures of many assets and liabilities are less precise. The board describes Level 3 inputs as unobservable, and limits their use by saying they shall be used to measure fair value to the extent that observable inputs are not available. This category allows for situations in which there is little, if any, market activity for the asset or liability at the measurement date. Also, note that the technique of inferring spreads from the most liquid credit market is consistent with the use of Level 2 or Level 3 inputs of SFAS 157 to value assets that are thinly traded.

$$p = \delta v - \gamma s,$$

Where δ is a positive constant less than1, s denotes the proportion of financial institutions who have sold their portfolio, and y is a positive constant."[61] A practical interpretation of the two ingredients δ and y is as follows: when banks securitize their outstanding loans, they place them in a decentralized over-the-counter market, with institutional investors such as life insurance companies or pension funds. These institutional investors have a limited absorption capacity captured by $y > 0$ because they are subject to diversification and asset-liability management constraints, and have lower monitoring skills captured by $\delta < 0$ because they do not enter into a banking relationship with the originator of the claim.[62]

> At date 0, if a FI decides to securitize its portfolio, then the proceeds are stochastic, and depend on how many other FIs have also chosen to sell the asset, in the sense of securitizing the loans and offering them for sale. This captures the uncertainty and low market resiliency implied by search and bargaining frictions [typical of OTC markets]. In order to model this uncertainty, we suppose that the FIs who have decided to sell are matched in random order with potential buyers between $t = 0$ and $t = 1$. The place of a given FI in the queue is uniformly distributed over [0, s], where S is the fraction of FIs having opting for a sale. Conditional on a fraction S of FIs opting for a sale, the expected proceeds from the sale are therefore
>
> $$\delta v - \gamma \frac{s}{2}.$$[63]

Note that Plantin, et al. designed the model so that selling the asset occurs for window-dressing reasons at date-1: portfolio sales are always inefficient for a positive value of v. In other words, if the FI decides to sell the portfolio, the expected proceeds are $\delta v - \frac{\gamma}{2} s$ that are always less than the cash flow v that can be realized from holding on to the portfolio until the terminal date-2. Studying such an environment is appealing because it highlights the real impact of pure measurement frictions even in the absence of any fundamental motive for sales.

To investigate how each measurement regime affects the decisions of the FIs to hold or offload the portfolio at date-0, Plantin, et al. calculate the differential expected value of holding versus selling the portfolio at date-0 for each measurement regime.[64] Plantin, et al. "carry out this analysis under the assumption that $d + \delta > 1$, namely, when assets are sufficiently long-lived and not too specific."[65]

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61 *Id.* at 442.

62 *Id.*

63 *Id.*

64 *Id.* at 443.

65 Plantin et al., *supra* note 47, at 443.

"Let Δ_{HC} denote the differential expected value of holding the portfolio versus selling it for a given FI manager under a historical cost regime so that

$$\Delta_{HC} > 0 \leftrightarrow \underbrace{(1-d)v + dv_0}_{\text{Expected valuation if hold}} > \underbrace{\delta v - \frac{\gamma}{2}s}_{\text{Expected price if sell}}."^{66}$$

"Or, equivalently,

$$\Delta_{HC} > 0 \leftrightarrow (d + \delta - 1)v < dv_0 + \frac{\gamma}{2}s \qquad (1)."^{67}$$

Similarly, denote Δ_{MM} as the same differential expected value under the fair value regime.[68] "Conditional on expecting that a fraction s of other FIs will sell the portfolio,

$$\Delta_{MM} > 0 \leftrightarrow \underbrace{(1-d)v + d\left(\delta v - \gamma s\right)}_{\text{Expected valuation if hold}} > \underbrace{\delta v - \frac{\gamma}{2}s}_{\text{Expected price if sell}}."^{69}$$

"Or, equivalently,

$$\Delta_{MM} > 0 \leftrightarrow (1-d)\left(1-\delta\right)v > \left(d - \frac{1}{2}\right)\gamma s. \qquad (2)."^{70}$$

From (2), it follows that if the loan portfolio is sufficiently short-lived ($d \leq \frac{1}{2}$), then inequality (2) is always satisfied for $v > 0$.[71]

