



## Case Study

# Home Mortgage Disclosure Act: Unlocking Actionable Insight Through Advanced Analytics

December 1, 2013

This case study was prepared to demonstrate the application of advanced analytics in the mortgage industry. We selected HMDA data as it effectively demonstrates our three-point value proposition in a data-driven regulatory environment – greater insight through advanced analytics, benchmark-based risk management, and integrated business process intelligence.

## Background

Financial institutions submit Home Mortgage Disclosure Act (“HMDA”) data so the public can evaluate a financial institution’s performance relative to the three objectives:

- Whether a financial institution is serving the housing credit needs of the neighborhoods and communities in which they are located.
- Aid public officials in targeting public investments from the private sector to areas where they are needed.
- Assist in identifying possible discriminatory lending patterns and enforcing antidiscrimination statutes.

HMDA does not prohibit any specific activity of lenders, or respondents, and it does not establish a quota system of mortgage loans. Rather, releasing HMDA data to the public facilitates public scrutiny of any and all respondents.

## Case Study Objectives

Mortgage TrueView prepared this case study to demonstrate how advanced analytics can unlock greater insight into HMDA Data. We acknowledge that there are many documents that evaluate HMDA data and that virtually all of these documents incorporate analytics – some of which are mathematically advanced – but our objective is to demonstrate how Business Intelligence-driven advanced analytics can provide actionable insight in support of broader political and policy considerations.

We believe the following topics addressed in this case study most clearly demonstrate our objective:

- How does incomplete data limit traditional HMDA analytics?
- How can advanced analytics drive improvements in two key areas – data quality and risk management?
- Can a risk-oriented evaluation of HMDA data (including consideration of how HMDA data can drive improvement in a mortgage originator’s bottom-line) improve the quality of HMDA reporting?

We begin by looking at data limitations that impact the analysis of the current HMDA data.

## HMDA Analytical Limitations

Evaluating a respondent’s lending activity has always been a challenge as the volume of data is enormous, the data models are incomplete, the nuances are subtle, and the analytical tools are limited.

This case study demonstrates the analytical limitations associated with the current HMDA data set by highlighting evaluating key HMDA data elements –

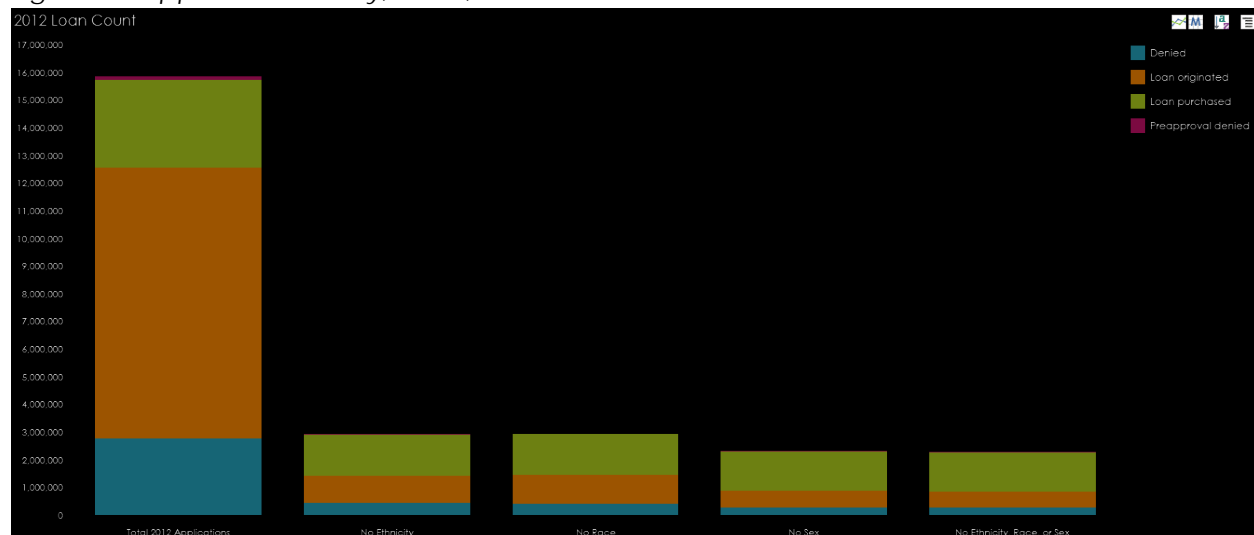
applicant ethnicity, race, and sex – in the content of two key lending trends – purchased loans and internet-based loan origination.

