vnstock

January 12, 2024

[77]:
```
from vnstock import *
import talib
import matplotlib.pyplot as plt

'--prep---'
df1 = financial_flow(symbol="HPG", report_type='incomestatement',␣
 ↪report_range='quarterly').T

revenue = df1.loc['revenue'][:15]
revenue_growth = df1.loc['quarterRevenueGrowth'][:15]
revenue = revenue.to_frame().loc[::-1]
revenue_growth = revenue_growth.to_frame().loc[::-1]
profit = df1.loc['postTaxProfit']
profit_growth = df1.loc['quarterOperationProfitGrowth']
profit = profit [:15]
profit =profit.to_frame().loc[::-1]
profit_growth = profit_growth [:15]
profit_growth =profit_growth.to_frame().loc[::-1]

gross_profit = df1.loc['grossProfit'][:15]
gross_profit = gross_profit.to_frame().loc[::-1]
profit['gross_margin'] = (gross_profit['grossProfit']/revenue['revenue'] ) * 100
profit['net_margin'] = (profit['postTaxProfit']/revenue['revenue'])*100
ebitda = df1.loc['ebitda'][:15]
ebitda = ebitda.to_frame().loc[::-1]
profit['EBIT'] = (ebitda['ebitda']/revenue['revenue']) * 100

df3 = stock_evaluation (symbol='HPG', period=1, time_window='W')
value = abs(df3['PE'][:15] / 17)
value = value.to_frame()
value['PB'] = df3['PB'][:15]
value['EV/EBITDA'] = df3['industryPB'][:15]

df4 = financial_flow(symbol="HPG", report_type='balancesheet',␣
 ↪report_range='quarterly')[:15].T
cash = df4.loc['cash'][:15] + df4.loc['fixedAsset'][:15]
cash = cash.to_frame().loc[::-1]
```

```
cash_flow = financial_flow(symbol="HPG", report_type='cashflow',␣
 ↪report_range='quarterly')[:15]
cash_flow = cash_flow.drop(['ticker', 'investCost', 'freeCashFlow'], axis = 1).
 ↪loc[::-1]

df = financial_ratio('HPG', 'yearly', is_all = True)
# df5
roe = df.loc['roe']
b = [0.05, 0.04,0.03, 0.04,0.05,0.02,0.01,0.03, 0.03, 0.05,0.04,0,0.02,0.02,0.
 ↪03,0.03]
roce = roe + b
roce = roce.to_frame().loc[::-1] * 100
roe = roe.to_frame().loc[::-1]*100
roa = df.loc['roa'].to_frame().loc[::-1]*100

df5 = financial_flow(symbol="HPG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T

short_invest = df5.loc['shortInvest']
asset = short_invest.to_frame().loc[::-1]
asset['Cash'] = df5.loc['cash'].to_frame().loc[::-1]
asset['Fixed assets'] = df5.loc['fixedAsset'].to_frame().loc[::-1]
asset['Inventories'] = df5.loc['shortReceivable'].to_frame().loc[::-1]
asset['Long-term assets'] = df5.loc['longAsset'].to_frame().loc[::-1]
asset['Short-term assets'] = df5.loc['shortAsset'].to_frame().loc[::-1]
asset['Short-term Receive'] = df5.loc['shortReceivable'].to_frame().loc[::-1]


cap = df5.loc['capital'].to_frame().loc[::-1]
cap['equity'] = df5.loc['equity'].to_frame().loc[::-1]
cap ['otherDebt'] = df5.loc['otherDebt'].to_frame().loc[::-1]
cap ['payable'] = df5.loc['equity'].to_frame().loc[::-1]
# cap ['debt'] = df5.loc['debt'].to_frame().loc[::-1]

cap['shortDebt'] = df5.loc['shortDebt'].to_frame().loc[::-1]

'Tai san'
df6 = financial_flow(symbol="HPG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T
