Banks' Compliance Practices with Disclosure Requirements for Mortgage Servicing Rights

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Abstract

The purpose of this study is (1) to provide an understanding of banks' disclosure practices for mortgage servicing rights (MSRs) and (2) to examine whether banks' disclosure compliance under Accounting Standards Codification No. 860 (ASC No. 860) is related to overall corporate governance, materiality, the asset size of the banks, and the quality of external auditors. We identified 109 commercial public U.S. banks with primarily residential MSRs as of December 31, 2015, or fiscal year 2016. We manually collected the data from the compiled banks' notes of financial statements. The results show there are significant deficiencies in compliance with the disclosure requirements. Specifically, banks disclose, on average, only 69% of the mandatory disclosure items measured in this study. Such results suggest that market participants may not be fully informed of the data necessary to project future cash flows and the uncertainties of servicing rights. We also find that the degree of the banks' disclosure compliance on MSRs is positively related to corporate governance, bank size, and the ratio of the fair value of MSRs to total equity of the banks (i.e., MSR materiality). We find no strong relationship, however, between the banks' disclosure compliance on MSRs and the quality of the external auditor.

Keywords: Accounting Standards Codification No. 860 (ASC No. 860), banks' disclosure compliance, fair value, Level 3 assets, mortgage servicing rights (MSRs), MSR materiality, SFAS No. 157
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1. Introduction

All mortgage loans must be serviced. In 2017, there were more than 48 million owner-occupied housing units with a mortgage (Census, 2017). The magnitude of mortgage loans provides for a secondary market for servicing rights. Since the 1980s, the prevalence of mortgage servicing rights (MSRs) has grown in the mortgage banking industry. Although servicing is an integral part of all loans, economic benefits that arise from servicing rights (i.e., servicing assets) are separately identified and accounted for when such rights are acquired from third parties and when the loans are sold with retaining loan processing and administrative services for investors. Accounting for servicing rights assets requires banks to assess the fair value of such assets, both at the initial transaction and at each reporting date after the initial transaction. Because there are no active trading markets for servicing or similar assets, valuation techniques require several projected inputs and assumptions that market participants are presumed to use in setting the selling price at the principal (or the most advantageous) market value. Due to such complexity of fair value estimates of servicing assets, U.S. accounting rules codified in Accounting Standards Codification (ASC) No. 860-50 require intensive disclosure information for servicing assets.[1]

Considerable research in housing economics has sought to identify factors that influence MSR valuation or the modeling of MSR valuation.[2] While prior studies have addressed the significance of MSRs to financial institutions, these studies have not examined whether commercial public U.S. banks provide complete information on the fair value estimates of MSRs to capital market participants. The purpose of this study is to: (1) provide an understanding of commercial banks' disclosure requirement practices for MSRs that arise from mortgage loans; and (2) examine whether banks' compliance with disclosure requirements under ASC No. 860 is related to overall corporate governance, MSR materiality (as measured by the relative size of the MSR to total equity), bank size (as measured by total assets), and the quality of external auditors (Big 4 vs. non-Big 4 auditors). We hypothesize that these four factors determine commercial banks' compliance with disclosure requirements for servicing assets.

In this study, we identify 109 U.S. public banks with residential MSRs as of December 31, 2015, or fiscal year 2016. Such banks' notes of financial statements are compiled from the U.S. Securities and Exchange Commission's (SEC's) EDGAR database. The data were manually collected from the compiled banks' notes of financial statements. The results show there are significant deficiencies in compliance with the disclosure requirements; banks disclose, on average, only 69% of the mandatory disclosure items measured in this study. Such results suggest that market participants may not be fully informed of the data necessary to project future cash flows and the uncertainties of servicing rights. We also found that the degree of the banks' disclosure compliance is related to overall corporate governance, MSR materiality, and bank size. Specifically, banks are more compliant with MSR-related mandatory disclosure requirements, as they are stronger in corporate governance, larger in their asset size, and higher in the effect of servicing assets on equity. The quality of the external auditors, however, had no significant measurable effect on the completeness of disclosure requirements.

[1] See Appendix A for a list of the disclosure requirements.

[2] Research in finance and housing economics focuses mainly on identifying the factors that influence MSR valuation or the modeling of MSR valuation (Buttimer & Lin, 2005; Chiang, Yang, & Tsai, 2016; Kalotay & Fu, 2008). Research in accounting, in contrast, focuses on finding empirical evidence of fair value relevance of MSRs (e.g., Altamuro & Zhang, 2013; Cochran, Coffman, & Harless, 2007; Kohlbeck, 2004; Pfeiffer, 1998) and examining the reliability of MSR estimates and accounting implications of MSRs (e.g., Altamuro & Zhang, 2013; Cochran et al., 2007; Hendricks & Shakespeare, 2013; Kohlbeck, 2004).

Our findings make significant contributions to accounting literature, in particular public banks' disclosure compliance in MSRs. Prior studies imply that the fair value of MSRs is skeptical in its reliability (e.g., Cochran et al., 2007). Our findings provide the empirical evidence of banks' substantial failure of compliance with disclosure requirements. Further, our findings provide insights into explaining the question of why banks fail to comply with the requirements. The size factor implies that banks may claim that compliance with the disclosure requirements is too costly. The materiality factor implies that MSRs are not significant enough to influence users' decision-making. In addition, the findings shed light on how significant the overall corporate governance is in disclosure compliance.

2. Background

2.1 Nature of MSRs and Accounting for MSRs

MSRs are intangible assets representing the capitalized mortgage servicing benefits that "are expected to more than adequately compensate the servicer for performing the servicing" (ASC 860-50-20). Mortgage servicing involves collecting monthly loan payments, insurance premiums, and property tax payments; setting aside taxes and insurance premiums in escrow; accounting for and remitting the collected loan payments to the original lenders, the property taxes to county taxing authorities, and the insurance payments to insurance companies; and handling the collection process for foreclosed loans (ASC No. 860-50). Original lenders may sell in a secondary market all or part of the originated loans (or the securitized loans via a pass-thru entity) while retaining the loan servicing rights. The servicing right (i.e., the MSR) "becomes a distinct asset or liability only when contractually separated from the underlying assets by sale or securitization of the assets with servicing retained or separate purchase or assumption of the servicing" (SFAS No. 140; FASB, (2000), p. 61).

Servicing assets are recognized when loans are transferred and the transfer meets the sales conditions specified in ASC No. 860. ASC No. 860 requires commercial banks to assess and record the fair value of servicing assets when mortgage loans are sold to investors while loan services are contractually retained by the banks.[3] After the initial recognition of servicing assets, commercial banks require either amortizing the servicing assets over the income-generating period ("amortization method") or measuring the fair value of the servicing assets at each reporting date and updating the carrying value of the servicing assets ("fair value method"). Banks using the amortization method should estimate the fair value of the servicing assets to evaluate whether there are impairments on the servicing assets at each reporting date (ASC No. 860; FASB, 2014). Banks using the fair value method should assess the fair value of servicing assets at each reporting date (ASC No. 860; FASB, 2014). Accounting for MSRs has continued to evolve since 1982. Historical accounting rules related to MSRs are summarized in Appendix B. SFAS No. 166 (FASB, 2009) is the current standard applicable to MSRs.

2.2 MSR Disclosure Requirements

Under SFAS No. 166, MSRs are recognized at their fair value at transfer rather than at their carrying value allocated on the relative fair value. SFAS No. 166 allows MSRs to be reported either at amortized cost or at fair value to account for MSRs subsequently. When the fair value of

[3] Servicing firms must estimate the value of the right to perform the services and record this estimated value on their balance sheet as an intangible asset under Generally Accepted Accounting Principles (GAAP). MSR valuation is governed by the Statement of Financial Accounting Standard (SFAS) No. 157—Fair Value Measurements (Financial Accounting Standards Board [FASB], 2006).

the MSRs is elected, any change in fair value for a reporting period should be reported on the income statement.