As shown in Figure 1, the 2012 HMDA data indicates that approximately 2.9 million out of 15.9 million actioned<sup>1</sup> loans, or approximately 20% of the actioned loans, do not include information about the applicant’s ethnicity, race, or sex.

The lack of information about an applicant’s ethnicity, race and sex is easy to demonstrate for purchased loans using the 2012 HMDA Dataset as Figure 1 also shows that approximately 1.5 million of the 3.2 million purchased loans, or approximately 45% of all purchased loans, do not include applicant ethnicity, race, and/or sex information.

The impact of internet-based loan applications on fair lending metrics is not as easy to measure but such loans undoubtedly make up significant portion of the 11% of non-purchased actioned loans without applicant ethnicity, race, and/or sex information.

Figure 1 – Applicant Ethnicity, Race, and Sex on Actioned Loans



Source: Mortgage TrueView

The growing volume in purchased loans and internet-based loan applications indicates that mortgage application data capture protocols need to be enhanced to (i) encourage applicants to provide ethnicity, race, and sex information and (ii) encourage the exchange of these details in connection with loan purchase transactions. Otherwise, the usefulness of HMDA data is likely to further diminish.

<sup>1</sup> Actioned loans (i) includes loans purchased, originated, and denied and (ii) excludes applications approved but not accepted, applications withdrawn by applicant, files closed for incompleteness, and preapproval requested approved by not accepted.

Now we turn to the next question – how can advanced analytics drive improvements in data quality and respondent risk management activities?

Advanced Analytics: Driving Greater HMDA Actionable Insights<sup>2</sup>

HMDA respondents are struggling to deal with the arrival of a new “data driven” regulator – the Consumer Financial Protection Bureau – that employs advanced analytics to identify risk and regulate respondents. From a regulatory perspective, HMDA data presents two fundamental issues that we address in the balance of this case study – Data Quality Risks and Advanced Analytics Risk.

**I. Data Quality Risks**

The FFIEC subjects HMDA filings to 157 data edits (see Table 1) that check the quality of the filing based on three edit types – quality, validity, and syntactical.

*Table 1 – FFIEC HMDA Data Edits*

Edit Type	Total	Classification	
		Proprietary	Public
Macro Quality Edits	33	-	33
Quality Edits	38	6	32
Validity and Syntactical Edits	86	29	57
	157	35	122

Quality Edits are applied to determine whether or not the submitted data agrees with expected values. HMDA respondents may review quality edit exceptions for correctness and, if necessary, change the response if the data is found to be erroneous.

Validity Edits are applied to identify incorrectly reported data and must be corrected before the filing can be accepted.

Syntactical Edits must be corrected if the record with the noted exception is to be included in the FFIEC database.

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<sup>2</sup> Because the integration of advanced analytics and HMDA data results in a level of insight too vast to address in a single case study, selected examples are included herein. In addition, the interactive nature of advanced analytics requires users to engage with the data in a way that leverages their knowledge, experience, and curiosity. We invite the readers of this case study to contact us as indicated at the conclusion of this case study to request HMDAnalytics access credentials.

Table 1 above also classifies the edits by those that are proprietary and those that are public. Public edits are those that can be independently verified based on public-domain HMDA data<sup>3</sup>. Conversely, proprietary edits are those that cannot be independently verified because certain HMDA data elements submitted by respondent are not released to the public.

Appendix A further classifies the 122 public edit checks by FFIEC Transaction Items and those that are Quality Edit checks. Appendix B provides benchmarks for each of the 65 public Quality Edit Checks.

## II. Advanced Analytical Risk

The substantive value of advanced analytics is to monitor business activity and identify issues and opportunities that might otherwise be overlooked to the detriment of the enterprise. Issues and opportunities can be classified into two categories – those that primarily increase risk and those that primarily impact profitability. This case study presents two examples of where advanced analytics provide insight into risk and one example where advanced analytics provides insight into improving the profitability.

a. **Risk Management.** Mortgage TrueView’s advanced analytical capabilities significantly enhance risk management activities for HMDA respondents. An analysis of denial activity substantiates this point by identifying two key risks associated with not providing denial reason codes for denied applications.

1. *OCC-Supervised Respondents.* As shown in Figure 2, OCC-supervised respondents failed to include a denial reason code for 159,989 applications.

