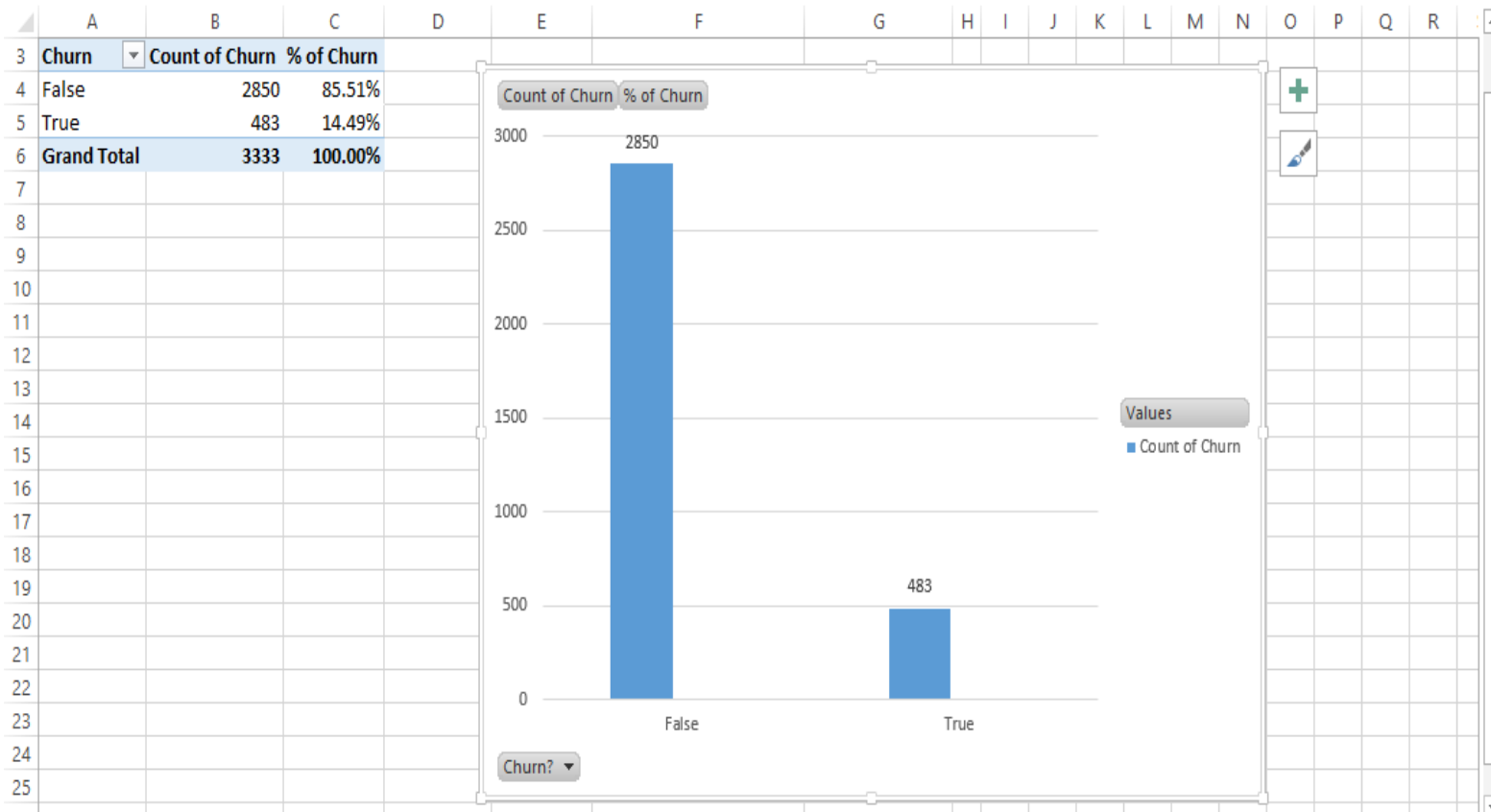


Churners



PivotChart Fields

Choose fields to add to report:

- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn?

Drag fields between areas below:

FILTERS

LEGEND (SERIES)

Σ Values

AXIS (CATEG...)