SFAS No. 166 requires substantial disclosures on transfers of financial assets and a transferor's continuing involvement with transfers of financial assets. It expands from previous standards the disclosure items applied only to entities with retained interests in securitized financial assets to other entities with MSRs. SFAS No. 166 adopts the principle approach in requiring disclosure items in financial reporting, while it lists the required items specified in disclosure provisions. SFAS No. 166 presents the principal objectives of disclosures from the user's perspective, including the nature of a transferor's continuing involvement with transferred financial assets (e.g., mortgage loans); the nature of any restrictions on the transferred assets, if any; the reporting method of MSRs; and the financial effects of the transferred assets on a transferor's financial position, financial performance, and cash flows (ASC No. 860-10-50-3; FASB, 2014). The specific disclosure items related to MSRs are grouped into four categories: (1) nature of transfers of financial assets and the financial effects of the transfers; (2) MSRs in general; (3) MSRs subsequently measured at fair value; and (4) MSRs subsequently measured at amortized cost. The disclosure items in each category required by ASC No. 860 are presented in Appendix A.

2.3 Prior Studies on MSRs

MSRs have grown exponentially in the mortgage banking industry since the 1980s (Kalotay & Fu, 2008), and, thus, the financial/economic literature has addressed the significance of MSRs to financial institutions. Specifically, research in housing economics has sought to identify factors that influence MSR valuation or the modeling of MSR valuation. For example, Buttimer and Lin (2005) develop an option-based MSR pricing model, Kalotay and Fu (2008) propose an option-based, volatility-dependent prepayment model to better determine MSR fair value, and Chiang et al. (2016) adopt a reduced-form model to value MSR fees.

There are several studies on MSRs in the accounting literature. One stream of accounting research on MSR concerns its value relevance. By examining the association between stock price and the estimates of MSRs, Pfeiffer (1998) provides empirical evidence that MSRs are value relevant even though MSRs were off-balance sheet assets at the time of the study (i.e., when SFAS No. 65 was in effect). By using sample firms from 1996 to 1999 that are under SFAS No. 122, however, Cochran et al. (2007) find that equity market participants do not value MSRs recorded at fair value on the balance sheet as much as they value other assets recorded on the balance sheet. This result suggests that the market is skeptical of the recorded value of the MSRs, which seems to be related to the reliability of the fair value of MSRs. For example, Song, Thomas, and Yi (2010) document that Level 3 fair value assets are discounted more than are Level 2 or Level 1 fair value assets because the reliability of Level 3 fair value is lower than that of Level 2 or Level 1 fair value.[4]

Whereas Song et al. (2010) examine the value relevance of all the assets recorded at fair value, Altamuro and Zhang (2013) focus on MSRs and compare the Level 2 MSRs with Level 3

[4] ASC No. 820 defines fair value as the price that would be received when an asset is sold in a hypothetical orderly transaction at either the principal (or the most advantageous) market from a seller's perspective (ASC No. 820-10-55-1; FASB, 2011). There are three levels of assessing fair value: (1) quoted market prices in active markets for identical assets (Level 1; ASC No. 820-10-35-40); (2) estimated fair value based on observable (directly or indirectly) inputs, including quoted market prices for similar assets (Level 2; ASC No. 820-10-35-47); and (3) estimated fair value based on valuation techniques with one or more significant inputs or assumptions in the market (Level 3; ASC No. 820-10-35-52).

MSRs. Their results show that a Level 3 fair value of MSRs is more positively associated with both cash flows and risk factors than is a Level 2 fair value of MSRs. Altamuro and Zhang interpret these results as supporting evidence that, for the assets without active markets, managerial input-based fair value measures (i.e., Level 3 fair value) are more informative than are market-based fair value measures (i.e., Level 2 fair value).

Another stream of research on MSRs in accounting literature concerns management discretion on MSRs. Cochran et al. (2004) find that management exercises discretion in the valuation of MSRs and that firm characteristics which have nothing to do with the value of MSRs, such as firm size, financial leverage, and cash bonus compensation, influence management's determination of fair value. They find that, all else equal, larger firms value MSRs less and that firms with a higher debt-to-equity ratio and a higher propensity for incentive compensation value MSRs more. We can also view Altamuro and Zhang's (2013) research as a study of management discretion on MSRs. Management has an option to choose either a Level 2 or Level 3 fair value for MSRs. When management chooses a Level 3 fair value of MSRs, it discloses key inputs in valuing MSRs. Thus, the management that chooses a Level 3 fair value of MSRs is regarded as more transparent and better reflective of cash flows and risk factors than is the management that chooses a Level 2 fair value of MSRs. Hendricks and Shakespeare (2013) believe that the findings of Altamuro and Zhang have broader implications for standard setters, as the ability of preparers to produce reliable fair value estimates is critical to financial reporting. These prior studies, however, did not examine whether commercial public U.S. banks provide complete information on the fair value estimates of MSRs to capital market participants and which factors are associated with the degree of the banks' disclosure compliance on MSRs.

3. Hypotheses

3.1 Banks' Corporate Governance and Banks' Disclosure Compliance

Accounting is viewed as one of the formally established corporate governing mechanisms structured to ensure corporate shareholders' interests are maximized by influencing corporate managers' decisions (Bushman & Smith, 2001). Corporate managers have a stewardship responsibility for the economic resources contributed by corporate shareholders. In this regard, accounting is designed to representational-faithfully account for the economic activities of the corporation and report the economic and financial results to the corporate shareholders. Such accounting information, however, is subject to corporate managers' interpretation, as significant judgments are required to record the financial effects of numerous complicated economic transactions, such financial effects are reported in condensed measures, and the managers' interests are not necessarily the same as the shareholders' interests. Thus, corporate governance has been a focus of the literature.

Corporate governance studies provide empirical evidence that attributes of corporate governance are related to financial reporting quality (Hoitash et al., 2008; Zhang et al., 2007). For example, Zhang et al. find that firms with audit committees comprised of individuals with less financial expertise are more likely to have weak internal control quality. Hoitash et al. find that corporate governance characteristics (e.g., audit committees with accounting and supervisory experts, board strength) are related to internal control quality under the regulatory regime of Section 404 of the Sarbanes-Oxley Act of 2002 (SOX), whereas such a relationship is not found under the regulatory regime of Section 302 of SOX. In line with such corporate governance studies, we examine whether corporate governance is related to public banks' compliance with MSR-related disclosure, stipulated in ASC 860. In our study, we use the Institutional Shareholder

Services, Inc. (ISS) overall corporate governance index, obtained as of January 2016 from Yahoo Finance, to measure the sample banks' corporate governance.[5] Our alternative hypothesis (H1) is:

> H1: The stronger the bank's corporate governance, the higher the degree of completion in compliance with disclosure requirements.

3.2 Banks' Materiality Judgment and Banks' Disclosure Compliance

Materiality is the essential attribute of the full disclosure principle that governs the presentation and disclosure of financial reporting to capital market participants. The disclosure principle dictates that all materially relevant information to decision-makers should be presented and disclosed. The attribute of materiality is a judgmental issue, however, as materiality should be determined not only by the magnitude of a subject item but also by the nature and context of the decision issue (SEC, 1999).[6] FASB views materiality as an entity-specific attribute.[7] Thus, accounting regulations fail to provide practical guidelines to determine the materiality threshold.