Figure 2 – Denied Application Benchmarks

Data Series	2012
Non-OCC Respondents or OCC Loans not Originated or Pre-approval Request Denied then a Denial Reason Code Must be Provided (V355)	<span style="color: green;">○</span>
OCC Respondents with Denied Loans without a Denial Reason Code (V385)	159,989 <span style="color: red;">○</span>
Duplicate Denial Codes (V360)	<span style="color: green;">○</span>

Source: Mortgage TrueView

“Drilling down” on the 159,989 denied application exceptions indicates that:

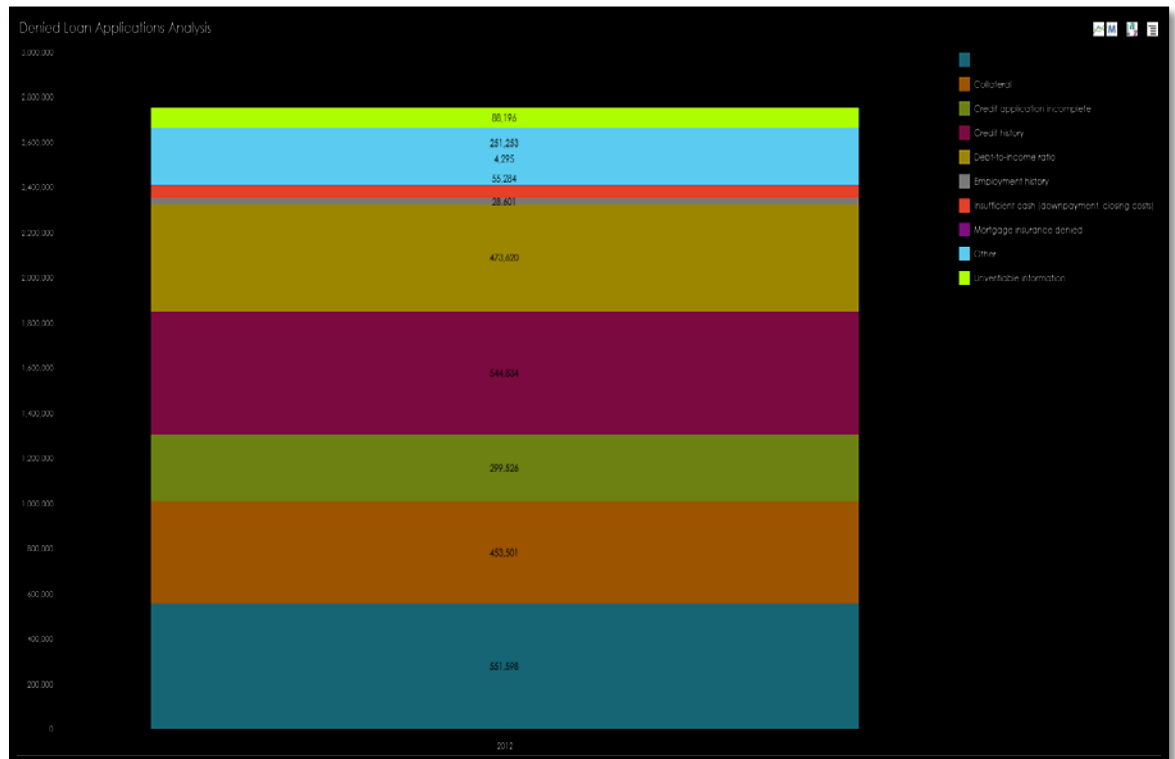
<sup>3</sup> Mortgage TrueView HMDAnalytics includes independent validation of all public edit types.

- 1,054 OCC-supervised respondents failed to include a denial reason code for at least 1 denied application.
- Ten OCC-supervised respondents account for 32% of the 159,989 denied applications with one respondent accounting for approximately 12% of the total.

The conclusion supported by this analysis is simple – the failure to provide a denial reason code for applications denied by an OCC-supervised respondent increases risk. The solution is to ensure that executive management has the advanced analytical insight needed to identify and address such risks.

2. *Denial Transparency.* Non-OCC-supervised respondents are not required to provide a denial reason code. As shown in Figure 3, only 551,598 (20%) of the 2,750,708 loans denied by non-OCC-supervised respondents do not include a denial reason code. This indicates that the majority of respondents embraces greater transparency in reporting denials and, in so doing, has increased the risk faced by those respondents that continue to follow the guidance that no denial reason code is required.

Figure 3 – Denied Loans by Denial Reason Code



Source: Mortgage TrueView

- b. **Enhancing Return on Investment.** Certain FFIEC edits can be leveraged into improved returns on a respondent’s business activities. Among the most compelling examples is “Approved Applications not Accepted (Q007)”. As noted in Figure 4, 3.8% of loan applications are approved but the applicant does not accept the approved mortgage.