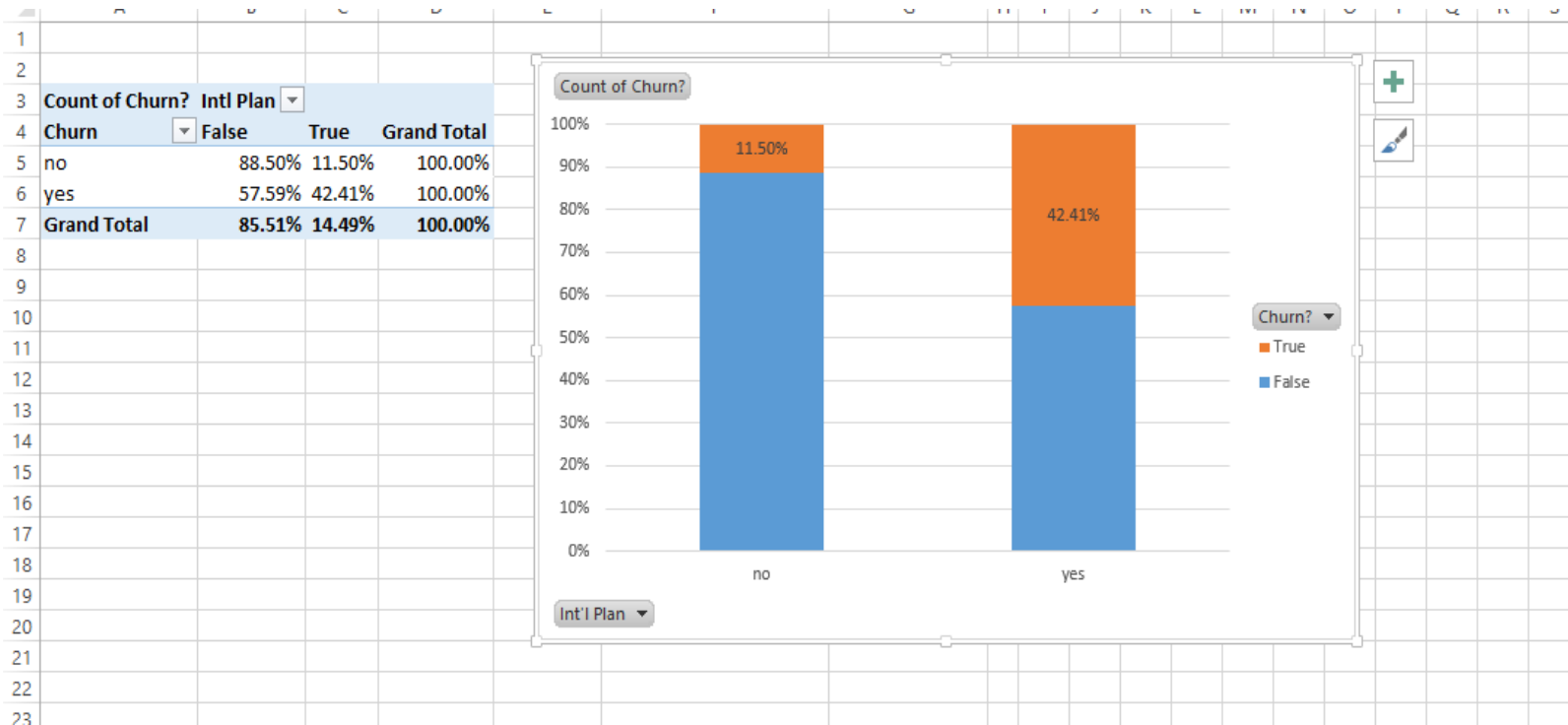
Σ VALUES

Churn?

Count of Churn

% of Churn

Categorical Variable Intl plan vs Churn



PivotChart Fields

Choose fields to add to report:

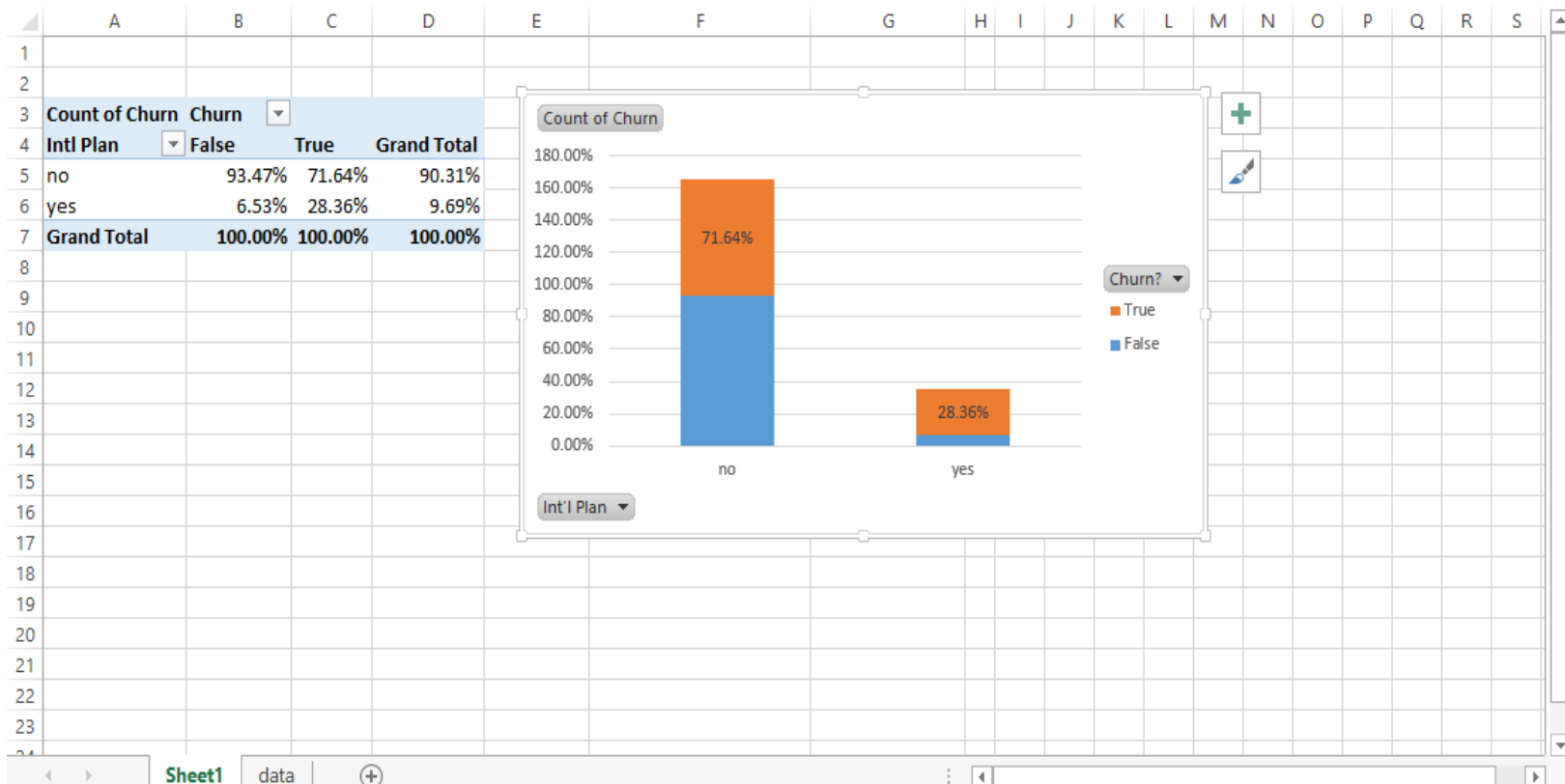
- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn?

Drag fields between areas below:

FILTERS	LEGEND (SERIES)
	Churn? ▼

AXIS (CATEG...)	VALUES
Int'l Plan ▼	Count of Chu... ▼

Categorical Variable Intl plan vs Churn



PivotChart Fields

Choose fields to add to report:

- Account Length
- Area Code
- Churn?
- CustServ Calls
- Day Calls
- Day Charge
- Day Mins

Drag fields between areas below:

FILTERS

LEGEND (SERIES)

Churn?

AXIS (CATEG...)