> A FI will never find it preferable to sell a loan portfolio with positive value, regardless of what other FIs do. The intuition is that when the horizon of the manager and the duration of the asset are not too different, the manager is less concerned by mismeasurement issues. The expected cost of a low fair value due to high liquidity premia (large S) is always smaller than the expected cost of securitization. Thus, even in an illiquid market, fair value accounting may not distort managerial decisions if the duration of the asset is sufficiently close to the horizon of the manager.[72]

66 *Id.* at 444.
67 *Id.*
68 *Id.* at 443.
69 *Id.*
70 *Id.*
71 Plantin et al., *supra* note 47, at 443.
72 *Id.*

To generate some interesting trade-offs, Plantin, et al. therefore restrict the analysis to the case where

$$d > \frac{1}{2}.$$ [73]

2. Historical Cost Regime

A comparison of inequalities (2) and (1) yields the central intuition of the Plantin, et al. paper. I will first investigate the historical cost regime. From inequality (1), the larger v is, the less likely this inequality will be met. This, in turn, implies that FIs

> find it optimal to sell assets that have recently appreciated in value, since booking them at historical cost understates their worth. Despite a possible discount in the secondary market, the inertia in accounting values gives these short-horizon firms the incentives to sell. Thus, when asset values have appreciated, the historical cost regime leads to inefficient sales . . . .[74]

This result is consistent with the arguments made by proponents of fair value accounting who claim that historical cost accounting induces managers to engage in gains trading by cherry-picking and selling those assets that have appreciated in value (i.e., winners) and holding on to those assets that have lost value (i.e., losers). An extreme case of gains trading is the U.S. Savings and Loan (S&L) debacle of the late 1980s when S&L managers held on to long-term loans that were worthless because under historical cost accounting, these financial institutions had a positive net worth. A fair value measurement regime would have arguably revealed the problem loans much sooner and the crisis could have been resolved at a lower cost. Note also from inequality (1) that the larger s is, the more likely the inequality will be met. In other words, in the historical cost regime, if a FI believes that other FIs will sell, it finds holding the asset more valuable. Put differently, in the historical cost regime, sales are strategic substitutes.

3. Fair Value Regime

A remedy to the inefficiency in the historical cost regime would be a shift to the fair value regime. This shift would allow FIs to exploit the sensitivity of the price signal p to the fundamental value, v. Inequality (2) shows that this may indeed be a remedy. The higher v is, the more likely the inequality will be satisfied—so FIs now efficiently hold on to their port-

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[73] *Id.*

[74] *Id.* at 439.

folios when fundamentals are good. However, this is an imperfect remedy. In trying to extract information from prices, a FI becomes sensitive to the behavior of other FIs. From (2), the larger *s* is, the less likely it is that the inequality will be met. In other words, in the fair value regime, if a FI believes that other FIs will sell, it finds selling the asset more valuable so that sales are strategic complements.[75] Unfortunately, such sales are inefficient because FIs do not sell their loan portfolios because fundamentals are bad but because they believe that other FIs may sell the loan portfolio before them.[76] Anticipating this negative outcome, FIs will be tempted to preempt the fall in price by selling the asset itself.[77] However, such preemptive action will merely serve to amplify the price fall.[78] The fair value regime thus generates endogenous volatility of prices that impede the resource allocation role of prices.

To summarize, in the historical cost regime, the decisions of FIs are not sensitive enough to market signals. In the fair value regime, in trying to extract information from the price signals, the decisions of FIs become too sensitive to market signals.

4. Comparison of the Two Regimes

The PSS Model is useful for understanding how the measurement regime implicates financial stability. Although historical cost accounting is limited since recent prices are not taken into account, it does have the virtue that it induces actions that dampen the financial cycle. When the market price of an asset falls (rises) below (above) the historical cost of the asset, the manager of the firm has the incentive to hold (sell) the asset. In other words, when the price falls (rises), the incentive is to hold (sell). Thus, the historical cost regime results in countercyclical trades that have a stabilizing effect on prices. Fair value accounting allows current price signals to be taken into account, but unfortunately, it tends to amplify the movements in asset prices relative to their fundamental values. In fair value accounting, when the price falls (rises), the incentive is to sell (hold). Thus, fair value accounting results in procyclical trades that destabilize prices. The mark-to-market regime leads to inefficient sales in bad times, but the historical cost regime turns out to be particularly inefficient in good times. The seniority of the asset's payoff (which determines the concavity of the payoff function) and the skewness of the distribution of the future cash flows have an important impact on the choice of the optimal regime.

