

The background of the slide features a large, faint watermark of the Rutgers University seal. The seal is circular and contains a sunburst in the center, with the words "RUTGERS UNIVERSITY" and "THE STATE UNIVERSITY OF NEW JERSEY" around the perimeter.

RUTGERS

THE STATE UNIVERSITY
OF NEW JERSEY

Visual Audit Task

Qi Liu, Lu Zhang, and Heejae Lee

Agenda

- Introduction
- Literature Review
- Data
- Visual Audit Exploratory Data Analysis Framework
- Visual Audit Task 1: Revenue Analysis
- Visual Audit Task 2: Internal Control Test
- Visual Audit Task 3: Testing Occurrence Assertion
- Visual Audit Task 4: Transaction Value Analysis
- Visual Audit Task 5: Analytical Procedure
- Questions
- Future Work

Introduction

- Using interactive visualization in accounting information system can help users to understand a very large set of financial information.
- In particular, continuous monitoring and continuous auditing increases the value of interactive visualization in an accounting information system context.
- However, there are only few studies that examine how interactive visualization should be applied in accounting, especially in auditing.
- Examine how interactive visualization can be used in auditing and suggest novel framework for visual audit.
- Demonstrate five visual audit task using hospital database

Literature Review

- Prior literature examined when and how interactive data visualization can bring more effective and efficient decision making for accounting data (Dilla & Raschke, 2010, Yigitbasioglu and Velcu, 2012).
- Most researches suggested that the effectiveness of data visualization tool depends on task characteristics and decision makers characteristics, consistent to cognitive fit theory.
- Dilla and Raschke (2015) suggested a framework for interactive data visualization in fraud detection procedure.
- However, the frameworks suggested in previous studies are theoretical, rather than practical.
- In this study, we applied explanatory data analysis (EDA) approach to develop visual audit framework.

Data

- Data from 45 hospitals
- Select client 11 as a target and perform visual audit task
 - Midsize hospital (Transaction volume, Number of Accounts)
 - High proportion of Bad Debt
- Use transactions from 2014 to 2016 for the analysis
 - Data integrity issue for previous year data
- Total 6,093,847 transactions record for client 11

Data

- Tables
 - Accounts
 - Shows most recent information for an account.
 - AR Snapshot
 - Created from ATB (aged trial balance) files
 - Shows account balances, aging, and general information for an account within a hospital system at end-of-month
 - AR Transaction
 - Shows the transactions that occurred, by posting date, for accounts within given hospital systems
 - AR Snapshot Estimates
 - MRA Snapshot Estimates
 - Holds the estimates that were used to create reserves by account during a hospital systems monthly close process
 - VA Gross Revenue
 - Shows the gross and net revenue attributed to an account as of a period id.

Data

- Mapping Tables
 - Billing Type, Financial Class, Inpatient/Outpatient Type, Insurance Provider, Patient Type, etc.
 - Service Type
 - Inpatient, Outpatient, Ambulatory Surgery, Emergency (ER), PCU (Progressive Care unit), Intensive Care Unit (ICU), Private, etc.
 - Transaction Type
 - Administration Adjustment, Bad Debt, Charity, Contractual, Denial, Exclude, Not Specified, and Payment

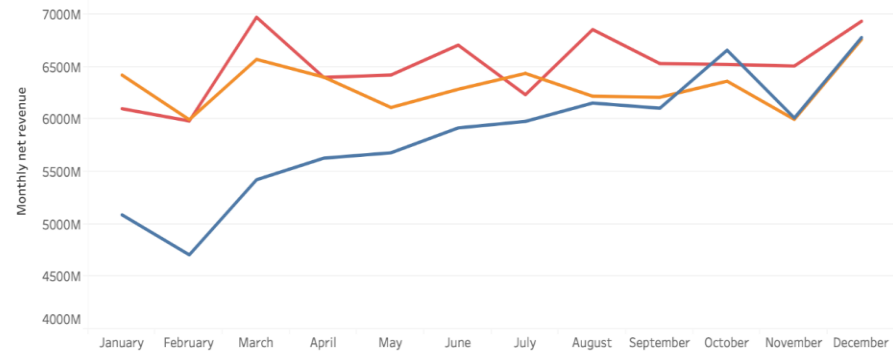
Visual Audit Task 1: Revenue Analysis

- Mainly perform risk assessment
- Demonstrate the monthly net revenue, gross revenue, net revenue over gross ratio and account receivable over net revenue ratio
- Drill down from entity level to lower level (e.g. account level)

Visual Audit Task 1: Revenue Analysis

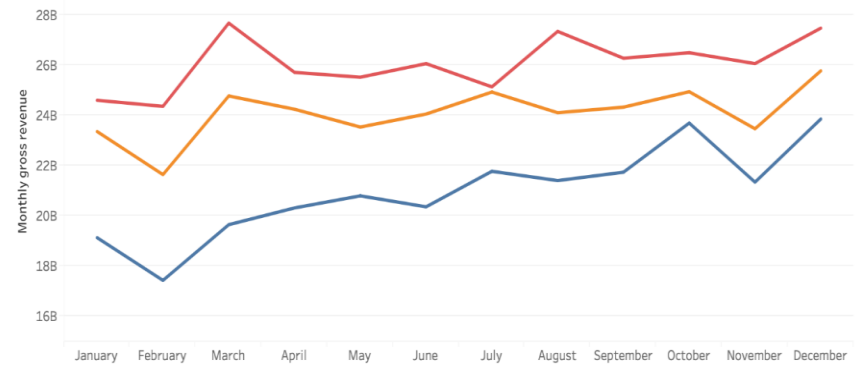
Monthly Net Revenue Comparison (2014 - 2016) - All Clients Excluding Extreme Records

YEAR
 ■ 2014
 ■ 2015
 ■ 2016

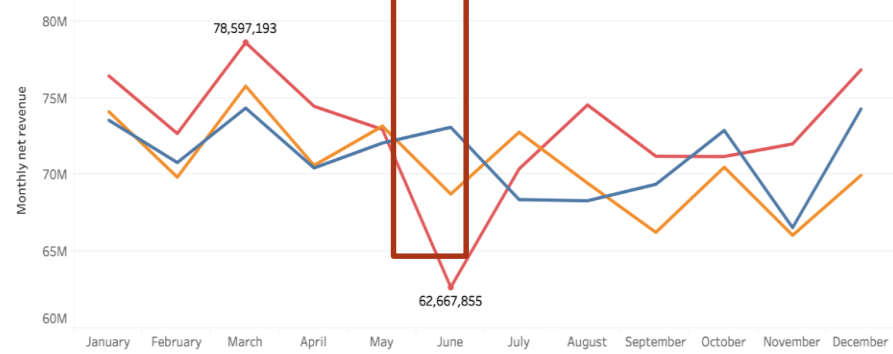


Monthly Gross Revenue Comparison (2014 - 2016) - All Clients Excluding Extreme Records

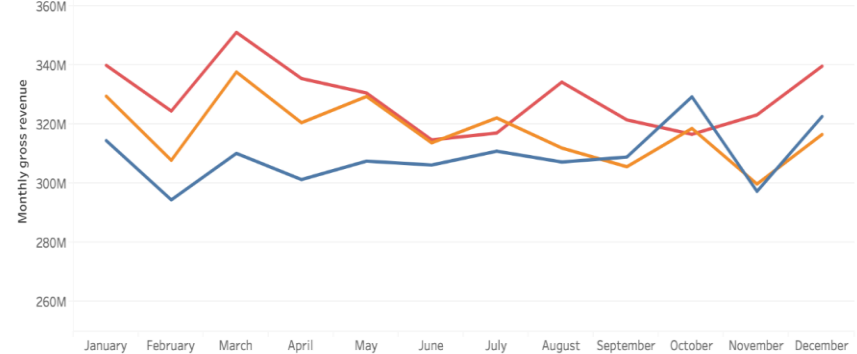
Year
 ■ 2014
 ■ 2015
 ■ 2016



Monthly Net Revenue Comparison (2014 - 2016) - Client 11



Monthly Gross Revenue Comparison (2014 - 2016) - Client 11

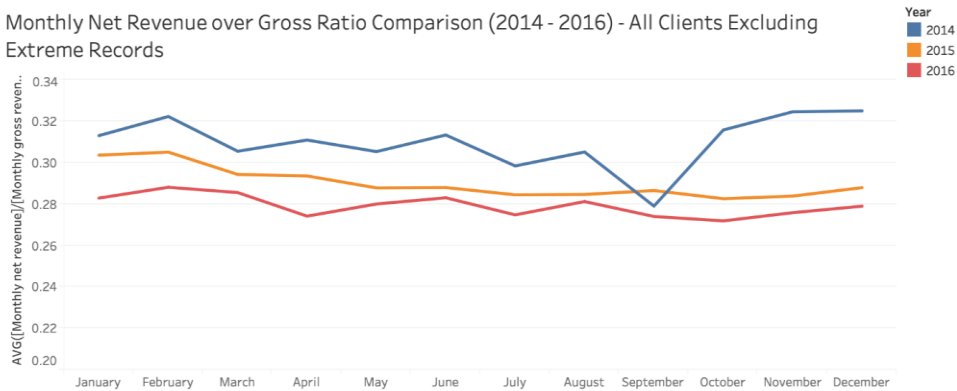


Dashboard 1: Total Net Revenue Monthly Analysis

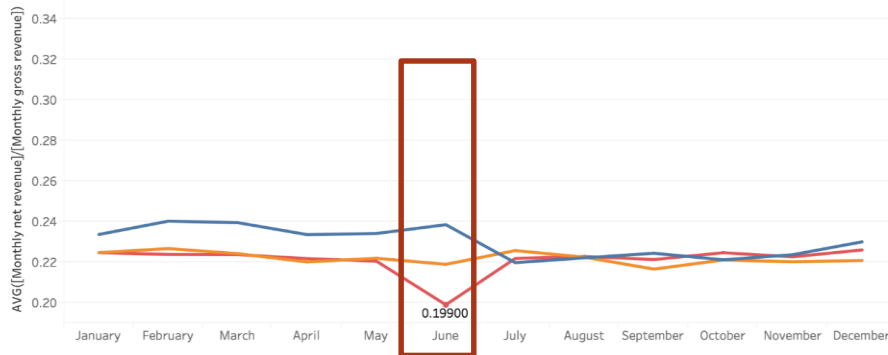
Dashboard 2: Total Gross Revenue Monthly Analysis

Visual Audit Task 1: Revenue Analysis

Monthly Net Revenue over Gross Ratio Comparison (2014 - 2016) - All Clients Excluding Extreme Records



Monthly Net Revenue over Gross Ratio Comparison (2014 - 2016) - Client 11

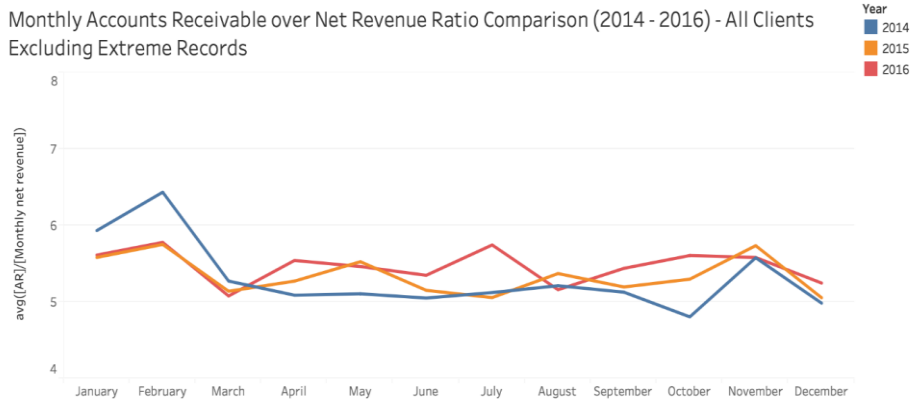


- We found that
 - Net revenue over gross revenue ratio is lower than the average ratio of all clients', which might indicate higher risk.
 - The monthly changes of ratios of client 11 are smaller than all clients'
 - A big drop on June 2016 for client 11, probably caused by the big net revenue drop in that month.

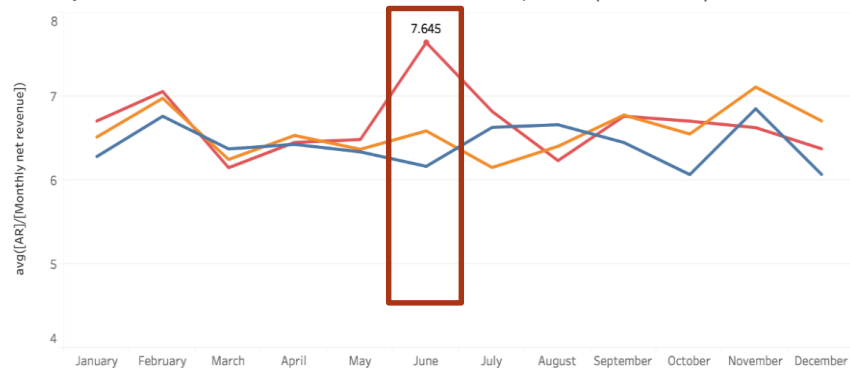
Dashboard 3: Net Revenue over Gross Revenue Ratio analysis

Visual Audit Task 1: Revenue Analysis

Monthly Accounts Receivable over Net Revenue Ratio Comparison (2014 - 2016) - All Clients Excluding Extreme Records

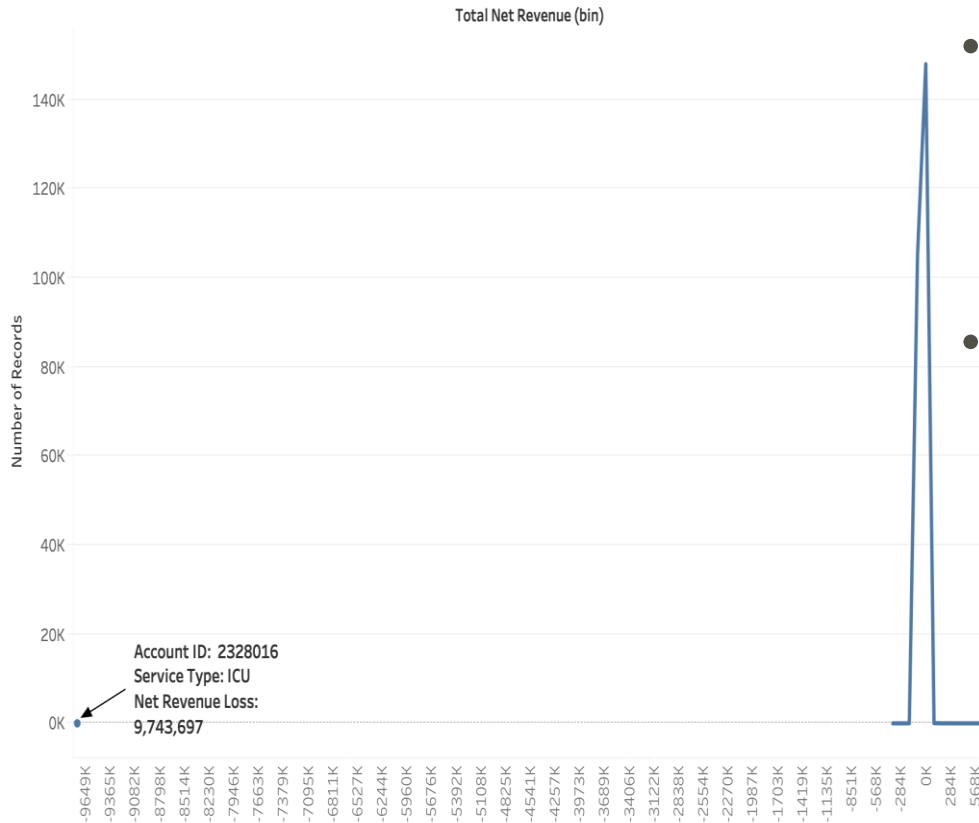


Monthly Accounts Receivable over Net Revenue Ratio Comparison (2014 - 2016) - Client 11



- Use Account Balance data recorded by the hospitals database as the Accounts Receivable
- We found that
 - The client’s Accounts Receivable over Net Revenue ratio is higher than the average ratio of all clients, which may indicate higher risk.
 - A big ratio increase on June 2016, which may be due to the big revenue drop.