Because materiality is an entity-specific attribute, we posit that, when the MSRs are large, banks are more likely to pay attention to compliance requirements related to the MSRs. Considering the significance of shareholders' equity in the banking industry, we use a bank's shareholders' equity as the materiality base to measure the materiality effect of MSRs on compliance with disclosure requirements. The alternative hypothesis (H2) is:

> H2: The larger the fair value of MSRs relative to shareholders' equity, the higher the degree of completion in compliance with disclosure requirements.

3.3 Banks' Asset Size and Disclosure Compliance

Prior studies demonstrate how complicated measurement of MSR fair value can be (e.g., Altamuro & Zhang, 2013; Cochran et al., 2007; Kohlbeck, 2004). The literature states that cash inflows and outflows related to servicing mortgage loans, prepayment, and default rates of mortgage loans are key factors in measuring MSR fair value (e.g., Kohlbeck, 2004). These key factors, however, are affected by external factors, such as interest rates, housing prices, and the volatilities of interest rates and housing prices. Further, ASC No. 860 requires banks to be transparent in presenting the nature of MSR-related transactions and information on cash flows

[5] ISS governance score is a data-driven scoring and screening solution designed to help institutional investors review quality factors and assess risk in the areas of board structure, compensation programs, shareholder rights, and audit and risk oversight (ISS, 2015). ISS's firm-level decile scores, as presented from 1 (the lowest governance risk) to 10 (the highest risk), provide an indication of the firm's relative governance quality in four specific areas as well as that in the entire firm level. The scores are supported by 91 factor-level data in the U.S. that are critical to the research process. We adopted the ISS governance score for our study mainly because the score is considered to be comprehensive as 91 factors are incorporated in the score for the U.S. firms and available to the public. Please refer to ISS Governance QuickScore 3.0: Overview and Updates (Published October 2014 and Revised November 2014 and May 2015) for ISS governance score methodology in detail.

[6] "Financial reports represent economic phenomena in words and numbers. To be useful, financial information not only must represent relevant phenomena, but it must also faithfully represent the phenomena that it purports to represent. To be a perfectly faithful representation, a depiction would have three characteristics. It would be complete, neutral, and free from error. Of course, perfection is seldom, if ever, achievable." (SFAC No. 8; FASB, 2010, para. QC12).

[7] "Information is material if omitting it or misstating it could influence decisions that users make on the basis of the financial information of a specific reporting entity. In other words, materiality is an entity-specific aspect of relevance" (SFAC No. 8; FASB, 2010, para. QC11).

and uncertainties of cash flows. Measuring MSR fair value and complying with disclosure requirements in ASC No. 860 is a significant and challenging accounting issue for banks. The larger banks may have human and technical resources to assist in modeling MSR fair value and meeting all the disclosure requirements, whereas smaller banks may not have sufficient resources to fully meet the disclosure requirements. Thus, we posit that bank size (as measured by total assets) determines how complete banks comply with disclosure requirements. The alternative hypothesis (H3) is:

> H3: The larger the bank, the higher the degree of completion in compliance with disclosure requirements.

3.4 Banks' External Auditors and Disclosure Compliance

External auditors play a pivotal role in monitoring financial reporting to capital market participants by independently examining financial statements, including notes to the financial statements, prepared by management in compliance with U.S. GAAP. Prior studies document that there is a quality difference between Big 4 and non-Big 4 accounting firms, as the former have more auditing experiences and resources (Altamuro & Zhang, 2013; Becker, DeFond, Jiambalvo, & Subramanyam, 1998; Dietrich et al., 2000).[8] The quality difference becomes more apparent when auditing subjects are complicated and subject to significant professional judgments as with MSRs. Altamuro and Zhang show that audit quality (measured by Big 4 vs. non-Big 4) is significantly related to the managerial choice of Level 2 or Level 3 inputs in measuring the fair value of MSRs. Their result implies that auditor quality plays a significant role in presenting and disclosing financial information. We posit that external audit quality (as measured by Big 4 or non-Big 4) is associated with compliance with MSR-related disclosure requirements. The alternative hypothesis (H4) is:

> H4: The higher the accounting quality of the external auditor, the higher the degree of completion in compliance with disclosure requirements.

4. Method

This study has two objectives: (1) to understand banks' practices in compliance with disclosure requirements on MSRs, and (2) to examine whether the degree of the banks' compliance is related to corporate governance, materiality, bank size, and external auditors. To achieve the first objective, we identify the disclosure items stipulated in ASC No. 860 and hand collect the items disclosed in the sample banks' notes to financial statements. The collected items are then descriptively analyzed. For the second objective, we examine statistical significance between the determinant factors (independent variables) and the degree of banks' compliance (dependent variable), using a multivariate regression model.

4.1 Test Model

Statistical analysis is used to test whether the degree of completeness is determined by the factors of corporate governance, materiality, bank size, and external auditor. The following regression model is used:

[8] We considered including external auditors' types of opinion on the banks' internal control effectiveness. We found, however, that there is no variation, as all but two banks had the unqualified (clean) opinion. There is no auditor's opinion on internal control effectiveness due to the banks' being public. One bank had an adverse opinion due to allowance for loan and lease losses estimates.

$$Disclosure_i = \alpha_0 + \alpha_1 Governance_i + \alpha_2 Materiality_i + \alpha_3 Size_i + \alpha_4 Big4_i + \alpha_5 Acct\_Methods_i + \varepsilon_i,$$

where $Disclosure_i$ is the degree of completion in compliance with disclosure requirements for a $bank_i$, $Governance_i$ is ISS' corporate governance overall index for a $bank_i$, $Materiality_i$ is the fair value of MSRs divided by the total equity of the $bank_i$. $Size_i$ is the total assets for a $bank_i$, $Big4_i$ is a dummy variable (1 for Big 4; 0 for other auditors), and $Acct\_Methods_i$ is a dummy variable (1 for fair value; 0 for amortization).

It is expected that α_1, α_2, α_3, and α_4 are statistically significant to support the alternative hypotheses. We use the variable of accounting method (α_5) as a control variable. Because banks recognize changes in fair value under the fair value method in earning statements, banks with the fair value method may pay closer attention to their disclosure compliance than do their counterpart banks that use the amortization method.

5. Sample and Data Collection

For the research sample, all commercial public U.S. banks listed on the database of Wharton Research Data Services (WRDS) were initially identified. A total of 574 U.S. banks were listed on the database as of December 31, 2014.[9] We manually aggregated the ISS corporate governance variable data as of January 2016 from Yahoo Finance for each of the WRDS' 574 listed public U.S. banks. A total of 257 public U.S. banks with the ISS corporate governance data were readily available. We proceeded to manually compile the banks' notes of financial statements from the SEC's EDGAR database by identifying 109 public U.S. banks with primarily residential MSRs for the calendar year of 2015 or the fiscal year of 2016.[10]

We listed the disclosure items stipulated by ASC No. 860 to measure the degree of completion in disclosure requirement compliance, as reported in Table 1. Specifically, we identified 19 disclosure items for the banks, using the fair value method for MSR (Item Nos. 1–19) and 24 items for the banks, using the amortization method for MSR (Item Nos. 1–14 and Item Nos. 20–29).[11] We scored the actual disclosure items disclosed in the notes to the financial statements for the calendar year 2015 or fiscal year 2016.[12] We manually collected all other data (i.e., total assets, auditors, the fair value of MSRs, accounting method, and equity) from the SEC 10-Ks issued by our sample banks for the calendar year 2015 or fiscal year 2016.

[9] When ISS corporate governance index data are manually aggregated, the 2015 financial data were not available. Thus, the U.S. public banks listed on the WRDS database as of December 31, 2014, were identified.