Figure 4 – Action Taken Benchmarks

Data Series	Value	Status
Approved Applications not Accepted (Q007)	3.80%	Green
Applications Withdrawn by Applicant (Q008)	2.31%	Green
Files Closed for Incompleteness (Q009)	2.31%	Green
Originated Loans Greater than 20% of Applications† (Q010)	52.95%	Green
Denied Conventional Loans Greater than 70% of Applications‡ (Minimum 50 Loans) (Q056)	12.21%	Green
Denied Applications (Minimum 50 Loans) (Q057)	2,910,697	Green
Denied Preapproval (Minimum 1,000 Loans) (Q058)	148,733	Green
Decisions 1-4 Family and Manufactured Housing applications with no Applicant Ethnicity as a percent of non-purchased, non-preapproval applications (Q080)	9.73%	Green
Decisions 1-4 Family and Manufactured Housing applications with no Applicant Race information as a percent of non-purchased, non-preapproval applications (Q081)	9.79%	Green
Decisions 1-4 Family and Manufactured Housing applications with no Applicant Gender information as a percent of non-purchased, non-preapproval applications (Q082)	6.02%	Green
Decisions 1-4 Family and Manufactured Housing Applications with No Ethnicity, Race, or Gender information as a percentage of non-purchased, non-preapproved applications (Q083)	5.76%	Green

Source: Mortgage TrueView

Advanced analysis using Mortgage TrueView indicates that among those firms with approved applicants that “walked”, the top 10 (exclusive of manufactured housing originators) would have generated \$126 million in additional aggregate revenue if their “walk rate” was equal to the average of 3.8%.

An important component of advanced analytics, Business Process Intelligence, can be used to more fully evaluate process issues that may likely have contributed to the lost revenue. For example, are “walks” attributable to one or more factors including:

- Processing delays
- Non-standard processing
- Incomplete applications
- Staffing attributes (i.e., efficiency ratios, turnover, etc.)
- Competitive trends
- Product attributes (i.e., pricing, down-payment, etc.)

## Conclusion

As this case study shows, there is a solution for obtaining vital information that most lenders have failed to recognize. Advanced analytics is essential to understanding how your processes are working or not working; what products and services are most effective in securing a closed loan; what costs are excessive and unnecessary and how you can do more with less. Furthermore, this information will allow you to be prepared for regulator questions and issues as well as be more effective in meeting new regulations.

Appendix A – FFIEC Public Edit Checks by Transaction Category

Category	All Edit Checks	Quality Edit Checks
Action Taken	13	11
Applicant	8	1
Census Tract	1	-
Coapplicant	11	1
HOEPA	15	11
Income	7	5
Lien	4	-
Loan Amount	11	10
Loan Purpose	3	1
Loan Type	2	1
MSA/MD	7	5
Occupancy	1	-
Other	1	1
Preapproval	9	2
Property Type	4	3
Purchaser	10	7
Rate Spread	10	6
Reasons for Denial	3	-
State/County Codes	2	-
<b>Total</b>	<b>122</b>	<b>65</b>



Appendix B – FFIEC Public Quality Edit Check 2012 Benchmarks

Transaction Item Group	Description	Quality Edit Check Index	Value
Action Taken	Approved Applications not Accepted	Q007	3.80%
Action Taken	Applications Withdrawn by Applicant	Q008	8.18%
Action Taken	Files Closed for Incompleteness	Q009	2.81%
Action Taken	Originated Loans Greater than 20% of Applications?	Q010	52.95%
Action Taken	Denied Conventional Loans Greater than 70% of Applications? (Minimum 50 Loans)	Q056	12.21%
Action Taken	Denied Applications (Minimum 50 Loans)	Q057	2,910,697
Action Taken	Denied Preapproval (Minimum 1,000 Loans)	Q058	148,733
Action Taken	Decisioned 1-4 Family and Manufactured Housing applications with no Applicant Ethnicity as a percent of non-purchased, non-preapproval applications	Q080	9.73%
Action Taken	Decisioned 1-4 Family and Manufactured Housing applications with no Applicant Race information as a percent of non-purchased, non-preapproval applications	Q081	9.79%
Action Taken	Decisioned 1-4 Family and Manufactured Housing applications with no Applicant Gender Information as a percent of non-purchased, non-preapproval applications	Q082	6.02%
Action Taken	Decisioned 1-4 Family and Manufactured Housing Applications with No Ethnicity, Race, or Gender Information as a percentage of non-purchased, non-preapproved applications	Q083	5.76%
Applicant	Non-Purchased Loans with "Not Applicable" Applicant Information	Q026	8,589
Coapplicant			
HOEPA	Non-NCUA Originated Home Improvement/Refi with Spread >8% Non-HOEPA	Q044	6,295,759
HOEPA	Non-NCUA Originated Home Improvement/Refi with Spread >10% non-HOEPA	Q045	104,997
HOEPA	NCUA Supervised with HOEPA Loans	Q050	325
HOEPA	Not Applicable G/R/E and HOEPA	Q051	18
HOEPA	Multifamily HOEPA	Q052	-
HOEPA	NCUA Originated HOEPA (Percent)	Q053	0.00%
HOEPA	NCUA Purchased HOEPA	Q054	-
HOEPA	Originated HOEPA First Lien FNMA (Percent)	Q062	0.00%
HOEPA	Originated HOEPA First Lien FHLMC (Percent)	Q063	0.00%
HOEPA	FNMA/FHLMC Purchased HOEPA	Q064	16
HOEPA	HOEPA Loans Greater than 200	Q065	2,231