Visual Audit Task 1: Revenue Analysis

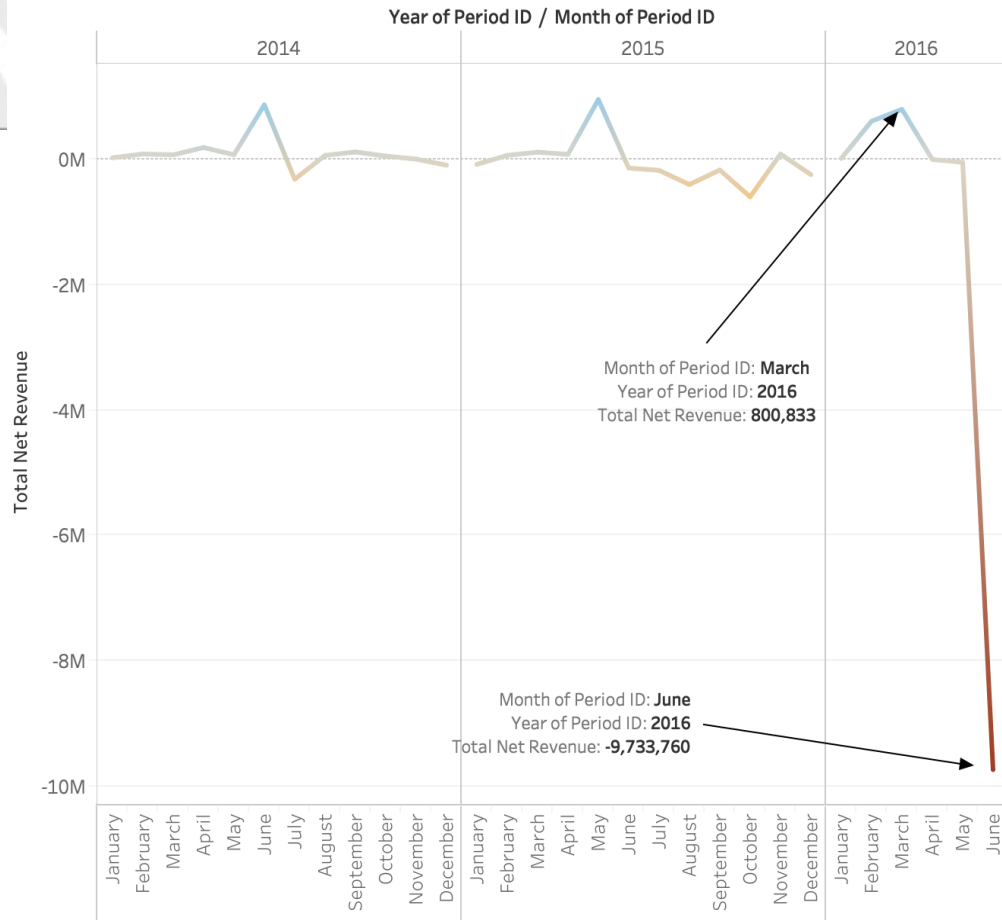


- Drill down to the account level to investigate the reason for the revenue drop in June 2016.
- Create line chart of the frequency distribution of all net revenue data recorded in June 2016 and find one extreme exception, account 2328016

– The exceptional record of net revenue loss might be the main cause for the big revenue drop in June 2016.

Figure 1: the frequency distribution of all the net revenue data recorded in June 2016

- Net revenue loss recorded in June 2016 was exceptional and abnormal
- No further revenue reports after June 2016, which indicated that the hospital may close the account 2328016 after June 2016
- The account is recorded under the ICU service type which only contributes about 4% revenue to the total revenue.
- In transaction table, we only found six months from 2014 to 2015 that recorded transaction history.
- However, in the revenue table, we found the complete revenue records from January 2014 to June 2016.
- Further testing on Accuracy and Occurrence assertions might be necessary.



Abc Cinet 11 Patient Description M Patient Type Descr...	# transaction Year and ... Account ID	Abc transaction Year and Month.csv Month of Posting ...	Abc transaction Year and Month.csv Transaction Type	# transaction Year and Month.csv Year of Posting Da...	# transaction Year and Month.csv Transaction Amount
ICU	2328016	May	Payment	2016	251,632.82
ICU	2328016	March	Payment	2016	-2,133,293.48
ICU	2328016	June	Payment	2016	-888,411.38
ICU	2328016	June	Contractual	2016	30,027.80
ICU	2328016	May	Contractual	2015	-8,601,763.88
ICU	2328016	June	Contractual	2015	-24,478.40

Dashboard 5. Line chart showing the monthly net revenue gain/loss reported under account 2328016. Table shows the history of transaction of the account.

Visual Audit Task 2: Internal Control Test

- Table – Accounts shows the aggregated transaction values and the most recent balances for each account.
- Table – Transaction shows the daily transactions under different transaction types for each account.
- In theory, the calculated total transaction value for each accounts using data from Table – Transaction should equal to the total transaction value reported for the same account in the Table – Accounts.
- A large deviation between two values might indicate internal control deficiency.

Visual Audit Task 2: Internal Control Test



Dashboard 16: The scatter plot show total transaction value in Account Table (X axis) and sum of transaction value of the account in Transaction Table (Y axis)

Visual Audit Task 2: Internal Control Test

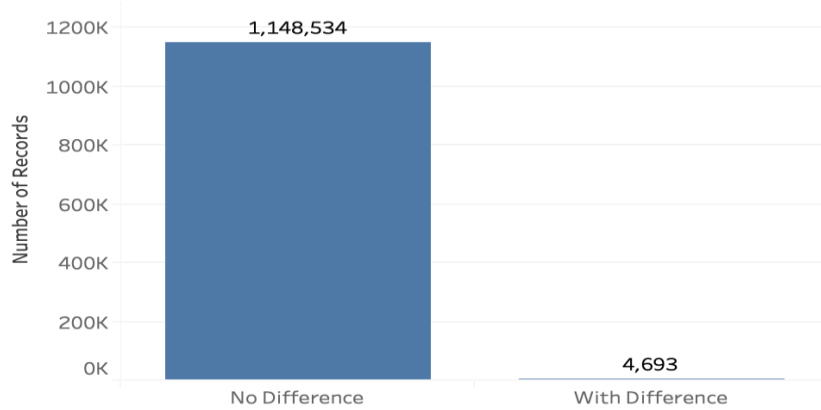
- Scatterplot analysis shows that
 - There are some accounts with mismatched recorded values
 - There are more accounts with positive difference than those with negative difference.
 - Larger number of accounts with mismatched bad debts records than that of other transaction types.

Visual Audit Task 2: Internal Control Test

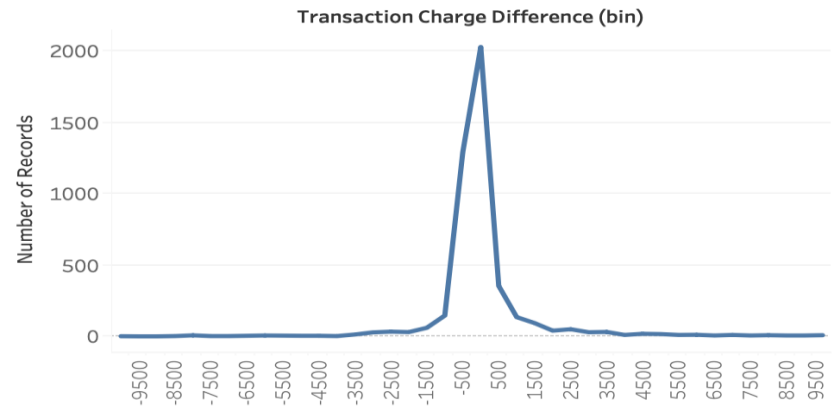
- Total charge: the value hospital charged the customer
- Total transaction values: charged balances were reduced by payment, admin adjustment, bad debts, contractual and charity deduction.
- Therefore, for each closed account, the total charge value was supposed to be equaled to the final total transaction value reported in the Table – Account.
- Value differences may indicate possible internal control weakness or completeness and accuracy assertion violation.
- Take a full population of accounts opened after January 2014 and closed before December 2016

Visual Audit Task 2: Internal Control Test

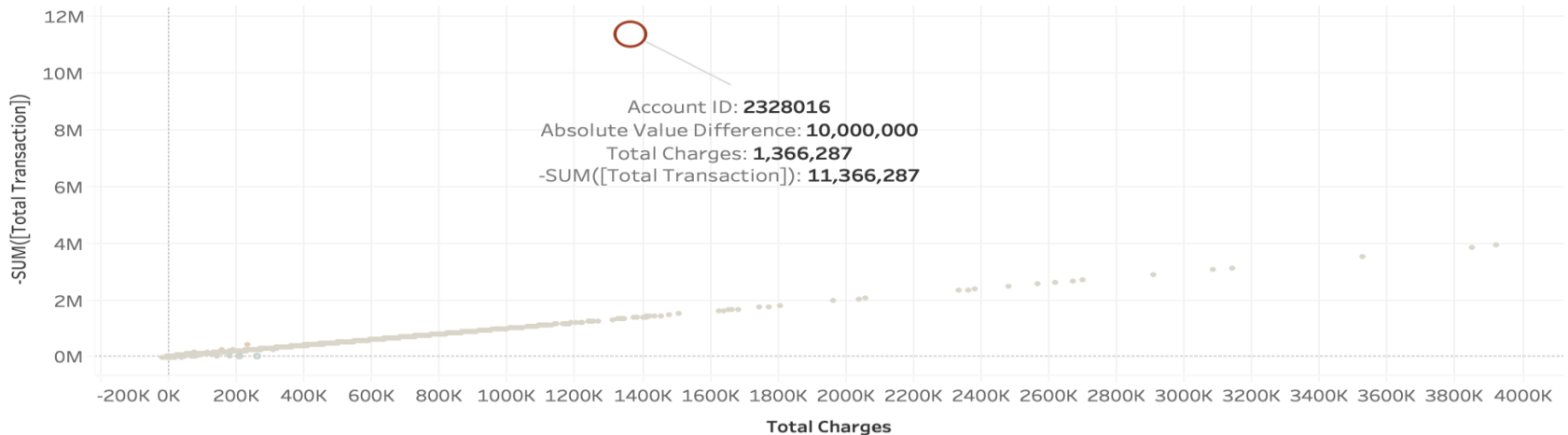
Number of Accounts with No Value Difference versus with Value Difference



Value Difference Distribution (Absolute Value More Than 1 and less than 10K)



Total Transaction Value versus Total Charges

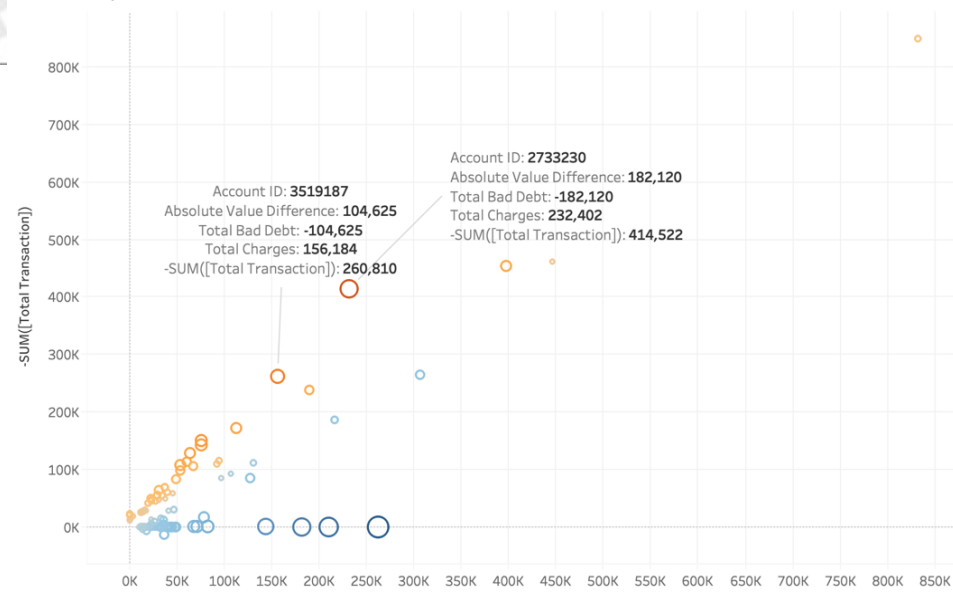


Visual Audit Task 2: Internal Control Test

- There was one account: 2328016 with 10M value difference, which may be caused by error
- Only about 0.4% closed accounts reported value difference
- There was no abnormal hypes or patterns detected regarding the frequency distribution of accounts with value difference.