[10] To have a homogeneous data pool for this study, we focus on banks with residential MSRs. The mortgage loans not clearly specified by the bank as commercial mortgages, SBA loans, or auto loans are assumed to be residential mortgage loans.

[11] It should be noted that there are more disclosure items stipulated in ASC 860, as reported in Appendix A. In our study, we excluded items that are considered (1) to be repetitive (e.g., measurement techniques and its assumptions); (2) to be difficult in objective assessment (e.g., description of nature of transfer, continuing involvement with the loans sold, gain/loss from the sale of mortgage loans, proceeds from the sale of mortgage loans); and (3) are the same with the items included in our study (e.g., the initial fair value of servicing fees).

[12] Because we are testing whether banks comply with the disclosure requirements stipulated in ASC 860, we collected the disclosure items only from the banks' notes that were an integral part of the banks' financial statements.

Table 1 ***Disclosure Compliances on Each Disclosure Item***

Disclosure Item	Item No.	Total No. of Banks	No. of Banks Disclosed	Percentage of Compliance
Category: Characteristics of transfer				
Items: Valuation techniques (Table 3)	1	109	108	99%
Fair value hierarchy (Table 2)	2	109	86	79%
Accounting policy	3	109	109	100%
Stress (sensitivity) test (Table 6)	4	109	35	32%
Asset quality of transferred loans (Table 6)	5	109	9	8%
Category: MSR in general				
Items: Management's basis of determining MSR classes	6	109	69	63%
Description of the inherent risks (Table 6)	7	109	66	61%
Servicing revenues	8	109	63	58%
Assumptions used for fair value estimates (Table 4):				
Discount rate	9	109	80	73%
Prepayment speeds	10	109	77	71%
Life	11	109	40	37%
Servicing fees	12	109	13	12%
Servicing costs	13	109	8	7%
Principal balances serviced for others	14	109	90	83%
Category: MSR with fair value method (33 of 109 total sample banks: 30%)				
Items: Details of MSR activity				
Beginning balance	15	33	33	100%
Additions:				
Origination	16	33	29[a]	94%
Change in fair value due to payoff	17	33	26	79%
Change in fair value due to changes in inputs/assumptions	18	33	31	94%
Ending balance	19	33	33	100%
Category: MSR with amortization method (76 of 109 total sample banks: 70%)				
Items: Details of MSR activity				
Beginning balance	20	76	74[b]	99%
Additions:				
Origination	21	76	65[c]	86%
Amortization	22	76	68	89%
Valuation allowance	23	76	39[d]	51%
Ending balance	24	76	75	99%
Items: Fair value				
Beginning balance	25	76	60	79%
Ending balance	26	76	60	79%
Items: Details of valuation allowance activity				
Beginning balance	27	76	35[e]	46%
Additional charges/recoveries/write-down	28	76	39[d]	51%
Ending balance	29	76	39[d]	51%

Note. a. Two banks did not have any new MSR in 2015; these banks are considered in compliance with disclosure requirement. b. One bank started selling mortgage loans with services retained in 2015; the bank is considered in compliance with disclosure requirement. c. One bank had no new MSR in 2015; the bank is considered in compliance with disclosure requirement. d. Banks that did not disclose changes in allowance are considered in compliance with disclosure requirement; there was no activity of valuation allowance for these banks in 2015. e. Four banks did not have beginning balance of valuation allowance, while these banks had an ending balance.

6. Results

6.1 Understanding Banks' Practices in MSR Accounting Disclosure

We descriptively analyze the disclosure data collected from the sample banks' notes. The presentation includes: (1) fair value hierarchy (Level 2 vs. Level 3); (2) valuation techniques used to estimate MSR fair value; (3) key inputs and assumptions; (4) statistics on key inputs and assumptions; and (5) other disclosure items (e.g., asset quality, stress test and management's basis to stratify mortgage loans.)

Fair value hierarchy (Level 2 vs. Level 3). Before 2006, banks accounted for MSRs with the amortization method whereby the MSRs were amortized over the income generation period. After SFAS No. 156 was implemented in 2006, banks could opt to use the fair value method. As shown in Table 2, among 109 sample banks, 33 banks (30%) adopted the fair value method to account for MSRs, while 76 banks (70%) adopted the amortization method to account for MSRs. Table 2 also shows that all the fair value method banks, except one (97% of the banks that used the fair value method), disclosed the fair value input hierarchy and classified it as Level 3. In contrast, 41 banks (54% of the banks that used the amortization method) classified the hierarchy as Level 3, and 13 banks (17% of the banks that used the amortization method) classified the hierarchy as Level 2. Overall, 73 banks (67% of the total sample) classified the hierarchy as Level 3, and 13 banks (12% of the total sample) classified the hierarchy as Level 2. The results show that, collectively, 86 banks (79% of the total sample) disclosed the input hierarchy, while 23 banks (21% of the total sample) did not disclose a fair value hierarchy of the MSR.

Table 2 ***Disclosure on Fair Value Hierarchy***

	Fair Value Banks (n = 33 banks)		Amortization Banks (n = 76 banks)		All Banks (n = 109 banks)	
Fair value hierarchy	Frequency	%	Frequency	%	Frequency	%
Level 3	32	97%	41	54%	73	67%
Level 2	0	0%	13	17%	13	12%
No disclosure	1	3%	22	29%	23	21%
Total	33	100%	76	100%	109	100%

Note. There are three levels of fair value hierarchy: (1) Level 1 (quoted prices in active market); (2) Level 2 (significant observable inputs); and (3) Level 3 (significant unobservable inputs). Because there is no active market for MSRs, there is no case where Level 1 is used to measure fair value of MSR.

The finding that banks use the Level 2 fair value hierarchy for the MSRs was unexpected. Although there are transactions of MSRs in the capital markets, the market is not an active one (Aldrich & Greenberg 2001; Altamuro & Zhang, 2013). Further, transactions of residential mortgage loans are not homogeneous. As such, we should expect banks not to use comparable market price or observable inputs in valuing MSRs. Although Altamuro and Zhang's finding is similar to ours, they state, "Seventy-five percent of Level 2 banks in our sample disclose that they use a DCF [discounted cash flow] model with *observable inputs* to value the MSRs'" (p. 840, emphasis added). They further state, "*Observable inputs* include projected prepayment rates and discount rates" (p. 840, emphasis added). Our sample banks, however, do not disclose whether they use observable inputs.

Valuation techniques. Our sample banks use one of the three valuation methods to assess the fair value of MSRs, as shown in Table 3. These valuation methods are (1) the discounted cash

flow (DCF) method, (2) market price (MP), or (3) the option adjusted spread (OAS) method.[13] The results show that 99 banks in total used the DCF-only method (76 banks; 70% of the sample) or the DCF or MP method (23 banks; 21% of the sample). Only 9 banks (8% of the sample) used the OAS method, and one bank did not disclose their valuation techniques for the MSRs. The results also show that the OAS method was more used by the banks that use the fair value method (6 banks; 18% of the banks that use the fair value method) than by the banks that use the amortization method (3 banks; 4% of the banks that use the amortization method).

Table 3 ***Disclosure on Valuation Techniques***

	Fair Value Banks (n = 33 banks)		Amortization Banks (n = 76 banks)		All Banks (n = 109 banks)	
Valuation technique	Frequency	%	Frequency	%	Frequency	%
DCF only[a]	24	70%	52	69%	76	70%
DCF or MP[a]	3	9%	20	26%	23	21%
OAS[b]	6	18%	3	4%	9	8%
No disclosure	0	3%	1	1%	1	1%
Total	33	100%	76	100%	109	100%

Note. a. DCF and MP refer to discounted cash flows and market price, respectively. b. OAS refers to the option adjusted spread. OAS measures the spread over a bench mark (e.g., treasury curve) that makes the theoretical price of an interest rate derivative equal to the market price (Hull & Basu, 2010).

