Accounting Discretion and Fair Value Reporting: A Study of US Banks' Fair Value Reporting of Mortgage-Backed-Securities

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Abstract: This study looks at US banks' fair value reporting of mortgage-backed-securities (MBS) before and after a new accounting rule, FSP 157–3, *Determining the Fair Value of a Financial Asset When the Market for That Asset Is Not Active*, initially issued by the US Financial Accounting Standard Board (FASB) and later adopted by the International Accounting Standard Board (IASB) into IFRS No. 13 *Fair Value Measurement*. FSP 157–3 allows for additional accounting discretion in fair value reporting when the market for a financial asset is inactive and significant adjustment needs to be exercised in estimating fair value. By evaluating MBS' fair value reporting against observable economic factors, firm-specific reporting incentives, and the reporting entity's mortgage-banking activities, this study makes inference on the relationship between accounting discretion exercised under FSP 157–3 and any unobservable, private information conveyed in the MBS' fair value reporting. Empirical results indicate that additional accounting discretion has been exercised in MBS' fair value reporting under FSP 157–3. While MBS' fair value reporting is less associated with economic factors and firm-specific characters under the new rule, it is reflective of the reporting entity's mortgage-banking activities.

Keywords: accounting discretion, fair value accounting, inactive market, mortgage-backed-securities, MBS

1. INTRODUCTION

The 2008 global financial crisis stoked the ongoing debate over the quality of financial reporting in the banking industry. The controversy is about fair value accounting for financial instruments (Laux and Leuz, 2009 and 2010; and Gebhardt and

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Novotny-Farkas, 2011), specifically the application of fair value accounting in inactive markets (Badertscher et al., 2012). Before the crisis, critics of fair value accounting argued that fair value accounting provides a convenient vehicle for earnings management with subjective and unverifiable estimates incorporated in reported accounting numbers (Watts, 2003a and 2003b; Beatty and Weber, 2006; Huizinga and Laeven, 2009; Jarva, 2009; and Dechow et al., 2010), while defenders of fair value accounting argued that accounting discretion is necessary to convey private but relevant accounting information to financial statement users (Schipper, 1989; Barth et al., 1995; Beaver and Venkatachalam, 2003; Barth and Taylor, 2010; and Uhde et al., 2011). The crisis added another avenue to the debate – the pro-cyclical effects in inactive markets due to the inflexibility in fair value accounting (Bowen et al., 2010; and Badertscher et al., 2012). At the core of the debate is the degree of discretion that reporting entities may exercise to incorporate private, unverifiable information in reaching fair value measurements. This study examines banks' fair value reporting and makes reference to the effect that accounting discretion has on fair value reporting. Specifically, this study examines US banks' fair value reporting of mortgage-backed-securities (MBS) around the financial crisis and the announcement of a new accounting rule that changes the degree of discretion allowed in fair value accounting.

On October 10, 2008, in response to the overwhelming calls to amend fair value accounting, the US Financial Accounting Standard Board (FASB) issued a Staff Position (FSP) 157–3, to allow more discretion in fair value accounting. On October 14, 2008, the International Accounting Standard Board (IASB) issued a press release that refers to FSP 157–3. The IASB press release reaffirms that fair value measurement guidance under the International Financial Reporting Standards (IFRS) and the US Generally Accepted Accounting Principles (GAAP) is consistent and that guidance given in FSP 157–3 will be included in the IFRS. To this extent, a new guidance on the application of fair value accounting in inactive markets is established in the global market. This study refers to the guidance as FSP 157–3, as it was first issued; however, the guidance is incorporated in both the US GAAP and the IFRS.[1]

FSP 157–3, *Determining the Fair Value of a Financial Asset When the Market for That Asset Is Not Active*, is short and to the point: when the market for a financial asset is not active, the reporting entity may determine that observable market inputs (Level 1 and Level 2 measures of fair value) require significant adjustment, and it would be more appropriate to use unobservable inputs (Level 3 measure of fair value) to estimate fair value. Previously, under US Financial Accounting Standard (FAS) 157, *Fair Value Measurements*, the fair value measurement hierarchy has to be strictly observed (Song et al., 2010). In other words, FSP 157–3 allows additional discretion in applying fair value accounting – the discretion to apply unobservable inputs over observable market inputs when the market for that asset is inactive.

This study contrasts banks' fair value reporting of their MBS holdings before and after FSP 157–3, using US banks as samples. The objectives of this study are: (1) to

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1 Under the US Accounting Standards Codification (ASC), guidance originally given in FSP 157–3 is codified as part of ASC Topic 820, *Fair Value Measurement*. In 2011, the IASB and the US FASB reached a common fair value measurement and disclosure requirement. On May 12, 2011, the US FASB issued Accounting Standards Update No. 2011–04, *Fair Value Measurement (Topic 820): Amendments to Achieve Common Fair Value Measurement and Disclosure Requirements in U.S. GAAP and IFRSs*, where FSP 157–3 guidance is codified as Topic 820–10–35–54C to 54H. On the same day, the IASB issued IFRS 13, *Fair Value Measurements*, where guidance given in FSP 157–3 is adopted into paragraph 84.

examine whether the additional discretion allowed by FSP 157–3 is reflected in banks' MBS fair value reporting; and (2) to study the information contents of fair value reporting after FSP 157–3. Overall, this study seeks to shed light on the association between accounting discretion and fair value accounting information.

Operationally, this study examines the association between US banks' fair value reporting of MBS and economic factors that should be driving the values of MBS. If fair values better reflect the underlying economics of assets and liabilities when compared with historical costs or amortized costs, as was alleged in FAS 157, then it is expected that economic factors would be closely associated with the fair value reporting (Dechow et al., 2010). The emphasis on observable economic factors as the benchmark to evaluate accounting information is gaining popularity (Wilson, 1996; Nissim, 2003; and Riedle, 2004). Unlike value-relevance studies (Barth, 1994; Ahmed and Takeda, 1995; Barth et al., 1996; Nelson, 1996; and Song et al., 2010) that evaluate fair value accounting's information content against stock returns, the emphasis on economic factors tests the assertion of FAS 157 most directly.

Using data collected from the Consolidated Financial Statements for Bank Holding Companies (FR Y-9C) reported to the US Federal Reserve System, this study provides empirical evidence on the effectiveness of FSP 157–3. The focus on a specific asset – MBS, is a natural choice since MBS are at the epicenter of the financial crisis, and the modeling of economic determinants of a specific asset can be more precise than that of aggregated assets (Riedle, 2004). Empirical findings support that the additional discretion afforded by FSP 157–3 is reflected in US banks' fair value reporting of MBS. The effectiveness of FSP 157–3 is documented.

A second focus of this study is to evaluate the information content of fair value reporting under FSP 157–3. After all, what is really of concern is not the degree of discretion exercised in fair value reporting, but rather, whether discretion is exercised to improve the quality of financial reporting. Given the inherent difficulty that private accounting information is not observable, this study evaluates US banks' MBS fair value reporting against observable economic factors that should be driving the economic values of MBS. To control for firm-specific reporting incentives, observable firm-specific variables are also studied as proxies for banks' accounting/reporting incentives. Empirical evidence indicates that US banks' fair value reporting of MBS holdings under FSP 157–3 contains information that cannot be well explained by observable economic factors or by banks' reporting incentives.

To better capture MBS' economic values and risk aspects, banks' MBS holdings are further separated into those backed or issued by a US government agency or a government-sponsored agency (agency-backed MBS),[2] and those issued by others (non-agency MBS). Agency-backed MBS are more homogeneous and have a more active trading market (Huizinga and Laeven, 2009) and hence are expected to be more closely associated with economic factors; non-agency MBS depend more heavily on private information and are expected to be less associated with economic factors. Empirical results support these positions.

Also, banks' fair value reporting of MBS is studied based on the reporting entity's mortgage banking activities. While MBS' economic values are the reporting entities'

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2 The US government agency such as the Government National Mortgage Association (GNMA) guarantees residential MBS; government-sponsored agencies such as the Federal Home Loan Mortgage Corporation (FHLMC) and the Federal National Mortgage Association (FNMA) issue residential MBS. For details, see Section 2, background and hypothesis development.

private information, they are the outcome of banks' mortgage banking activities. By analyzing banks' mortgage banking activities, this study draws further inference on the economic value of MBS to evaluate the fair value reporting. Empirical findings show that fair value fluctuations are consistent with banks' mortgage banking activities. Overall, those findings support that private information is conveyed under FSP 157–3; they support fair value defenders' view that more discretion is necessary for fair value accounting to reflect the economic conditions of MBS.

This study contributes to advancing our understanding of accounting discretion and fair value accounting under FSP 157–3. A profound effect of FSP 157–3 is to allow asset-specific assumptions to override market-based inputs when the market for that asset is inactive. This effect challenges the original assertion made in US FAS 157, *Fair Value Measurement*, that fair value measurements are more reflective of market participants' expectations. When the market for a specific asset is considered inactive or not orderly, at the management's discretion, ' . . . the use of a reporting entity's own assumptions about future cash flows and appropriately risk-adjusted discount rates is acceptable' (FSP 157–3, paragraph 9a). This study provides empirical evidences that under FSP 157–3, market-based economic factors play a smaller role as the driving factor for fair value reporting, at least, for US banks' MBS holdings. Instead, unobservable, private information is conveyed in the fair value reporting.

Under FSP 157–3, financial statement users have to keep in mind that 'fairness' in fair value accounting is weighing against the reporting entities' private information; it is not strictly the market participants' expectations. A seemingly small change in the degree of discretion in fair value accounting has profound impacts on the nature of fair value reporting. Discretion in accounting reporting can be welfare improving (Barth and Taylor, 2010). Whether the enhanced level of discretion is the standard-setting bodies' intention or rather a side-effect from a quick remedy to stop fair value accounting's pro-cyclical effects, the discretionary nature of fair value accounting cannot be denied. Practical impacts of this subtle change of discretion level should concern the standard-setting bodies. This study provides empirical evidence to document the effects.

The rest of the study is structured as follows: Section 2 gives the background of the debate over fair value accounting and FSP 157–3; hypotheses and positions taken by this study are also presented. Section 3 describes the research design and test variables. Empirical results are given in Sections 4 and 5. Section 6 gives the conclusive remarks.

2. BACKGROUND

(i) Fair Value and Discretion in Accounting Measurement

Fair value, under IFRS 13 *Fair Value Measurement* and US Accounting Standard Codification (ASC) Topic 820, of the same title (previously FAS 157), is defined as 'the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.' This definition highlights several aspects that inevitably involve accounting discretion. First, this definition recognizes that fair value is of a 'would be' nature. The transaction to sell the asset or to transfer the liability is a hypothetical transaction as of the measurement date. It is the 'would be' exit price, not the documented entry price or the carrying value of the underlying asset. Secondly, it emphasizes that fair value is a

market-based measurement, not an entity-specific measurement. Therefore, fair values should be determined based on the assumptions that market participants would use in valuing the asset or liability.