- Exclude Account 2328016, which might be a outlier or exception
- Identify 134 accounts with more than 10K value difference
- Later, auditor could further investigate those accounts if there was any internal control weakness, error or fraud causing those large value differences

Total Transaction Value versus Total Charges (Difference more than 10K and Excluding Exception)



Account ID	-SUM([Total Transaction])	([Total Charges]+[Total Transaction])	ABS([Total Charges]+[Total Transaction])	Total Admin Adj	Total Bad Debt	Total Charges	Total Charity	Total Contractual	Total Exclude
3954463	0.00	182,368.63	182,368.63	0.00	0.00	182,368.63	0.00	0.00	0.00
3946816	13,201.01	10,012.76	10,012.76	0.00	0.00	23,213.77	0.00	-13,201.01	0.00
3921628	0.00	40,106.36	40,106.36	0.00	0.00	40,106.36	0.00	0.00	0.00
3899153	0.00	10,933.82	10,933.82	0.00	0.00	10,933.82	0.00	0.00	0.00
3879838	84,566.63	43,061.79	43,061.79	0.00	0.00	127,628.42	0.00	-84,566.63	0.00
3874189	13,957.16	19,215.82	19,215.82	0.00	0.00	33,172.98	0.00	-9,954.98	0.00
3870373	0.00	16,690.63	16,690.63	0.00	0.00	16,690.63	0.00	0.00	0.00
3868597	45,790.06	-17,916.83	17,916.83	0.00	0.00	27,873.23	0.00	-31,701.35	0.00
3864035	11,615.63	-11,615.63	11,615.63	0.00	0.00	0.00	0.00	0.00	0.00
3845592	57,737.16	-12,171.01	12,171.01	0.00	0.00	45,566.15	0.00	-35,566.15	0.00
3820400	0.00	26,748.57	26,748.57	0.00	0.00	26,748.57	0.00	1,273.94	0.00
3796253	0.00	17,359.52	17,359.52	0.00	0.00	17,359.52	0.00	0.00	0.00
3794853	0.00	12,630.00	12,630.00	0.00	0.00	12,630.00	0.00	0.00	0.00
3784286	29,119.26	18,386.78	18,386.78	0.00	0.00	47,506.04	0.00	-29,119.26	0.00
3773906	0.00	13,384.51	13,384.51	0.00	0.00	13,384.51	0.00	0.00	0.00
3752959	109,970.15	-17,484.20	17,484.20	0.00	0.00	92,485.95	0.00	-77,957.16	0.00
3726805	0.00	12,148.00	12,148.00	0.00	0.00	12,148.00	0.00	0.00	0.00
3724261	92,052.57	15,637.00	15,637.00	0.00	0.00	107,689.57	0.00	-46,762.84	0.00
3722873	29,651.61	17,043.28	17,043.28	0.00	0.00	46,694.89	0.00	-29,651.61	0.00
3696702	-13,703.85	50,069.34	50,069.34	0.00	25,034.67	36,365.49	0.00	-7,683.47	0.00
3695818	1,763.20	13,885.00	13,885.00	0.00	0.00	15,648.20	0.00	-1,288.00	0.00
3673362	17,073.45	61,220.38	61,220.38	0.00	0.00	78,293.83	0.00	-17,073.45	0.00
3640569	0.00	15,120.06	15,120.06	0.00	0.00	15,120.06	0.00	0.00	0.00
3640149	185,555.41	30,820.14	30,820.14	0.00	0.00	216,375.55	0.00	-185,270.41	0.00
3635640	542.42	10,786.97	10,786.97	0.00	0.00	11,329.39	0.00	0.00	0.00
3620154	0.00	14,472.92	14,472.92	0.00	0.00	14,472.92	0.00	0.00	0.00
3593965	23,680.66	-11,840.33	11,840.33	0.00	-23,680.66	11,840.33	0.00	0.00	0.00
3590062	0.00	33,998.22	33,998.22	0.00	0.00	33,998.22	0.00	0.00	0.00
3577102	64,129.49	-32,708.18	32,708.18	0.00	0.00	31,421.31	0.00	-54,651.88	0.00
3573033	0.00	48,980.13	48,980.13	0.00	0.00	48,980.13	0.00	0.00	0.00
3530252	84,899.59	12,114.94	12,114.94	0.00	0.00	97,014.53	0.00	-40,272.99	0.00
3519187	260,809.74	-104,625.27	104,625.27	0.00	-104,625.38	156,184.47	0.00	-68,943.44	0.00
3515898	18,722.17	-15,008.17	15,008.17	0.00	0.00	3,714.00	0.00	-18,722.17	0.00
3509143	264,998.41	42,048.61	42,048.61	0.00	-222,949.80	307,047.02	0.00	0.00	0.00
3493506	111,497.82	19,563.47	19,563.47	0.01	0.00	131,061.29	0.00	-101,497.83	0.00
3491389	24,759.72	-11,530.36	11,530.36	0.00	0.00	13,229.36	0.00	-15,298.85	0.00
3479502	47,981.72	-10,118.23	10,118.23	0.00	0.00	37,863.49	0.00	-24,601.62	0.00
3454076	0.00	14,602.69	14,602.69	0.00	0.00	14,602.69	0.00	0.00	0.00

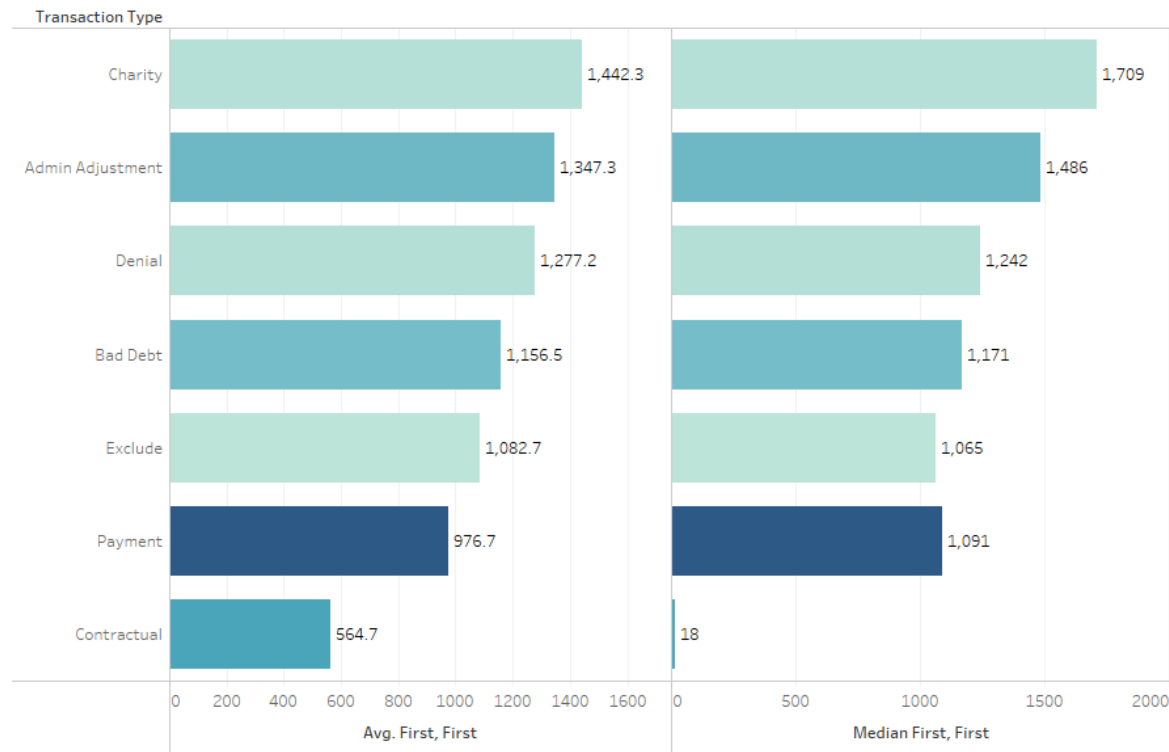
Visual Audit Task 3: Testing Occurrence Assertion

- Test Occurrence Assertion using the date difference between billing date and collecting date
- Focus on the difference between first billing date and first transaction recording date
- Change the bin size for the detailed investigation

Visual Audit Task 3: Testing Occurrence Assertion

1. Date difference between first billing date and first transaction recording date under 7 different transaction types.
2. Bar length: Average date difference (left graph) and Median date difference (right graph); Color intensity: Number of records
3. Testing sample (about 70k) is small compared to the full population (4M) because most of the billing date is recorded as 19000101.
4. Findings: 1) Payment transaction reported the highest frequency, 2) The payment took place 2.5 years after the first billing date on average, 3) for the contractual transaction, there is a big difference between average date difference and median date difference

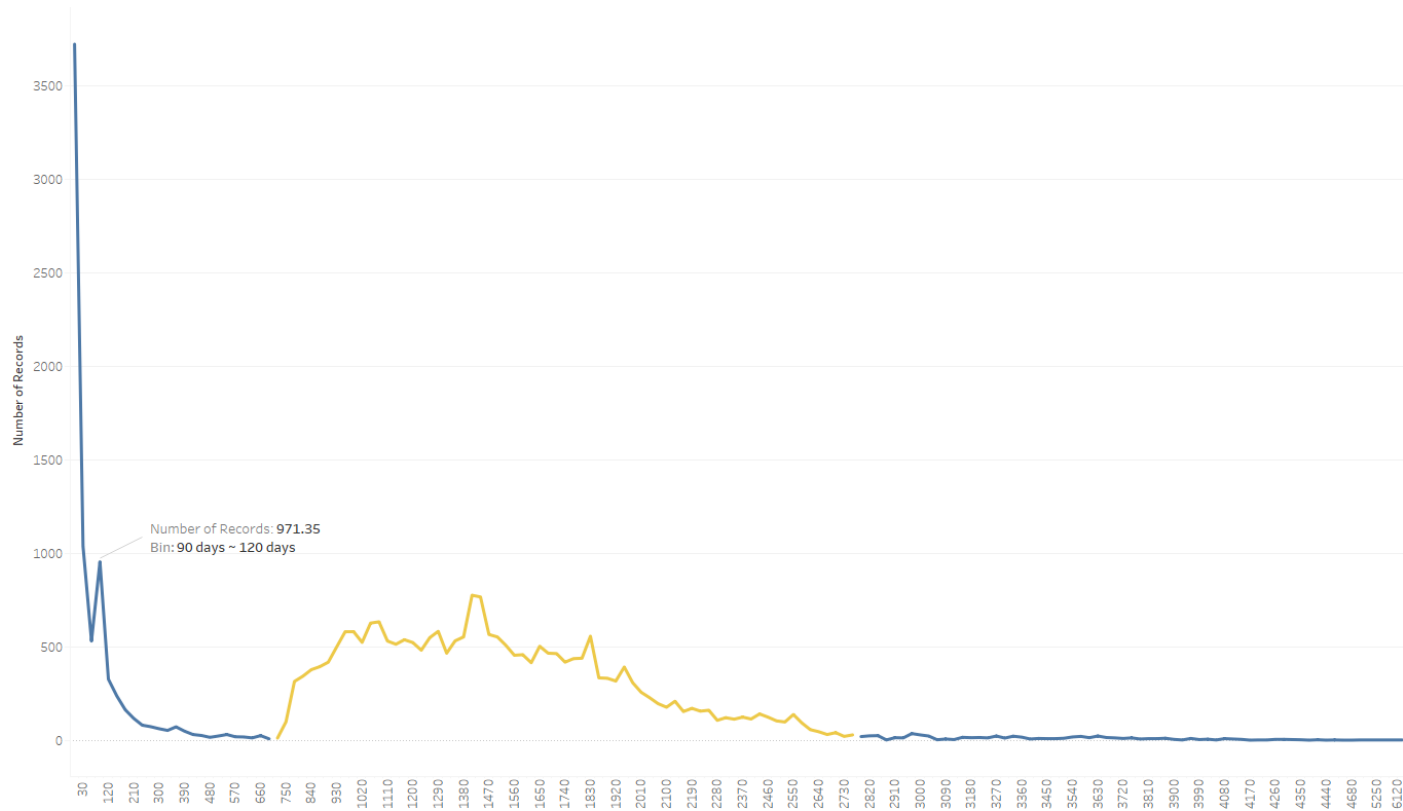
Date Difference: Average and Median



Visual Audit Task 3: Testing Occurrence Assertion

1. Value frequency line chart (bin size = 30 Days)
2. Two hypes was identified. The first one occurred at 90 ~ 120 days and the second one occurred around 2.5 ~ 7.5 years.

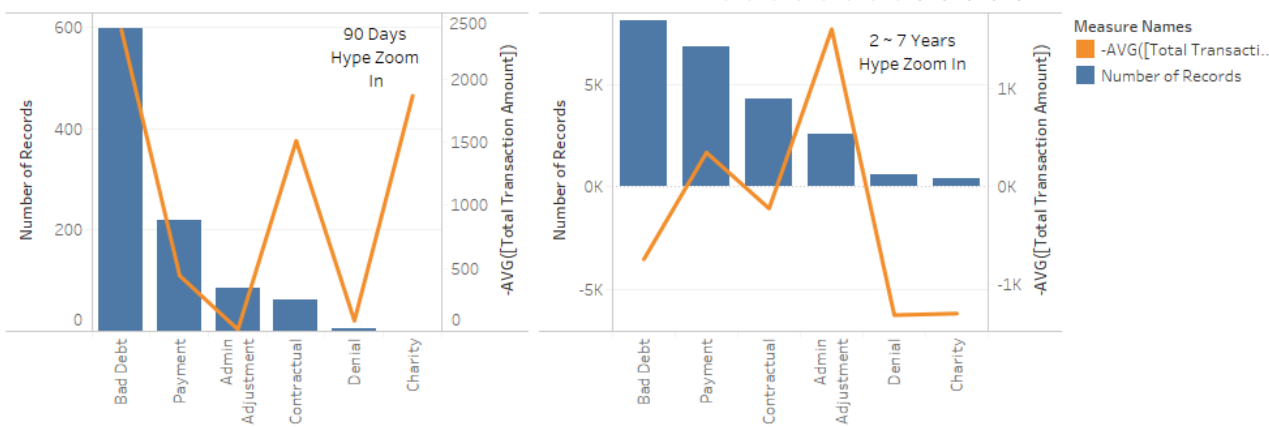
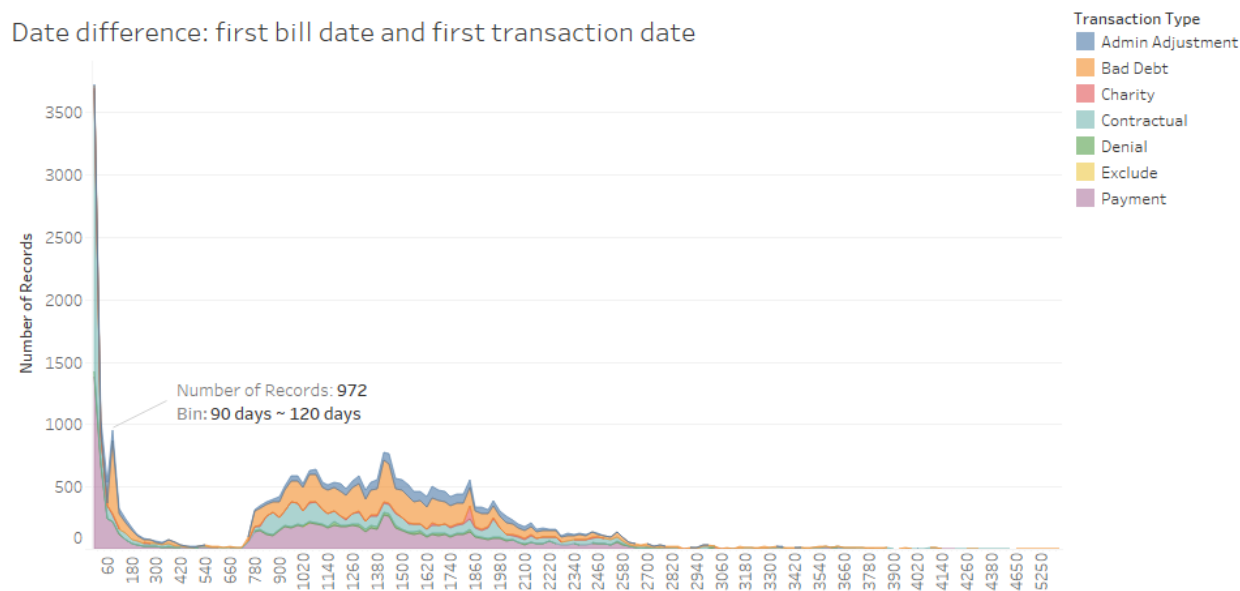
Date difference: first bill date and first transaction date