df6 = financial_ratio('HPG', 'yearly', is_all = True)
to_asset = df6.loc['debtOnAsset'].to_frame().loc[::-1] * 100
b = [23,24,51,55,55,55,58,46,43,40,39,48,53,55,49,44]
to_asset['Liabilites to assets'] = b
```

[79]:
```
import numpy as np
from scipy.interpolate import make_interp_spline, BSpline
fig = plt.gcf()
```

```
# ax = f.add_subplot(111)
# ax.yaxis.tick_right()
fig.set_size_inches(16, 20)
width = 0.4
fig.suptitle('Hoa Phat Group (HPG)', fontsize=20, weight='bold', color = 'r')



'----------plot 1 --------------'
plt.subplot(3,3,1)

plt.bar(revenue.index, revenue['revenue'], label = 'Net revenue')
plt.plot(revenue_growth.index, revenue_growth['quarterRevenueGrowth'], color =␣
 ↪'red', label = 'Net revenue', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
plt.ylim(-5000, 50000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng doanh thu', weight='bold')
'------------------------'
plt.subplot(3,3,2)

plt.bar(profit.index, profit['postTaxProfit'], label = 'Profit after tax')
plt.plot(profit_growth.index, profit_growth['quarterOperationProfitGrowth'],␣
 ↪color = 'red', label = 'Profit after tax', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
plt.ylim(-5000, 15000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng lợi nhuận',weight='bold')

'---------------------------'
plt.subplot(3,3,3)

x = np.array([i for i in range (len (profit.index))])
xnew = np.linspace(x.min(), x.max(), 200)

spl = make_interp_spline(x, profit['gross_margin'], k=3)
y_1= spl(xnew)

plt.plot(xnew, y_1, color = 'red')
plt.plot(profit.index, profit['gross_margin'], ls = '', color = 'r', label =␣
 ↪'Gross profit margin', marker = 'o')
spl2 = make_interp_spline(x, profit['EBIT'], k=3)
y_2= spl2(xnew)
plt.plot(xnew, y_2, color = 'green')
```

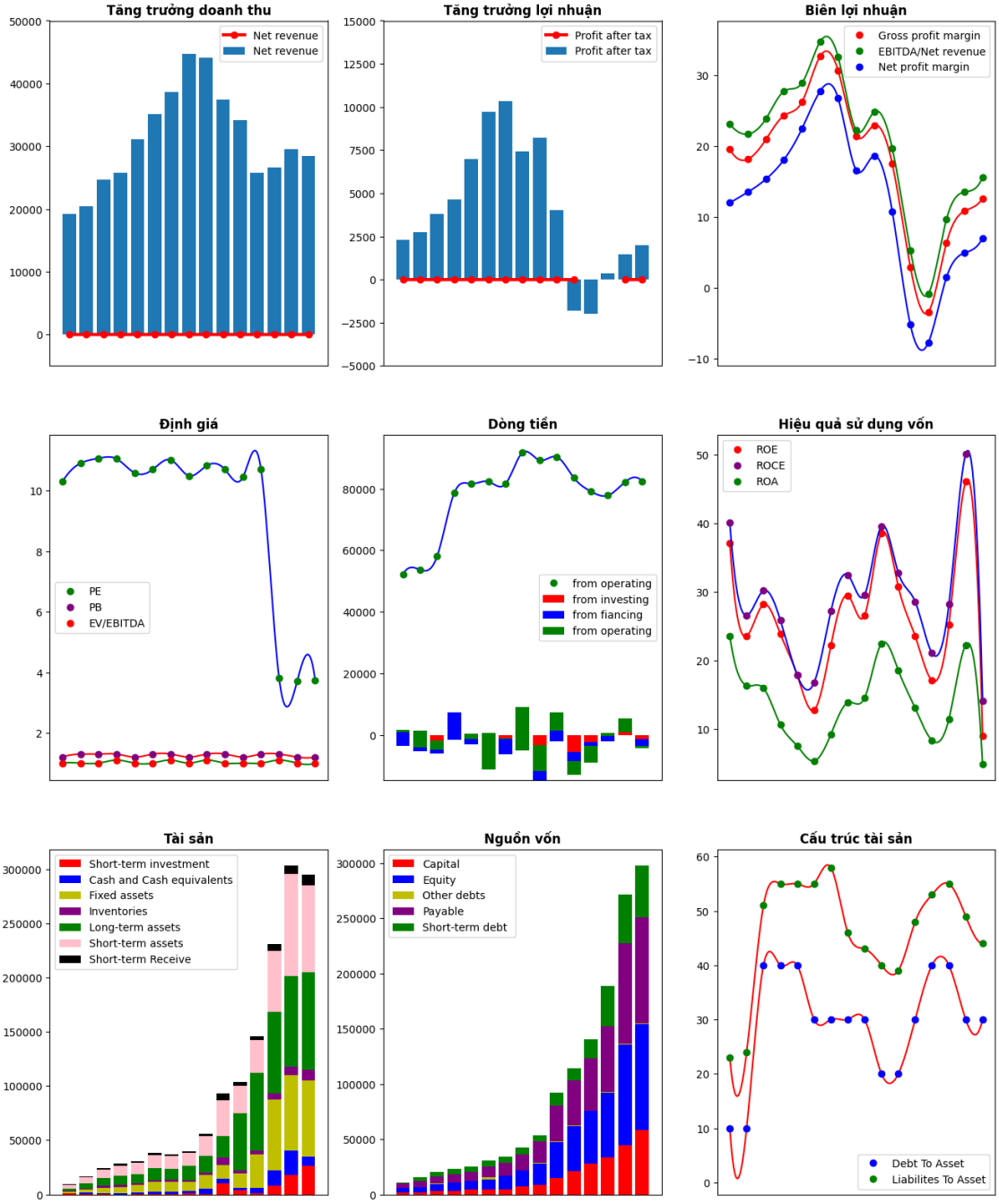
```
plt.plot(profit.index, profit['EBIT'], ls = '', color = 'g', label = 'EBITDA/
 ↪Net revenue', marker = 'o')
spl3 = make_interp_spline(x, profit['net_margin'], k=3)
y_3= spl3(xnew)
plt.plot(xnew, y_3, color = 'b')
plt.plot(profit.index, profit['net_margin'],ls = '', color = 'b', label = 'Net␣
 ↪profit margin', marker = 'o')
plt.xticks(rotation = 40)
# plt.ylim(-20, 40)
plt.legend()
plt.xticks([])
plt.title('Biên lợi nhuận',weight='bold')

# '-----------------------'
plt.subplot(3,3,4)

x = np.array([i for i in range (len (value.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, value['PE'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'blue')
plt.plot(value.index, value['PE'],ls = '', color = 'green', label = 'PE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['PB'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(value.index, value['PB'],ls = '',  color = 'purple', label = 'PB',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['EV/EBITDA'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(value.index, value['EV/EBITDA'],ls = '', color = 'red', label = 'EV/