VALUES

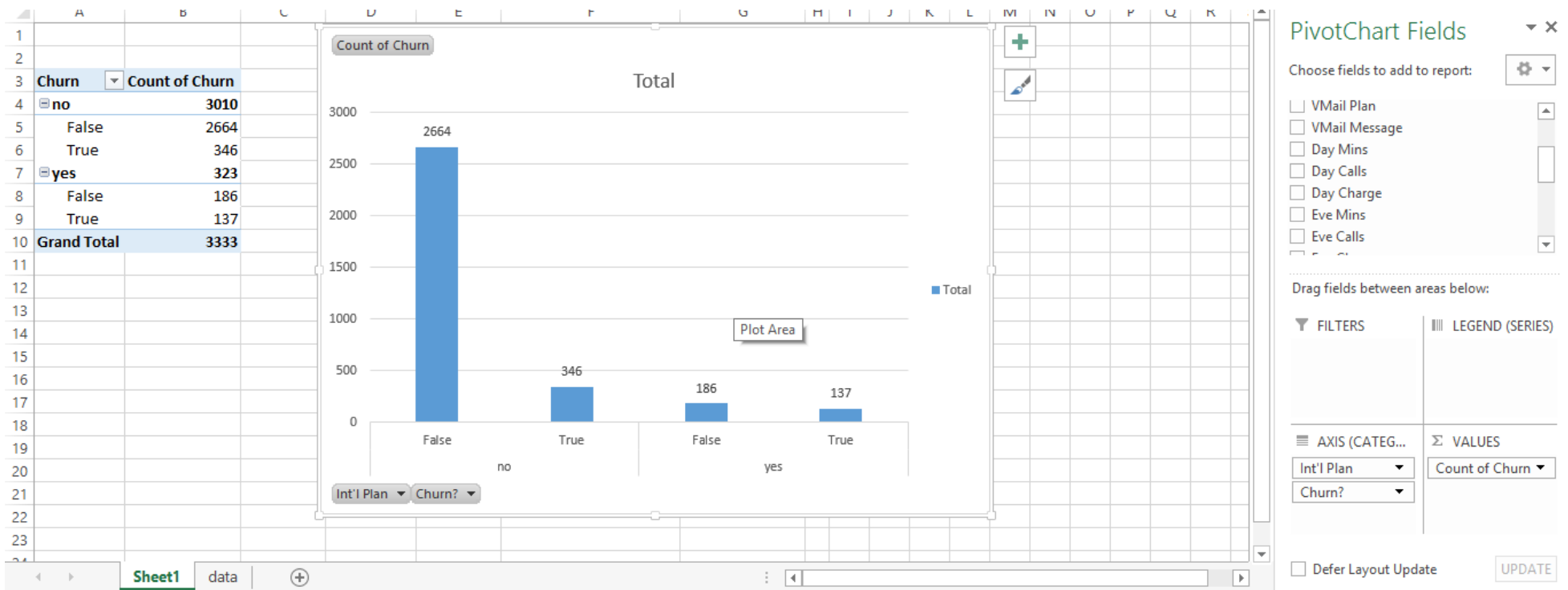
Intl Plan

Count of Churn

Defer Layout Update

UPDATE

Categorical Variable Intl plan vs Churn



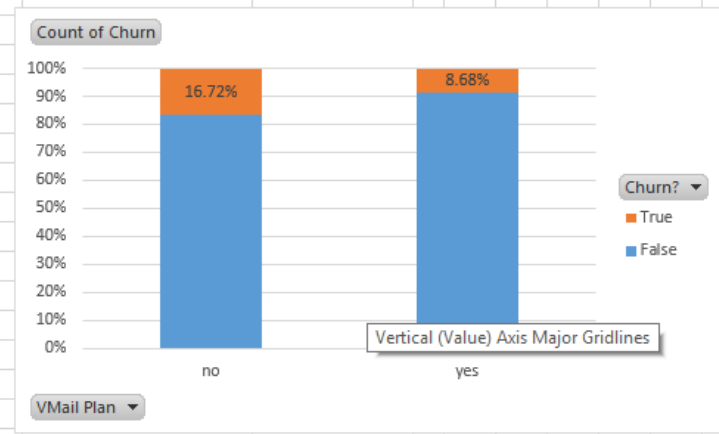
Intl plan vs Churn

To summarize, this EDA on the International Plan has indicated that

- perhaps we should investigate what is it about our international plan that is inducing our customers to leave;
- we should expect that, whatever datamining algorithms we use to predict churn, the model will probably include whether or not the customer selected the International Plan

Categorical Variable VMail plan vs Churn

Count of Churn	Churn		
Vmail Plan	False	True	Grand Total
no	83.28%	16.72%	100.00%
yes	91.32%	8.68%	100.00%
Grand Total	85.51%	14.49%	100.00%



PivotTable Fields

Choose fields to add to report: [Settings]

- Night Charge
- Night Mins
- Phone
- State
- VMail Message
- VMail Plan**

MORE TABLES...

Drag fields between areas below:

FILTERS	COLUMNS
	Churn?