Visual Audit Task 3: Testing Occurrence Assertion

- Lower the aggregated level to service level (top figure) and select a sub-sample including accounts only recorded in the first hype (bottom left figure) and the second hype (bottom right figure).
- Findings: 1) both hypes were mainly caused by the bad debt transactions; 2) the second hype was highly related to the transactions with positive numbers (probable adjustment/transfer); 3) the first hype was solely caused by the regular transactions with negative numbers

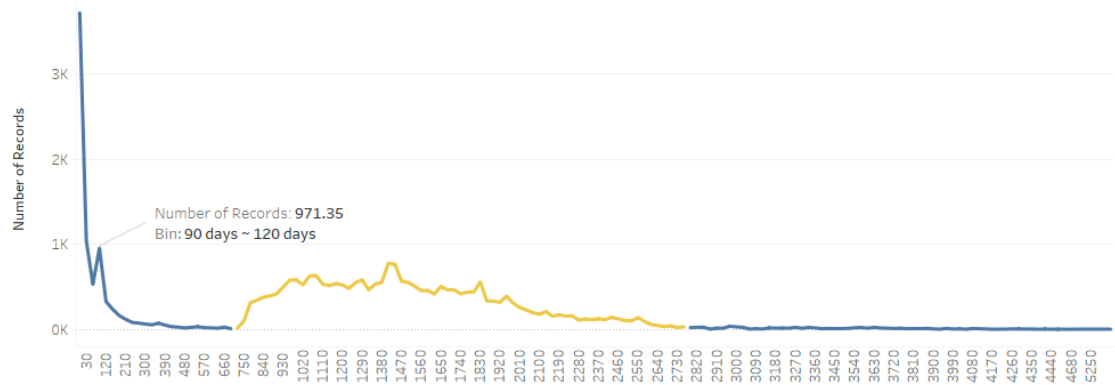
Date difference: first bill date and first transaction date



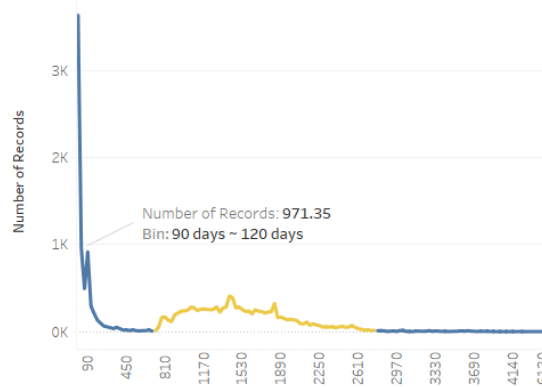
Visual Audit Task 3: Testing Occurrence Assertion

Confirm the second finding stated in the previous slide by generating the similar line chart but using negative value transactions (bottom left figure) or positive value transactions (bottom right figure).

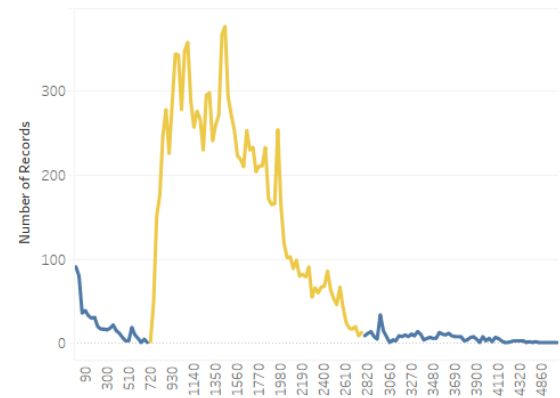
Date difference: first bill date and first transaction date



Negative transaction value



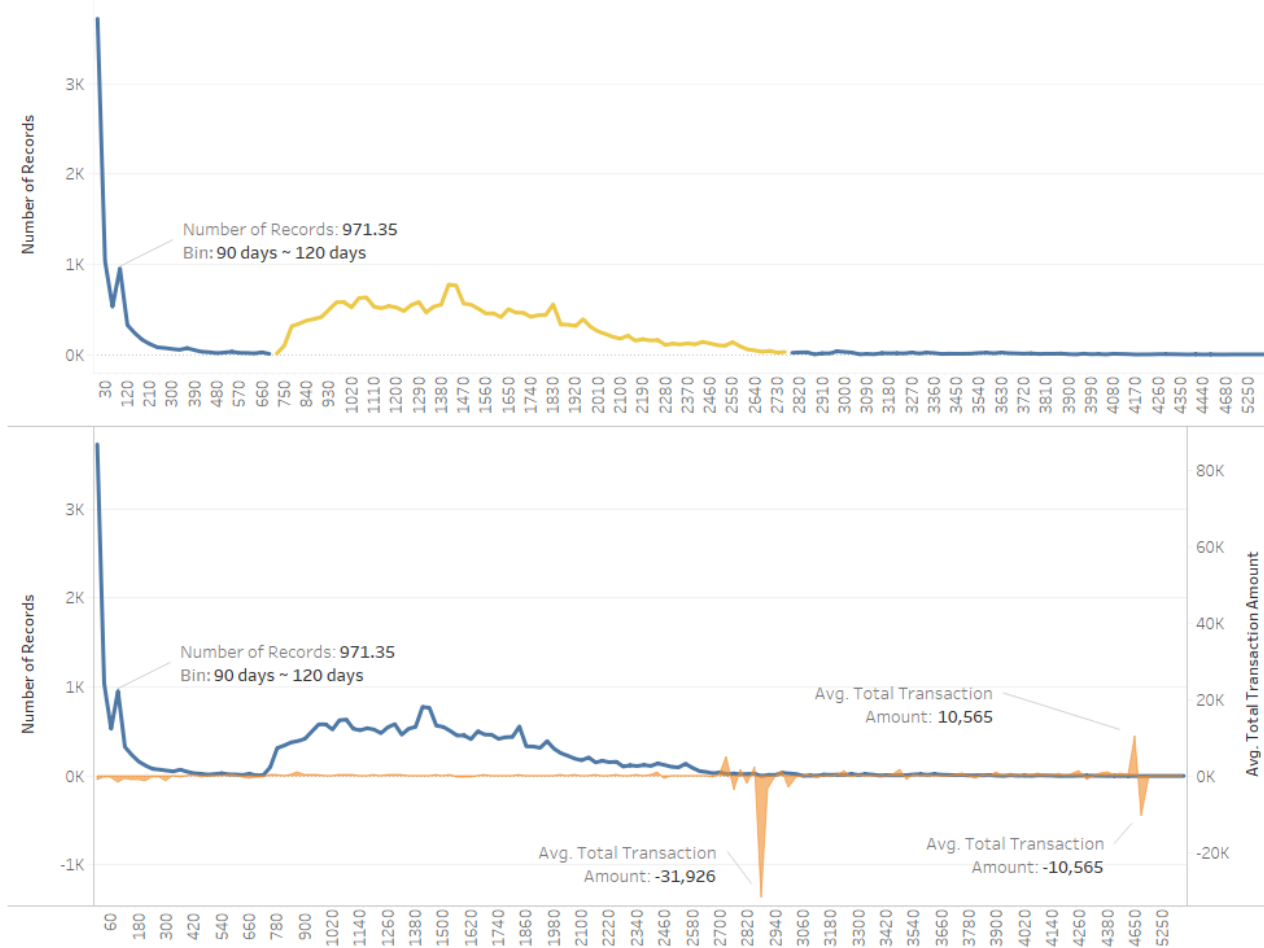
Positive transaction value



Visual Audit Task 3: Testing Occurrence Assertion

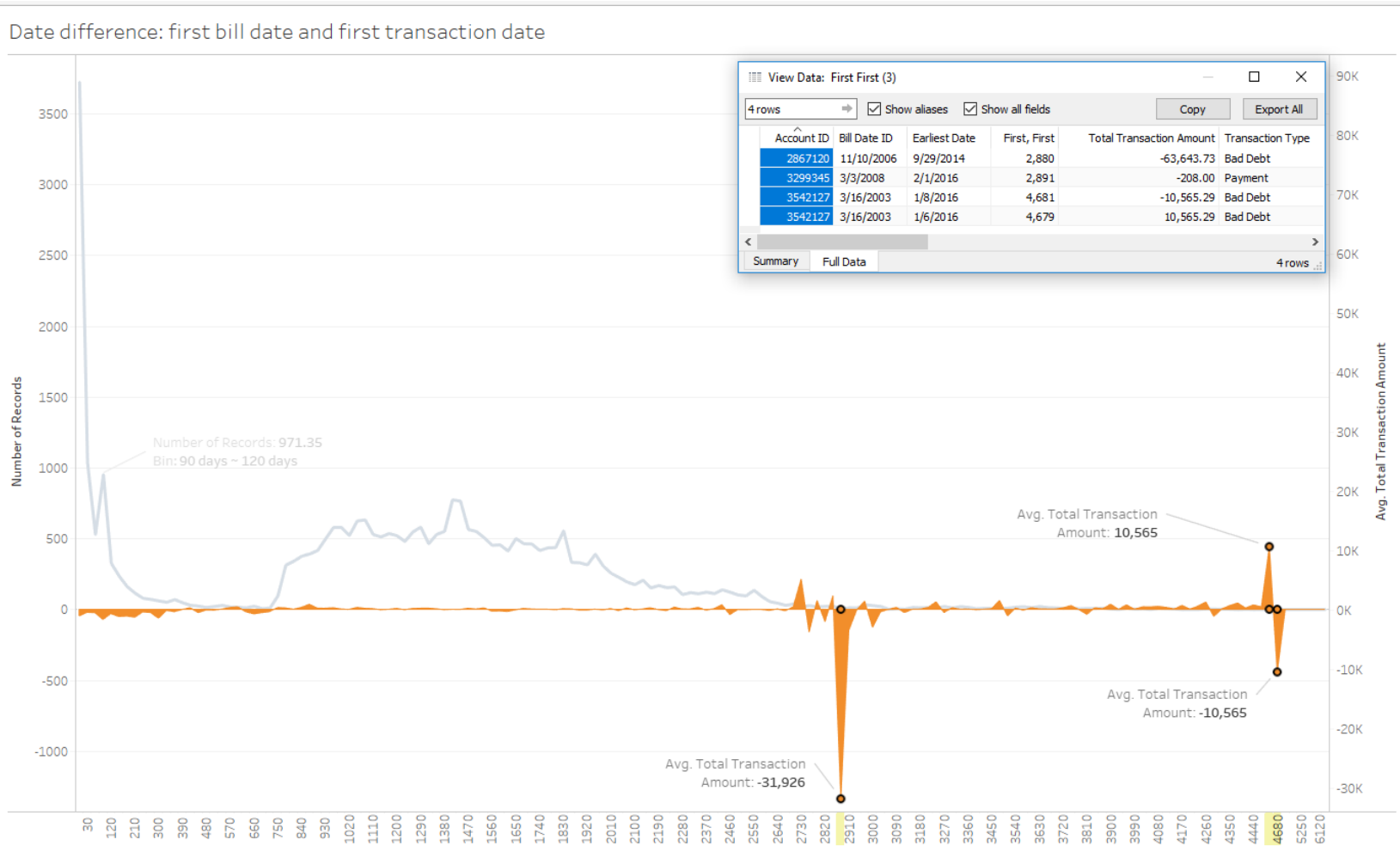
1. Use dual axis and orange area to indicate the average recorded transaction value for each bin.
2. Anomalies identified (low frequency but high value; offsetting records with high value).

Date difference: first bill date and first transaction date



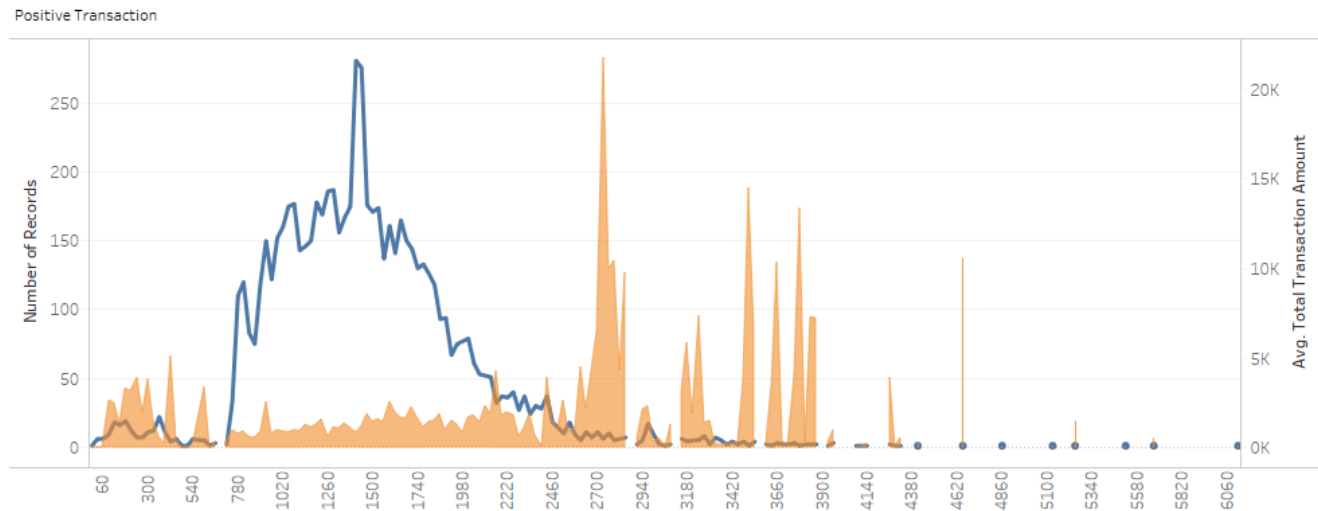
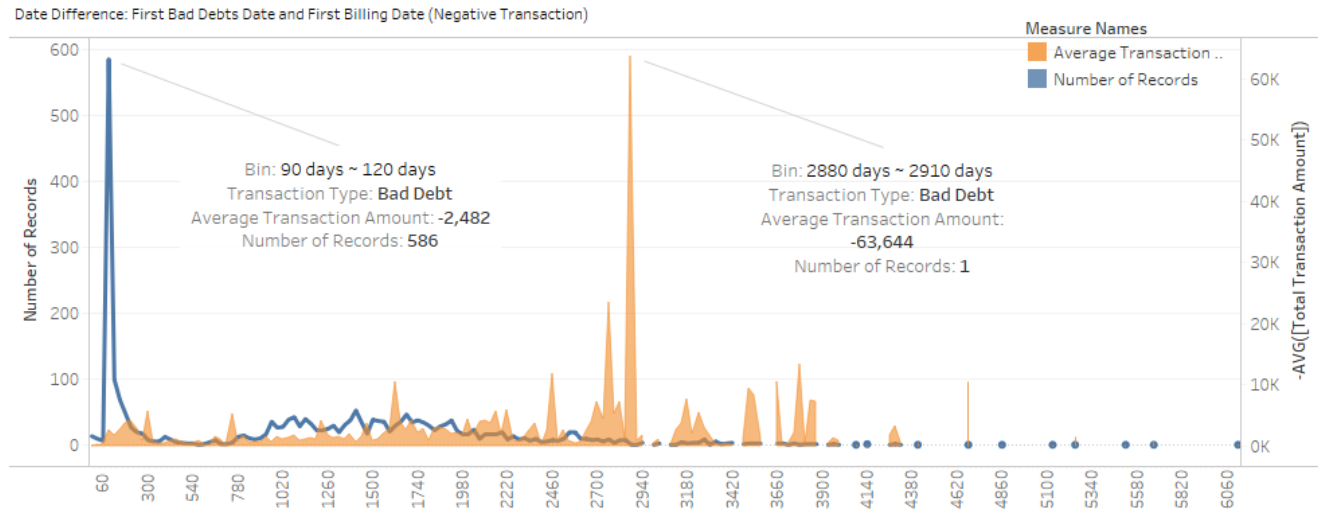
Visual Audit Task 3: Testing Occurrence Assertion

Select anomalies and use table for further investigation.