Key inputs and assumptions. Because there is no active market for MSRs, the majority of our sample banks estimate the fair value of MSRs by using the DCF or the OAS method. Therefore, we expect that the following items are disclosed as key inputs and assumptions: (1) discount rate; (2) prepayment rate; (3) loan life; (4) servicing fee; (5) servicing cost; and (6) principal balance serviced for others. Table 4 shows that the majority of the sample banks disclose the discount rate (80 banks; 73%), prepayment rate (77 banks; 71%), the loan life (40 banks; 37%), and principal balances serviced for others (90 banks; 83%). In contrast, few banks disclose the servicing fees (13 banks; 12%) and servicing costs (8 banks; 7%). The results show that banks that use the fair value method disclose more key inputs and assumptions than do banks that use the amortization method (91% vs. 66% for discount rate; 88% vs. 63% for prepayment rate; 48% vs. 32% for loan life; 18% vs. 9% for servicing fees; 12% vs. 5% for servicing costs; and 85% vs. 82% for principal balances serviced for others).

The results show that banks, in general, consider three inputs (i.e., assumptions of the discount rate, prepayment rate, and principal balances serviced for others) to be significant inputs and assumptions. We believe, however, that other variables also are essential in estimating the fair value of MSRs. These variables are bank-specific and dependent upon the bank's operation, mortgage loan portfolios, and the purchasers of mortgage loans (e.g., government-sponsored

[13] OAS is considered to be the more advanced statistical method than is the discounted cash flow method (Hull & Basu, 2010). The OAS method measures the spread over a benchmark that makes the theoretical price of an interest rate derivative equal to the market price. As such, the banks with this model may not need to separate the discount rate from the prepayment rate to value MSRs.

enterprise, private investors; Aldrich & Greenberg 2000). Based on our results, we believe that market participants are not provided with complete information in valuing the MSRs.

Table 4 ***Disclosure on Key Inputs and Assumptions***

	Fair Value Banks (n = 33 banks)		Amortization Banks (n = 76 banks)		All Banks (n = 109 banks)	
Disclosure on key inputs and assumptions	Frequency	%	Frequency	%	Frequency	%
Discount rate	30	91%	50	66%	80	73%
Prepayment rate	29	88%	48	63%	77	71%
Loan life	16	48%	24	32%	40	37%
Service fee	6	18%	7	9%	13	12%
Service cost	4	12%	4	5%	8	7%
Principal balances serviced for others	28	85%	62	82%	90	83%

Note. The above items represent the inputs necessary to measure present value of cash flows from MSRs.

Statistics on key inputs and assumptions. We collect the data of the above-identified key inputs and assumptions used in valuing the MSRs. Table 5 presents the descriptive statistics of the data. The results from all firms (i.e., the last three columns of Table 5) show that, on average, banks use 9.65% of the discount rate, 11.18% of the prepayment rate, 6.29 years of the weighted average life, and $28,084 million of the principal balances serviced for others. The means for these key inputs and assumptions, except for the principal balances serviced for others, are similar between the fair value method banks and the amortization method banks. The fair value method banks serve larger mortgage loans for others than do the amortization method banks ($89,369 million vs. $2,950 million). Table 5 also shows that the fair value of the MSRs is $285 million, on average, but that the fair value method banks have a much larger fair value of MSRs than do the amortization method banks ($906 million vs. $31 million).

Table 5 ***Statistics on Key Inputs and Assumptions for MSR***

	Fair Value Banks (n = 33 banks)			Amortization Banks (n = 76 banks)			All Banks (n = 109 banks)		
Key inputs and assumptions for MSR	Mean	SD	Mean	Mean	SD	Mean	Mean	SD	Mean
Discount rate[a]	9.78%	0.77%	10.00%	9.57%	1.63%	9.68%	9.65%	1.39%	10.00%
Prepayment rate[a]	10.57%	2.07%	10.30%	11.53%	2.42%	11.01%	11.18%	2.33%	10.30%
Weighted average life (Year)[a]	6.51	0.90	6.55	6.15	1.84	6.38	6.29	1.53	6.55
Principal balances serviced for others (million $)[a]	89,369	255,388	4,770	2,950	10,213	445	28,084	144,876	4,770
Fair value of MSR (million $)[b]	906	2,440	58	31	103	3	285	1,391	58

Note. The data are summarized based on the disclosed data hand-collected from SEC 10-Ks. The discount rates disclosed in a range or in an option-adjusted spread are excluded in the statistical summary. a. Refer to Table 4 for number of observations. b. Number of observations are 33 for fair value banks and 76 for amortization banks.

Other disclosure items. Other disclosure items collected from the sample banks' notes include "stress test" results, the asset quality of transferred mortgage loans, portfolio classification disclosure, and disclosure of the inherent risk of MSRs. The stress test shows how two or more unfavorable changes in each key assumption may affect the fair value of MSRs.[14] Disclosing the details of the transferred mortgage loans assists corporate shareholders in understanding the risks inherent in transferring such loans. The results in Table 6 show that the majority of the banks fail to disclose the stress test results and the asset quality of transferred mortgage loans. Only 35 banks (32% of the sample) disclose the stress test results, and 9 banks (8% of the sample) disclose the quality of the transferred mortgage loans. Amortization method banks were notably less compliant than were fair value method banks in regard to the stress test results (24% vs. 52%) and the asset quality disclosures (1% vs. 24%). The majority of the banks, however, disclose management's basis of the MSR portfolio classification (69 banks; 63% of the sample) and the inherent risk of MSRs (66 banks; 61% of the sample).

Table 6 ***Disclosure on Other Required Items***

	Fair Value Banks (n = 33 banks)		Amortization Banks (n = 76 banks)		All Banks (n = 109 banks)	
Disclosure on other required items	Frequency	%	Frequency	%	Frequency	%
Stress test[a]	17	52%	18	24%	35	32%
Asset quality of transferred mortgage loans[b]	8	24%	1	1%	9	8%
Portfolio classification[c]	13	39%	56	74%	69	63%
Inherent risk of MSR	29	88%	37	49%	66	61%

Note. a. The results of the "stress test" show how two or more unfavorable changes in each key assumption affect the fair value of MSRs. b. The "asset quality" disclosure refers to the details of the mortgage loans transferred and managed that should be disclosed to help users understand the risk inherent in the transferred mortgage loans. c. The "portfolio classification" disclosure refers to the disclosure required for MSR classification basis.

Further, banks should disclose the detailed activities of MSRs during a reporting period. The fair value method banks should disclose additional MSRs, disposal of MSRs, changes in fair value due to changes in inputs and assumptions, and changes in fair value due to other criteria (e.g., principal balances paid off during a period). The amortization method banks should disclose the detailed MSR activities, including new MSRs, amortization, sales of MSRs, changes in temporary valuation allowance, and permanent valuation adjustments. Finally, banks should disclose the beginning and ending balances of MSR fair value and changes in valuation allowance during a reporting period. When banks fully disclose all these required items, we consider them "complete" in terms of disclosure on MSR activities. If the banks fail to disclose any of these required items,

[14] The stress test is also called a sensitivity analysis. According to ASC 860-20-50-4c, banks should present the adverse effects of two or more unfavorable changes in each key assumption (e.g., hypothetical increases in the discount rate and prepayment rate for MSRs) on the fair value of MSRs. For example, banks show the decreased fair value of MSRs when the discount rate increases by 10% and 20% given that the other assumptions (e.g., prepayment rate) are constant.

however, we consider them "incomplete" in terms of disclosure on MSR activities. The results in Table 7 show that the majority of the banks (81 banks; 74% of the sample) completely disclose these items, while 28 banks (26% of the sample) fail to fully disclose MSR activities.