ROWS	VALUES
VMail Plan	Count of Churn

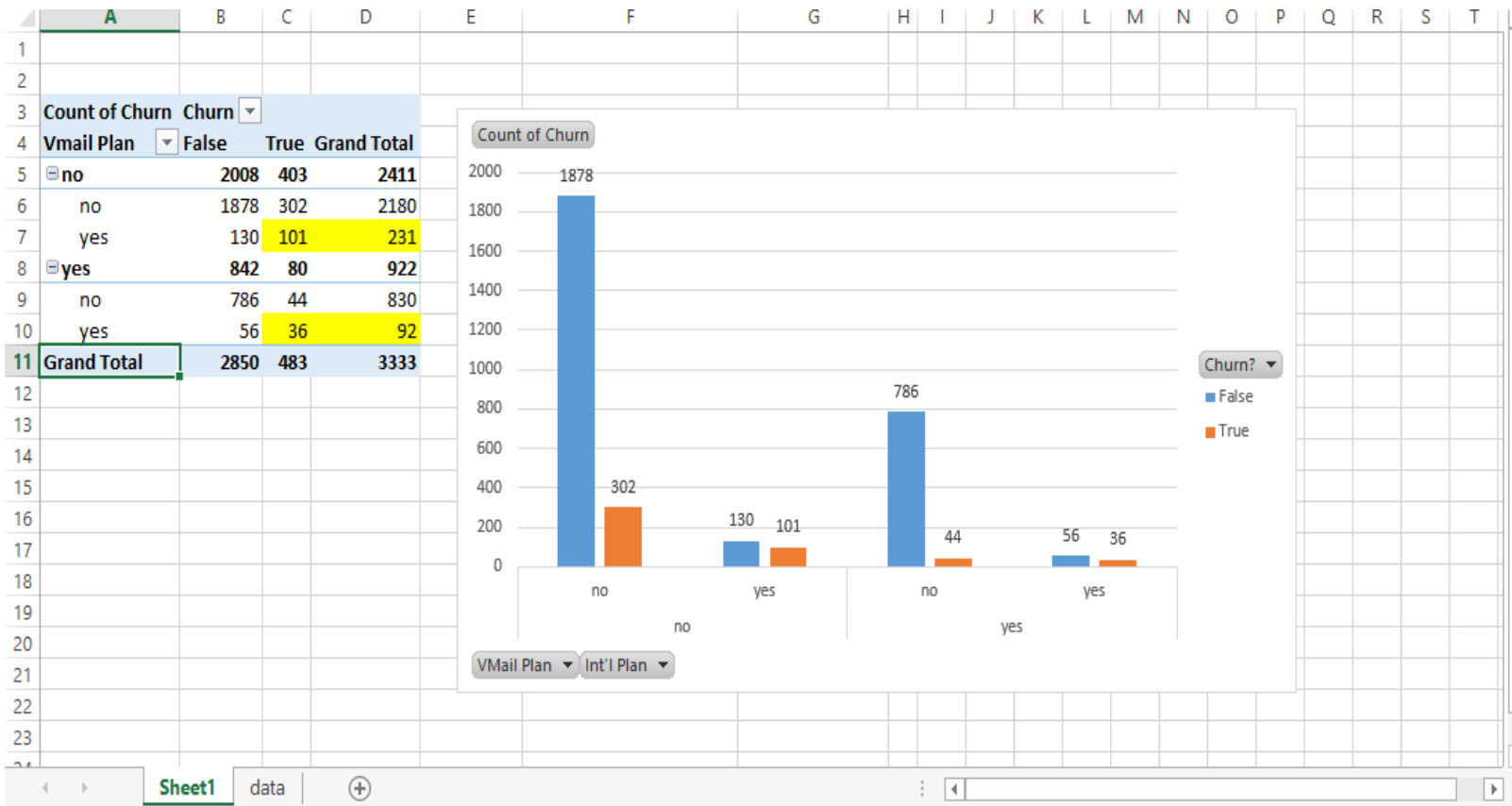
Defer Layout Update [UPDATE]

VMail plan vs Churn

To summarize, this EDA on the VMail Plan has indicated that

- Thus, customers without the Voice Mail Plan are nearly twice as likely to churn as customers with the plan
- Perhaps we should enhance our Voice Mail Plan still further, or make it easier for customers to join it, as an instrument for increasing customer loyalty;
- We should expect that, whatever datamining algorithms we use to predict churn, the model will probably include whether or not the customer selected the Voice Mail Plan

Categorical Variable (VMail plan, Intl Plan) vs Churn



PivotTable Fields

Choose fields to add to report:

- Intl Calls
- Intl Charge
- Intl Mins
- Int'l Plan
- Night Calls
- Night Charge
- Night Mins

Drag fields between areas below:

FILTERS

COLUMNS

ROWS

VALUES

VMail Plan

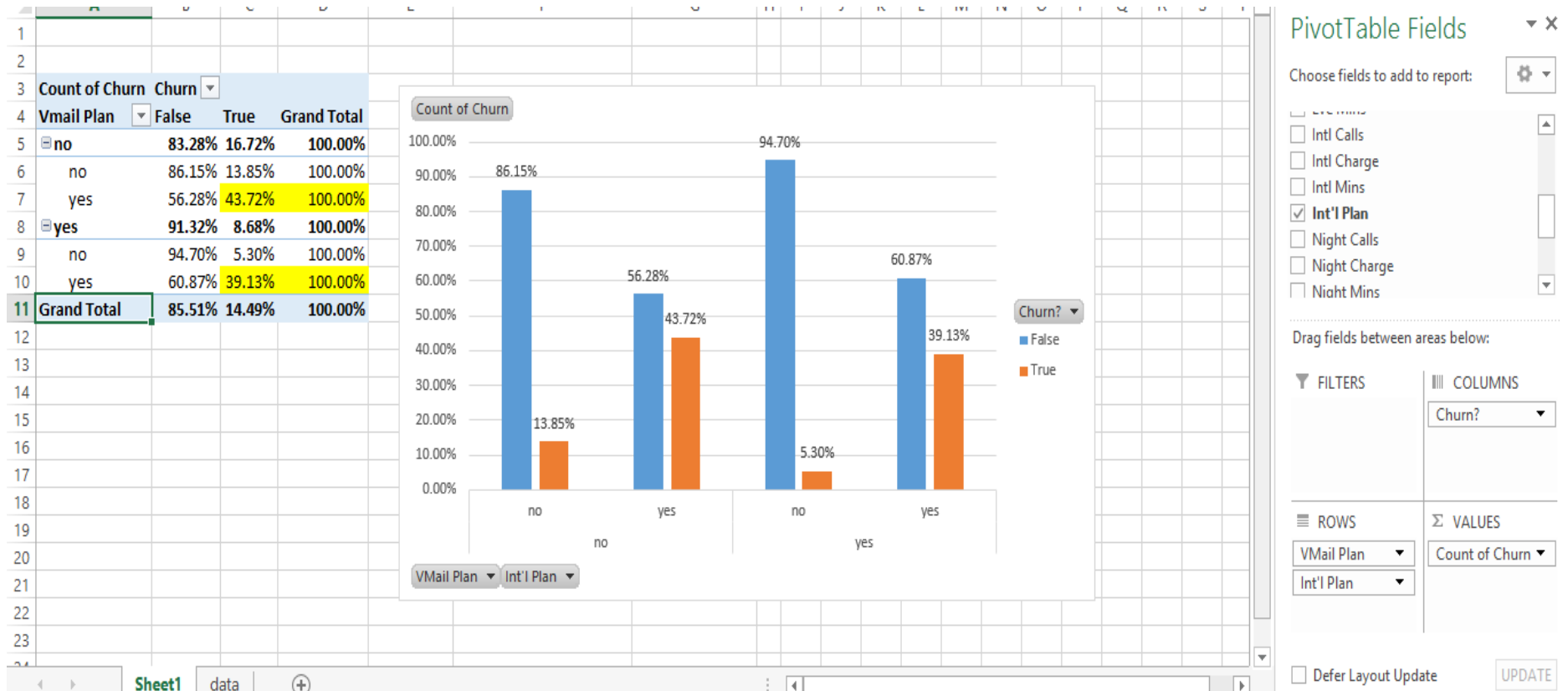
Count of Churn

Intl Plan

Defer Layout Update

UPDATE

Categorical Variable (VMail plan, Intl Plan) vs Churn



(VMail plan, Intl Plan) vs Churn

To summarize, this EDA on the VMail Plan and Intl Plan has indicated that

- Among customers with no voice mail plan, the proportion of churners is greater for those who do have an international plan ($101/231=44\%$) than for those who do not ($302/2180=14\%$)
- There are many more customers who have the voice mail plan only ($786+44=830$) than have both plans ($56+36=92$)
- Again, however, among customers with the voice mail plan, the proportion of churners is much greater for those who also select the international plan ($36/92=39\%$) than for those who do not ($44/830=5\%$)
- That is, international plan holders have greater churn regardless of whether they are Voice Mail plan adopters or not