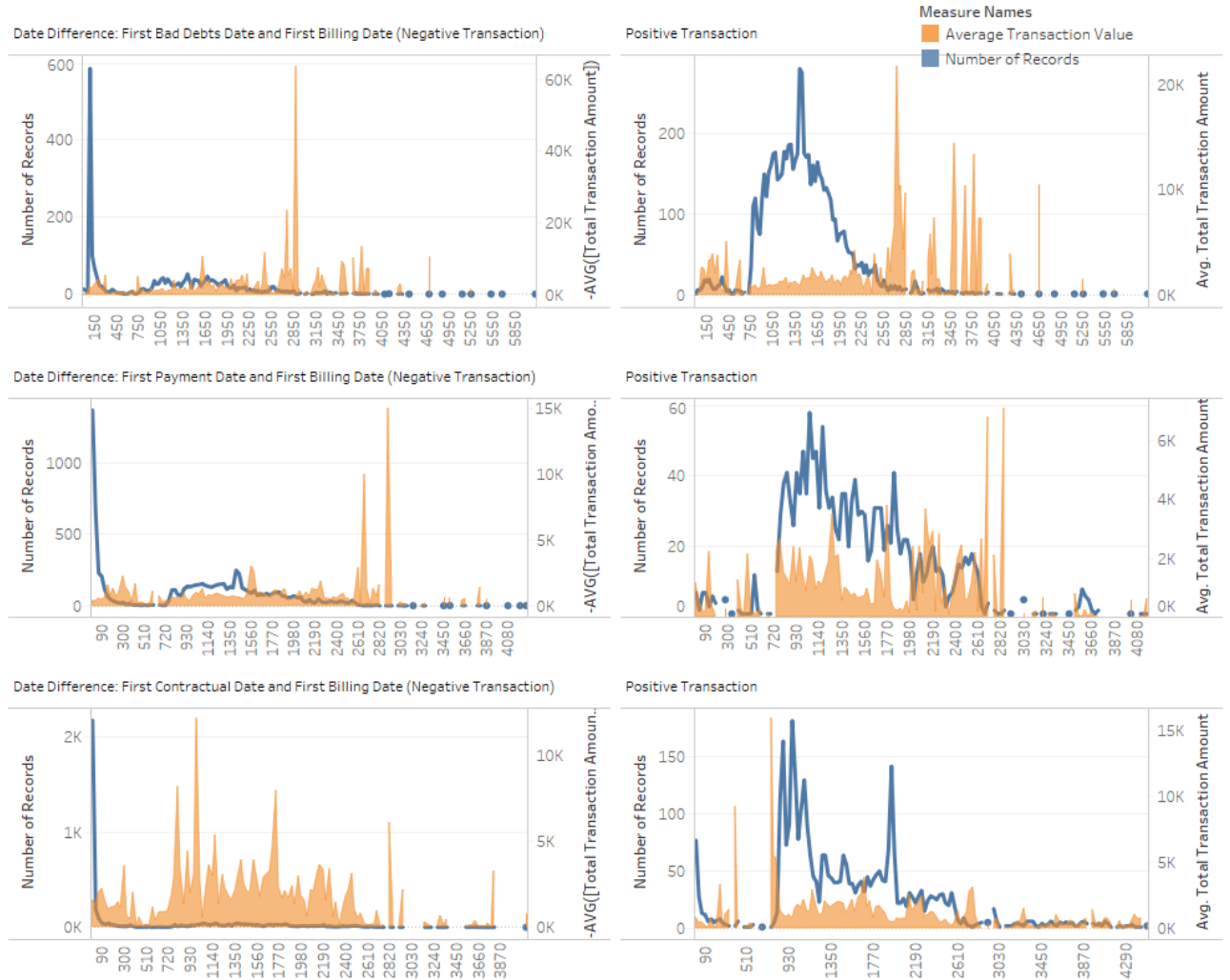
Visual Audit Task 3: Testing Occurrence Assertion

1. Similar graph as that of last slide
2. Used bad debts transaction records only and divided the sample into transaction with negative values (top figure) and positive values (bottom figure).



Visual Audit Task 3: Testing Occurrence Assertion

Applied the similar method to other transaction types: Payment (middle figure) and Contractual (bottom figure).



Visual Audit Task 4: Transaction Value Analysis

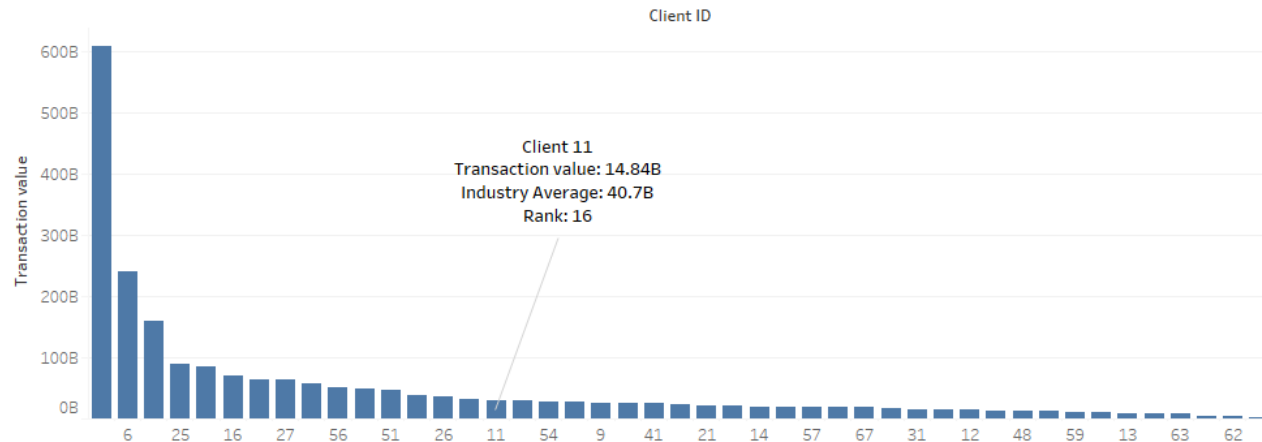
- Perform risk assessment and test audit assertions
- Use transaction values under different Transaction Type
- Conduct K-means clustering analysis to identify comparable peers

Visual Audit Task 4: Transaction Value Analysis

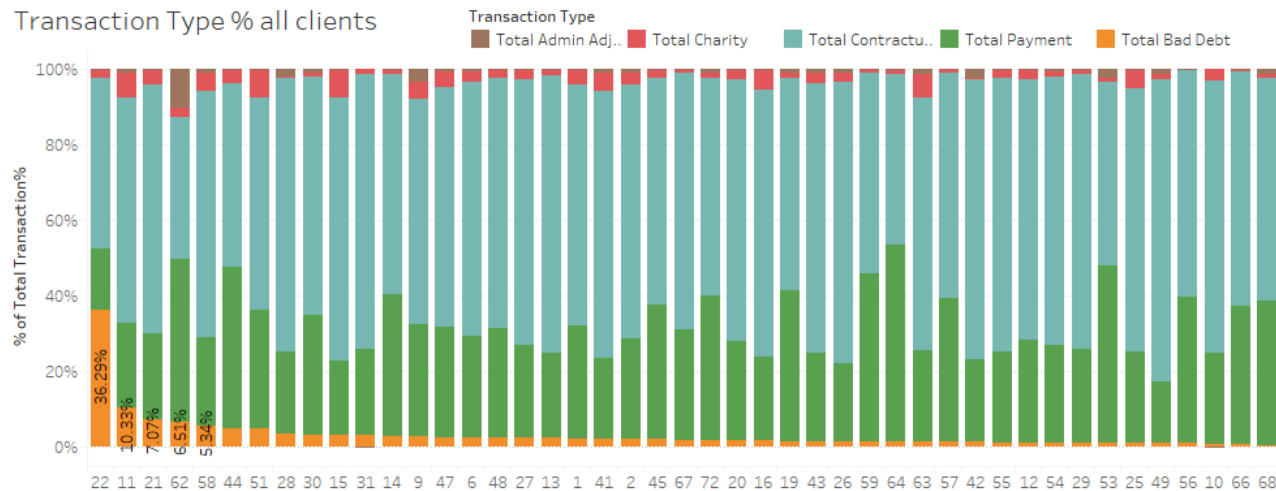
1. We generated bar chart to compare total transaction value among all clients (top figure). Based on the results, Client 11 ranked No.16 over 45 hospitals and its reported transaction value was below the industry average (14.84b versus 40.7b).

2. Zooming into the transaction type level, we generated stacked bar chart to investigate the percentage of transaction value of different transaction types over total among all clients. We found that client 11 reported high bad debts transaction % (ranked the second).

Total Transaction Value all clients



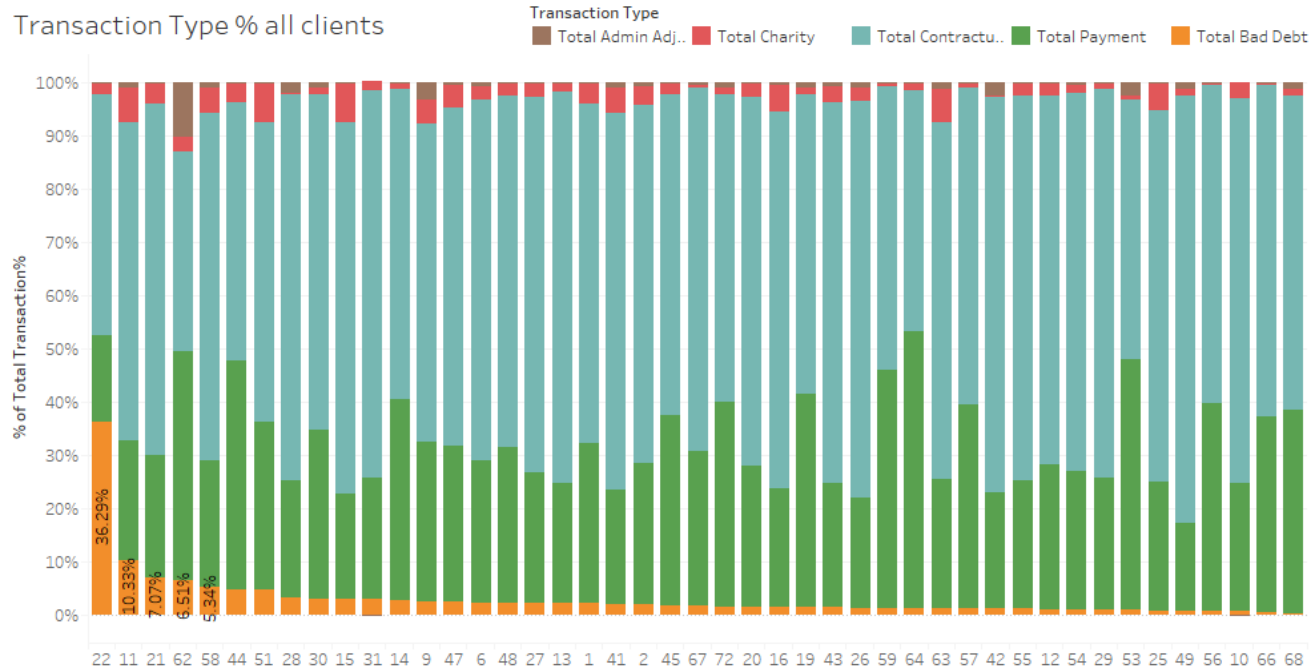
Transaction Type % all clients



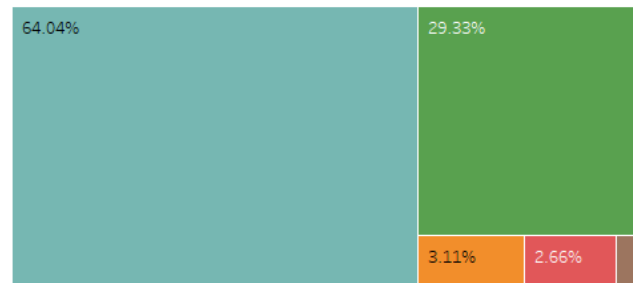
Visual Audit Task 4: Transaction Value Analysis

We further compared client 11's bad debts percentage with industry average (bottom left) and with the percentage of total bad debts over total transaction value reported by all clients. The bad debts percentage of client 11 was way over those two indicators (10.33% versus 3.11% and 2.35%).

