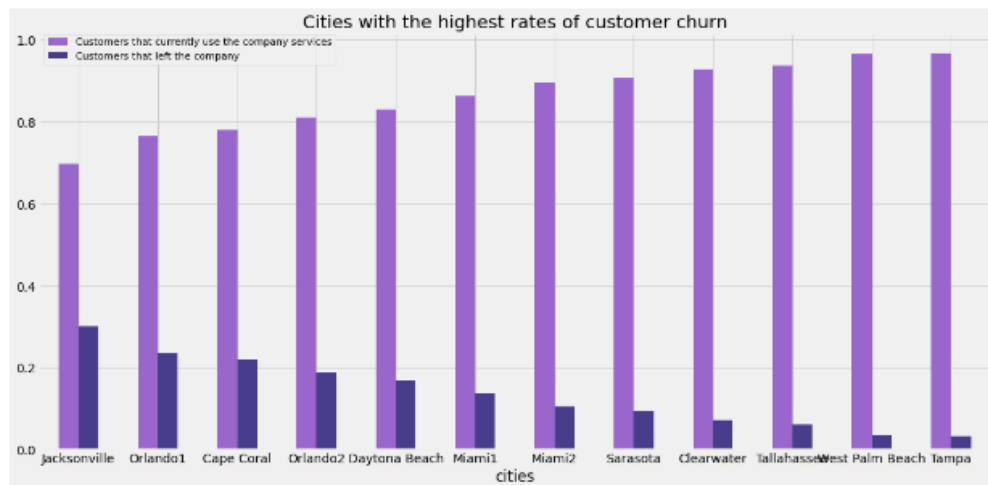


```

In [76]: 1 # Column chart of urban areas
2 plt.style.use('fivethirtyeight')
3
4 colors = ['#9966CC','#483D8B']
5
6 df_city = pd.crosstab(index=df.loc[:,'city'], columns=df.loc[:,'churn'])
7
8 df_city = df_city.sort_values(by=1, ascending=False)
9
10 fig,ax = plt.subplots(figsize=[17,8])
11 df_city.plot(kind='bar',legend=True, ax=ax, color = colors)
12 ax.xaxis.set_tick_params(labelrotation=0)
13 ax.legend(['Customers that currently use the company services', 'Custom
14           bbox_to_anchor=(0.0, 1.01), loc='upper left',prop={'size': 11
15 ax.set(title='Cities with the highest rates of customer churn', xlabel=

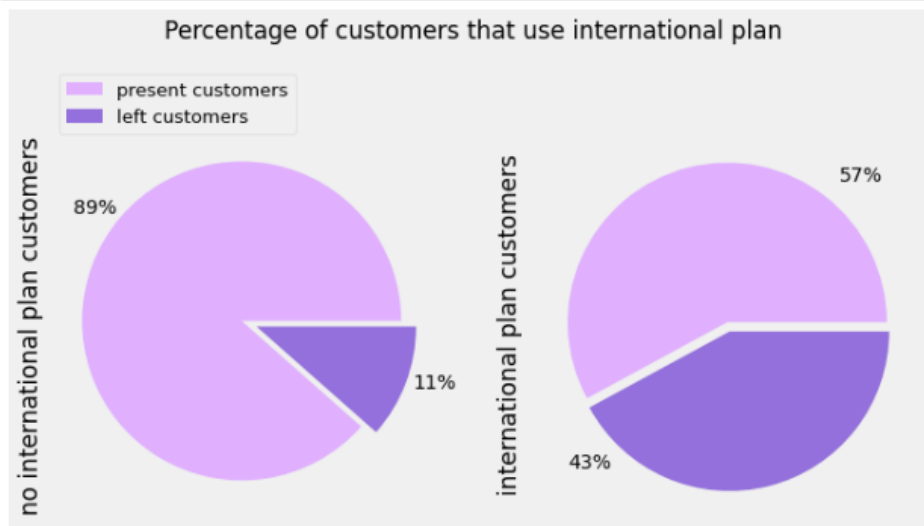
```



```

6 # print(df_international_plan)
7
8 colors = ['#E0B0FF', '#9370DB']
9
10 explode_=[0.05,0.05]
11 explode_1=[0.01,0.05]
12 fig, ax = plt.subplots(nrows=1, ncols=2, figsize=(10,6))
13 df_international_plan.plot(kind='pie',y='no',ax=ax[0], labels=['',''],
14 df_international_plan.plot(kind='pie',y='yes',ax=ax[1], labels=['',''],
15 fig.suptitle('Percentage of customers that use international plan', fon
16 ax[0].legend(['present customers', 'left customers'],
17             bbox_to_anchor=(0.0,1.15), loc='upper left', fontsize=13);
18 ax[0].set_ylabel('no international plan customers', fontsize=17)
19 ax[1].set_ylabel('international plan customers', fontsize=17);
20
21
22 t1 = ax[0].text(1.03, -0.4, '11%')