IFRS 13 gives a hierarchy in reaching fair value: Level 1 measures include observable inputs such as quoted prices of identical assets or liabilities from active markets; Level 2 measures include indirectly observable inputs such as quoted prices of comparable assets and liabilities from active markets; Level 3 measures include unobservable inputs generated from the reporting entity's private information and their best assumptions on the market conditions. The higher the level, the less observable and the more discretionary. It has been documented that value relevance of fair values differs among the three levels, with Level 3 being the least value relevant (Song et al., 2010). The interpretation is that information users discount the informativeness of Level 3 fair value measures due to the accounting discretion and the lack of verifiability.

Accounting discretion can have both positive and negative influences on the quality of accounting information (Ghosh and Moon, 2010). Dechow et al. (2010) look at the fair value accounting for asset securitization gains in evaluating the discretionary nature of fair value accounting and the quality of accounting information. They point out that valuations of retained interests from securitizations require management to make assumptions on future market conditions such as discount rates, default rates and prepayment rates. These assumptions provide management with discretion to determine the gain on securitization. Given the lack of verifiability on future market conditions, the discretion afforded by fair value accounting provides a convenient earnings-management tool with compensation side benefits. Their empirical results document the association between gains on securitizations and CEO compensation incentives. The premise in their paper is that gains on securitizations, resulting from fair value accounting, are entirely discretionary. This premise on the discretionary nature of fair value accounting is similar to that in Karthik and Watts (2008). Banks' opportunistic behavior exploiting fair value accounting's discretion is also documented by Huizinga and Laeven (2009).

Defenders of fair value accounting, however, consider fair value a better vehicle to communicate mangers' private information regarding future cash flows because of its discretionary nature (Beaver and Venkatachalam, 2003; and Barth and Taylor, 2010). The argument is that, as a market-based measurement, fair value accounting reflects general market conditions instead of asset-specific private information. To de-emphasize the general market conditions and to faithfully report economic conditions of specific assets or liabilities, accounting discretion is necessary for reporting entities to convey asset-specific, private information on their unique holdings. Barth and Taylor (2010) point out that accounting discretion may be welfare improving and are calling for more research to investigate the role of discretion in fair value estimates. This study contributes to this avenue.

(ii) The Financial Crisis and FSP 157–3

The 2008 global financial crisis challenges the definition of fair value on one previously overlooked keyword: an 'orderly' transaction. Both Level 1 and Level 2 fair value measures look at quoted prices from active markets, but what happens when the market is inactive? Can there still be orderly transactions? On October 10, 2008, at the peak of the financial crisis, the US FASB issued FSP 157–3, *Determining the Fair Value of*

a Financial Asset When the Market for That Asset Is Not Active, to answer those questions. FSP 157–3 acknowledges that transactions may be 'not orderly' in an inactive market. In that case, Level 2 market inputs may be adjusted by Level 3 assumptions:

> . . .it is not appropriate to automatically conclude that any transaction price is determinative of fair value. Determining fair value in a dislocated market depends on the facts and circumstances and may require the use of significant judgment about whether individual transactions are forced liquidations or distressed sales (FSP 157–3 paragraph 9a).

On October 14, 2008, the IASB issued a press release acknowledging that the objective of a fair value measurement is the price at which an orderly transaction would take place between market participants, not the price that would be achieved in a forced liquidation or distress sale. The IASB press release explicitly refers to FSP 157–3 and reaffirms that guidance given in FSP 157–3 will be included in the IFRS. A total synchronization of fair value measurement between the IFRS and the US GAAP was reached in May 2011 when guidance originally given in FSP 157–3 was included in IFRS 13 and US ASC Topic 820–10–35–54.

Under FSP 157–3, in a dislocated market, the reporting entities have the discretion to apply Level 3 inputs over Level 2 inputs even when observable market inputs are available. In other words, unobservable inputs can trump observable market inputs, if it is determined that the market of the underlying assets or liabilities is not active and transactions are not orderly.[3] For the due procedure, FSP 157–3 was released for public comment for only eight days,[4] the shortest exposure period on record. FSP 157–3 was issued on October 8, and was effective immediately upon issuance. The timing of the issuance results is a clean contrast with no transition complication. The fair value hierarchy has to be strictly followed for financial statements up to the second quarter of 2008; beginning with the third quarter of 2008, FSP 157–3 was effective.

Market reactions to the new fair value rule have been documented in some value-relevance studies (Huizinga and Laeven, 2009; Bhat et al., 2010; and Bowen et al., 2010). However, what additional accounting information the market is reacting to still needs to be studied. This study fills this gap.

(iii) Hypotheses

(a) Effectiveness of FSP 157–3

The timing of FSP 157–3 is critical during the financial crisis; the intended effect is to quickly stop the market-based fair value accounting that exacerbates the downward spiral (the pro-cyclical effects); and the targeted asset at the center of the entire crisis is

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3 To further clarify when to apply FSP 157–3, on April 9, 2009, US FASB issued FSP 157- 4 *Determining Fair Value When the Volume and Level of Activity for the Asset or Liability Have Significantly Decreased and Identifying Transactions That Are Not Orderly*. FSP 157–4 gives more guidelines on how to assess the market conditions, but the accounting treatment of having Level 3 assumptions trump Level 2 market inputs was established in FSP 157–3.
4 The exposure draft of FSP 157–3 (FSP FAS 157-c) was jointly issued by the FASB and the US government agency (Office of the Chief Accountant of the US Securities Exchange Commission) on September 30, 2008. It was not expected that FSP 157–3 would be substantively different from the SEC press release, and it was not. In that sense, accounting practitioners, auditors and statement users were informed of the new rules at the very last day of the third quarter of 2008, before the quarterly reports were due.

MBS.[5] If FSP 157–3 is effective, then we expect to see the additional discretion reflected in the financial statements immediately, particularly at the MBS fair value reporting. MBS are studied here because: (1) they are at the center of the 2008 financial crisis and they are the focus of FSP 157–3; (2) theories on the economic determinants of MBS' valuation are well developed in the finance literature; and (3) both fair values and amortized costs of MBS are disclosed on bank' financial statements.

> H$_1$: Banks exercise more discretion in their fair value reporting of MBS holdings after FSP 157–3 (beginning with the third quarter of 2008).

(b) Association with Economic Factors

The main reason for the standard-setting bodies to allow the additional discretion is to disentangle the downward economy from banks' MBS fair value reporting. MBS, by default, are unique financial assets. No two issues of MBS have identical underlying mortgages; and even within the same issue, different tranches of securities have different risk aspects (Chen et al., 2008; and Cheng et al., 2011). Whether a reporting entity's MBS holdings are part of the so called 'toxic assets' or good-standing, still-performing assets, only the reporting entities with their private information on the MBS holdings are in the position to give assessments. If this asymmetric information is to be properly communicated through financial reporting, it is expected that MBS' fair value reporting be less associated with general economic factors and more associated with asset-specific information.

In a perfect scenario, it would be ideal if one could investigate whether MBS' fair value reporting under FSP 157–3 is more driven by private information. Given that private information is unobservable, this study examines MBS' fair value reporting against observable economic factors. To control for the reporting entities' accounting/reporting incentives, commonly used proxies for banks' reporting incentives are included in this study as control variables.

> H$_{2A}$: Banks' MBS fair value reporting is less associated with general economic factors after FSP 157–3 (beginning with the third quarter of 2008).

Different MBS have different risk aspects, thus different needs for a vehicle to convey private information. This study next examines banks' MBS holdings differentiated by the main characteristic that alters MBS' economic value and risk aspect, namely, government backing.

In the US housing finance market, government backing to expand the secondary mortgage market in the form of MBS is carried out by three government or government-sponsored agencies: the Government National Mortgage Association (commonly known as GNMA, or Ginnie Mae); the Federal National Mortgage Association (FNMA or Fannie Mae); and, the Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac). GNMA is a wholly-owned government agency that guarantees residential MBS while FNMA and FHLMC are government-sponsored[6]

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5 FSP157–3 gives an illustration on how to apply reporting-entity-imposed assumptions to reach the fair value of non-agency MBS.

6 FNMA was founded in 1938 during the Great Depression as part of President Roosevelt's New Deal. Originally a wholly owned government agency, FNMA was split and converted to a federally chartered but privately held corporation in 1968 to remove its activity and debt from the federal budget. Meanwhile, a wholly owned government agency, GNMA, was created to guarantee MBS insured by other government

agencies that issue MBS. GNMA-backed securities are the only MBS that are backed by the full credit guaranty of the US government. FNMA- and FHLMC-issued MBS, even though not explicitly guaranteed by the US government, do have de facto government backing (Dreier and John, 1993). This study pools together GNMA-backed and FNMA- and FHLMC-issued MBS as agency-backed MBS. MBS issued by all the others such as private depository institutions, insurance companies and state and local municipalities are grouped as non-agency MBS. In US banks' FR Y-9C reports, holdings of MBS guaranteed by the GNMA or issued by the FNMA or the FHLMC are required to be disclosed separately from other MBS.[7]

Given the lending guideline on mortgage loans, agency-backed MBS tend to be more homogeneous and more closely tied to economic factors. As a matter of fact, they become important economic indicators themselves. Non-agency MBS, on the other hand, encompass much more private information that only the asset holders can access. If discretion is properly exercised to convey private information, it is expected that fair value reporting is less associated with economic factors for non-agency MBS than for agency-backed MBS.

H_{2B}: Banks' fair value reporting for non-agency MBS is less associated with general economic factors after FSP 157–3.

(c) Firm-Level Analysis of Mortgage Banking Activities

MBS' risk aspects and economic values are unobservable to statement users; however, a bank's MBS holding is the outcome of its mortgage banking activities such as mortgage loans securitization and the dealing with non-agency MBS. This study also analyzes the reporting entities' mortgage banking activities at per-firm level. Each bank's practices and attitudes towards different mortgage banking activities result in MBS holdings with different risk aspects and economic values. If the different economic values are properly conveyed, it is expected that MBS' fair value reporting will vary across firms with different mortgage banking activities.

To carry out a firm-level analysis, sample firms are grouped into the securitizers (those engage in mortgage loans securitization) and the non-securitizers (those do not engage in mortgage loans securitization and only purchase MBS as investments). Alternatively, sample firms are also grouped into the agency dealers (those which only deal with agency-backed MBS) and the non-agency dealers (those which systematically deal with non-agency MBS). It is hypothesized that banks' fair value reporting of MBS varies based on their mortgage banking activities.

H_{3A}: Banks' fair value reporting of MBS differs significantly between securitizers and non-securitizers after FSP 157–3.

H_{3B}: Banks' fair value reporting of MBS differs significantly between agency dealers and non-agency dealers after FSP 157–3.

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agencies such as the Department of Veterans Affairs. To further expand the housing finance market and to provide competition to the newly split FNMA, FHLMC was established in 1970. The status and charter of FHLMC are essentially the same as that of FNMA.

7 For detailed definitions of US government-backed MBS as well as different forms of non-agency MBS, see the filing instruction of the FR Y-9C on line item HC-B 4a and 4b.