CustServ Call Vs Churn

Wiretel_Churn data - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER ANALYZE DESIGN FORMAT

Chart Area: Format Selection, Reset to Match Style, Current Selection

Insert Shapes: Change Shape

Shape Styles: Shape Fill, Shape Outline, Shape Effects

WordArt Styles: A, A, A

Arrange: Bring Forward, Send Backward, Selection Pane, Align, Group, Rotate

Size: 3", 5"

Chart 4: X, ✓, fx

Count of Churn	Column Labels		
Row Labels	False.	True.	Grand Total
0	86.80%	13.20%	100.00%
1	89.67%	10.33%	100.00%
2	88.54%	11.46%	100.00%
3	89.74%	10.26%	100.00%
4	54.22%	45.78%	100.00%
5	39.39%	60.61%	100.00%
6	36.36%	63.64%	100.00%
7	44.44%	55.56%	100.00%
8	50.00%	50.00%	100.00%
9	0.00%	100.00%	100.00%
Grand Total	85.51%	14.49%	100.00%

PivotChart Fields

Choose fields to add to report:

- Night Mins
- Night Calls
- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn

Drag fields between areas below:

FILTERS

LEGEND (SERIES)

Churn

AXIS (CATEG...)

CustServ Calls

VALUES

Count of Churn

Defer Layout Update

UPDATE

Sheet1 data

CustServ Call vs Churn

To summarize, this EDA on the CustServ Call has indicated that

- We should carefully track the number of customer service calls made by each customer
- By the third call, specialized incentives should be offered to retain customer loyalty, because, by the fourth call, the probability of churn increases greatly;
- We should expect that, whatever datamining algorithms we use to predict churn, the model will probably include the number of customer service calls made by the customer

Day Mins Vs Churn

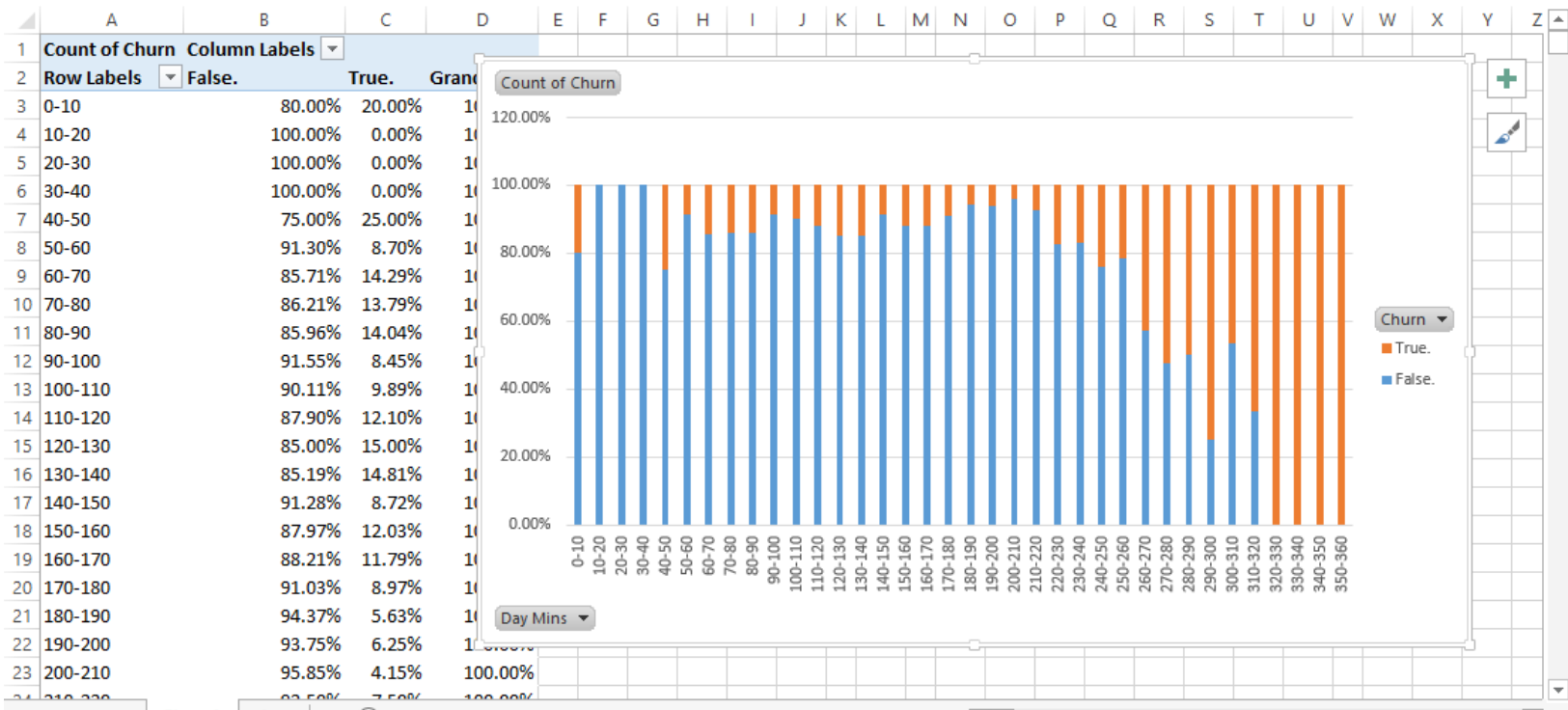
Wiretel_Churn data (version 2) [Recovered] - Excel

PIVOTCHART TOOLS

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER ANALYZE DESIGN FORMAT

Clipboard Font Alignment Number Styles Cells Editing

Chart 1



PivotChart Fields

Choose fields to add to report:

- State
- Account Length
- Area Code
- Phone
- Int'l Plan
- VMail Plan
- VMail Message
- Day Mins
- Day Calls

Drag fields between areas below:

FILTERS

LEGEND (SERIES)
Churn

AXIS (CATEG...)
Day Mins

VALUES
Count of Churn

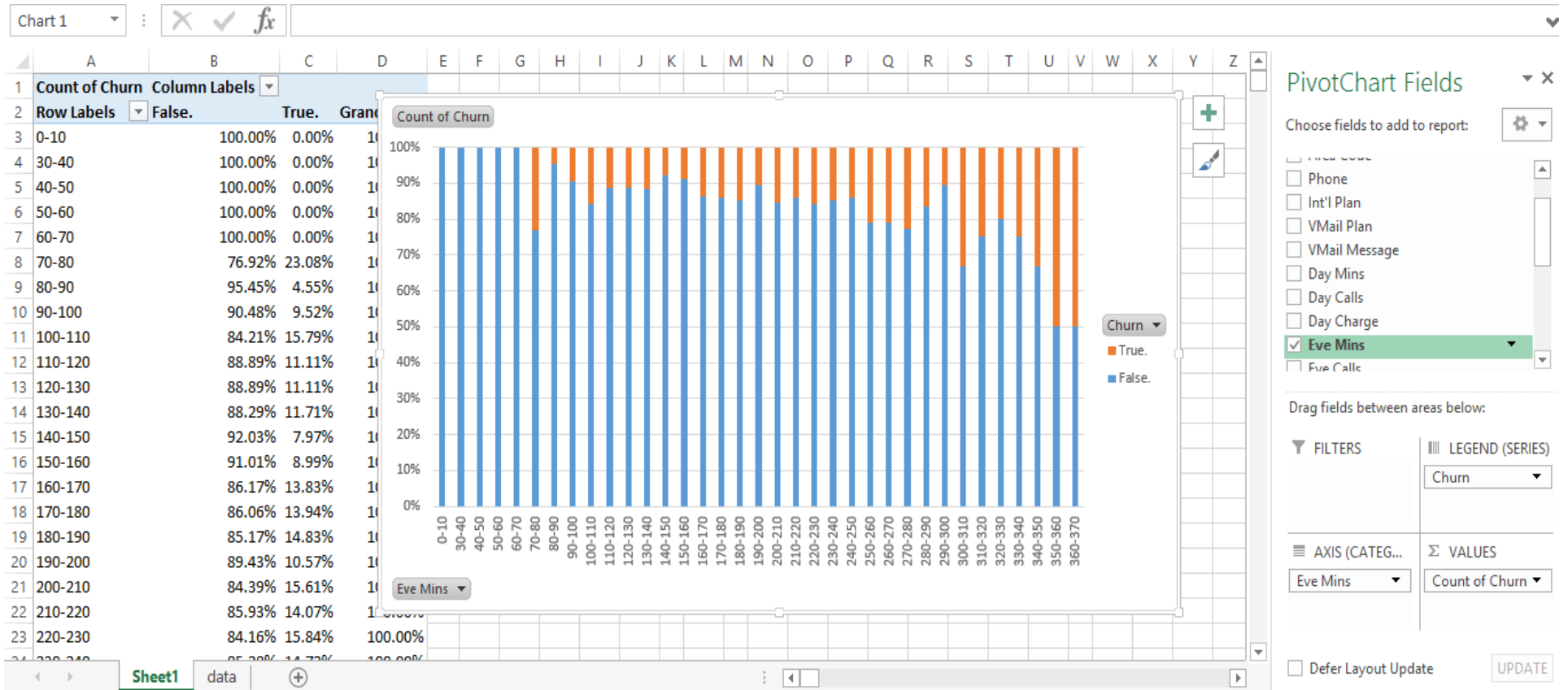
Defer Layout Update UPDATE

Day Mins vs Churn

To summarize, this EDA on the Day Mins has indicated that

- High day-users tend to churn at a higher rate
- Therefore, we should carefully track the number of day minutes used by each customer
- As the number of day minutes passes 200, we should consider special incentives
- We should investigate why heavy day-users are tempted to leave
- We should expect that our eventual data mining model will include day minutes as a predictor of churn