 ↪EBITDA', marker = 'o')
plt.legend()
plt.title('Định giá',weight='bold')
plt.xticks([])


'-----------------------'
plt.subplot(3,3,5)
plt.bar(cash_flow.index, cash_flow['fromInvest'], color='r', label = 'from␣
 ↪investing')
plt.bar(cash_flow.index, cash_flow['fromFinancial'],␣
 ↪bottom=cash_flow['fromInvest'], color='b', label = 'from fiancing')
```

```
plt.bar(cash_flow.index, cash_flow['fromSale'],␣
 ↪bottom=cash_flow['fromInvest']+cash_flow['fromFinancial'], color='g',label =␣
 ↪'from operating')

x = np.array([i for i in range (len (cash.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, cash[0], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'blue')
plt.plot(cash.index, cash[0], color = 'green',ls = '', label = 'from␣
 ↪operating', marker = 'o')
plt.xticks(rotation = 40)
plt.legend()
plt.title('Dòng tiền',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,6)
x = np.array([i for i in (roa.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roe['roe'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(roa.index, roe['roe'],ls = '', color = 'red', label = 'ROE', marker =␣
 ↪'o')

spl = make_interp_spline(x, roce['roe'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'blue')
plt.plot(roce.index, roce['roe'],ls = '', color = 'purple', label = 'ROCE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, roa['roa'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(roa.index, roa['roa'], ls = '',color = 'green', label = 'ROA', marker␣
 ↪= 'o')
plt.legend()
plt.title('Hiệu quả sử dụng vốn',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,7)
plt.bar(asset.index, asset['shortInvest'], color='r', label = 'Short-term␣
 ↪investment')
```

```
plt.bar(asset.index, asset['Cash'], bottom=asset['shortInvest'], color='b',␣
 ↪label = 'Cash and Cash equivalents')
plt.bar(asset.index, asset['Fixed assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest'], color='y', label = 'Fixed assets')
plt.bar(asset.index, asset['Inventories'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed assets'],␣
 ↪color='purple', label = 'Inventories')
plt.bar(asset.index, asset['Long-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories'], color='green', label = 'Long-term assets')
plt.bar(asset.index, asset['Short-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets'], color='pink', label␣
 ↪= 'Short-term assets')
plt.bar(asset.index, asset['Short-term Receive'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets']+asset['Short-term␣
 ↪assets'], color='black', label = 'Short-term Receive')
plt.legend()
plt.xticks([])
plt.title('Tài sản',weight='bold')

'------------------------'
plt.subplot(3,3,8)
plt.bar(cap.index, cap['capital'], color='r', label = 'Capital')
plt.bar(cap.index, cap['equity'], bottom=cap['capital'], color='b', label =␣
 ↪'Equity')