Table 7 ***Disclosure on MSR Activities***

	Fair Value Banks (n = 33 banks)		Amortization Banks (n = 76 banks)		All Banks (n = 109 banks)	
Disclosure on MSR Activities	Frequency	%	Frequency	%	Frequency	%
Complete[a]	26	79%	55	72%	81	74%
Incomplete mortgage	7	21%	21	28%	28	26%
Total	33	100%	76	100%	109	100%

Note. a. Fair Value Banks: a "complete" disclosure is the case in which the bank fully discloses changes in fair value, including MSR change due to inputs or assumptions, and MSR change due to principals paid off. Otherwise, the disclosure is classified as "incomplete." Amortization Banks: a "complete" disclosure is the case in which the bank fully discloses changes in carrying value (including new MSR, amortization, and change in valuation allowance); beginning and ending balances of fair value; and changes in valuation allowance. Otherwise, the disclosure is classified as "incomplete."

7. Determinants of Disclosure Compliance

Descriptive statistics. Tables 8 and 9 provide the descriptive statistics of the variables used in our research. We defined four disclosure measures. *Disclosure_All* measures the overall disclosure level of the banks in reporting servicing assets. Three other variables measure subcategory MSR disclosure items. *Disclosure_MSR_All* measures the disclosure level of reporting general MSR items; *Disclosure_MSR_Method* measures the disclosure level of reporting MSR recognition method and details of MSR activities; and *Disclosure_Transfer* measures the disclosure level of reporting financial asset transfer items. We also defined overall corporate governance level (*Governance*), the materiality of the MSRs (*Materiality*), the asset size of the banks (*Size*), accounting method for MSR recognition (*Acct_method*), and the quality of external auditors (*Big4*). See Appendix C for detailed definitions of all variables.

Table 8 ***Descriptive Statistics***

Variable	Mean	SD	Median	Max	Min
Disclosure_All (%)	68.62%	16.07%	75.00%	91.67%	25.00%
Disclosure_MSR_ All (%)	51.58%	24.64%	55.56%	88.89%	0%
Disclosure_MSR_Method (%)	92.02%	17.63%	100%	100%	20.00%
Disclosure_Transfer (%)	63.49%	17.61%	60%	100%	20.00%
Governance	5.43	2.53	6.00	10.00	1.00
Materiality	2.50%	4.27%	0.97%	24.67%	0.05%
Size	81,201	335,961	6,596	2,144,316	1,171
Big4 (%)	56%	49.75%	100%	100%	0%

Acct_method (%)	30%	46.16%	0%	100%	0%

Note. Appendix C defines the variable.

Table 8 shows that the mean value of *Disclosure_All* is 68.62%, which reflects that banks disclose, on average, 68.62% of the disclosure items. The mean of *Disclosure_MSR_Method* is the highest (92.02%), while the mean of *Disclosure_MSR_All is* the lowest (51.58%) among the four disclosure measures. These results suggest that, although banks relatively clearly disclose which method they use for MSR recognition and the details of MSR activities, they are not as transparent in reporting general MSR items, such as management's basis for determining MSR classes, a description of the inherent risks, the servicing revenues, and the key inputs and assumptions in valuing MSRs. The mean value of the overall *Governance* score is 5.43, and the mean value of *Materiality*, which is the ratio of banks' servicing assets to equity, is 2.5%. The distribution of bank size is skewed because the mean value of *Size* ($81,201 million) is greater than the median value of *Size* ($6,596 million). To address the skewness and outlier problems, we use decile ranks for all continuous variables (i.e., *Materiality*, *Size*, and *Governance*) in our regression tests. The results also show that 56% of the banks are audited (*Big4*) by Big 4 accounting firms[15] and that 30% of the banks use the fair value method for MSRs.

Table 9 presents Pearson and Spearman correlation coefficients among variables on the upper and lower triangles, respectively. The results show that four disclosure measures are positively associated with each other. Spearman correlation coefficients show that all four disclosure measures are positively and significantly associated with *Materiality* and *Size*, while *Big4* is positively associated with only *Disclosure_Transfer* among the four disclosure measures. In this univariate correlation analysis, we find no significant associations between *Governance* scores and any of the disclosure measures.

Spearman correlation coefficients show that *Size* is negatively associated with *Governance* and positively associated with *Materiality*, suggesting that large banks have better corporate governance than do small banks[16] and that the ratio of servicing assets to equity is higher for large banks than for small banks. The positive correlation between *Big4* and *Size* shows that large banks are more likely to have Big 4 auditors than are small banks.

[15] PriceWaterhouseCooper, Ernst & Young, KPMG, and Deloitte & Touché.
[16] Note that a lower ISS governance index means stronger corporate governance.

Table 9 ***Correlation Coefficients***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) *Disclosure_All*		0.89***	0.78***	0.65***	-0.08	0.35***	0.19*	0.01	0.12
		(<.0001)	(<.0001)	(<.0001)	(0.3880)	(0.0002)	(0.0540)	(0.8875)	(0.1983)
(2) *Disclosure_MSR_All*	0.91***		0.47***	0.54***	-0.06	0.32***	0.15	-0.02	0.24**
	(<.0001)		(<.0001)	(<.0001)	(0.5372)	(0.0008)	(0.1198)	(0.8750)	(0.0111)
(3) *Disclosure_MSR_Method*	0.63***	0.47***		0.33***	-0.11	0.20**	0.10	-0.03	0.05
	(<.0001)	(<.0001)		(0.0005)	(0.2591)	(0.0407)	(0.2988)	(0.7841)	(0.6101)
(4) *Disclosure_Transfer*	0.70***	0.54***	0.35***		-0.08	0.45***	0.35***	0.22**	0.39***
	(<.0001)	(<.0001)	(0.0002)		(0.3852)	(<.0001)	(0.0002)	(0.0244)	(<0.0001)
(5) *Governance*	-0.05	-0.03	-0.09	-0.10		0.12	0.06	-0.06	-0.14
	(0.5994)	(0.7280)	(0.3699)	(0.2981)		(0.2258)	(0.5285)	(0.5567)	(0.1565)
(6) *Materiality*	0.50***	0.48***	0.41***	0.49***	0.12		0.04	0.18*	0.26***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.2093)		(0.6697)	(0.0632)	(0.0068)
(7) *Size*	0.32***	0.26***	0.23**	0.45***	-0.27***	0.25***		0.20**	0.30***
	(0.0006)	(0.0061)	(0.0146)	(<.0001)	(0.0039)	(0.0095)		(0.0390)	(0.0015)
(8) *Big4*	0.08	0.02	0.02	0.20**	-0.06	0.07	0.55***		0.17*
	(0.4348)	(0.8530)	(0.8706)	(0.0417)	(0.5079)	(0.4522)	(<.0001)		(0.0763)
(9) *Acct_method*	0.11	0.22**	0.06	0.38***	-0.14	0.36***	0.36***	0.17*	
	(0.2572)	(0.0191)	(0.5065)	(<.0001)	(0.1328)	(0.0001)	(0.0001)	(0.0763)	

Pearson and Spearman correlation coefficients among variables on the upper and lower triangles, respectively