3. RESEARCH DESIGN

(i) Sample Selection

To test the effect of FSP 157–3, US banks' quarterly financial reports are collected from the Consolidated Financial Statements for Bank Holding Companies (FR Y-9C), filed to the Federal Reserve System, between 2006 Q1 and 2010 Q4 (the latest available when collecting) for all reporting entities.[8] This sampling period renders 10 quarters before FSP 157–3 and 10 quarters after. For firm-quarter observations to be included in the sample, combined MBS holdings (agency-backed as well as non-agency MBS) have to represent at least 1% of total non-intangible assets. Only residential MBS are included in this study; commercial MBS are not included.[9] To eliminate extreme observations, the sample is winsorized at 5% based on total MBS' fair-value-to-book-value ratio (the main test variable in this study). To facilitate a valid firm-level analysis, each firm is required to have at least four quarterly observations before or after FSP 157–3 to be included in the firm-level study of that period.

A total of 15,431 firm-quarter observations are used in this study, covering 889 bank holding companies. Numbers of valid observations in each quarter range from 737 to 815, relatively evenly distributed. Table 1 gives the breakdown of firm-quarter observations by the weight that total MBS represent in total non-intangible assets. On average, total MBS represent about 9.61% of total non-intangible bank assets, with 8.88% and 0.72%, respectively, of agency-backed and non-agency MBS. The majority of MBS holdings are agency-backed MBS (92.40%). In dollar amounts, total MBS averaged $1.32 billion per reporting entity per quarter, with $1.09 billion of agency-backed and $0.23 billon of non-agency MBS for the full sample. However, some banks simply do not deal with non-agency MBS. Up to 9,007 observations report only agency-backed MBS holdings with zero non-agency MBS holdings.[10] For the 6,426 observations that do report non-agency MBS holdings, the average amount is around $570 million. It shows the importance of MBS as a bank asset and how it can be at the epicenter of the financial crisis.

The test variable in this study, FVRatio_t, is fair value of total MBS deflated by the amortized costs (book value) of total MBS, similar to that in Huizinga and Laeven (2009). A ratio between the fair value and the book value highlights the incremental information content provided by the fair value reporting, above and beyond what is conveyed in the amortized costs. Similar fair-value-to-book-value ratio is studied for other assets with both fair values and book values disclosed (Nissim, 2003). Total MBS are then separated into those agency-backed and non-agency MBS, with the fair-value-to-book-value ratios denoted as FVRatio_a and FVRatio_n, respectively.

8 FR Y-9C is required for bank holding companies with total consolidated assets of $500 million or more.
9 In FR Y-9C, commercial MBS are reported separately from residential MBS. Commercial mortgages have different features than residential mortgages such as higher interest rates and prepayment penalty. As a result, commercial MBS have different risk aspects than residential MBS. It is not appropriate to pool them together in a study.
10 Of the 15,431 observations used in this study, only seven report zero agency-backed MBS but some holdings of non-agency MBSs.

Table 1

MBS as a Percentage of Total Non-Intangible Assets, by Firm-Quarter
Observations

Total MBS Holdings*

MBS as % of Total Non-Intangible Assets	Frequency	%	Cumulative %
1% to 10%	9,362	60.67	60.67
10% to 20%	4,792	31.05	91.72
20% to 30%	1,036	6.71	98.44
30% to 40%	186	1.21	99.64
40% to 50%	41	0.27	99.91
50% to 60%	13	0.08	99.99
above 60%	1	0.01	100
Total # of observations	15,431		

Agency-Backed vs. Non-Agency MBS**

MBS as % of Total Non-Intangible Assets	Agency-Backed MBS			Non-Agency MBS		
	Frequency	%	Cumulative %	Frequency	%	Cumulative %
less than 10%	10,079	65.32	65.32	15,248	98.81	98.81
10% to 20%	4,358	28.24	93.56	169	1.10	99.91
20% to 30%	813	5.27	98.83	11	0.07	99.98
30% to 40%	140	0.95	99.78	1	0.01	99.99
40% to 50%	25	0.16	99.94	2	0.01	100
50% to 60%	9	0.06	100			
Total # of observations	15,431			15,431		

Notes:
*On average, US banks' total MBS holdings represent 9.61% of total non-intangible assets in this sample.
**Agency-backed MBS include MBS either guaranteed by the Government National Mortgage Association (GNMA) or issued by the Federal National Mortgage Association (FNMA) and the Federal Home Loan Mortgage Corporation (FHLMC); on average, agency-backed MBS represent 8.88% of total non-intangible bank assets in this sample. Non-agency MBS include MBS issued by others such as private depository institutions, insurance companies, and state and local municipalities; on average, non-agency MBS represent 0.72% of total non-intangible bank assets in this sample.

(ii) MBS Valuations

Due to the complexity of MBS and the uncertainty of mortgage borrowers' default or prepayment behavior, different valuation models have been developed in the finance literature (Dunn and McConnell, 1981; McConnel and Singh, 1994; Hall, 1995; Childs et al., 1996; Boudoukh et al., 1997; Fink et al., 2005; and Rom Poulsen, 2007). However, many of the models remain at the academic research stage and there has not been a dominating model generally adopted by mortgage-banking practitioners (Chen et al., 2008). This lack of consensus on pricing models indirectly contributed to the turmoil in MBS valuation during the 2008 financial crisis.

(a) Dunn and McConnell (1981)

As far back as 1981, in modeling the pricing of GNMA-backed MBS, Dunn and McConnell (1981) established that interest rate alone can be the major determinant

of MBS pricing, similar to other fixed-income debt security. They demonstrated that the value of a GNMA backed MBS is a function of two variables, interest rate and time to maturity. A third variable is the possibility of prepayment, which equals to either 0 or 1 in their model. When prepayment equals to 1, a prepayment occurs, and the security ceases to exist. Later studies (McConnell and Singh, 1994; and Childs et al., 1996) also support current market interest rate as the most important determinant of MBS pricing. Similar to a straight bond or any other fixed-income debt security, MBS are expected to have a negative association with interest rates.

(b) Childs et al. (1996)

GNMA-backed MBS are unique in that they are guaranteed by the US government and thus bear almost no default risks. For non-GNMA-backed MBS, on top of the interest rate risks, default risks are also major determinants for MBS' valuation. Delinquency rates vary in each mortgage pool; as a result, the intrinsic value of each MBS is unique. More recent MBS pricing models (McConnel and Singh, 1994; Childs et al., 1996; and Gabaix et al., 2007) reached the overall conclusion that MBS pricing is a function of mortgage delinquency rates and the collateral properties' price level, along with current period interest rates.

Unlike other traditional fixed-income-debt securities, MBS are subject to prepayments triggered by refinancing, which, in turn, are driven by lowered interest rates and/or general house price level changes. When prepayment occurs, the security ceases to exist. Unlike Dunn and McConnell (1981) who inserted a 1 or 0 dummy to indicate prepayment, Childs et al. (1996) treat prepayment rate as a continuous variable presented as a percentage of principal that is prepaid during a one-year period.

(c) Boudoukh et al. (1997)

Another line of studies on MBS' valuation developed a nonparametric model-free approach by using multivariate density estimation procedures to investigate the relation between MBS prices and economic factors (Boudoukh et al., 1997; and Fink et al., 2005). Earlier simulation models are highly dependent on and sensitive to assumptions about interest rates, delinquency rates, and prepayment rates. Those rates are highly correlated and can create the multicollinearity problem in a regression model. In that sense, a nonparametric model-free approach has its merit.

(iii) The Model

To estimate the association between MBS' fair value reporting and economic factors, the following model is used in this study:

$$\text{FVRatio} = \alpha_1 + \beta_1 \text{IntRate}_j + \beta_2 \text{MrgtDlq}_j + \beta_3 \text{Prepay}_j + \beta_4 \text{HPIndex}_j$$
$$+ \beta_5 \text{Tier1}_{tj} + \beta_6 \text{ROA}_{tj} + \beta_7 \text{Crdtrisk}_{tj} + \beta_8 \text{Liqtrisk}_{tj} + \varepsilon,$$

(Regression 1)

where:

FVRatio   = the ratio between reported fair value and amortized costs of total MBS (FVRatio_t), or agency-backed MBS (FVRatio_a), or non-agency MBS (FVRatio_n).

Economic factors include:

IntRate$_j$ = prime interest rate for 30-year fixed debt securities in quarter j;
MrgtDlq$_j$ = aggregated national mortgage delinquency rate in quarter j (for non-agency MBS, the delinquency rate is separately available and is substituted here as SubDlq);
Prepay$_j$ = aggregated prepayment rate from FNMA's mortgage pools in quarter j;
HPIndex$_j$ = seasonally adjusted purchase-only index percentage change over the previous quarter in quarter j;

Bank-specific factors included as control variables:

Tier1$_{tj}$ = tier 1 capital ratio for firm t in quarter j;
ROA$_{tj}$ = return on total asset for firm t in quarter j;
Crdtrisk$_{tj}$ = a proxy for credit risk for firm t in quarter j;
Liqtrisk$_{tj}$ = a proxy for liquidity risk for firm t in quarter j;

β_1 to β_8 are the coefficients estimated, and, ε is the error term.

Regression (1) is used to estimate coefficients of the explanatory variables for observations before and after FSP 157–3 separately.[11] Additional regressions (Regression 2, 3 and 4) reduce the number of economic factors from 4 to 2 to reduce multicollinearity; the results are presented together with that from Regression (1) in Table 4 to Table 6.

(a) Economic Factors

Four economic factors are included in this study as economic determinants of MBS valuation: interest rate (IntRate), mortgage delinquency rates (MrgtDlq), residential house price index (HPIndex), and mortgage prepayment rate (Prepay). Interest rates, delinquency rates and house price index are aggregated data at the national level, collected from the US Federal Housing Finance Agency. Prepayment rates are aggregated from FNMA MBS pools. Following the modeling of MBS valuation, it is expected that MBS' fair values have negative associations with the interest rates, the delinquency rates, and the prepayment rates. The association with general house price level is less directional, depending on whether price moves trigger defaults or prepayments.

To reduce the multicollinearity issue, this study also reduces the economic factors to three variables (IntRate, MrgtDlq and HPIndex in Regression 2; IntRate, Prepay

11 To run separate regressions for observations before and after FSP 157–3 is a choice of the research design. The alternatives include a stacked regression, similar to Riedl (2004), or a dummy indicator interacting with all explanatory variables. The primary assumption for the alternative is either that the error term from each separate regression has the same distribution (a stacked regression) or that the intercept term is fixed (interaction model). Based on the univariate analysis and the inequality of the test variable before and after FSP 157–3, this study does not make assumptions on those terms and uses separate regressions instead.

and HPIndex in Regression 3) and then to two variables (IntRate and HPIndex in Regression 4, with IntRate and HPIndex being the least correlated economic factors).

(b) Bank-Specific Factors

The influences that banks' accounting/reporting incentives have on fair value reporting have been well documented (Beatty et al., 2002; Karaoglu, 2005; and Dechow et al., 2010). Empirical evidence from those studies indicates a positive association between banks' financial reporting discretion and transactions such as securitizations (Karaoglu, 2005; Dechow et al., 2010; and Cheng et al., 2011) and fair value reporting of assets such as retained interests in securitized assets or loan loss provisions (Beatty et al., 2002; and Nissim, 2003). To control for banks' reporting incentives, bank-specific factors are included in this study. Four variables are used in this study as proxies for banks' four major reporting incentives: regulatory, performance measurement, credit risk, and liquidity risk (Ahmed and Takeda, 1995; Beatty et al., 2002; Nissim, 2003; Karaoglu, 2005; and Cardone-Riportella et al., 2010).