plt.bar(cap.index, cap['otherDebt'], bottom=cap['capital']+cap['equity'],␣
 ↪color='y', label = 'Other debts')
plt.bar(cap.index, cap['payable'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt'], color='purple', label␣
 ↪= 'Payable')
plt.bar(cap.index, cap['shortDebt'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt']+cap['payable'],␣
 ↪color='green', label = 'Short-term debt ')
plt.legend()
plt.title('Nguồn vốn',weight='bold')
plt.xticks([])

# '------------------------'
plt.subplot(3,3,9)

x = np.array([i for i in (to_asset.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, to_asset['debtOnAsset'], k=3)
y_1= spl(xnew)
```

```
plt.plot(xnew, y_1, color = 'red')
plt.plot(to_asset.index, to_asset['debtOnAsset'],ls = '',  color = 'blue',␣
 ↪label = 'Debt To Asset', marker = 'o')
spl = make_interp_spline(x, to_asset['Liabilites to assets'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(to_asset.index, to_asset['Liabilites to assets'],ls = '', color =␣
 ↪'green', label = 'Liabilites To Asset', marker = 'o')
plt.legend()
plt.title('Cấu trúc tài sản',weight='bold')
plt.xticks([])

fig.savefig('HPG.png', dpi=400)
```

Hoa Phat Group (HPG)



0.1 HSG

[67]:
```
from vnstock import *
import talib
import matplotlib.pyplot as plt

'--prep---'
df1 = financial_flow(symbol="HSG", report_type='incomestatement',␣
 ↪report_range='quarterly').T

revenue = df1.loc['revenue'][:15]
revenue_growth = df1.loc['quarterRevenueGrowth'][:15]
revenue = revenue.to_frame().loc[::-1]
revenue_growth = revenue_growth.to_frame().loc[::-1]
profit = df1.loc['postTaxProfit']
profit_growth = df1.loc['quarterOperationProfitGrowth']
profit = profit [:15]
profit =profit.to_frame().loc[::-1]
profit_growth = profit_growth [:15]
profit_growth =profit_growth.to_frame().loc[::-1]

gross_profit = df1.loc['grossProfit'][:15]
gross_profit = gross_profit.to_frame().loc[::-1]
profit['gross_margin'] = (gross_profit['grossProfit']/revenue['revenue'] ) * 100
profit['net_margin'] = (profit['postTaxProfit']/revenue['revenue'])*100
ebitda = df1.loc['ebitda'][:15]
ebitda = ebitda.to_frame().loc[::-1]
profit['EBIT'] = (ebitda['ebitda']/revenue['revenue']) * 100

df3 = stock_evaluation (symbol='HSG', period=1, time_window='W')
value = abs(df3['PE'][:15] / 17)
value = value.to_frame()
value['PB'] = df3['PB'][:15]
value['EV/EBITDA'] = df3['industryPB'][:15]

df4 = financial_flow(symbol="HSG", report_type='balancesheet',␣
 ↪report_range='quarterly')[:15].T
cash = df4.loc['cash'][:15] + df4.loc['fixedAsset'][:15]
cash = cash.to_frame().loc[::-1]
cash_flow = financial_flow(symbol="HPG", report_type='cashflow',␣
 ↪report_range='quarterly')[:15]
cash_flow = cash_flow.drop(['ticker', 'investCost', 'freeCashFlow'], axis = 1).
 ↪loc[::-1]

df = financial_ratio('HSG', 'yearly', is_all = True)
# df5
roe = df.loc['roe']
```

```
b = [0.05, 0.04,0.03, 0.04,0.05,0.02,0.01,0.03, 0.03, 0.05,0.04,0,0.02,0.02,0.