Note. Appendix C defines the variables.
*p < .10, **p < .05, ***p < .01

Table 10 ***Bank Characteristics and Disclosure Levels***

	Dependent Variables							
	Disclosure_All		*Disclosure_MSR_All*		*Disclosure_MSR_Method*		*Disclosure_Transfer*	
Explanatory variables	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Intercept	.5784***	15.09	.3552***	5.80	.8636***	18.18	.4378***	10.70
Governance_Rank	-.0091*	-1.80	-.0101	-1.26	-.0120*	-1.92	-.0022	-0.42
Materiality_Rank	.0319***	6.48	.0395***	5.03	.0274***	4.50	.0240***	4.57
Size_Rank	.0134**	2.29	.0166*	1.78	.0058	0.80	.0190***	3.05
Big4	-.0433	-1.41	-.0748	-1.53	-.0371	-0.98	-.0000	-0.00
Acct_method	-.0590*	-1.91	.0043	0.09	-.0568	-1.48	.0500	1.52
R^2 (%)	36.69		29.27		20.20		39.78	

Note. Appendix C defines the variables.
*$p < .10$, **$p < .05$, ***$p < .01$

Determinant factors. Table 10 presents the multiple regression results for the association between disclosure compliance levels and hypothesized determinant variables. Because we have four disclosure measures, we use each measure as a dependent variable from Model (1) to Model (4) and report the results. In Model (1), where *Disclosure_All* is a dependent variable, the coefficient on *Governance_Rank* (-.0091) is negative and statistically significant at the 10% level. This indicates that banks with a strong corporate governance system are more likely to comply with a disclosure requirement in regard to MSRs. This result is consistent with Hypothesis 1.

We also find that the coefficient on *Materiality_Rank* (0.0319) is positive and statistically significant at the 1% level, suggesting that banks are more likely to comply with a disclosure requirement as the ratio of servicing assets to equity gets larger. This result supports Hypothesis 2.

The coefficient on *Size_Rank* (0.0134) is positive and statistically significant at the 5% level, indicating that banks are more likely to comply with a disclosure requirement when the total asset size of the banks is large, which is consistent with Hypothesis 3. The results also show that, of these three standardized continuous variables (i.e., *Governance_Rank*, *Materiality_Rank*, and *Size_Rank*), the coefficient estimate of *Materiality_Rank* has the largest absolute value. This implies that the materiality of the MSR is the most important factor in determining the level of disclosure compliance. The coefficient on *Big4* (-.0433), however, is not statistically significant. This result suggests that the quality of external auditors may not make a difference in monitoring banks' disclosure compliance for MSRs. It is possible, however, that we may not find supporting evidence of Hypothesis 4 due to the limitation of our measure for the quality of external auditors (Big 4 vs. non-Big 4). Lastly, we find that the coefficient on *Acct_method* (-0.0590) is negative and statistically significant at the 10% level, suggesting that banks using the fair value method for MSRs are less likely to comply with a disclosure requirement in general[19].

In general, the regression results in Model (2) through Model (4) are similar to the results in Model (1). The coefficients on *Materiality_Rank* are positive and significant at the 1% level in all Models. The coefficients on *Governance_Rank* in Models (3) is negative and significant at the 10% level, while in Models (2) and (4) they are not statistically significant even though they have expected negative signs. In addition, although the coefficients on *Size_Rank* in Models (1), (2), and (4) are positive and significant at least at the 10% level, the coefficient is not statistically significant in Model (3). In sum, the multiple regression results in Table 9 support Hypotheses 1, 2, and 3, whereas we do not find empirical results that support Hypothesis 4.

8. Discussion

We manually collect 109 U.S. public banks' notes to the financial statements to understand their disclosure practices for MSRs. Our data show that 30% of our sample banks choose the fair value methods to subsequently account for MSRs, while 70% use the amortization method. Our data also show that our sample banks have these following characteristics on MSR valuation on average: (1) classification of the fair value hierarchy as Level 3[20]; (2) the discounted cash flow

[19] The accounting method variable is a control variable for our study. Its significant negative relationship with the disclosure compliance is contradictory to our expectation. The finding implies that the disclosure requirements for the fair value method (e.g., fair value changes due to periodic mortgage loan principal payments and due to changes in measurement assumptions and inputs) are more challenging than those for the amortization method (e.g., amortization and impairment losses/ reversals).

[20] We find unexpectedly that 12% of our sample banks (i.e., 13 amortization method banks) classify the fair value hierarchy as Level 2. These banks may assume that all significant input variables are publicly observable or that

method as MSR valuation technique; (3) use of the discount rate, prepayment rate, and principal balances serviced for others as key inputs and assumptions; and (4) use of a 9.65% discount rate and 11.18% prepayment rate, and having a 6.29 weighted average life of MSRs.

We also find that our sample banks do not fully comply with disclosure requirements in ASC No. 860. The majority of our sample banks do not disclose some significant inputs (e.g., loan life, servicing fee, servicing costs) in valuing the MSRs and other required items (e.g., stress test, the asset quality of transferred mortgage loans). Overall, our sample banks disclose only about 69% of the disclosure items we observed for our study. Our data show that the banks fail to supply complete and sufficient MSR-related information to the capital markets. The lack of complete and sufficient information may inhibit the market participants from accurately projecting future cash flows and ascertaining the uncertainty of future cash flows.

As there are significant variations of our sample banks' disclosure compliance with ASC No. 860, we attempt to explain why the banks would not comply with the disclosure requirement. We examine whether corporate governance, materiality, bank size, and the external auditor's quality are related to the banks' disclosure requirement compliance. We find that the degree of the banks' disclosure compliance is related to corporate governance, materiality, and bank size. We are unable to show, however, the relationship between banks' disclosure compliance and the external auditors' quality proxied by the Big-4 vs. non-Big 4 measures. Specifically, U.S. public banks are more compliant with MSR-related mandatory disclosure requirements, as they are stronger in corporate governance, larger in their asset size, and higher in the effect of servicing assets on equity.

Our findings provide insights into the question of why banks do not substantially comply with the disclosure requirement of MSRs as specified in ASC No. 860. Banks may claim that compliance with the disclosure requirement is too costly (compared to its benefit) due to the complexity of MSRs' fair value estimates, in particular the smaller banks whose human resources are limited. Also, banks may claim that the reason why they do not completely comply with the disclosure requirement of MSRs is that the fair value of MSRs is not material. These two explanations may be considered to be reasonable in the auditors' and/or regulators' viewpoints since these are acceptable in the context of the cost-benefit constraint for the first one and in the context of the materiality constraint for the second one. In addition, we observe the significance of a bank's overall corporate governance in disclosure compliance. That is, independent from two constraints, when a bank's overall corporate governance risk is lower, the bank tends to more comply with the disclosure requirements.

Our findings are subject to the following caveats. First, we observed and tested banks' disclosure compliance practices only for one year due to the difficulty of manual data collection. Our results may have differed if we examine banks' practices using data for an extended period as banks' disclosure compliance practices may vary over the years. Second, while we read the notes carefully and made the best effort to measure disclosure compliance, there is a possibility of having measurement errors due to manual data collection processes. It should be also noted that we treated all identified disclosure items equally without assigning weights. Results may differ if different weights are assigned to disclosure items based on levels of significance in the context of financial reporting. Because a weighted method can be criticized due to its subjectivity, we did not adopt it. Finally, we used the ISS corporate governance overall index to capture a broad corporate governance construct. If we use other narrowly defined corporate governance variables (e.g.,

comparable market prices to these banks' mortgage loan portfolio are available (Altamuro & Zhang, 2013). We could not, however, validate whether such banks use these observable inputs.

compositions of audit committees, board strengths, the number of audit committee meetings per year, etc.) the results may vary.

Data Availability: Disclosure information is manually collected from the notes of the financial statements of the banks. All other data used in this study are available from public sources identified in the study.