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75 *Id.* at 444.

76 *Id.*

77 Plantin et al., *supra* note 47, at 444.

78 *Id.*

These effects lead to clear economic trade-offs between the two measurement regimes. In particular, the PSS Model generates the following three main implications:

> 1. For sufficiently short-lived assets, [fair value accounting] induces lower inefficiencies than historical cost accounting. The converse is true for sufficiently long-lived assets.
>
> 2. For sufficiently liquid assets, [fair value accounting] induces lower inefficiencies than historical cost accounting. The converse is true for sufficiently illiquid assets.
>
> 3. For sufficiently junior assets, [fair value accounting] induces lower inefficiencies than historical cost accounting. The converse is true for sufficiently senior assets.[79]

The preceding implications shed some light on the political economy of accounting policy.[80] The opposition to fair value accounting has been led by the banking and insurance industries, while the equity investors have been the most enthusiastic proponents for fair value accounting.[81] For banks and insurance companies, a large proportion of their balance sheet consists precisely of items that are of long duration, senior, and illiquid. For banks, these items appear on the asset side of their balance sheets.[82] "Loans, typically, are senior, long-term, and very illiquid. For insurance companies, the focus is on the liabilities side of their balance sheet. Insurance liabilities are long-term, illiquid and have limited upside from the point of view of the insurance company."[83] In contrast, equity is a class of assets that are junior, and (in the case of marketed equity) traded in liquid stock markets. For investors of such assets, fair value accounting tends to be superior. This observation helps to explain why equity investors have been the most enthusiastic supporters of fair value accounting.

Returning to insights (1) and (2), in trying to alleviate the information asymmetry between insiders and outsiders, fair value accounting may magnify the negative effect of illiquid markets because it induces FIs to engage in procyclical trades that destabilize prices in the economy. In this second-best world, in choosing between historical cost and fair value measurement regimes, policy makers need to trade-off strategic concerns against fundamental concerns. Clearly, when fundamental concerns overwhelm strategic concerns, fair value accounting is desirable. But, as the PSS Model has shown, for a large proportion of the FIs' assets, strategic concerns may overwhelm fundamental concerns.[84]

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79 *Id*. at 438.

80 *Id*.

81 *Id*.

82 *Id*.

83 Plantin et al., *supra* note 47, at 438.

84 *See id.* at 440.

In the PSS Model, inefficient sales and distortions only occurred during periods of market distress in the fair value regime.[85] In good times, FIs would efficiently hold on to their assets in the fair value regime but would inefficiently sell them in the historical cost regime.[86] Thus, fair value accounting does relatively well in good times but performs very poorly in bad times.[87] Conversely, historical cost performs poorly in good times but does relatively well in bad times.[88] However, crises are invariably preceded by a period of excess in the financial markets. Although the clamor for the suspension of fair value accounting has been very vocal during periods of market distress as in the current financial crisis, it should be considered that most of the excesses being unwound during crises were built up during the preceding boom period. From a policy perspective, it is very important to identify the distortions on the way up, as well as the distortions on the way down in a fair value regime. I am not aware of any research that studies how fair value accounting in particular, or how the accounting measurement regime in general, affects the amplification of the financial cycle. I next discuss how fair value accounting may play a role as an amplification mechanism in the economy.

B. *Fair Value Accounting as an Amplification Mechanism*

Adrian and Shin[89] provide interesting empirical evidence on the interaction between the measurement regime and the financial cycle. They show that, in responding to shifts in prices and risk, financial intermediaries react quite differently from households. Households tend not to adjust their balance sheets drastically to changes in asset prices. In aggregate flow of funds data for the household sector in the United States, leverage falls when total assets rise.[90] In other words, for households, the change in leverage and change in balance sheet size are negatively related.[91] However, for security dealers and brokers (including the major investment banks), there is a positive relationship between changes in leverage and changes in balance sheet size.[92] Far from being passive, financial intermediaries adjust their balance sheets actively and do so in such a way that leverage is high

85 *Id*. at 440.