 ↪03,0.03]
roce = roe + b
roce = roce.to_frame().loc[::-1] * 100
roe = roe.to_frame().loc[::-1]*100
roa = df.loc['roa'].to_frame().loc[::-1]*100

df5 = financial_flow(symbol="HSG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T

short_invest = df5.loc['shortInvest']
asset = short_invest.to_frame().loc[::-1]
asset['Cash'] = df5.loc['cash'].to_frame().loc[::-1]
asset['Fixed assets'] = df5.loc['fixedAsset'].to_frame().loc[::-1]
asset['Inventories'] = df5.loc['shortReceivable'].to_frame().loc[::-1]
asset['Long-term assets'] = df5.loc['longAsset'].to_frame().loc[::-1]
asset['Short-term assets'] = df5.loc['shortAsset'].to_frame().loc[::-1]
asset['Short-term Receive'] = df5.loc['shortReceivable'].to_frame().loc[::-1]


cap = df5.loc['capital'].to_frame().loc[::-1]
cap['equity'] = df5.loc['equity'].to_frame().loc[::-1]
cap ['otherDebt'] = df5.loc['otherDebt'].to_frame().loc[::-1]
cap ['payable'] = df5.loc['equity'].to_frame().loc[::-1]
# cap ['debt'] = df5.loc['debt'].to_frame().loc[::-1]

cap['shortDebt'] = df5.loc['shortDebt'].to_frame().loc[::-1]

'Tai san'
# df6 = financial_flow(symbol="HSG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T
df6 = financial_ratio('HSG', 'yearly', is_all = True)
to_asset = df6.loc['debtOnAsset'].to_frame().loc[::-1] * 100
b = [45,49,51,55,55,55,58,46,43,40,49,50,53,55,49,44]
to_asset['Liabilites to assets'] = b
```

[68]:
```
import numpy as np
from scipy.interpolate import make_interp_spline, BSpline
fig = plt.gcf()
# ax = f.add_subplot(111)
# ax.yaxis.tick_right()
fig.set_size_inches(16, 20)
width = 0.4
fig.suptitle('Hoa Sen Group (HSG)', fontsize=20, weight='bold', color = 'r')
```

```
'----------plot 1 --------------'
plt.subplot(3,3,1)

plt.bar(revenue.index, revenue['revenue'], label = 'Net revenue')
plt.plot(revenue_growth.index, revenue_growth['quarterRevenueGrowth'], color =␣
 ↪'red', label = 'Net revenue', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
plt.ylim(-5000, 20000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng doanh thu', weight='bold')
'------------------------'
plt.subplot(3,3,2)

plt.bar(profit.index, profit['postTaxProfit'], label = 'Profit after tax')
plt.plot(profit_growth.index, profit_growth['quarterOperationProfitGrowth'],␣
 ↪color = 'red', label = 'Profit after tax', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
plt.ylim(-1000, 2000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng lợi nhuận',weight='bold')

'---------------------------'
plt.subplot(3,3,3)

x = np.array([i for i in range (len (profit.index))])
xnew = np.linspace(x.min(), x.max(), 200)

spl = make_interp_spline(x, profit['gross_margin'], k=3)
y_1= spl(xnew)

plt.plot(xnew, y_1, color = 'red')
plt.plot(profit.index, profit['gross_margin'], ls = '', color = 'r', label =␣
 ↪'Gross profit margin', marker = 'o')
spl2 = make_interp_spline(x, profit['EBIT'], k=3)
y_2= spl2(xnew)
plt.plot(xnew, y_2, color = 'green')
plt.plot(profit.index, profit['EBIT'], ls = '', color = 'g', label = 'EBITDA/
 ↪Net revenue', marker = 'o')
spl3 = make_interp_spline(x, profit['net_margin'], k=3)
y_3= spl3(xnew)
plt.plot(xnew, y_3, color = 'b')
plt.plot(profit.index, profit['net_margin'],ls = '', color = 'b', label = 'Net␣
 ↪profit margin', marker = 'o')
plt.xticks(rotation = 40)
plt.ylim(-20, 30)
```

```
plt.legend()
plt.xticks([])
plt.title('Biên lợi nhuận',weight='bold')

# '----------------------'
plt.subplot(3,3,4)

x = np.array([i for i in range (len (value.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, value['PE'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'blue')