Eve Mins Vs Churn

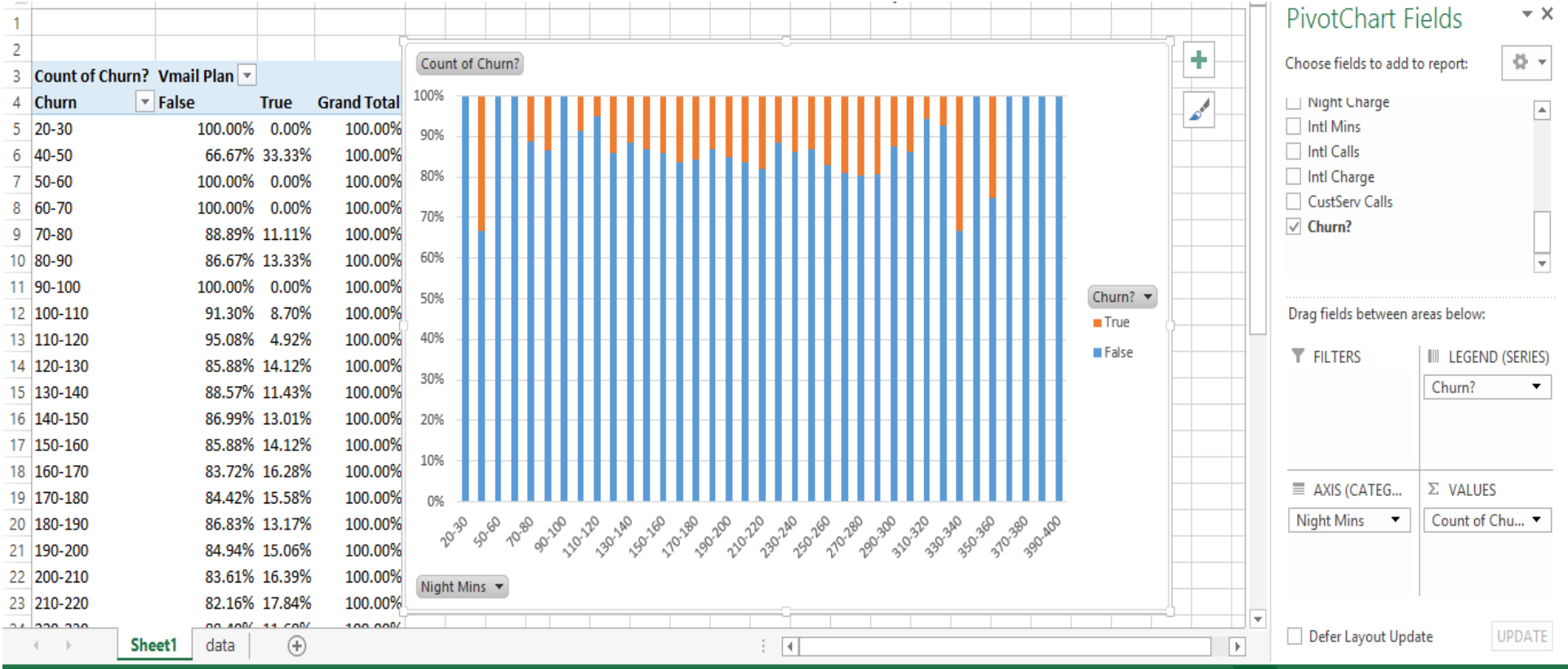


Eve Mins vs Churn

To summarize, this EDA on the Eve Mins has indicated that

- There is a slight tendency for customers with higher evening minutes to churn

Night Mins Vs Churn



PivotChart Fields

Choose fields to add to report:

- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn?

Drag fields between areas below:

FILTERS

LEGEND (SERIES)
Churn?

AXIS (CATEG...)
Night Mins

VALUES
Count of Chu...

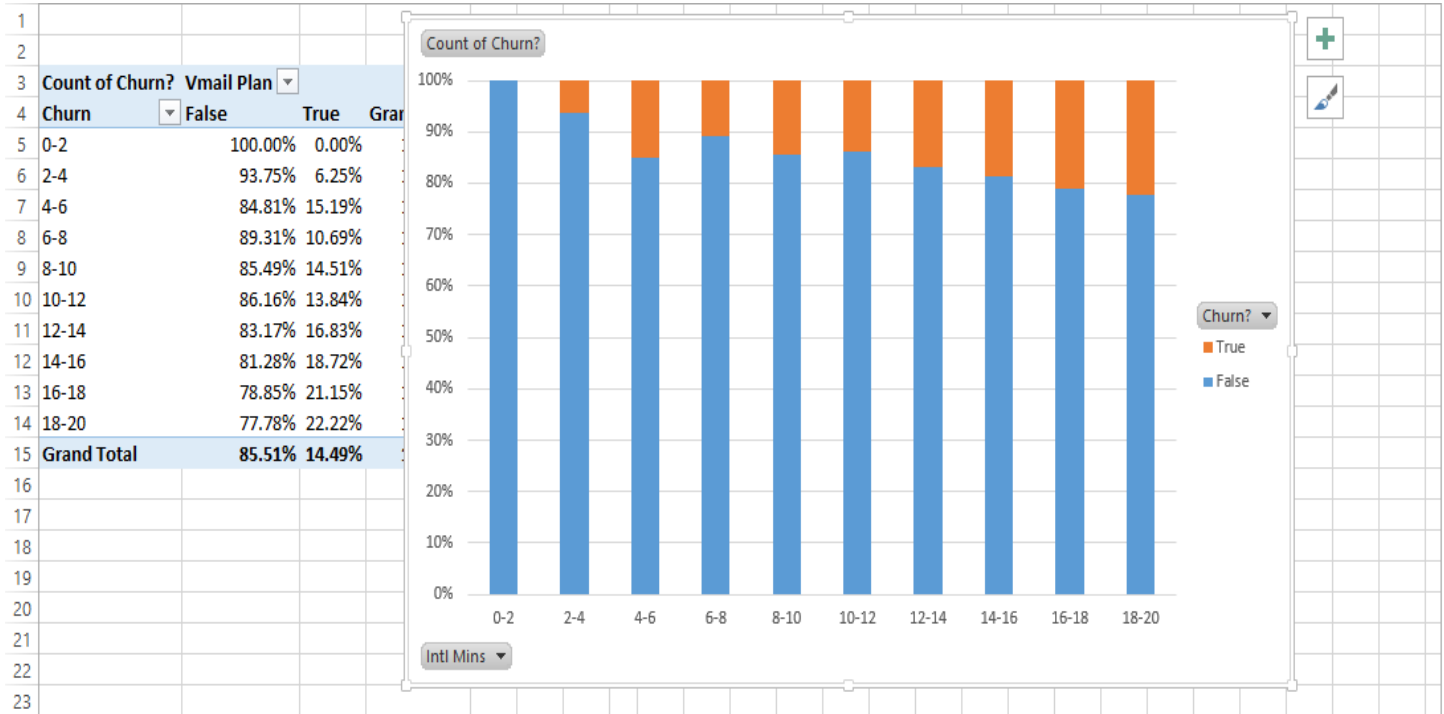
Defer Layout Update UPDATE

Night Mins vs Churn

To summarize, this EDA on the Night Mins has indicated that

- There is no obvious association between churn and night minutes, as the pattern is relatively flat

Intl Mins Vs Churn



PivotChart Fields

Choose fields to add to report:

- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn?

Drag fields between areas below:

FILTERS	LEGEND (SERIES)
	Churn?