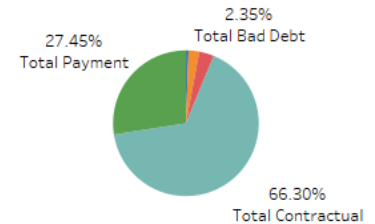
Transaction Type % all clients



Industry Average

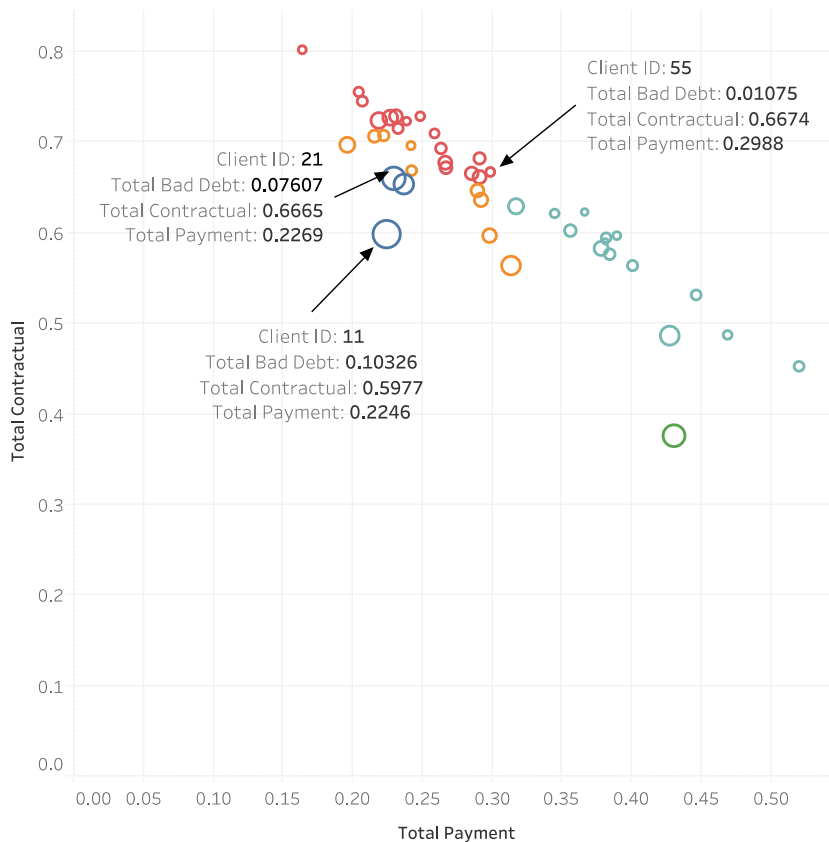


Total Bad Debts over Total Transaction - All Clients



Visual Audit Task 4: Transaction Value Analysis

Clustering based on Transaction Type value proportion, excluding Client 22



Size: the average Bad Debt%.
Color: the clusters

- Run K-means clustering using transaction structure based on transaction type (Admin Adjustment, Bad Debt, Charity, Contractual, and Payment)
 - Proportion over total transaction value
- Exclude client 22 from the sample because it has exceptionally high bad debt%.
- Client 11 has higher bad debts% and lower payment%
- Drill down from entity level to the division level by analyzing aggregated value based on the service type the client offered.

Visual Audit Task 4: Transaction Value Analysis

Clustering based on Size Related Variables



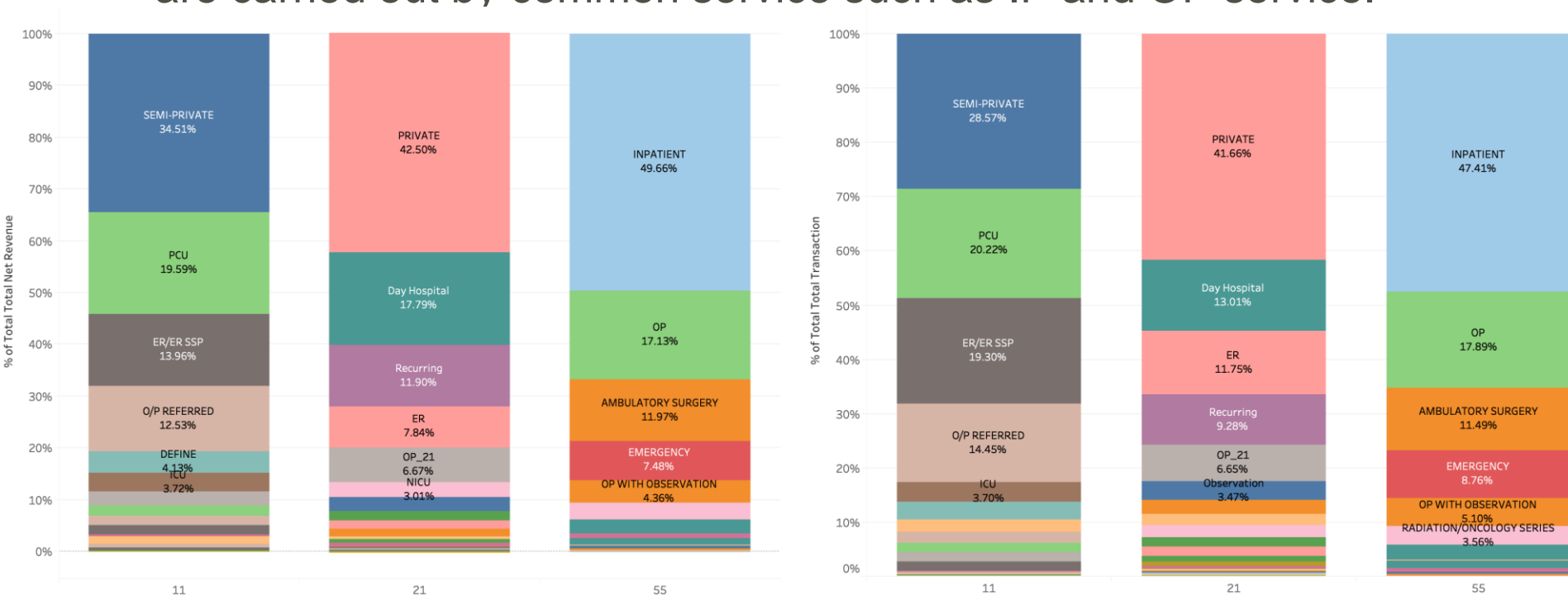
- Run K-means clustering analysis using five size related variables (total account number, total transaction value, total payment value, total net revenue and total account receivable balances)
- Exclude client 1, 2, 6 whose sizes are significantly larger than others.
- Client 55 is similar to Client 11 in terms of size

Visual Audit Task 4: Transaction Value Analysis

- Select two hospitals as the peers of client 11
- Client 21
 - both belong to the same cluster representing the highest bad debt transaction value proportion over total transaction value and also belong to the same cluster indicating smaller size
- Client 55
 - similar in terms of size to client 11 while it belongs to the cluster with the lowest bad debt transaction over total transaction value.
- Create dashboard to compare three clients' total transaction value and total net revenue under different service types

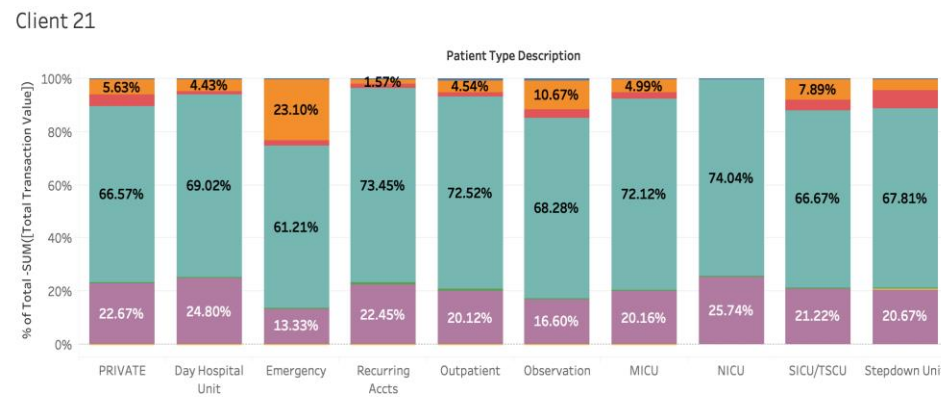
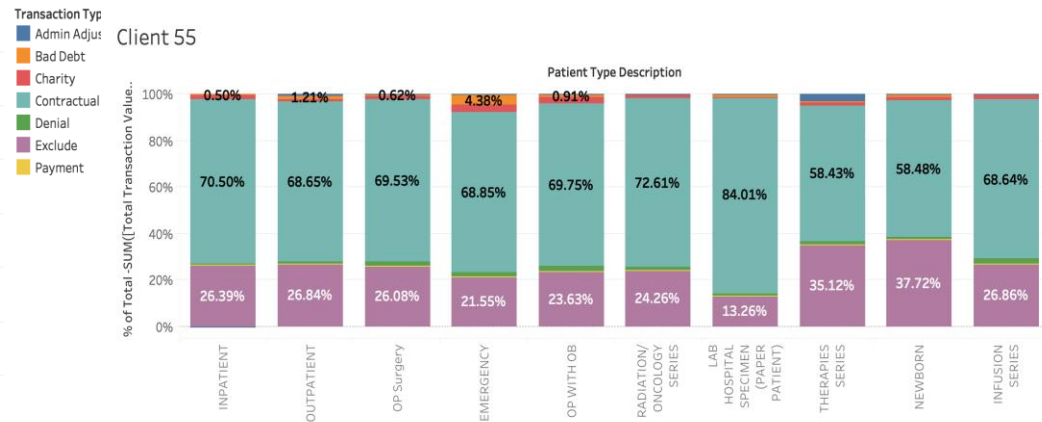
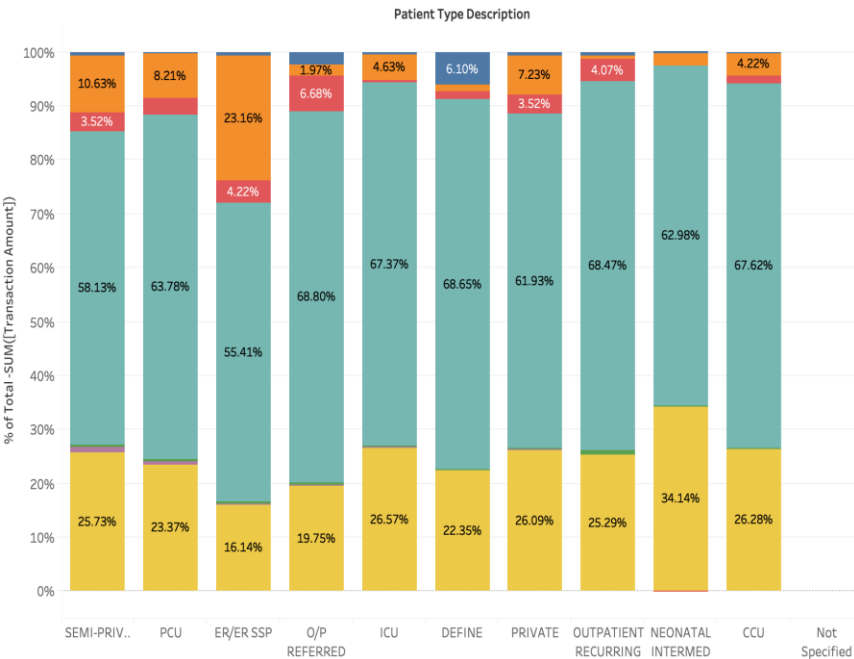
Visual Audit Task 4: Transaction Value Analysis

- For client 11 and 21, most of their revenue and transaction values are generated from more special service like semi-private, private, and PCU.
- On the other hand, for client 55, most of its revenue and transaction are carried out by common service such as IP and OP service.



Dashboard 7: Stacked Bar Charts show the proportion of net revenue (left) and total transaction value under service type of each clients (Client 11, Client 21, and Client 55)

Visual Audit Task 4: Transaction Value Analysis



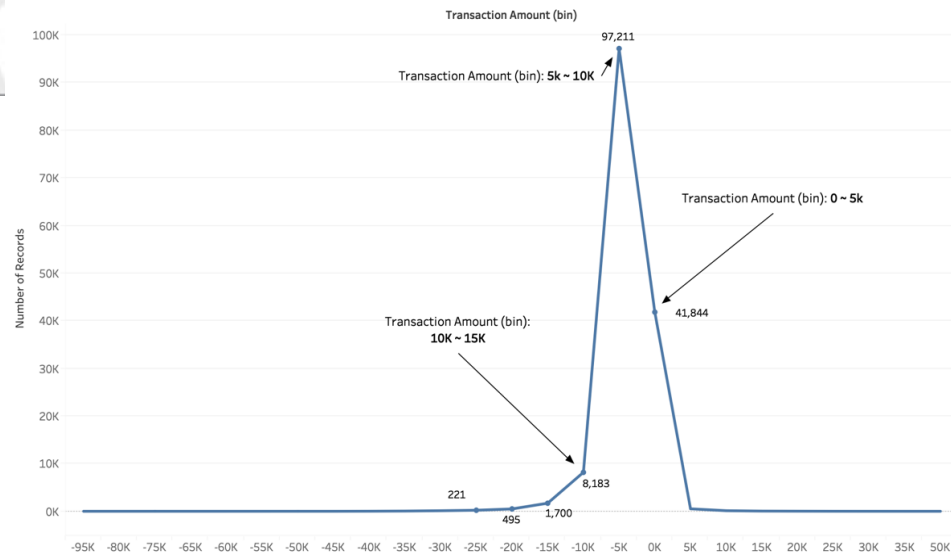
Dashboard 8: Stacked Bar Charts show the proportion of transaction value of different transaction type under Top 10 service type of each clients (Client 11, Client 55, and Client 21).

This dashboard shows that Client 11 has high bad debts%.

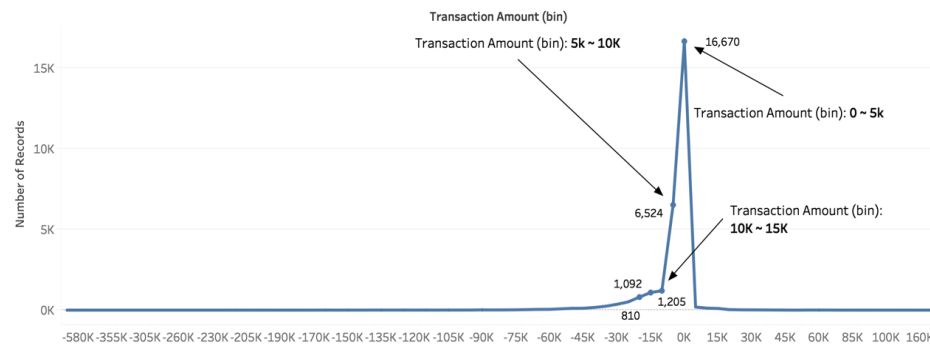
- Drilled down to the account level to investigate why the client has high bad debts % reported under ER, Semi-Private and PCU services.
- We found that
 - Semi-Private and PCU services have more exceptional records with extreme values
 - Semi-Private and PCU services have a lot small but positive transaction records
 - ER has a large number of small to medium bad debts transaction reports

Dashboard 10: Line charts showing the distribution of bad debts transaction of ER, Semi-Private, and PCU