Tier 1 capital ratio (Tier1) is commonly used in accounting/banking studies as a proxy for regulatory capital requirement (Ahmed and Takeda, 1995; Nelson, 1996; Nissim, 2003; and Song et al., 2010). In this study, Tier 1 ratio is calculated as total risk-based capital divided by total risk-weighted assets.

Performance measurement provides another incentive for bank managers to manage reported accounting numbers (Ahmed and Takeda, 1995; Ahmed et al., 1999; Nelson, 1996; Nissim, 2003; and Dechow et al., 2010). Different variables are used as proxies for this incentive, including levels of return on assets (ROA), changes of ROA, net income, or adjusted net income. This study uses ROA as a proxy for performance-related reporting incentive. ROA is calculated with accounting earnings where unrealized holding gains such as fair value changes from MBS are excluded.

Credit risk is measured as current period total write-offs divided by net loans. This proxy is similar to those used in Ahmed and Takeda (1995) and Nissim (2003). Following Cardone-Riportella et al. (2010), this study includes a proxy for banks' liquidity risk. The ratio between net loans to deposits and other short-term liabilities is calculated as the liquidity indicator. This ratio measures the mismatch of the term-structures on the asset and the liability side; the higher the ratio, the less liquidity, the higher liquidity risks.

Those proxies for banks' reporting incentives have been developed in accounting/finance literature, particularly in earnings management studies. This study, however, is not an earnings-management study; instead, it is an information-content study of the economic determinants of MBS fair value reporting. Bank-specific variables are studied here to rule out the potential competing explanation beyond unobservable, asymmetric private accounting information. If any association with the test variables is observed, the directions of the associations are not projected.

4. EMPIRICAL RESULTS

Descriptive statistics and correlations between the variables are given in Table 2. Overall, during the test period, fair values of MBS fairly stated the amortized costs, the ratio for total MBS (FVRatio_t) is 1.0011, just above 1. Agency-backed MBS have fair values higher than their amortized costs (mean of FVRatio_a = 1.0041), while

Table 2
Descriptive Statistics and Correlations

Panel A: Descriptive Statistics

	N	Mean	Median	Std. Dev.	25%	75%	Minimum	Maximum
FVRatio_t	15,431	1.00114	1.00060	0.02402	0.98335	1.01941	0.93070	1.05826
FVRatio_a	15,424	1.00416	1.00447	0.02399	0.98601	1.02256	0.90007	1.06102
FVRatio_n	64,240	0.95012	0.97482	0.08240	0.92477	0.99551	0.59434	1.98441
IntRate	15,431	0.05737	0.06060	0.00742	0.05020	0.06380	0.04550	0.06720
MrgtDlq	15,431	0.07266	0.06990	0.02114	0.05120	0.09720	0.04390	0.10030
Prepay	15,431	0.16961	0.16450	0.06847	0.11190	0.23120	0.06510	0.27100
HPIndex	15,431	−0.00765	−0.00220	0.01152	−0.02470	−0.00140	−0.02810	0.01570
Tier1	15,431	0.08729	0.08490	0.03375	0.07453	0.09746	−0.17101	0.58269
ROA	15,431	0.00215	0.00327	0.01309	0.00113	0.00658	−0.25130	0.21604
Crdtrisk	15,121	0.00399	0.00107	0.00734	0.00034	0.00314	$1.10E-07$	0.09551
Liqtrisk	15,365	0.87170	0.89439	0.17005	0.79412	0.98553	0.03050	1.98743

Panel B: Correlation Table

Variables	FVRatio_a	FVRatio_n	IntRate	MrgtDlq	Prepay	HPIndex	Tier1	ROA	CrdtRisk	LiqtRisk
FVRatio_t	0.90379	0.10233	−0.7009	0.71581	0.56544	−0.29813	0.02683	−0.09460	0.19237	−0.11947
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	15,424	6,424	15,431	15,431	15,431	15,431	15,431	15,431	15,121	15,365
FVRatio_a		−0.25118	−0.7825	0.81122	0.62638	−0.35273	0.00602	−0.13516	0.22889	−0.11110
		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.4545	<0.0001	<0.0001	<0.0001
		6,417	15,424	15,424	15,424	15,424	15,424	15,431	15,115	15,358
FVRatio_n			0.29887	−0.34618	−0.21978	0.16858	0.07433	0.16620	−0.10974	−0.0210
			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0927
			6,424	6,424	6,424	6,424	6,424	6,424	6,325	6,380
IntRate				−0.95276	−0.85723	0.26391	0.03063	0.22301	−0.36788	0.20892
				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
				15,431	15,431	15,431	15,431	15,431	15,121	15,365

MrgtDlq	0.75759	−0.33604	−0.04077	−0.23740	0.34762	−0.17682
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	15,431	15,431	15,431	15,431	15,121	15,365
Prepay		0.03876	−0.01739	−0.18398	0.24597	−0.20526
		<0.0001	0.0308	<0.0001	<0.0001	<0.0001
		15,431	15,431	15,431	15,121	15,365
HPIndex			0.02794	0.06242	−0.11876	−0.06046
			0.0005	<0.0001	<0.0001	<0.0001
			15,431	15,431	15,121	15,365
Tier1				0.46936	−0.07642	0.07750
				<0.0001	<0.0001	<0.0001
				15,431	15,121	15,365
ROA					−0.50909	0.06118
					<0.0001	<0.0001
					15,121	10,365
CrdtRisk						−0.0076
						0.3510
						15,062

Notes:

Variable definitions:

FVRatio_t = the ratio between fair value and amortized costs of total MBS;
FVRatio_a = the ratio between fair value and amortized costs of agency-backed MBS;
FVRatio_n = the ratio between fair value and amortized costs of non-agency MBS;
IntRate = prime interest rate for 30-year fixed debt securities;
MrgtDlq = aggregated national mortgage delinquency rate;
Prepay = aggregated prepayment rate from FNMA's mortgage pools;
HPIndex = aggregated house price index, seasonally adjusted, percentage change over the previous quarter;
Tier1 = tier 1 capital ratio calculated as total risk-based capital divided by total risk-weighted assets;
ROA = return on total assets;
Crdtrisk = a proxy for credit risk measured as total write-offs divided by net loans, similar to Ahmed and Takeda (1995) and Nissim (2003);
Liqrisk = a proxy for liquidity risk measured as the ratio between net loans to short-term liabilities, similar to Cardone-Riportella et al. (2010).

non-agency MBS have fair values lower than their amortized costs (mean of FVRatio_n = 0.9501). Those numbers are comparable with those reported in Bhat et al. (2010);[12] they initially confirm that the financial crisis and the 'toxic' aspect of MBS is more of a problem with non-agency MBS than with agency-backed MBS. While interest rates are relatively low during the test period, ranging from 4.55% to 6.72%, the economic turmoil during the test period is captured by the average 7.26% mortgage delinquency rate and overall decline in house-price index. As expected, economic factors are highly correlated. IntRate, MrgtDlq, and Prepay have correlation coefficients above 0.75, or even as high as 0.95. These high correlations justify the reduction of economic factors in the models.

Bank-specific variables are widely distributed, with the standard deviation equal to several times the mean for some variables (ROA and CrdtRisk). Note that the coefficients are 0.469 between ROA and Tier1, and -0.509 between ROA and CredRisk. The relatively high correlations between performance measurement and other reporting incentives are consistent with earlier studies (Beatty et al., 2002; and Karaoglu, 2005).

(i) Univariate Analysis

Figure 1 presents charts of quarterly average FVRatio over the test period of 20 quarters. Chart 1 presents the quarterly average for total MBS (FVRatio_t); Chart 2 and Chart 3 present that of agency-backed (FVRatio_a) and non-agency (FVRatio_n) MBS, respectively. It is noticeable that the standard deviations of FVRatios increase right after FSP 157–3 took effect in 2008 Q3. This provides the initial evidence that MBS' fair value reporting moves around the amortized costs more freely after FSP 157–3. The increase of standard deviations is the most noticeable for non-agency MBS in Chart 3. Right after the issuance of FSP 157–3, while the means of FVRatio_n are dropping, reflecting the 'toxic' aspect of non-agency MBS, standard deviations increase dramatically. At the extremes, fair values of non-agency MBS are reported at either 59% or 198% of their amortized costs (Table 2 Panel A, the minimum and maximum of FVRatio_n). Considering that the average amount of non-agency MBS holdings in this study is about $570 million, this deviation translates to a fair value fluctuation from about a quarter billion write-down to more than a half billion write-up. During an economic downturn while most financial assets drop in values, why did some MBS holdings drop less or even increase in fair value? Were those MBS outperforming the rest? Were there credit-enhancement provisions for a specific holding? Was the future cash flow expectation better than the others? Only the holders of each specific tranche of MBS can answer those questions. In that sense, fair value reporting of MBS has the potential to convey much private information beyond that conveyed by the amortized costs.

T statistics on the equality of average means and standard deviations before and after FSP 157–3 are given in Table 3. The focus is on the standard deviations, while the change of average means can be attributed to general economic conditions. For total MBS, FVRatio_t, the difference in the standard deviations before and after FSP 157–3 is statistically significant ($t = −11.06$, Pr. < 0.0001, assuming equal variance). For agency-backed MBS, FVRatio_a, standard deviations increased after FSP 157–3 ($t = −3.6$,

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12 Using similar bank data from Y-9C, but with a different time frame, 2006 Q3 to 2010 Q1, Bhat et al. (2010) reported overall average fair value to amortized cost ratio of 1.0073 for agency-backed MBS and 0.9395 for non-agency MBS.