23 t2 = ax[0].text(-1.1, 0.7, '89%')
24
25 t3 = ax[1].text(0.7, 0.9, '57%')
26 t4 = ax[1].text(-1, -0.9, '43%')

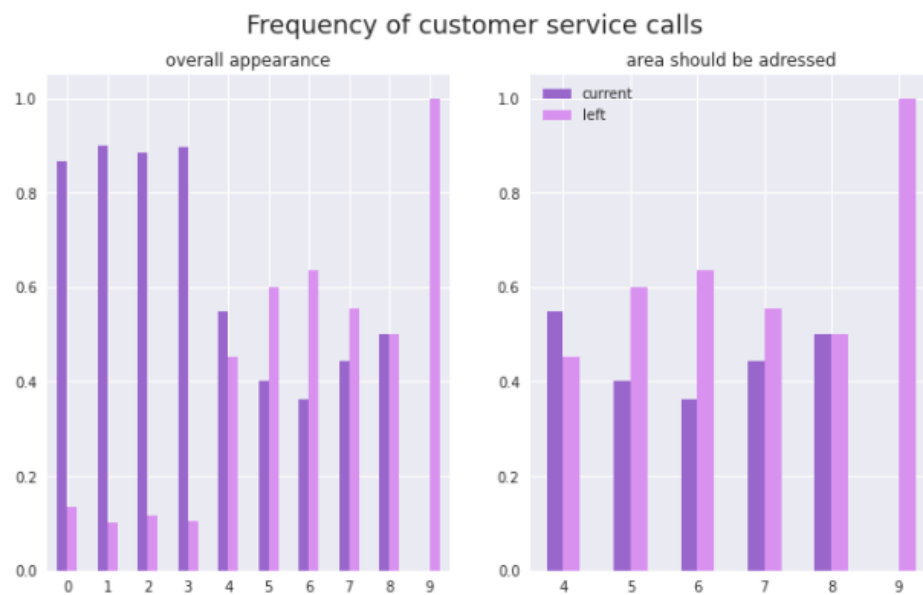
```



```

In [81]: 1 plt.style.use('seaborn')
2 colors = ['#9966CC','#D891EF']
3 df_service_calls = pd.crosstab(index=df.loc[:, 'customer_service_calls'],
4                               columns=df.loc[:, 'churn'], normalize='index')
5 fig, ax = plt.subplots(nrows=1, ncols=2, figsize=[10,6])
6 df_service_calls.plot(kind='bar', legend=False, ax=ax[0], color = colors)
7 ax[0].xaxis.set_tick_params(labelrotation=0)
8 df_service_calls.iloc[4:].plot(kind='bar', legend=True, ax=ax[1], color = colors)
9 ax[1].xaxis.set_tick_params(labelrotation=0)
10 ax[0].set(xlabel='')
11 ax[1].set(xlabel='')
12 ax[1].legend(['current', 'left'])
13 fig.suptitle('Frequency of customer service calls', fontsize=18);
14 ax[0].set(title='overall appearance')
15 ax[1].set(title='area should be addressed');
16

```



```

In [649]: 1 # Line plot for findings in logistic regression
2 plt.style.use('fivethirtyeight')
3 fig, ax = plt.subplots()
4 ax.plot(p_y, color='#7851A9')
5 ax.vlines(x=p_y[p_y>=0.5].index[0], ymin=0, ymax=1, colors='#56A0D3');
6
7 # ann.remove
8 ann = ax.annotate(s='The threshold \n      value',
9                  xytext=[0.1,0.71],xy=[0.44,0.7],xycoords='axes fraction',
10                  fontsize=13,arrowprops=dict(facecolor='black',linewidth=0.0
11 ax.set(title='Logistic regression model');

```