86 *Id*.

87 *Id*.

88 *Id*.

89 Tobias Adrian & Hyun Song Shin, *Liquidity and Leverage* (Federal Reserve Bank of New York and Princeton Univ., Working Paper, 2007).

90 *Id*. at 5.

91 *Id*. at 6.

92 *Id*. at 7-8.

during booms and low during busts.[93] Leverage is procyclical in this sense.[94]

When balance sheets are marked-to-market continuously, changes in asset values show up immediately as increases in the marked-to-market equity of the FI and elicit responses from them. The accounting regime may therefore affect the degree to which such procyclical actions led to amplification of the financial cycle. To understand this mechanism, consider the following simple example of a financial intermediary, taken from Adrian and Shin, that manages its balance sheet actively in order to maintain a constant leverage ratio of 10.[95] The financial intermediary initially holds 100 worth of assets (securities, for simplicity) and has funded this holding with debt worth 90 so that its initial balance sheet is illustrated in Figure 4.[96]

Assets	Liabilities
Securities, 100	Equity, 10
	Debt, 90

Figure 4: Initial Balance Sheet

"Assume that the price of debt is approximately constant for small changes in total assets. Suppose the price of securities increases by 1% to 101."[97] Leverage then reduces to 101/11 = 9.18 as shown in Figure 5.[98]

Assets	Liabilities
Securities, 101	Equity, 11
	Debt, 90

Figure 5: Balance Sheet Right After a Price Increase

If the bank targets a leverage of 10, then it must take on additional debt worth 9, and with the proceeds purchases, securities worth 9.[99] "Thus, an increase in the price of the security of 1 leads to an increased holding of securities worth 9. The demand curve [for the asset] is upward-sloping.

93 *Id.*

94 *Id.*

95 Tobias Adrian & Hyun Song Shin, *Liquidity and Financial Contagion*, FIN. STABILITY REV. (SPECIAL ISSUE NO. 11), Feb. 2008, at 4.

96 *Id.*

97 *Id.*

98 *Id.*

99 *Id.*

After the purchase, leverage is now back up to 10."[100] Figure 6 shows the ending balance sheet.

Assets	Liabilities
Securities, 110	Equity, 11
	Debt, 99

Figure 6: Ending Balance Sheet After a Price Increase

As explained by Adrian and Shin:

> The mechanism works in reverse, on the way down. Suppose there is shock to the securities price so that the value of security holdings falls [from 110] to 109. On the liabilities side, equity bears the burden of adjustment, since the value of debt stays approximately constant. Leverage is now too high (109/10 = 10.9) [as shown in Figure 7.][101]

Assets	Liabilities
Securities, 109	Equity, 10
	Debt, 99

Figure 7: Balance Sheet Right After a Price Decrease

"The bank can adjust down its leverage by selling securities worth 9, and paying down 9 worth of debt. Thus, a fall in the price of securities leads to sales of securities. The supply curve [for the asset] is downward-sloping."[102] Figure 8 shows that the new balance sheet "is now back to where it started before the price changes. Leverage is back down to the target level of 10."[103]

Assets	Liabilities
Securities, 100	Equity, 10
	Debt, 90

Figure 8: Ending Balance Sheet Right After a Price Decrease

As explained by Adrian and Shin:

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100 *Id.* (emphasis added).

101 Adrian & Shin, *supra* note 89, at 4.

102 *Id.*

103 *Id.*

> *Leverage targeting entails upward-sloping demands and downward-sloping supplies*. The perverse nature of the demand and supply curves are even stronger when the leverage of the financial intermediary is pro-cyclical—that is, when leverage is high during booms and low during busts. When the securities price goes up, the upward adjustment of leverage entails purchases of securities that are even larger than that for the case of constant leverage. If, in addition, there is the possibility of feedback, then the adjustment of leverage and price changes will reinforce each other in an amplification of the financial cycle.[104]

The PSS Model suggests that for illiquid assets, "greater demand for the asset tends to put upward pressure on its price."[105] Fair value accounting ensures that this price increase shows up immediately on the balance sheet. If a financial institution targets leverage, then there is the potential for a feedback effect in which the stronger balance sheet feeds greater demand for the asset, which in turn raises the asset's price and leads to a stronger balance sheet. The mechanism works exactly in reverse in downturns. If as Plantin, et al. suggest, greater supply of the illiquid asset "tends to put downward pressure on its price, then there is the potential for a feedback effect in which weaker balance sheets lead to greater sales of the asset, which depresses the asset's price and [leads] to even weaker balance sheets."[106] These mechanisms are illustrated in Figure 9.