Figure 1

Relationship Between MBS' Fair Values and Amortized Costs Over Time

Test variable = the ratio between fair value and amortized costs of total MBS (FVRatio_t)

Chart 1: Total MBS holdings, including both agency-backed and non-agency MBS

(firm-quarter observation = 15,431)
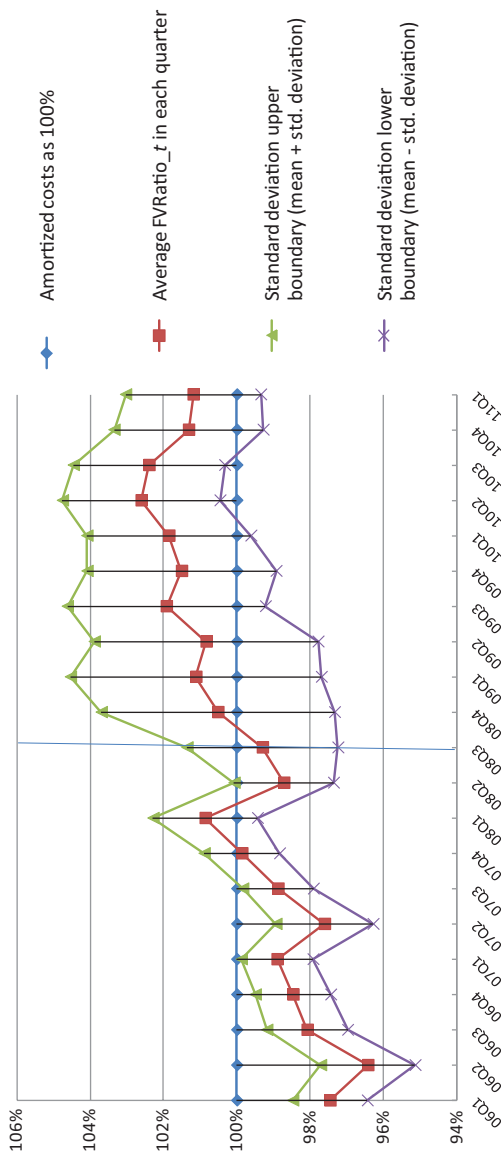
Figure 1 (Continued)

Test variable = the ratio between fair value and amortized costs of agency-backed MBS (FVRatio_*a*)

Chart 2: Agency-backed MBS holdings
(firm-quarter observation = 15,424)

- ◆ Amortized costs as 100%
- ■ Average FVRatio_*a* in each quarter
- ◄ Standard deviation upper boundary (mean + std. deviation)
- ✕ Standard deviation lower boundary (mean - std. deviation)

Figure 1 (Continued)

Test variable = the ratio between fair value and amortized costs of non-agency MBS (FVRatio_n)
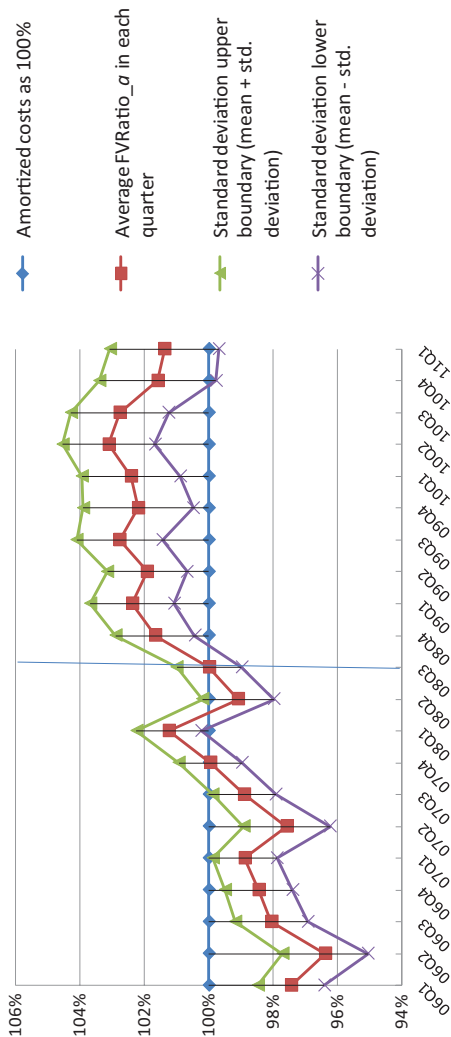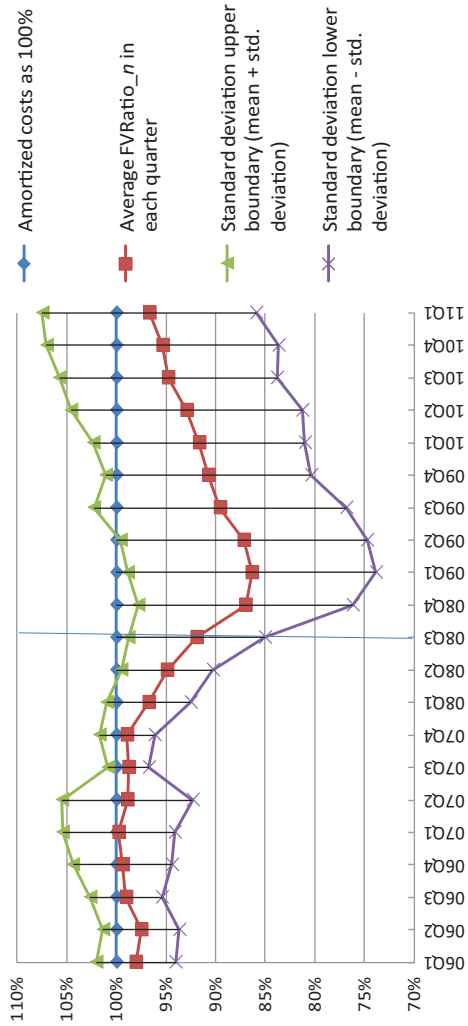
**Chart 3: Non-agency MBS holdings
(firm-quarter observation = 6,424)**

Table 3

T Statistic on the Equality of Test Variables Before and After FSP 157–3

Test Variable		Before FSP 157–3	After FSP 157–3	T Statistic Ho: $\mu_{before} = \mu_{after}$			
				Variances	DF	t Value	Pr > |t|
FVRatio_t	Mean:	0.9854	1.0158	Equal	18	−6.22	<0.0001
				Unequal	16.4	−6.22	<0.0001
	Std. Dev.:	0.0110	0.0188	Equal	18	−11.06	<0.0001
				Unequal	16	−11.06	<0.0001
FVRatio_a	Mean:	0.9861	1.0211	Equal	18	−6.82	<0.0001
				Unequal	15.5	−6.82	<0.0001
	Std. Dev.	0.0107	0.0137	Equal	18	−3.60	0.0021*
				Unequal	11.4	−3.60	0.0038*
FVRatio_n	Mean:	0.9821	0.9204	Equal	18	6.19	<0.0001
				Unequal	13.5	6.19	<0.0001
	Std. Dev.	0.0423	0.0930	Equal	18	−9.21	<0.0001
				Unequal	17.6	−9.21	<0.0001

Notes:

*T statistic for the standard deviation of FVRatio_a is significant at the 0.01 level. For all the others, the *T* statistics are significant at the 0.0001 level.

For FVRatio_t, the ratio between fair value and amortized costs of total MBS, 7,498 firm-quarter observations are used for before-FSP-157–3 and 7,933 observations are used for after. A total of 15,431 pooled firm-quarter observations.

For FVRatio_a, the ratio between fair value and amortized costs of agency-backed MBS, 7,882 firm-quarter observations are used for before-FSP-157-3 and 7,542 observations are used for after. A total of 15,424 pooled firm-quarter observations.

For FVRatio_n, the ratio between fair value and amortized costs of non-agency MBS, 3,183 firm-quarter observations are used for before-FSP-157–3 and 3,342 observations are used for after. A total of 6,424 pooled firm-quarter observations.

Pr. = 0.0021). Even though it is not significant at the 0.0001 level like that of FVRatio_t, it is significant at the 0.01 level.

The most noticeable difference is from the non-agency MBS (FVRatio_n). The significant decrease in average means of FVRatio_n (from 0.9821 drops to 0.9204) confirms the 'toxic' aspect of non-agency MBS during the financial crisis. Considering the average amount of \$570 million non-agency MBS holdings in this sample, this drop translates to about \$35 million write-down for an average non-agency MBS holder. That explains the term 'toxic' assets for non-agency MBS during the financial crisis. Additional to the drop of the means, however, the dramatic increase in the standard deviations (from 0.042 to 0.093, with Pr. < 0.0001) needs attention. While overall non-agency MBS are dropping in value, some drop less than others; some even increase in fair value. Why? Again, only the MBS holders with private information on specific holdings can answer. To this end, accounting discretion is necessary, and indeed exercised, for the reporting entities to convey additional information. Without detailed information on credit enhancement and performance expectations on specific MBS holdings, statement users have to count on the reporting entities' private information and assumptions to reach the fair value estimates.

Overall, at the univariate level, initial analyses indicate that MBS' fair value reporting moves around the amortized cost more freely after FSP 157–3,[13] particularly

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13 Another potentially powerful test at the univariate level is to look directly at the weights of Level 3 fair value reporting versus that of Level 1 and Level 2 fair value reporting, similar to Song et al. (2010). However,

for non-agency MBS. It provides initial evidence to document the effectiveness of FSP 157–3.

(ii) Regression Results

Table 4 reports the coefficient estimates from the regression models and the *F* statistics on the significance of the test variables. Panel A presents the estimates for the full sample. As expected, economic factors are associated with MBS' fair value reporting. Most economic factors are statistically significantly associated with FVRatio_*t* (at 0.001 level), other than individual ones with inconsistent signs.[14] The significance of economic factors is further confirmed in the partial model when only the four economic factors are included. Overall, the full model or the economic-factor-alone partial model is significant (*F* statistic with Pr. < 0.0001) with adjusted R^2 more than 50%.

Bank-specific factors seem to also play some roles in determining FVRatio_*t*, even though not nearly as influential. Three variables: regulatory concerns (Tier1), performance measurement (ROA) and concerns of credit risks (Crdtrisk) show consistent significance in the full model. However, the incremental explanatory power is limited. While the bank-factor-alone partial model is significant (*F* statistic with Pr. < 0.0001), the adjusted R^2 is only above 5%. This finding is consistent with the findings in earlier studies of banks' fair value reporting and their accounting incentives (Karaoglu, 2005; and Dechow et al., 2010). Even though the incremental explanatory power is limited, we cannot rule out bank-specific reporting incentives as part of the driving forces for total MBS fair value reporting. Song et al (2010) in their value relevance study on banks' fair value reporting point out that certain bank characteristics may play a role in the market's perception of a bank's overall fair value reporting. The interaction between fair value reporting and banks' reporting incentives seems to be the same for MBS; bank-specific factors do play some role in MBS' fair value reporting.

The adjusted R^2 is around 0.53 for the full model. Notice that by dropping economic factors from four variables to two variables, the adjusted R^2 remains about the same; the model is not losing much explanatory power. It is consistent with MBS valuation modeling in the finance literature finding that interest rate alone can be the dominating determinant of MBS valuations (Dunn and Mc Connell, 1981; McConnell and Singh, 1994; and Childs et al., 1996).

Panels B and C in Table 4 separate the sample to observations before and after FSP 157–3. Panel B, with about half of the observations ($N = 7498$), the adjusted R^2 dropped to 0.43. Overall, the estimates are similar to those in Panel A. Notice that before FSP 157–3, while reporting entities have less discretion in their fair value reporting, bank-specific factors have even less influence on MBS' fair value reporting. Bank-factor-alone partial model has very limited explanatory power.

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fair value input level information is not required separately for MBS. This study did look at the weight change of fair value input levels, but for all non-trading financial assets combined, instead of specifically for MBS.

On average, before FSP 157–3, Level 1 and Level 2 market inputs led to 58% of fair value reporting. That number dropped to 49% after FSP 157–3. Level 3 inputs increased from less than 40% to more than 52% after FSP 157–3. The effect of FSP 157–3 is clearly pronounced. However, limited by data availability specific to MBS, the analysis of total non-trading financial assets is not a focus of this study.