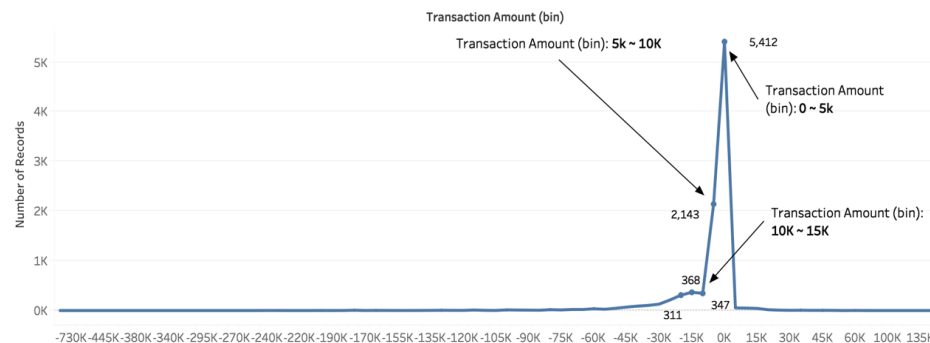
ER - Bad Debts distribution , 2016



Semi-Private - Bad Debts Distribution, 2016

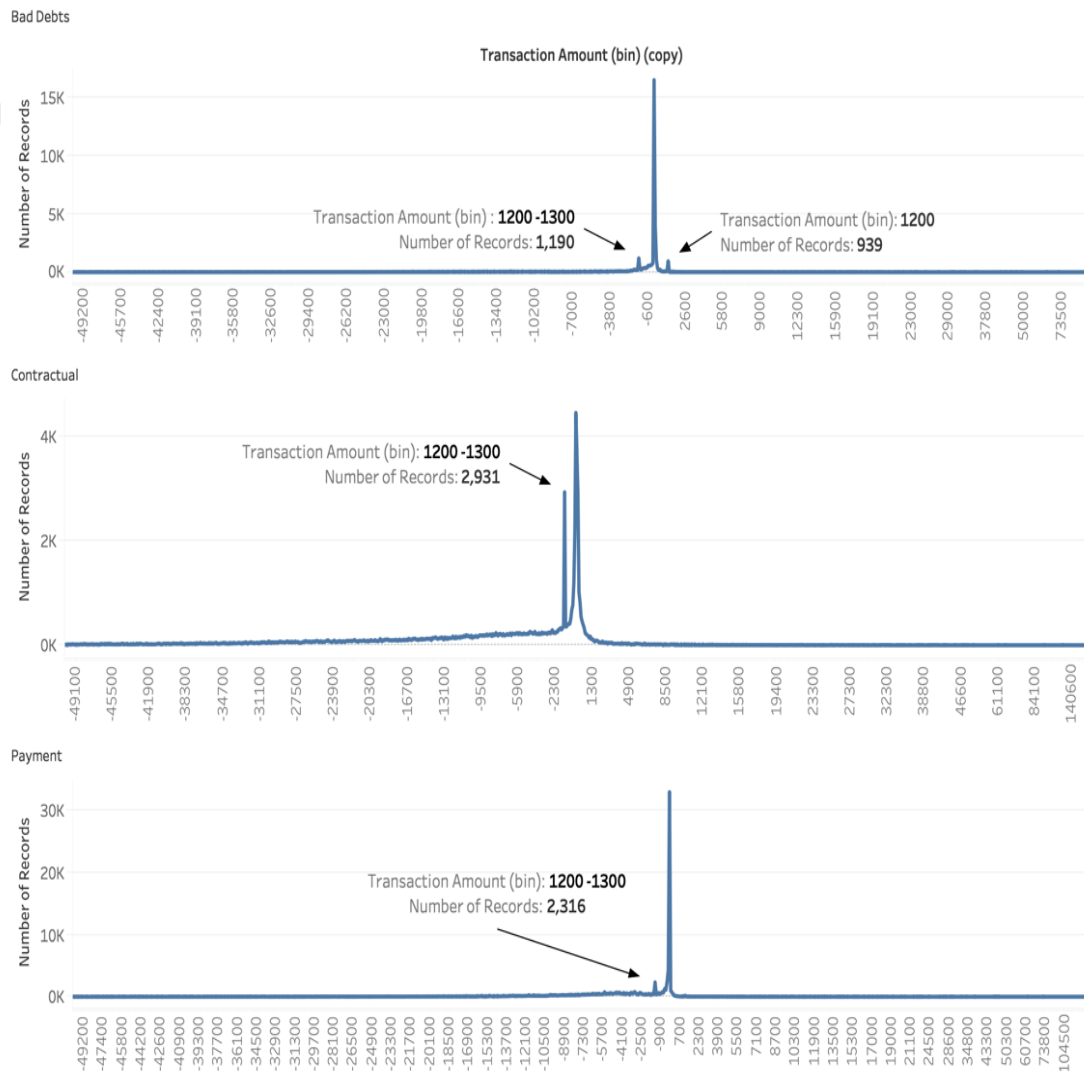


PCU- Bad Debts Distribution, 2016



Sub-Task: Other transaction types analysis

- Narrow down the bin size from 5000 to 100.
- An abnormal hype located in the bin: \$-1200 - \$-1300 for Payment, Contractual and Bad Debts transactions and another hype located in the bin: \$1200 - \$ 1300 for Bad Debts transactions.
- Next, we narrow down the bin size from 100 to 1 for sub-sample



Dashboard 11: Line charts showing the distribution of Bad Debts, Contractual, and Payment transaction under Semi-Private, PCU, ICU and CCU services

Visual Audit Task 4: Transaction Value Analysis

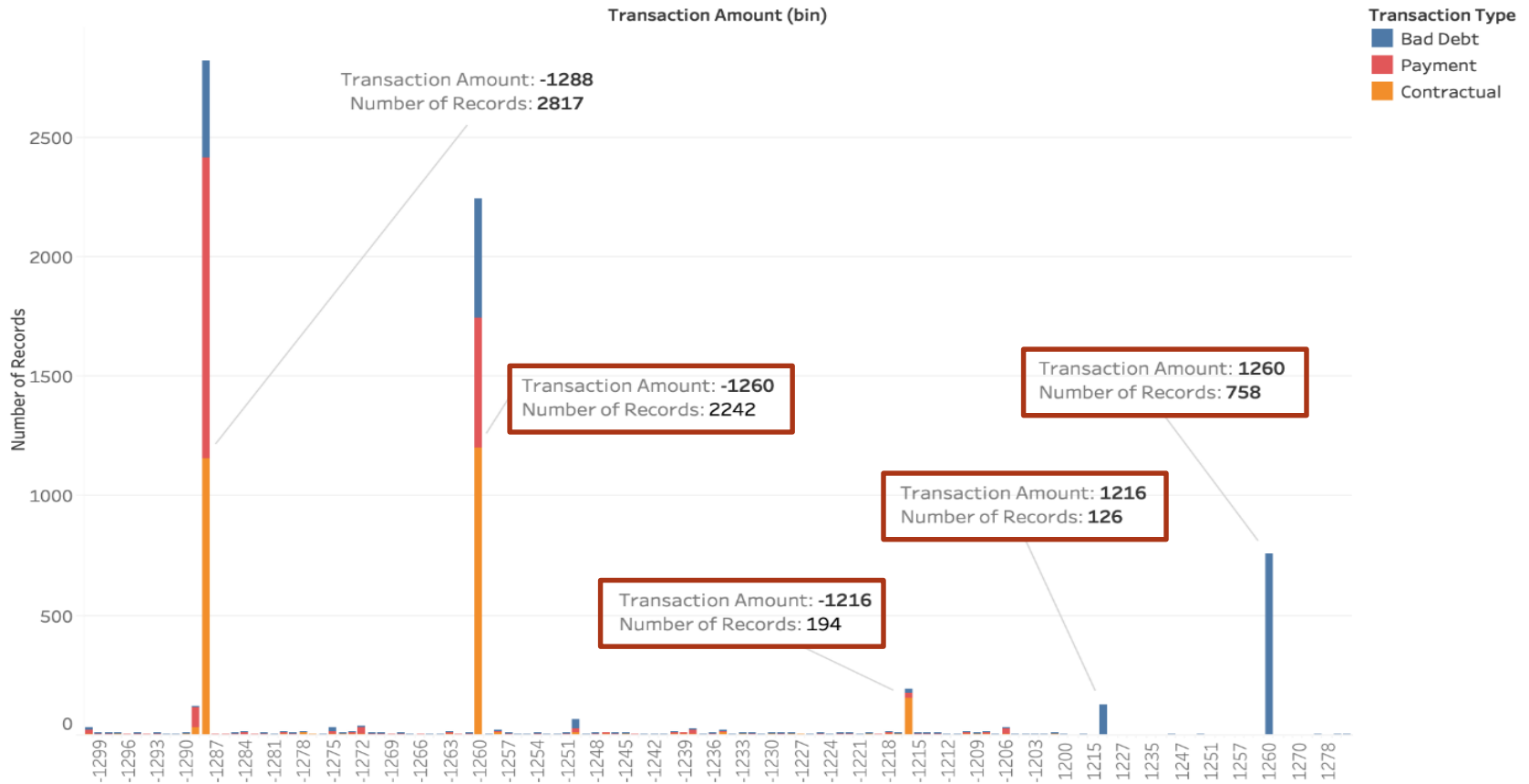
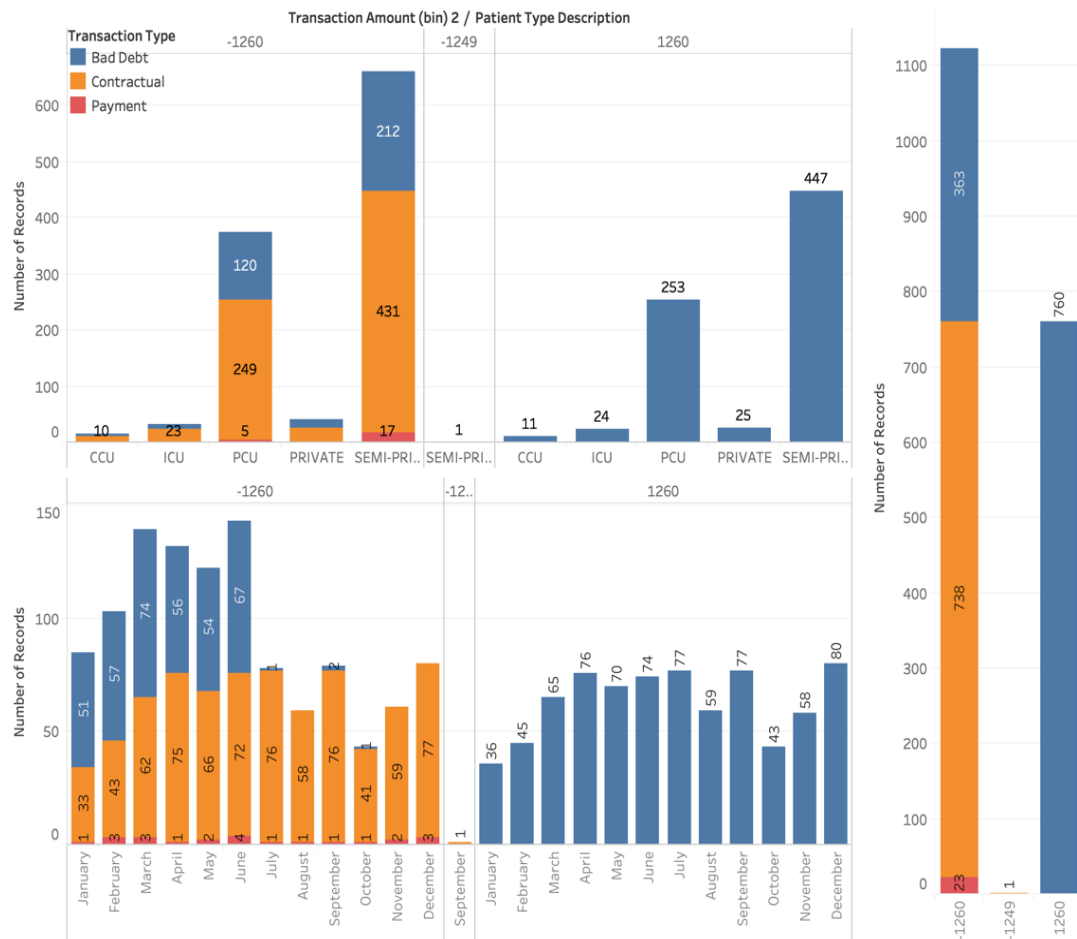


Figure 6: Stacked bar chart show the frequency distribution of the transaction value reported by the accounts

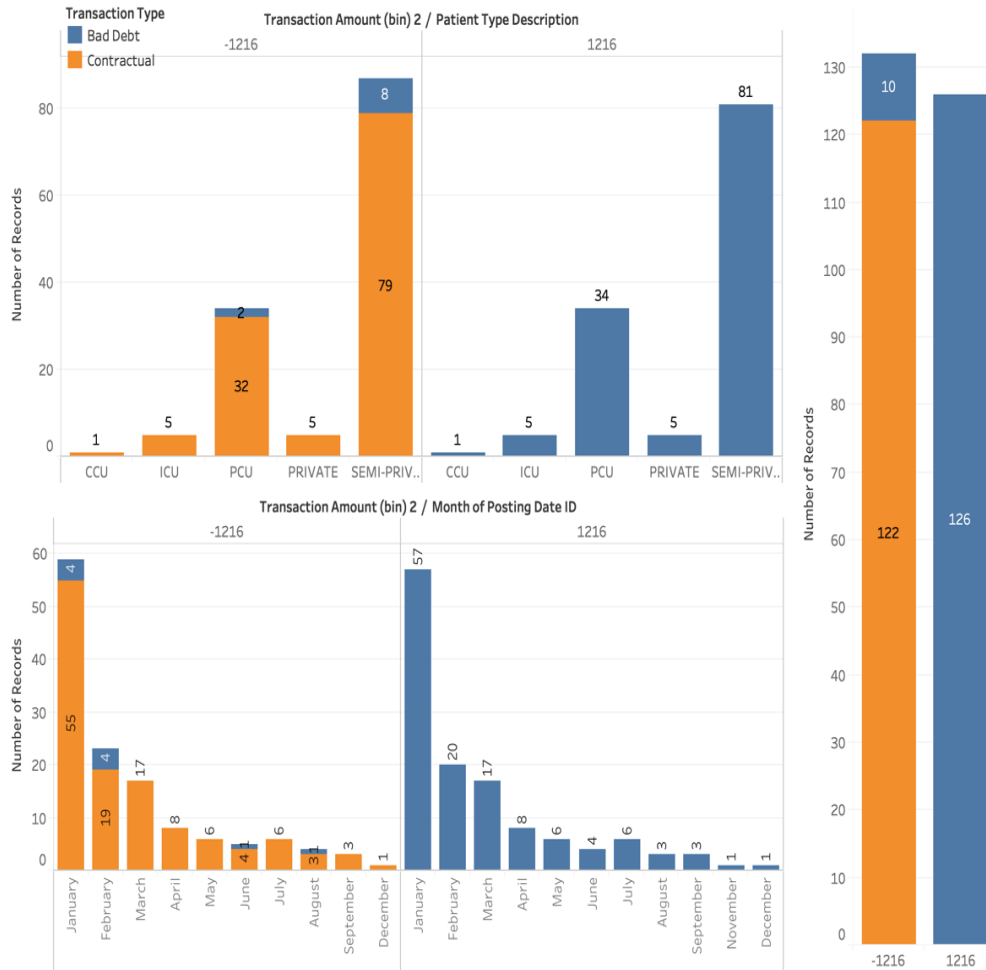
Visual Audit Task 4: Transaction Value Analysis



- Drill down the analysis from entity level to service level and from year level to month level.
- We found that
 - For each month, the number of accounts reported bad debts transaction of \$1260 equals to a combined number of accounts reported contractual and payment transaction of \$-1260
 - most accounts fall into those two bins were recorded under Semi-Private and PCU services.