Transaction Item Group	Description	Quality Edity Check Index	Value
Income	Applications with Applicant Income <\$10k as a percentage of Total Assets	Q016	0.00%
Income	Applications with Applicant Income > \$2 Million	Q014	12,486
Income	Originated Loans with Loan Amount > 5x Applicant Income and Applicant Income <Than \$9k	Q024	8,075
Income	Non-Purchased 1-4 Family or Manufactured Housing Loan Applications with Applicant Income = "NA"	Q027	1,162,593
Income	Applications with "Not Applicable" Ethnicity, Race, or Gender and Applicant Income is not "NA"	Q067	8,926,629
Loan Amount	Applications >= \$1MM and Loan Amount > 5x Income	Q001	12,993
Loan Amount	1-4 Family Applications with Income =< \$200K and Loan Amount >= \$2 MM	Q002	388
Loan Amount	1-4 Family or Manufactured Housing FHA loan with Loan Amount > \$729K	Q003	3,429
Loan Amount	1-4 Family or Manufactured Housing VA loan with Loan Amount > \$729K	Q004	4,893
Loan Amount	1-4 Family or Manufactured Housing sold to FNMA/GNMA/FHLMC/FAMC with Loan Amount > \$729K	Q005	4,330
Loan Amount	Multifamily Application with Loan Amount < \$100K or > \$10MM	Q013	-
Loan Amount	1-4 Family Purchase Application with Loan Amount <= \$10K	Q025	38,657
Loan Amount	Manufactured Housing Applications with Loan Amount > \$150K	Q036	21,408
Loan Amount	Subordinated Lien with Loan Amount > \$100K	Q037	7,015
Loan Amount	No Lien with Loan Amount > \$200K	Q038	809
Loan Purpose	Home Purchased Approved Loans as a percent of Home Purchase loan applications	Q006	48.73%
Loan Type	Non-conventional loans Purchased by Fannie or Freddie	Q035	6,746
MSA/MD	Number of loan applications that report MSA/MD = NA should be > 30% of the total number of loan applications.	Q023	13.08%
MSA/MD	Preapproval applications with MSA/MD, state, county, census tract should equal NA	Q049	-
Other	Year-over-Year Change in Applications	Q011	0.00%

Transaction Item Group	Description	Quality Edity Check Index	Value
Preapproval	Preapproval Request Withdrawn by Applicant	Q047	0.16%
Preapproval	Preapproval Request Closed for Incompleteness	Q048	0.04%
Property Type	Multifamily Loan Applications as a percentage of all applications	Q.015 Count	0.26%
Property Type	Multifamily Loan Applications Amount as a percentage of all application amounts	Q.015 Amount	3.13%
Property Type	Multifamily Applications >= 200	Q031	48,651
Property Type	VA or FSA/RHS Loan Type and Multifamily Property Type	Q059	38
Purchaser	Non-multifamily non-refi originated or purchased FHA/VA sold volume test	Q073	84.86%
Purchaser	Non-multifamily refi originated or purchased FHA/VA sold volume test	Q074	87.83%
Rate Spread	Originated HOEPA Loans without a Rate Spread Value	Q039	243
Rate Spread	Purchased by Agency with Lien and Rate Spread >10% or No Value	Q040	67,877
Rate Spread	Originated HOEPA Loans with a Rate Spread Value >= 5% or No Value	Q055	0.02%
Rate Spread	Originated 1-4 Family with First Liens as a percent of Originated Loans	Q061.A	-
Rate Spread	Credit Union Originated 1-4 Family Loans with a First Lien	Q061.B	-
Rate Spread	Applications with a Rate Spread >= 13% or Null	Q066	296,256

## Contact Us

For more information about Mortgage TrueView or to discuss the specifics and/or concepts discussed in this case study, please contact one of the following:

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