14 The inconsistent signs may be attributable to the multicollinearity in economic factors. When the number of variables is reduced and only leaves the most unrelated ones, IntRate and HPIndex, the signs are consistent with significance.

Table 4

Regressions on the Relationship Between MBS' FV and Economic and/or Bank-Specific Factors

Full Model: FVRatio $= \alpha_1 + \beta_i$ economic factors $+ \beta_{ii}$ bank specific factors $+ \varepsilon$

Dependent variable (FVRatio$_t$): the ratio between fair value and amortized costs of total MBS

Panel A: Full Sample, Including Observations Both Before and After FSP 157-3

	Exp. Sign	Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		0.98883	142.32	1.13692	327.90	1.00846	200.17	1.12658	829.63
IntRate	−	−0.61610	−7.15*	−2.40641	−52.07*	−0.86332	−14.02*	−2.27303	−107.90*
MrgtDlq	−	0.55964	24.44			0.53176	24.31		
Prepay	−	0.01956	4.10	−0.01506	−3.24*				
HPIndex	+/−	−0.19818	−13.7*	−0.22926	−15.61*	−0.16962	−13.37*	−0.25467	−20.49*
Tier1		0.02359	5.06*	0.02687	5.66*	0.02430	5.22*	0.02641	5.56*
ROA		0.09331	6.44*	0.04547	3.11*	0.08692	6.03*	0.04885	3.35*
Crdtrisk		−0.15502	−6.71*	−0.22813	−9.77*	−0.17406	−7.69*	−0.21514	−9.35*
Liqtrisk		0.00064	0.77	0.00184	2.16	0.00080	0.96	0.00175	2.06
N		15,431		15,431		15,431		15,431	
Adj. R^2		0.53		0.51		0.53		0.51	

F test on model significance:

Full model with 4 econ. factors and 4 bank specific factors   F value = 2136 Pr. <0.0001; Adj. R^2 = 0.5315

4 Economic factors alone: FVRatio $= \alpha + \beta_i$ econ. factors   F value = 4130 Pr. <0.0001; Adj. R^2 = 0.5231

4 Bank specific factors alone: FVRatio $= \alpha + \beta_i$ bank specific factors   F value = 228 Pr. <0.0001; Adj. R^2 = 0.0570

Panel B: Partial Sample, Observations Before FSP 157–3

		Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		1.25243	68.88	1.26938	139.37	1.24353	71.31	1.25824	210.36
IntRate	−	−4.28211	−23.46*	−4.41761	−33.4*	−4.14095	−25.37*	−4.2625	−46.66*
MrgtDlq	−	0.16435	1.08			0.13634	0.9		
Prepay	−	−0.01004	−1.73	−0.00937	−1.62				
HPIndex	+−	−0.14037	−1.94*	−0.21566	−11.89*	−0.17176	−2.46*	−0.23319	−16.01*
Tier1		0.000814	0.13	0.00111	0.18	3.45E − 05	0.01	0.000328	0.05
ROA		0.14694	6.9*	0.14537	6.84*	0.15126	7.15*	0.1497	7.1*
Crdtrisk		−0.18402	−4.23*	−0.18519	−4.26*	−0.17814	−4.11*	−0.17946	−4.14*
Liqtrisk		−0.0007	−0.81	−0.0007	−0.81	−0.00071	−0.83	−0.00071	−0.82
N		7,498		7,498		7,498		7,498	
Adj R^2		0.43		0.43		0.43		0.43	

F test on model significance:

Full model with 4 econ. factors and 4 bank specific factors F value = 697   Pr. <0.0001; Adj. R^2 = 0.4355

4 Economic factors alone: FVRatio = $\alpha + \beta_i$ econ. factors F value = 1362   Pr. <0.0001; Adj. R^2 = 0.4299

4 Bank specific factors alone: FVRatio = $\alpha + \beta_i$ bank specific factors F value = 6   Pr. <0.0001; Adj. R^2 = 0.0029

Table 4 (Continued)

Panel C: Partial Sample, Observations After FSP 157–3

	Exp. Sign	Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		1.01302	87.07	1.14174	144.71	0.96204	115.88	1.08393	368.69
IntRate	−	−1.08070	−7.76*	−2.13163	−17.53*	−0.38200	−4.61*	−1.29497	−21.65*
MrgtDlq	−	0.72879	14.88			0.76387	15.66		
Prepay	−	−0.05382	−6.24*	−0.06856	−7.89*				
HPIndex	+/−	0.02328	0.57	0.42566	13.64*	−0.07816	−2.07*	0.31972	11.31*
Tier1		0.03539	5.41*	0.03607	5.44*	0.03491	5.33*	0.03549	5.33*
ROA		0.10492	5.16*	0.07673	3.74*	0.11940	5.90*	0.09367	4.57*
Crdtrisk		−0.11857	−3.74*	−0.18421	−5.79*	−0.07379	−2.39*	−0.13047	−4.19*
Liqrisk		0.000891	0.63	0.000282	0.20	0.000147	0.10	−0.00072	−0.50
N		7,933		7,933		7,933		7,933	
Adj. R^2		0.17		0.14		0.16		0.14	

F test on model significance:

Full model with 4 econ. factors and 4 bank specific factors   *F* value = 202   Pr. <0.0001; Adj. R^2 = 0.1706

4 Economic factors alone: FVRatio = $\alpha + \beta_i$ econ. factors   *F* value = 346   Pr. <0.0001; Adj. R^2 = 0.1499

4 Bank specific factors alone: FVRatio = $\alpha + \beta_i$ bank specific factors   *F* value = 54   Pr. <0.0001; Adj. R^2 = 0.0267

Notes:

*Indicates statistic significance at 0.01 level.

The full sample in Panel A includes pooled firm-quarter observations, from 2006 Q1 to 2010 Q4, of US bank holding companies that file the FR Y-9C report (minimum total assets \$500 million). To be included in the sample, total MBS have to represent at least 1% of total non-intangible bank assets in that reporting quarter. *F* tests on model significance are conducted by first regressing the dependent variable with all eight independent variable, then with only the four economic factors, and then with only the four bank-specific factors. Panel B is estimated with observations from 2006 Q1 to 2008 Q2 (10 quarters), before FSP 157–3 took effect. Panel C is estimated with observations from 2008 Q3 to 2010 Q4 (10 quarters), after FSP 157–3 took effect. The seven-day exposure period and the immediate effectiveness of FSP 157–3 assure that there is no transition period and no complication of early- vs. late-adopters.

Variable definition:

IntRate, interest rate for 30-year fixed-rate debt securities; MrgtDlq, aggregated mortgage delinquency rate; Prepay, aggregated prepayment rate; HPIndex, house-price index; Tier1, tier 1 capital ratio; ROA, return on total assets; Crdtrisk, a proxy for credit risk measured as total write-offs divided by net loans; Liqtrisk, a proxy for liquidity risk measured as the ratio between net loans to short-term liabilities.

The focus is on Panel C which demonstrates a substantial drop of explanatory power. With slightly more than half of the observations ($N = 7933$) from the full sample, the adjusted R^2 dropped to around 0.17. Individually, economic factors still show significance, but overall, the model has little explanatory power. F statistics show that the full model and both the economic-factor-alone and the bank-factor-alone partial models are all still significant, but the explanatory power is much compromised. This finding is supportive of hypothesis 2A that banks' fair value reporting of MBS is less associated with economic factors after FSP 157–3. The question is: if economic factors and bank-specific factors combined can only explain about 17% of the movement in FVRatio_t, then what is driving it? Some unobserved, private information must be driving MBS' fair value reporting after FSP 157–3.

Together, empirical results from the univariate and the regression analyses show that, (1) fair value reporting of MBS move around their amortized costs more freely after FSP 157–3, indicating more accounting discretion being exercised (supportive of H_1); (2) the movement in MBS fair value reporting cannot be explained by general economic factors that are believed to be driving MBS valuations (supportive of H_{2A}); and (3) while the associations between bank-specific reporting incentives and MBS' fair value reporting cannot be entirely ruled out, these relatively weak associations cannot explain the movement of MBS' fair value reporting after FSP 157–3.

(iii) Agency-Backed versus Non-Agency MBS Holdings

Table 5 and Table 6 present the regression results for agency-backed (FVRatio_a) and non-agency (FVRatio_n) MBS. The first thing to notice: the selection criterion for the subsample is less restrictive than that for the full sample.

One of the criteria in selecting the full sample is that combined MBS holdings represent at least 1% of total non-intangible assets to be relevant. Considering that most reporting entities hold a combination of agency-backed and non-agency MBS, to apply the same 1% criterion to either the agency-backed or the non-agency MBS alone largely reduces the sample size and the power of the test. To release the restriction and yet to maintain MBS' relevance as a significant bank asset, the subsamples look at the absolute dollar value rather than the relative asset percentage. To be included in these subsample studies, observations have to report holdings of agency-backed, or non-agency MBS, alone, at least $5 million dollar (1% of the $500 million minimum filing requirement for FR Y-9C report). This criterion renders 15,331 firm-quarter observations for the agency-backed MBS study and 3,061 firm-quarter observations for the non-agency MBS study. Only 100 firm-quarter observations from the full sample report agency-backed MBS less than $5 million. For non-agency MBS, however, the distribution is much more uneven. Up to 9,007 firm-quarter observations report zero non-agency MBS, and 3,363 firm-quarter observations report non-agency MBS less than $5 million and are excluded.

Table 5 reports the fair-value-to-book-value ratio for agency-backed MBSs (FVRatio_a). Panel A presents the estimates for observations before FSP 157–3 ($N = 7,440$). Similar to the full sample analysis, interest rates (IntRate) consistently show statistical significance with the expected negative sign; it further confirms that interest rate is the most dominating determinant of MBS valuations (Dunn and Mc Connell, 1981; McConnell and Singh, 1994; and Childs et al., 1996). Overall, the significances in estimated coefficients are comparable to those in the full sample.