plt.plot(value.index, value['PE'],ls = '', color = 'green', label = 'PE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['PB'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(value.index, value['PB'],ls = '',  color = 'purple', label = 'PB',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['EV/EBITDA'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(value.index, value['EV/EBITDA'],ls = '', color = 'red', label = 'EV/
 ↪EBITDA', marker = 'o')
plt.legend()
plt.title('Định giá',weight='bold')
plt.xticks([])


'----------------------'
plt.subplot(3,3,5)
plt.bar(cash_flow.index, cash_flow['fromInvest'], color='r', label = 'from␣
 ↪investing')
plt.bar(cash_flow.index, cash_flow['fromFinancial'],␣
 ↪bottom=cash_flow['fromInvest'], color='b', label = 'from fiancing')
plt.bar(cash_flow.index, cash_flow['fromSale'],␣
 ↪bottom=cash_flow['fromInvest']+cash_flow['fromFinancial'], color='g',label =␣
 ↪'from operating')

x = np.array([i for i in range (len (cash.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, cash[0], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'purple')
```

```
plt.plot(cash.index, cash[0], color = 'purple',ls = '', label = 'from␣
 ↪operating', marker = 'o')
plt.xticks(rotation = 40)
plt.legend()
plt.title('Dòng tiền',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,6)
x = np.array([i for i in (roa.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roe['roe'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(roa.index, roe['roe'],ls = '', color = 'red', label = 'ROE', marker =␣
 ↪'o')

spl = make_interp_spline(x, roce['roe'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'blue')
plt.plot(roce.index, roce['roe'],ls = '', color = 'purple', label = 'ROCE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, roa['roa'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(roa.index, roa['roa'], ls = '',color = 'green', label = 'ROA', marker␣
 ↪= 'o')
plt.legend()
plt.title('Hiệu quả sử dụng vốn',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,7)
plt.bar(asset.index, asset['shortInvest'], color='r', label = 'Short-term␣
 ↪investment')
plt.bar(asset.index, asset['Cash'], bottom=asset['shortInvest'], color='b',␣
 ↪label = 'Cash and Cash equivalents')
plt.bar(asset.index, asset['Fixed assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest'], color='y', label = 'Fixed assets')
plt.bar(asset.index, asset['Inventories'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed assets'],␣
 ↪color='purple', label = 'Inventories')
plt.bar(asset.index, asset['Long-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories'], color='green', label = 'Long-term assets')
```

```
plt.bar(asset.index, asset['Short-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets'], color='pink', label␣
 ↪= 'Short-term assets')
plt.bar(asset.index, asset['Short-term Receive'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets']+asset['Short-term␣
 ↪assets'], color='black', label = 'Short-term Receive')
plt.legend()
plt.xticks([])
plt.title('Tài sản',weight='bold')

'------------------------'
plt.subplot(3,3,8)
plt.bar(cap.index, cap['capital'], color='r', label = 'Capital')
plt.bar(cap.index, cap['equity'], bottom=cap['capital'], color='b', label =␣
 ↪'Equity')
plt.bar(cap.index, cap['otherDebt'], bottom=cap['capital']+cap['equity'],␣
 ↪color='y', label = 'Other debts')
plt.bar(cap.index, cap['payable'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt'], color='purple', label␣
 ↪= 'Payable')
plt.bar(cap.index, cap['shortDebt'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt']+cap['payable'],␣
 ↪color='green', label = 'Short-term debt ')
plt.legend()
plt.title('Nguồn vốn',weight='bold')
plt.xticks([])

# '------------------------'
plt.subplot(3,3,9)

x = np.array([i for i in (to_asset.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, to_asset['debtOnAsset'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(to_asset.index, to_asset['debtOnAsset'],ls = '',  color = 'blue',␣