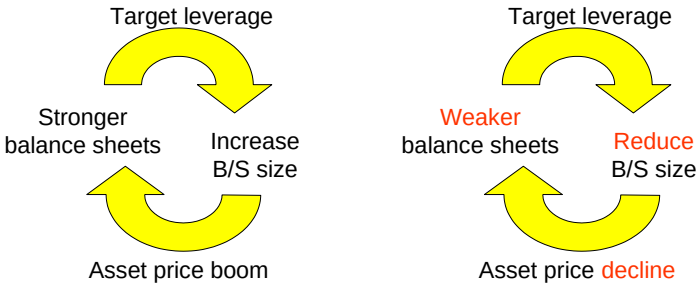

Figure 9: Fair Value Accounting as an Amplifying Mechanism

In summary, the preceding discussion illustrates the amplifying effects of fair value accounting given that financial institutions were targeting leverage. Stated differently, in a second-best world in which there is a greater stress on short-term incentives, fair value accounting may play an important role in the propagation of market dynamics that lead to an amplification of the financial cycle.[107] Clearly, much more formal economic modeling is

104 *Id.*

105 *Id.* at 5.

106 *Id.*

107 Note that an interesting question to ask is why financial institutions are targeting leverage. For an interesting discussion on the role of leverage and its relationship with Value-at-Risk (VaR) measures. *See* Adrian & Shin, *supra* note 89, at 3-4, 6.

needed in order to understand what role fair value accounting could play in the amplification of the financial cycle.

V. CONCLUDING REMARKS

I have deliberately abstracted away from explicitly discussing the role that fair value accounting may have played in the current financial crisis. Instead, I have emphasized the importance of the second-best perspective in any accounting debate about greater transparency. When there are multiple imperfections in the world, restricting a strict subset of it need not always improve welfare. In their quest for greater transparency, standard setters such as IASB and FASB often do not consider the overall economic impact of accounting standards. Instead, these entities see their role in much narrower terms—ensuring that accounting values reflect current terms of trade between willing parties.

Fair value accounting would indeed be desirable in a world in which information asymmetry were the only friction between insiders and outsiders. Unfortunately, as discussed above, financial institutions also operate in a world with illiquid and incomplete markets. Given these imperfections, in trying to extract information from prices, financial institutions may react to price movements in such a way as to destabilize prices and hence, resource allocation in the economy. Thus, accounting standards have far-reaching consequences for financial markets and the amplification of financial cycles. To the extent that accounting standards have such a far-reaching impact, the constituency affected by the accounting standard setters may be much broader than that IASB and FASB have in mind when setting such standards.

Clearly, much more research is needed in order to get a better understanding of the mechanisms through which fair value accounting may affect financial stability. I have described some of those mechanisms in this paper. Even if we were to find evidence that fair value accounting was one of the villains in the current financial crisis, I still believe that a transition to fair value accounting is still desirable in the long-run. In the long-run, large mispricings in relatively illiquid secondary markets would likely trigger financial innovations in order to attract new classes of investors. This enlarged participation would, in turn, enhance liquidity, potentially making fair value accounting desirable.

In the short-run, the PSS Model opens the door to a more general analysis of the normative implications for the design of an optimal standard. For example, a measurement regime in which the accounting value of an asset is the average over some interval of time would allow market prices to fully exert themselves over the medium-term, but prevent the short-run dynamics that lead to distorted decisions. A measurement regime for illiquid assets that discounts future cash flows with discount factors that are an average of past-observations may be desirable. In doing so, managers

would be confident that fire sales by other firms would have a limited impact on the end-of-period valuation of their assets. This procedure may remove to a large extent the risk of self-fulfilling liquidity shocks that we have emphasized, while also mitigating the absence of price signals in a historical cost regime.