Table 5

Regressions on Agency-Backed MBS' FV with Economic and Bank-Specific Factors

Full Model: $FVRatio = \alpha_1 + \beta_i$ economic factors $+ \beta_{ii}$ bank specific factors $+ \varepsilon$
Dependent variable ($FVRatio\_a$): the ratio between fair value and amortized costs of agency-backed MBS

Panel A: Partial Sample, Observations Before FSP 157–3

	Exp. Sign	Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		1.23522	70.54	1.26979	144.60	1.24011	73.87	1.27795	221.54
IntRate	−	−4.17068	−23.72*	−4.44691	−34.87*	−4.24823	−27.04*	−4.56055	−51.78*
MrgtDlq	−	0.33532	2.28			0.35065	2.40		
Prepay	−	0.00551	0.98	0.00687	1.23				
HPIndex	+−	−0.15990	−2.30	−0.31352	−17.92*	−0.14267	−2.12	−0.30065	−21.42*
Tier1		−0.00757	−1.28	−0.00692	−1.17	−0.00714	−1.21	−0.00635	−1.08
ROA		0.15546	7.48*	0.15210	7.34*	0.15306	7.42*	0.14888	7.24*
Crdtrisk		−0.18440	−4.37*	−0.18665	−4.42*	−0.18755	−4.45*	−0.19074	−4.53*
Liqtrisk		−0.00028	−0.33	−0.00027	−0.32	−0.00027	−0.32	−0.00026	−0.31
N		7,440		7,440		7,440		7,440	
Adj. R²		0.51		0.51		0.51		0.51	

F test on model significance:
Full model with 4 econ. factors and 4 bank specific factors F value = 940   Pr: <0.0001; Adj. R^2 = 0.5120
4 Economic factors alone: $FVRatio = \alpha + \beta_i$ econ. factors F value = 1,843   Pr: <0.0001; Adj. R^2 = 0.5071
4 Bank specific factors alone: $FVRatio = \alpha + \beta_i$ bank specific factors F value = 10   Pr: <0.0001; Adj. R^2 = 0.0053

Panel B: Partial Sample, Observations After FSP 157–3

	Exp. Sign	Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		0.97181	110.95	1.11227	184.61	0.94568	151.38	1.07548	478.95
IntRate	−	−0.47915	−4.57*	−1.62694	−17.52*	−0.12107	−1.94	−1.09444	−23.97*
MrgtDlq	−	0.79469	21.56			0.81268	22.17		
Prepay	−	−0.02758	−4.25*	−0.04364	−6.58*				
HPIndex	−	0.03548	1.15	0.47320	19.85*	−0.01651	−0.58*	0.40573	18.80*
Tier1		0.02732	5.55*	0.02808	5.55*	0.02708	5.50*	0.02772	5.46*
ROA		0.07553	4.94*	0.04469	2.85*	0.08297	5.45*	0.05548	3.55*
Crdtrisk		−0.11497	−4.83*	−0.18678	−7.70*	−0.09204	−3.96*	−0.15262	−6.42*
Liqrisk		0.00673	6.36*	0.00604	5.55*	0.00635	6.02*	0.00540	4.97*
N		7,891		7,891		7,891		7,891	
Adj R^2		0.24		0.19		0.24		0.19	

F test on model significance:

Full model with 4 econ. factors and 4 bank specific factors	F value = 316	Pr. <0.0001; Adj. R^2 = 0.2445	
4 Economic factors alone: FVRatio = $\alpha + \beta_i$ econ. factors	F value = 548	Pr. <0.0001; Adj. R^2 = 0.2192	
4 Bank specific factors alone: FVRatio = $\alpha + \beta_i$ bank specific factors	F value = 40	Pr. <0.0001; Adj. R^2 = 0.0197	

Notes:
* Indicates statistic significance at 0.01 level
Panel A is estimated with observations from 2006 Q1 to 2008 Q2 (10 quarters), before FSP 157–3 took effect. Panel B is estimated with observations from 2008 Q3 to 2010 Q4 (10 quarters) after FSP 157–3 took effect. To be included in the sample, holdings of agency-backed MBS have to be at least $5 million in that reporting quarter.

Variable definition:
IntRate, interest rate for 30-year fixed-rate debt securities; MrgtDlq, aggregated mortgage delinquency rate; Prepay, aggregated prepayment rate; HPIndex, house price index; Tier1, tier 1 capital ratio; ROA, return on total assets; Crdtrisk, a proxy for credit risk measured as total write-offs divided by net loans; Liqrisk, a proxy for liquidity risk measured as the ratio between net loans to short-term liabilities.

Table 6

Regressions on Non-Agency MBS' FV with Economic and Bank-Specific Factors

Full Model: FVRatio $= \alpha_1 + \beta_i$ economic factors $+ \beta_{ii}$ bank specific factors $+ \varepsilon$
Dependent variable (FVRatio$_n$): the ratio between fair value and amortized costs of non-agency MBS

Panel A: Partial Sample, Including Observations Before FSP 157–3.

	Exp. Sign	Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		1.41873	8.57	0.59553	8.08	1.34573	25.84	1.01046	29.21
IntRate	–	−5.54791	−3.38*	2.69568	3.85	−4.87092	−6.44*	−0.23772	−0.45
MrgtDlq	–	−0.18003	−0.46			−0.27868	−8.47*		
Prepay	–	−0.29850	−5.54*	1.51950	6.36				
HPIndex	+–	0.94646	1.89	2.88722	7.99*	1.17410	11.34*	0.65321	7.67*
Tier1		−0.08765	−2.22	−0.08759	−2.20	−0.08796	−2.23	−0.08045	−2.00
ROA		0.60976	3.66*	0.89377	5.58*	0.62996	3.91*	0.86348	5.32*
Crdtrisk		−0.02217	−0.06	0.34976	0.97	$4.07E-05$	0.00	0.40582	1.11
Liqtrisk		−0.01340	−3.23*	−0.01410	−3.37*	−0.01342	−3.24*	−0.01463	−3.45*
N		1,604		1,604		1,604		1,604	
Adj. R^2		0.12		0.11		0.12		0.08	

F test on model significance:

Full model with 4 econ. factors and 4 bank specific factors		F value = 29	Pr. <0.0001; Adj. R^2 = 0.1273
4 Economic factors alone: FVRatio $= \alpha + \beta_i$ econ. factors		F value = 50	Pr. <0.0001; Adj. R^2 = 0.1141
4 Bank specific factors alone: FVRatio $= \alpha + \beta_i$ bank specific factors		F value = 15	Pr. <0.0001; Adj. R^2 = 0.0361

Panel B: Partial Sample, Including Observations After FSP 157–3

	Exp. Sign	Regression 1: 4 Econ. Factors		Regression 2: 3 Econ. Factors		Regression 3: 3 Econ. Factors		Regression 4: 2 Econ. Factors	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept		1.21174	11.90	0.84825	13.18	1.43372	18.12	1.07110	35.98
IntRate	−	−6.08722	−4.61*	−1.01149	−1.40	−7.80875	−6.37*	−2.54412	−4.16*
MrgtDlq	−	0.48781	3.44			0.42429	4.94		
Prepay	−	−0.39445	−4.59*	0.55329	3.90				
HPIndex	+−	−0.53513	−1.57	−1.19793	−3.85*	−0.05434	−0.17	−0.70447	−2.47
Tier1		0.17652	2.59*	0.17404	2.53	0.17729	2.59*	0.17471	2.53
ROA		0.36739	1.74	0.49682	2.35	0.32649	1.54	0.46117	2.17
Crdtrisk		0.77385	2.49	1.13729	3.75*	0.69765	2.24	1.08148	3.55*
Liqtrisk		−0.06489	−5.07*	−0.07061	−5.50*	−0.06825	−5.33*	−0.07495	−5.84*
N		1,457		1,457		1,457		1,457	
Adj R^2		0.08		0.07		0.07		0.06	

F test on model significance:
Full model with 4 econ. factors and 4 bank specific factors	F value = 17	Pr. <0.0001; Adj. R^2 = 0.0828	
4 Economic factors alone: FVRatio = $\alpha + \beta_i$ econ. factors	F value = 20	Pr. <0.0001; Adj. R^2 = 0.0525	
4 Bank specific factors alone: FVRatio = $\alpha + \beta_i$ bank specific factors	F value = 20	Pr. <0.0001; Adj. R^2 = 0.0505	

Notes:
* Indicates statistic significance at 0.01 level

Panel A is estimated with observations from 2006 Q1 to 2008 Q2 (10 quarters), before FSP 157–3 took effect. Panel B is estimated with observations from 2008 Q3 to 2010 Q4 (10 quarters) after FSP 157–3 took effect. To be included in the sample, holdings of non-agency MBS have to be at least $5 million in that reporting quarter.

Variable definition:
IntRate, interest rate for 30-year fixed-rate debt securities; MrgtDlq, aggregated mortgage delinquency rate; Prepay, aggregated prepayment rate; HPIndex, house price index; Tier1, tier 1 capital ratio; ROA, return on total assets; Crdtrisk, a proxy for credit risk measured as total write-offs divided by net loans; Liqtrisk, a proxy for liquidity risk measured as the ratio between net loans to short-term liabilities.

Adjusted R^2 remains around 0.51 across the four regression estimates for the full model. From the partial models, it is clear that the explanatory power comes from economic factors. Bank-specific factors have very limited incremental explanatory power. While both partial models are significant, economic-factor-alone partial model has adjusted R^2 above 0.50, but bank-factor-alone partial model has adjusted R^2 less than 0.01.

Panel B reports the regressions estimates from observations after FSP 157–3 ($N = 7,891$). Consistent with the full sample, the explanatory power drops. After FSP 157–3, the adjusted R^2 drops to around 0.24 and opens up room for other information not captured by the two groups of factors to be the determinant driving FVRatio_a. From the partial sample, bank-specific factors actually gain better explanatory power, even though still limited. Together, these results show that after FSP 157–3, economic factors demonstrate much less explanatory power; these findings provide further evidence that supports hypothesis H$_{2A}$.

One of the most interesting findings of this study is presented in Table 6, regressions on non-agency MBS' fair value ratio (FVRatio_n) against economic and bank-specific factors. With only 3,061 observations, it is a unique subsample where the reporting entities hold at least \$5 million of non-agency MBS. While it represents about only 19.83% of the full sample, it really is the focal point. After all, the 2008 financial crisis is about sub-prime lending, and FSP 157–3 is trying to address non-agency MBS where the financial products are less homogeneous and private information regarding specific security plays a much more important role in its valuation.

Panel A reports the regressions on observations before FSP 157–3 ($N = 1604$). Most noticeably, while the full model and the partial models are all statistically significant (F statistic with Pr. < 0.0001), the adjusted R^2 drops sharply. While the adjusted R^2 for agency-backed MBS moves around 0.50 before FSP 157–3, it drops to around 0.12 for non-agency MBSs for the same period. None of the economic factors consistently shows significant association with FVRatio_n. It seems that economic factors are weak determinants of non-agency MBS' fair value reporting even before FSP 157–3, when compared with agency-backed MBS. Either the fair value reporting of non-agency MBS is influenced by other factors, or the valuation of non-agency MBS simply does not follow the modeling of agency-backed MBS, and thus the fair value of non-agency MBS cannot be captured by general economic factors.

A closer look at the partial models helps to rule out bank-specific factors as a strong competing explanation. While the bank-factor-alone partial model is overall significant, it has even less explanatory power ($R^2 = 0.03$) than the economic-factor-alone partial model, and the incremental power is very limited. If those developed proxies can successfully reflect banks' reporting incentives, as demonstrated in earlier studies (Ahmed and Takeda, 1995; Nelson, 1996; Nissim, 2003; and Cardone-Riportella et al., 2010), but fail to demonstrate incremental explanatory power in this model, then this leaves the most possible explanation that non-agency MBS' fair value reporting is driven by some unobserved, additional information.

Panel B reports regressions for observations after FSP 157–3 ($N = 1457$). While the associations with individual economic factors are mostly inconsistent, similar to that before FSP 157–3, the adjusted R^2 drops even lower to 0.08 for the full model. Partial models show similar results. Both the economic-factor-alone model and the bank-factor-alone model have very limited explanatory power (R^2 around 0.05). Note that the R^2 for the bank-factor-alone model actually increases after

FSP 157–3; in the full model, significant associations between bank-specific factors and FVRatio_n are observed. Even though the incremental explanatory power from bank-specific reporting incentive is weak overall, after FSP 157–3, with more discretion on the reporting entity's hand, the influence is gaining. The influence from reporting entities' earnings management incentives cannot be ruled out entirely.