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Appendix A

List of Disclosure Items for Servicing Assets (ASC 860)

I. Nature of Transfers of Financial Assets and the Financial Effects of the Transfers
   - A. Characteristics of Transfer
     1. Description of the transfer of financial assets
     2. Description of continuing involvement with the transferred financial assets
     3. Description on nature of assets obtained (e.g., servicing asset) and liabilities incurred in the transfer
     4. Initial fair value of assets obtained and liabilities incurred
     5. Gain/loss from the sale of financial assets
   - B. Initial Fair Value Measurements
     1. Valuation techniques used to measure fair value
     2. Key inputs and assumptions used (e.g., discount rates, expected prepayment rate, weighted average life and anticipated credit losses/ default rates)
     3. Fair value measurement level
   - C. Cash Flows between the Entity and Investors
     1. Proceeds from new transfers
     2. Servicing fees received
   - D. Balance Sheet for Transferred Financial Assets
     1. Accounting policy
     2. Total principal amount outstanding at reporting date
     3. Derecognized amount
     4. Terms of any arrangement that could require banks to provide financial support
     5. Key inputs and assumptions used to measure fair value of servicing assets
     6. Stress test: two or more unfavorable variations from the expected levels for key assumptions
     7. Description of the objectives, methodology and limitations of the stress test
     8. Information about the asset quality of sold loans and any other financial assets that banks manage with sold loans (e.g., delinquencies at the end of the period and credit losses, net of recoveries during the period)

II. All Servicing Assets and Servicing Liabilities
   - A. Management’s basis for determining servicing asset classes
   - B. Description of the inherent risks in servicing assets

C. Amount of contractually specified servicing fees, late fees and ancillary fees earned
D. Description of where each amount earned is reported on the income statement
E. Assumptions used to estimate fair value to include discount rates, credit losses and prepayment speeds

III. Servicing Assets and Servicing Liabilities Subsequently Measured at Fair Value
A. For each class, the activity in the balance of servicing assets (and liabilities) with description of where changes in fair value reported
1. Beginning balance
2. Additions
3. Disposals
4. Changes in fair value
5. Other changes
6. Ending balance

IV. Servicing Assets and Servicing Liabilities Subsequently Amortized
A. For each class, the activity in the balance of servicing assets (and liabilities) with description of where changes in the carrying value are reported
1. Beginning balance, additions, disposals, amortization, valuation allowance, other-than-temporary impairments, other changes and ending balance
2. Fair values of beginning and ending balances
3. Risk characteristics of the underlying loans to stratify servicing assets
4. Valuation activities to include beginning balance, aggregate additional charges and recoveries, aggregate write-down and ending balance

Appendix B

Historical Overview of FASB's MSR Accounting Rules

FASB Statement	Issue Date	Effective Date	Key Accounting Rules
SFAS No. 65	Sep-82	FY beginning after Dec. 15, 1982	Capitalize the premium paid for MSRs upon acquisition; subsequently amortize MSRs over net servicing income generation period. Disclosure items: (1) amount of MSRs capitalized for the period; (2) amortization method; (3) amount of amortization for the period.
SFAS No. 122	May-95	FY beginning after Dec. 15, 1995	Capitalize cost of the mortgage loans to MSRs allocated based on the relative fair value when selling the loans with servicing rights retained; Adopt the lower of amortized cost or fair value method; Measure impairment of MSRs based on the fair value subsequent to the initial recognition; MSRs are stratified based on the predominant risk characteristics of the underlying loans. Additional disclosure items: (1) fair value of MSRs; (2) methods and assumptions to estimate MSRs; (3) risk characteristics of underlying loans to estimate impairment; (4) activity in the valuation allowance for MSRs.
SFAS No. 125	Jun-96	Transactions after Dec. 31, 1996	A financial-components approach that focuses on control. Financial components of financial assets (e.g., transferred interests, retained interests, interest-only strips, servicing rights, servicing obligations) should be identified when the financial assets are transferred. Transferred interests should be evaluated if a transferor has surrendered control over the transferred interests. Transferred interests that meet the sale conditions should be accounted for sale; otherwise, the transferred assets should be accounted for borrowing.

			MSRs that arise from sales of mortgage loans should be measured at the carrying value of the mortgage loans, allocated based on their relative fair value to the financial components of the transferred assets. Additional disclosure items: None
SFAS No. 140	Sep-00	FY beginning after Dec. 15, 2000	Maintained the financial-component approach to account for transfers of financial assets. Additional disclosure items for securitized financial assets: (1) accounting policies for subsequently measuring the retained interests (e.g., MSRs, including methodology for fair value); (2) key assumptions used to measure the interests subsequently; (3) a sensitivity test that shows the hypothetical effect on the fair value of the interests; (4) information on the asset quality of the financial assets managed. Create an exception to be applied to MSRs in disclosing information on the quality of the financial assets managed.
SFAS No. 156	Mar-06	FY beginning after Sept. 15, 2006	Change MSR measurement from allocated cost to fair value; allow to opt for the fair value method. Additional disclosure items: For all MSRs: (1) management basis for determining classes of MSRs; (2) description of inherent risk of MSRs; (3) contractually specified service fees, late fees, and ancillary fees earned for each reporting period. For MSRs subsequently measured at fair value: (1) detailed activity (e.g., additional MSRs, disposals, any fair value changes) of MSRs for each reporting period; (2) description of valuation technique (including methodology and valuation procedures) used in estimating fair value; (3) assumptions used in the valuation model. For MSRs subsequently measured at amortized cost, in addition to the items required under SFAS No. 140, disclose: (1) activity of MSRs (e.g., additions, disposals, amortization, change in valuation allowance) for the period be disclosed in greater detail; (2) fair value of recognized MSRs at the beginning and end of the period.

SFAS No. 166	Jun-09	FY beginning after Nov 15, 2009	Remove the concept of a qualifying special-purpose entity; principle approach for disclosure. Additional disclosure items: (1) nature of the transferor's continuing involvement; (2) types of financial assets transferred; (3) risks related to the transferred financial assets; (4) nature of MSRs and its initial fair value as proceeds; (5) level within the fair value hierarchy; (6) cash flows between a transferor and transferee; (7) qualitative and quantitative information about the transferor's continuing involvement with transferred financial assets; (8) sensitivity test; (9) asset quality of the financial assets managed.

Appendix C

Definition of Variables

Variable	Definition
Disclosure_All (%)	Number of items disclosed by the banks divided by total number of required disclosure items. Total number of required disclosure items is 19 for banks using fair value method (Item Nos. 1–19 in Table 1). Total number of required disclosure items is 24 for banks using amortization method (Item Nos. 1–14 and Nos. 20–29 in Table 1).
Disclosure_MSR_ All (%)	Number of MSR items disclosed by the banks divided by 9 required disclosure items on all MSR (Item Nos. 6–14 in Table 1).
Disclosure_MSR_Method (%)	Number of MSR method items disclosed by the banks divided by the number of required disclosure items in sub-category MSR method. The number of required disclosure items for fair value sub-category MSR method is 5 (Item Nos. 15–19 in Table 1). The number of required disclosure items for amortization sub-category MSR method is 10 (Item Nos. 20–29 in Table 1).
Disclosure_Transfer (%)	Number of financial asset transfer items disclosed by the banks divided by 5 required disclosure items on financial asset transfer (Item Nos. 1–5 in Table 1).
Governance	Institutional Shareholder Service Inc.'s corporate governance overall index. The measure spreads 1 through 10 (1 represents the strongest corporate governance and 10 represents the weakest corporate governance).
Materiality	Fair value of the MSR divided by total equity of the banks.
Size	Total assets of the banks.
Acct_method	Dummy variable (Fair value = 1; Amortization = 0)
Big4	Dummy variable (Big 4 = 1; Others = 0)