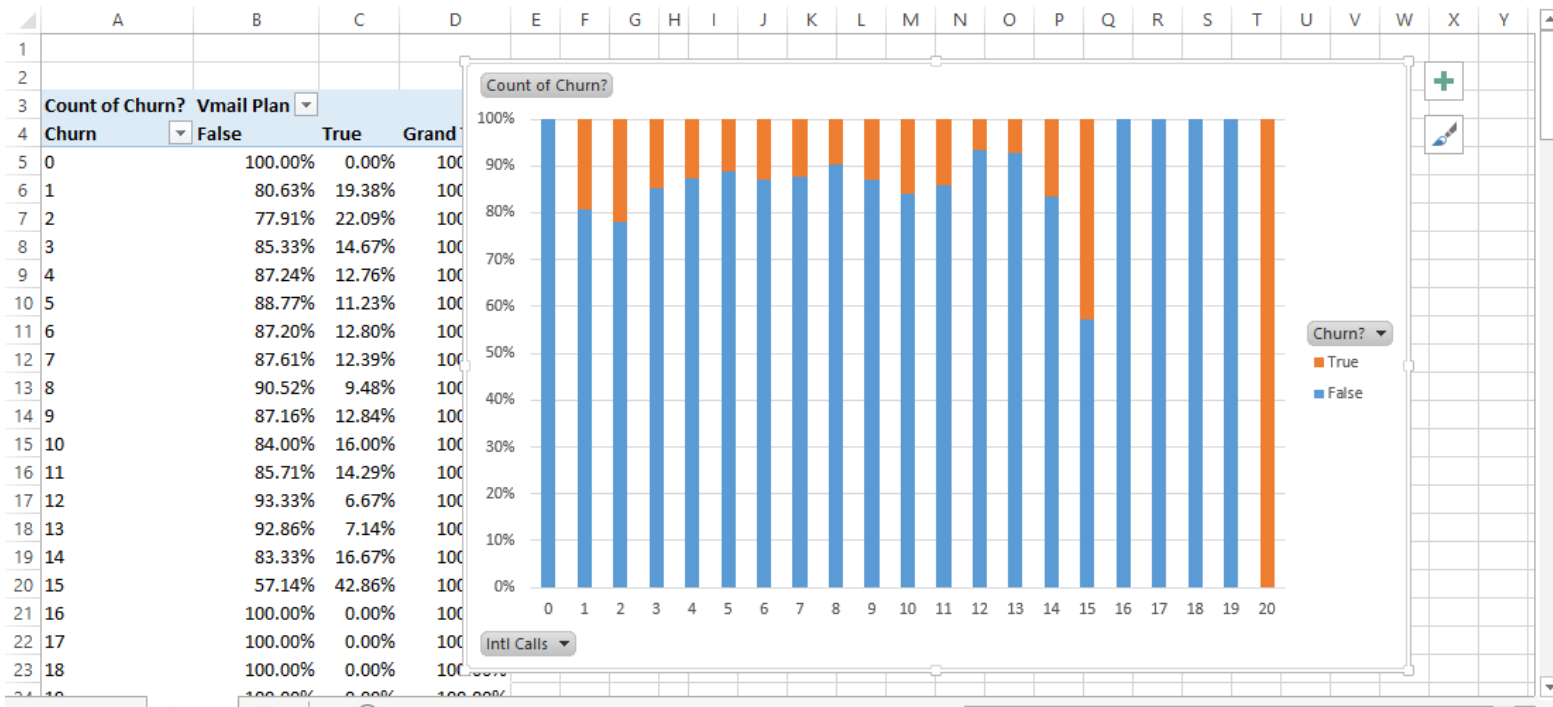
AXIS (CATEG...)	VALUES
Intl Mins	Count of Chu...

Intl Mins vs Churn

To summarize, this EDA on the Intl Mins has indicated that

- There is a slight tendency for customers with higher Intl minutes to churn

Intl Calls Vs Churn



PivotChart Fields

Choose fields to add to report:

- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn?

Drag fields between areas below:

FILTERS

AXIS (CATEG...)

Intl Calls

LEGEND (SERIES)

Churn?

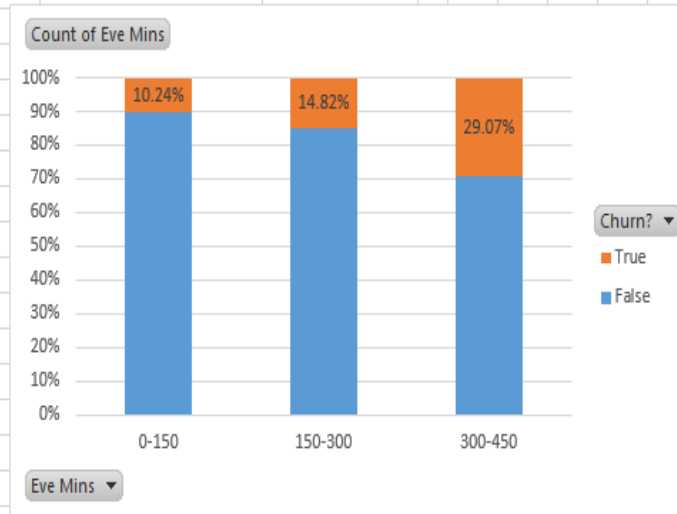
VALUES

Count of Chu...

Defer Layout Update UPDATE

Binning (High Mid Low) Eve Mins Vs Churn

Count of Eve Mins	Churn		Grand Total
Churn	False	True	
0-150	89.76%	10.24%	100.00%
150-300	85.18%	14.82%	100.00%
300-450	70.93%	29.07%	100.00%
Grand Total	85.51%	14.49%	100.00%



PivotTable Fields

Choose fields to add to report:

- Night Charge
- Intl Mins
- Intl Calls
- Intl Charge
- CustServ Calls
- Churn?

MORE TABLES...

Drag fields between areas below:

FILTERS

COLUMNS

Churn?

ROWS

VALUES

Eve Mins

Count of Eve ...

Defer Layout Update

UPDATE

Day Mins, Day Calls and Day Charge correlation

	M	D	C	D	L
1		<i>Day Mins</i>	<i>Day Calls</i>	<i>Day Charge</i>	
2	Day Mins	1			
3	Day Calls	0.00675	1		
4	Day Charge	1	0.006752962	1	
5					
6					

- Day Mins and Day charge are perfectly correlated (one of them can be removed from the analysis)

Eve Mins, Eve Calls and Eve Charge correlation

1		<i>Eve Mins</i>	<i>Eve Calls</i>	<i>Eve Charge</i>
2	Eve Mins	1		
3	Eve Calls	-0.011430108	1	
4	Eve Charge	0.999999776	-0.011422894	1
5				
6				

- Eve Mins and Eve charge are perfectly correlated (one of them can be removed from the analysis)

Night Mins, Night Calls and Night Charge correlation

1		<i>Night Mins</i>	<i>Night Calls</i>	<i>Night Charge</i>
2	Night Mins	1		
3	Night Calls	0.011203856	1	
4	Night Charge	0.999999215	0.01118782	1
5				
-				

- Night Mins and Night charge are perfectly correlated (one of them can be removed from the analysis)

Final Insights

- Customers with the *International Plan* tend to churn more frequently
- Customers with the *Voice Mail Plan* tend to churn less frequently
- Customers with four or more *Customer Service Calls* churn more than four times as often as the other customers
- Customers with low *Day Minutes* and high *Customer Service Calls* churn at a higher rate than the other customers
- For the remaining predictors, EDA uncovers no obvious association of *churn*