If the 2008 financial crisis is all about subprime lending, and FSP 157–3 is targeting the valuation of non-agency MBS, empirical findings presented in Table 6 help to narrow the focus on non-agency MBS. Findings from Table 6 support hypothesis H_{2B} that banks' fair value reporting of non-agency MBS is even less associated with economic factors after FSP 157–3.

5. FIRM LEVEL ANALYSIS

Song et al. (2010) in their value-relevance study on banks' fair value reporting point out that certain bank characteristics may play a role in the market's perception of a bank's overall fair value reporting. This study is not a value-relevance study on the associations between MBS' fair value reporting and the market's perception. However, MBS holdings can be the outcome of a bank's mortgage banking activities. While statement users do not have information regarding specific MBS holdings, such as credit enhancement provisions in each tranche or the creditworthiness of the underlying mortgage borrowers, one can gain insights on a bank's MBS holdings by studying a bank's mortgage banking activities. For example, securitizers are likely to retain riskier lower tranche as retained-interests while non-securitizers are likely to invest in credit-enhanced higher tranche. Also, it is a firm-level decision whether a bank is investing in non-agency MBS, or dealing strictly with agency-backed MBS. This study looks at these two firm-level characteristics – securitization and non-agency dealing – in evaluating the information content of US banks' fair value reporting of MBS.

Table 7 contrasts the means and standard deviations for the three test variables (FVRatio_t, FVRatio_a, and FVRatio_n) between groups of firms with different characteristics. To test hypothesis H_{3A} and H_{3B}, firm-quarter observations are rearranged to a firm-level dataset. Quarterly observations are grouped by each reporting entity, and the average of each of the three test variables is calculated for before- and after-FSP 157–3 for each reporting entity. To be included in the study, at least four observations have to be included in that period. These criteria result in 790 firms for before-FSP 157–3 period and 889 firms for after-FSP 157–3 period.

Panel A reports the contrast between securitizers and non-securitizers. Non-securitizers are identified if a firm does not report any securitization gain/loss (Y-9C item number BHCKB493) and carries no outstanding principal balance of residential loans securitized (Y-9C item number BHCKB705) during the 20-quarter test period. Similar criterion is used in Cheng et al. (2011). Notice that numbers of securitizers versus non-securitizers are disproportionate. There are only 84 securitizers before FSP 157–3 and 80 after, while there are 706 and 809 non-securitizers for before- and after-FAP 157–3 period, respectively. This disproportionate distribution is comparable to the sampling in Uhde et al. (2011) for European banks. Considering that securitization transactions can be costly and highly technical, only a handful of banks choose to access the capital market this way.

Table 7

T Statistics on the Equality of Test Variables Before and After FSP 157–3, by
Firm-Level Mortgage- Banking Activities

Panel A: Securitizers vs. Non-Securitizers

Section 1 Before FSP 157–3 N = 84 securitizers (Strs) 706 non-securitizers (N-Strs)				Section 2 After FSP 157–3 N = 80 securitizers 809 non-securitizers			
Variable	*Strs*	*N-Strs*	*DF.*	Pr. > |t|	*Strs*	*N-Strs*	*DF.*	Pr. > |t|
Means:								
FVRatio_t	0.9855	0.9857	788	0.8596	1.0126	1.0159	887	0.0866
FVRatio_a	0.9875	0.9862	788	0.2661	1.0219	1.0210	887	0.4769
FVRatio_n	0.9889	0.9810	388	0.0427	0.9182	0.9270	442	0.4656
Std. Dev.								
FVRatio_t	0.0130	0.0135	788	0.3110	0.0155	0.0130	887	<0.0001*
FVRatio_a	0.0133	0.0140	788	0.1251	0.0127	0.0121	886	0.2031
FVRatio_n	0.0331	0.0192	368	0.1045	0.0587	0.0485	400	0.0031*

Panel B: Agency Dealers vs. Non-Agency Dealers

Section 1 Before FSP 157–3 N = 630 Agency dealers (Adls) 62 Non-agency dealers (N-Adls)				Section 2 After FSP 157–3 N = 745 Agency dealers 54 Non-agency dealers			
Variable	*Adls*	*N-Adls*	*DF.*	Pr. > |t|	*Adls*	*N-Adls*	*DF.*	Pr. > |t|
Means:								
FVRatio_t	0.9861	0.9836	690	0.0826	1.0197	0.9846	797	<0.0001*
FVRatio_a	0.9861	0.9876	690	0.2523	1.0197	1.0181	797	0.0382
FVRatio_n	–	0.9781	–	–	–	0.9020	–	–
Std. Dev.								
FVRatio_t	0.0138	0.0118	690	<0.0001*	0.0122	0.0180	797	<0.0001*
FVRatio_a	0.0138	0.0120	690	0.0013*	0.0122	0.0106	796	0.0092*
FVRatio_n	–	0.0251	–	–	–	0.0382	–	–

Notes:
*Indicates statistical significance at the 0.01 level.

In Panel A, non-securitizers are identified if a firm does not report any securitization gain/loss (Y-9C item number BHCKB493) and carries no outstanding principal balance of residential loans securitized (Y-9C item number BHCKB705) during the 20-quarter test period. The rest are identified as securitizers. Section 1 tests the difference between the two groups before FSP 157–3; Section 2 tests that after.

In Panel B, agency dealers are identified if a firm does not report any non-agency MBS holdings (Y-9C item number BHCKG310 and BHCKG322) throughout the test period; non-agency dealers are identified if a firm reports non-agency MBS holdings systematically throughout the test period. Section 1 tests the difference between the two groups before FSP 157–3; Section 2 tests that after. By definition, agency dealers do not hold non-agency MBSs, FVRatio_n is not available in Panel B for agency dealers.

Section 1 shows that before FSP 157–3, there is no significant difference between the two groups for both the means and the standard deviations of the test variables. For all three test variables, none of the difference is significant at 0.01 level from the *T* test. After FSP 157–3, in Section 2, while the means increase for FVRatio_t and FVRatio_a (consistent with Figure 1, Chart 1 and 2) and decreases for FVRatio_n (consistent with Figure 1, Chart 3), there is no significant difference between the two groups. The

interpretation is that both the securitizers and the non-securitizers are affected by the market turmoil. For the standard deviations, however, there is significant difference between the two groups (Pr. < 0.0001 for FVRatio_t). While everybody is affected by the market turmoil, securitizers with their lower-tranche retained interests are more sensitive to the market turmoil and have more private information that needs to be conveyed. If the information is properly conveyed in MBS' fair value reporting, it is not surprising to see the securitizers having significantly higher standard deviations. The case is particularly true for FVRatio_n where the standard deviation is 0.0587 for securitizers and 0.0485 for non-securitizers (Pr. $= 0.0031$). Together, those findings support hypothesis H$_{3A}$.

Panel B reports the contrast between agency dealers and non-agency dealers. Agency dealers are identified if a firm does not report any non-agency MBS holdings (Y-9C item number BHCKG310 and BHCKG322) throughout the test period. Only strict agency dealers are included in this analysis.[15] To be included as a non-agency dealer, a firm has to report non-agency MBS holdings systematically throughout the test period. This criterion largely reduces the sample size in this group; only 62 firms before FSP 157–3 and 54 firms after FSP 157–3 are identified as active non-agency dealers. The small sample size challenges the validity of this analysis, but it faithfully reflects the disparate distribution of dealerships on the market. The market of non-agency MBS is highly concentrated.

Section 2 in Panel B shows that after FSP 157–3, both the mean and the standard deviation have significant difference between strict agency dealers and non-agency dealers. While average means of fair values (FVRatio_t) increases for strict agency dealers (from 0.9861 to 1.0197, consistent with Figure 1 Chart 1), it does not increase as much for non-agency dealers (from 0.9836 to 0.9846). As a result, there is a significant difference between the two groups after FSP 157–3. Also, while average standard deviation decreases for strict agency dealers (from 0.0138 to 0.0122), it increases for non-agency dealers (from 0.0118 to 0.0180). This finding is supportive of hypothesis H$_{3B}$ that banks' fair value reporting of MBS differs significantly between agency dealers and non-agency dealers after FSP 157–3.

Together, findings at the firm-level analysis indicate that MBS' fair value reporting after FSP 157–3 does reflect the reporting entities' mortgage banking activities. These findings provide indirect evidence that the additional discretion afforded by FSP 157–3 is taking effect in conveying relevant information. While the additional information cannot be explained by either economic factors or bank-specific reporting incentives, it is reflective of the reporting entity's mortgage banking activities.

6. CONCLUSION

Accounting discretion has always been controversial, whether it is a vehicle to convey private accounting information or a vehicle for earnings management; the controversy is stocked with fair value accounting (Karthik and Watts, 2008; and Dechow et al., 2010). At the climax of the 2008 global financial crisis, with the intention to control fair value's pro-cyclical effect that amplifies the downward economy, the FASB issued FSP 157–3 that allows a reporting entity to 'significantly adjust' market inputs of fair

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15 Banks holding mostly agency-backed MBS but small amount of non-agency MBS are not included in either group. 90 firms report some non-agency MBS holdings in at least one quarter, but no non-agency MBS in other quarters. Those firms are excluded from this study.

value measurement by applying assumptions based on the reporting entity's private information. The IASB reaffirmed this accounting treatment with a press release shortly after. The impact that the additional discretion afforded by FAP 157–3 has had on the information content of fair value reporting needs to be investigated. This study provides empirical evidence to address this issue.

This study looks at one specific financial asset, mortgage backed securities (MBS), and examines its fair value reporting before and after FSP 157–3. By evaluating the fair value reporting against observable economic factors and bank-specific reporting incentives, this study makes an inference on the relationship between additional accounting discretion and any unobservable, private accounting information conveyed under the new fair value rule. This study documents: (1) the effectiveness of FSP 157–3; (2) that the additional information content cannot be explained by observable general economic factors or bank-specific reporting incentives; and (3) that the additional information content seems to be consistent with the reporting entity's mortgage banking activities.

In a sense, this study is facing exactly the same challenge that financial-statement users are facing — the verifiability of fair value reporting. Given the information asymmetry regarding the underlying assets, MBS in this study, whether the market is re-acting to accounting information that is more reflective of MBS' economic value, or is simply misled by management-introduced biases cannot be verified directly. This study provides indirect evidence that the unexplained information content is consistent with the reporting entity's mortgage banking activities. The inherent shortage of verifiabil-ity for private accounting information prevents any direct evidence on this issue.

This study does not document strong association with banks' reporting incentives, but cannot entirely rule them out. When the reporting entity's private information and assumptions can override the observable market inputs, fair value reporting ceases to be the best representation of the market-participants' expectations; it is influenced by the reporting entity's expectations. While it seems that FSP 157–3 merely allows additional discretion for the reporting entity to disentangle from the downward economy, statement users as well as the accounting standard-setting bodies have to keep in mind the enhanced discretionary nature of fair value reporting under FSP 157–3.

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