Dashboard 12: Stacked bar chart show the number of records under different transaction type of bin \$1260 and bin\$-1260 in service level (top) and month level (bottom)

Visual Audit Task 4: Transaction Value Analysis



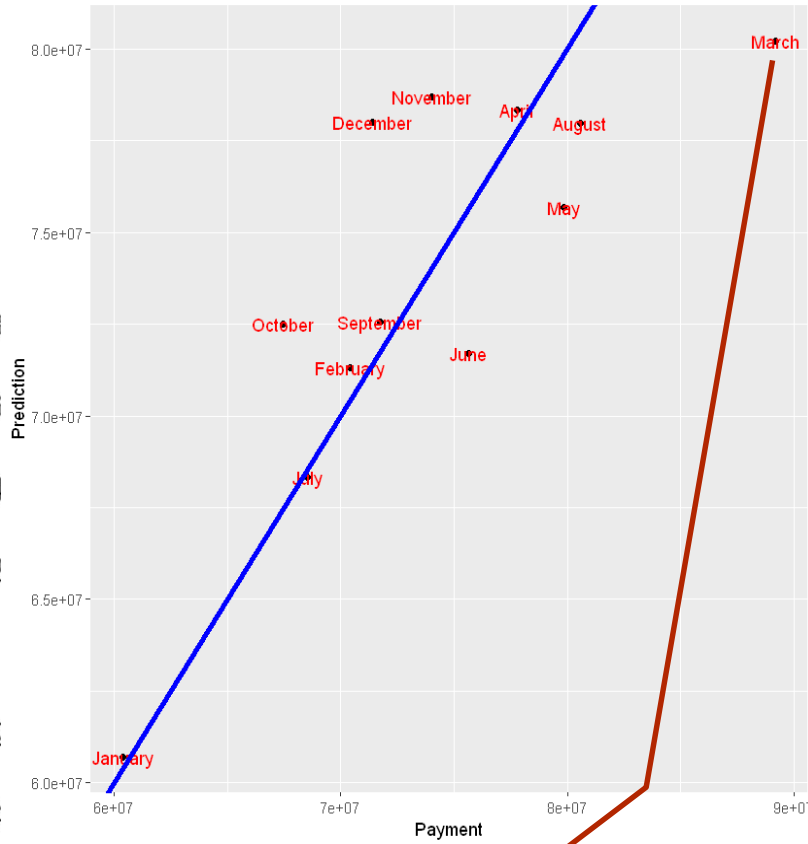
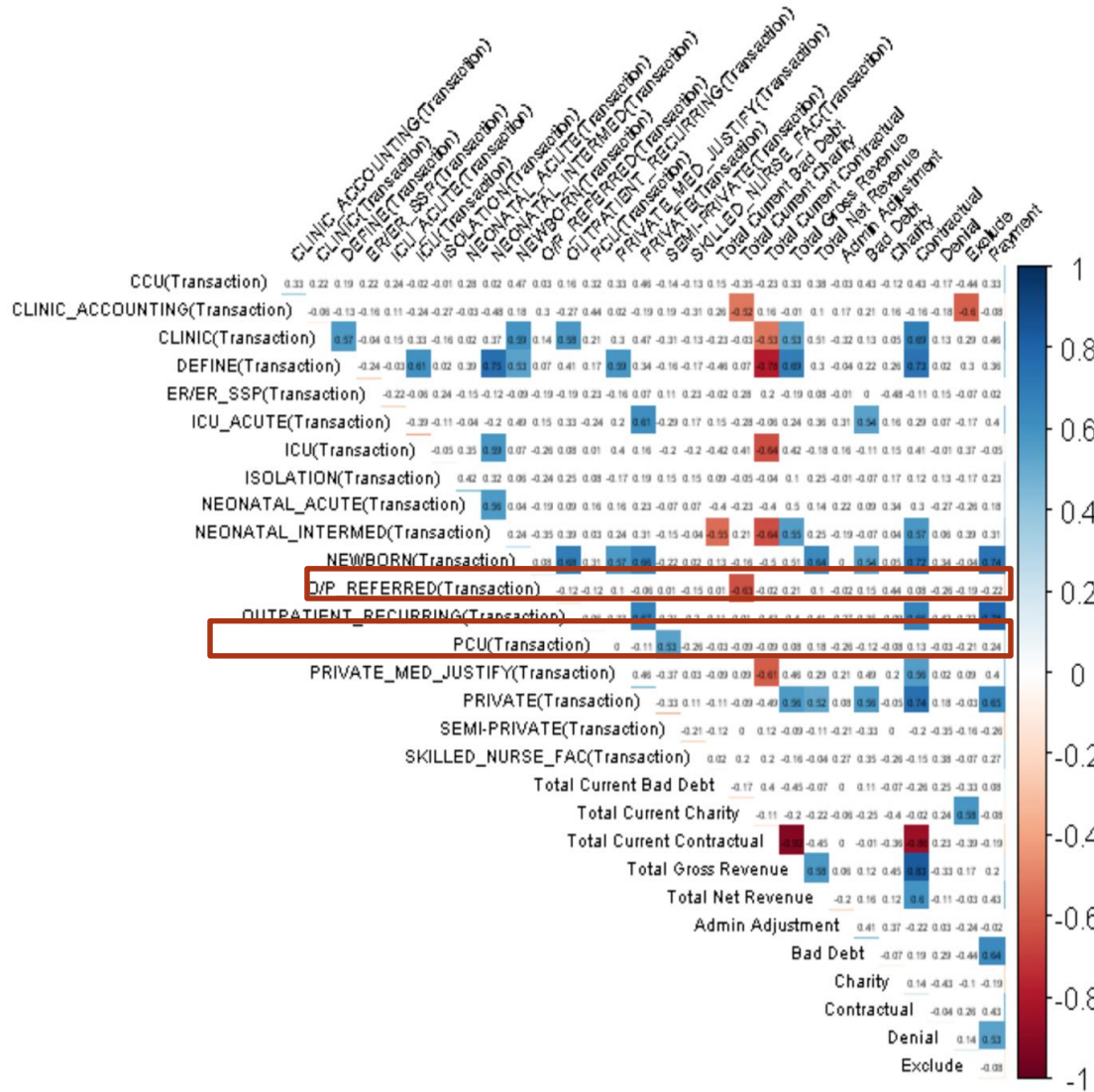
- We found similar results for bin \$1,216 and \$-1,216.
- The client might transferred multiple bad debts balance with same dollar value as either \$1260 or \$1216 to contractual deduction or a combination of contractual and payment transactions.

Dashboard 13: Stacked bar chart show the number of records under different transaction type of bin \$1216 and bin\$-1216 in service level (top) and month level (bottom)

Visual Audit Task 5: Analytical Procedure

- Investigate the correlations among monthly transaction values under different service types
- Build the prediction model for monthly net revenue, monthly gross revenue and monthly transaction values under different transaction types.

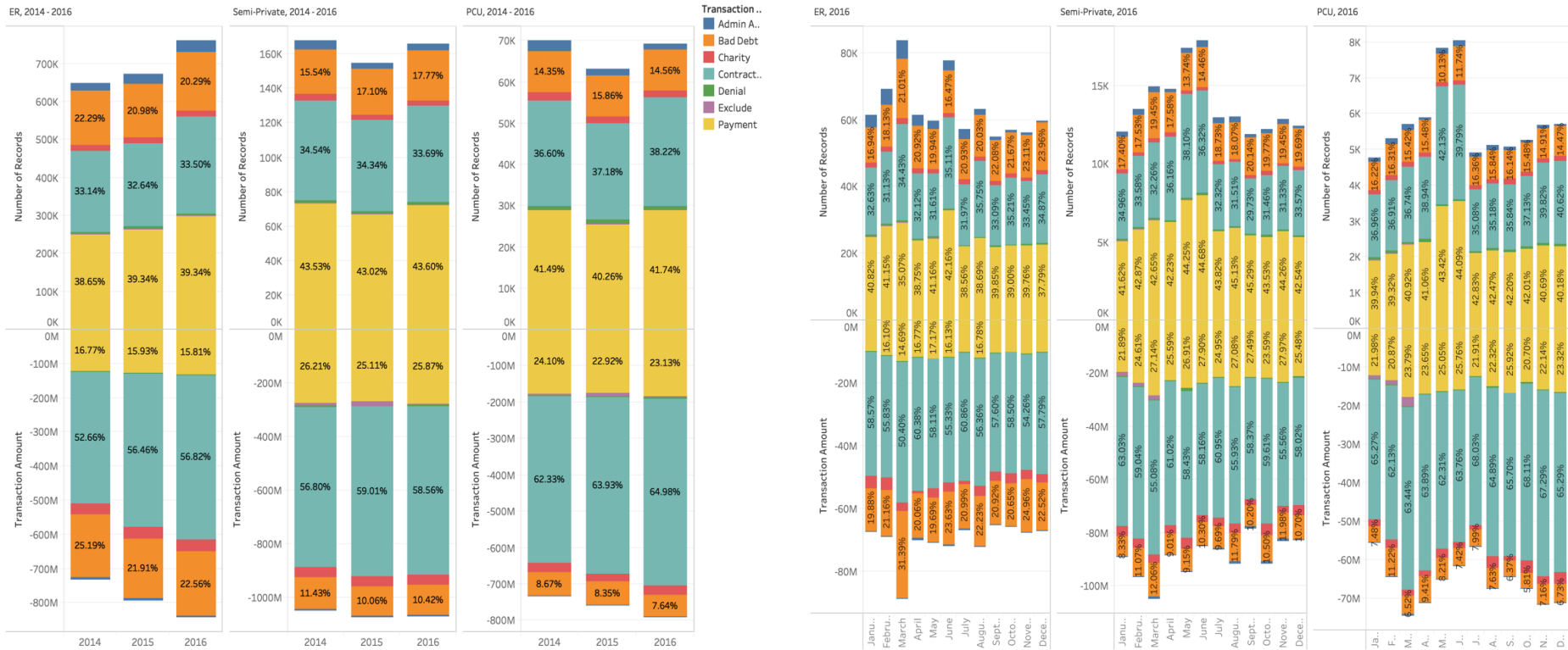
Visual Audit Task 5: Analytical Procedure



We decide to conduct further investigation for the exceptional payment occurred in March 2016

Visual Audit Task 5: Analytical Procedure

- Drill down from entity level to service level (ER, Semi-Private, PCU) and yearly to monthly level



Dashboard 14: Stacked bar chart show the proportion of transaction amount and number of record under different transaction type in different service level, yearly (left) and monthly (right)

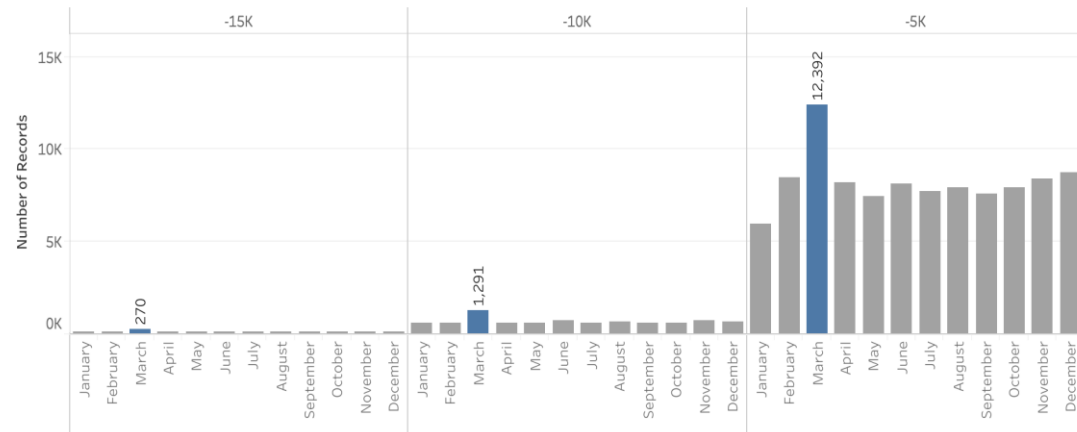
Visual Audit Task 5: Analytical Procedure

- The proportions are constant over three years
- Large number of records and transaction value under ER were reported in March 2016
- Large number of records under ER was reported in June 2016 but total transaction value was normal
- Both Semi-Private and PCU reported high transaction frequency in May and June in 2016 but recorded transaction value was normal
- High bad debts transaction value percentage in March 2016 reported under ER service

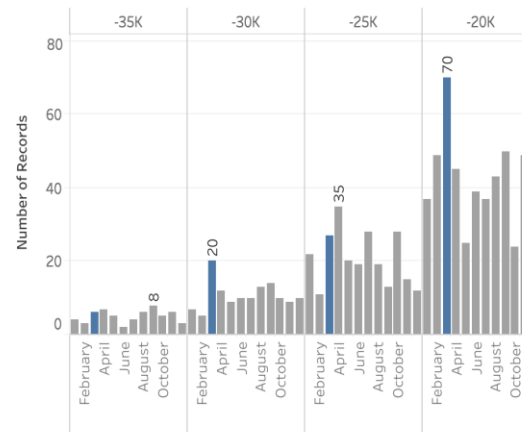
Visual Audit Task 5: Analytical Procedure

- Drill down to the account level and create frequency distribution of Bad Debts bar charts with bin size equal to 5000.
- High bad debts transaction value reported under ER in March 2016 is not due to exceptional accounts with exceptional bad debts records.

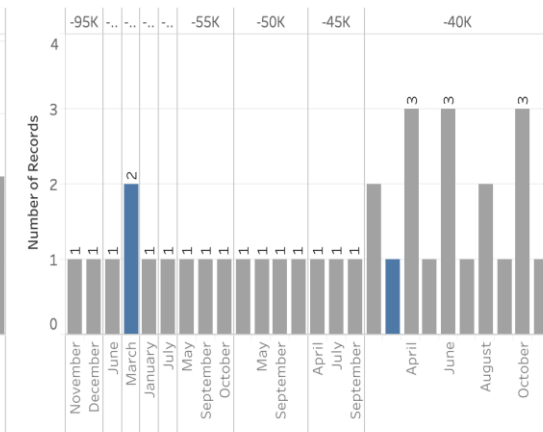
Bad Debts Transaction Value: 0 ~ 15K



15K ~ 35K



More Than 35K



Dashboard 15: The frequency distribution bar charts show bad debts transaction under ER service reported in 2016

Visual Audit Task 5: Analytical Procedure

- Based on the visual analysis shown in dashboard 14 and 15, we believe that, in the later investigation and testing, auditor should focus more on the ER service occurred in March 2016 and try to find out the reason for the exceptional higher transaction value and bad debts reported in March.

Questions

- Does service type of the account affect the proportion of transaction value under different transaction type? (Related to Visual Audit Task 4)
- Can we get additional information about the specific hospitals? (Related to Visual Audit Task 1)
- Any data missing? (Mismatch between Account table and Transaction table) Why bad debt transactions have higher mismatch rate? (Related to Visual Audit Task 2)
- Any business rule related to the abnormal hype for the distribution of difference between billing date and transaction date? (3 years, 6 years) (Related to Visual Audit Task 3)

Future Work

- Improve the framework
- Audit visual evidence and reporting standardization
- Experiments to test the framework