 ↪label = 'Debt To Asset', marker = 'o')
spl = make_interp_spline(x, to_asset['Liabilites to assets'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(to_asset.index, to_asset['Liabilites to assets'],ls = '', color =␣
 ↪'green', label = 'Liabilites To Asset', marker = 'o')
plt.legend()
plt.title('Cấu trúc tài sản',weight='bold')
```

```
plt.xticks([])

fig.savefig('HSG.png', dpi=400)
```

Hoa Sen Group (HSG)

[69]:
```
from vnstock import *
import talib
import matplotlib.pyplot as plt

'--prep---'
df1 = financial_flow(symbol="VNM", report_type='incomestatement',␣
 ↪report_range='quarterly').T

revenue = df1.loc['revenue'][:15]
revenue_growth = df1.loc['quarterRevenueGrowth'][:15]
revenue = revenue.to_frame().loc[::-1]
revenue_growth = revenue_growth.to_frame().loc[::-1]
profit = df1.loc['postTaxProfit']
profit_growth = df1.loc['quarterOperationProfitGrowth']
profit = profit [:15]
profit =profit.to_frame().loc[::-1]
profit_growth = profit_growth [:15]
profit_growth =profit_growth.to_frame().loc[::-1]

gross_profit = df1.loc['grossProfit'][:15]
gross_profit = gross_profit.to_frame().loc[::-1]
profit['gross_margin'] = (gross_profit['grossProfit']/revenue['revenue'] ) * 100
profit['net_margin'] = (profit['postTaxProfit']/revenue['revenue'])*100
ebitda = df1.loc['ebitda'][:15]
ebitda = ebitda.to_frame().loc[::-1]
profit['EBIT'] = (ebitda['ebitda']/revenue['revenue']) * 100

df3 = stock_evaluation (symbol='VNM', period=1, time_window='W')
value = abs(df3['PE'][:15] / 17)
value = value.to_frame()
value['PB'] = df3['PB'][:15]
value['EV/EBITDA'] = df3['industryPB'][:15]

df4 = financial_flow(symbol="VNM", report_type='balancesheet',␣
 ↪report_range='quarterly')[:15].T
cash = df4.loc['cash'][:15] + df4.loc['fixedAsset'][:15]
cash = cash.to_frame().loc[::-1]
cash_flow = financial_flow(symbol="HPG", report_type='cashflow',␣
 ↪report_range='quarterly')[:15]
cash_flow = cash_flow.drop(['ticker', 'investCost', 'freeCashFlow'], axis = 1).
 ↪loc[::-1]

df = financial_ratio('VNM', 'yearly', is_all = True)
# df5
roe = df.loc['roe'][:16]
```

```
b = [0.05, 0.04,0.03, 0.04,0.05,0.02,0.01,0.03, 0.03, 0.05,0.04,0,0.02,0.02,0.
 ↪03,0.03]
roce = roe + b
roce = roce.to_frame().loc[::-1][:16] * 100
roe = roe.to_frame().loc[::-1][:16]*100
roa = df.loc['roa'].to_frame()[:16].loc[::-1]*100

df5 = financial_flow(symbol="VNM", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T

short_invest = df5.loc['shortInvest']
asset = short_invest.to_frame().loc[::-1]
asset['Cash'] = df5.loc['cash'].to_frame().loc[::-1]
asset['Fixed assets'] = df5.loc['fixedAsset'].to_frame().loc[::-1]
asset['Inventories'] = df5.loc['shortReceivable'].to_frame().loc[::-1]
asset['Long-term assets'] = df5.loc['longAsset'].to_frame().loc[::-1]
asset['Short-term assets'] = df5.loc['shortAsset'].to_frame().loc[::-1]
asset['Short-term Receive'] = df5.loc['shortReceivable'].to_frame().loc[::-1]


cap = df5.loc['capital'].to_frame().loc[::-1]
cap['equity'] = df5.loc['equity'].to_frame().loc[::-1]
cap ['otherDebt'] = df5.loc['otherDebt'].to_frame().loc[::-1]
cap ['payable'] = df5.loc['equity'].to_frame().loc[::-1]
# cap ['debt'] = df5.loc['debt'].to_frame().loc[::-1]

cap['shortDebt'] = df5.loc['shortDebt'].to_frame().loc[::-1]

'Tai san'
# df6 = financial_flow(symbol="HSG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T
df6 = financial_ratio('VNM', 'yearly', is_all = True)
to_asset = df6.loc['debtOnAsset'].to_frame().loc[::-1][:16] * 100
b = [45,49,51,55,55,55,58,46,43,40,49,50,53,55,49,44]
to_asset['Liabilites to assets'] = b
```

[70]:
```
import numpy as np
from scipy.interpolate import make_interp_spline, BSpline
fig = plt.gcf()
# ax = f.add_subplot(111)
# ax.yaxis.tick_right()
fig.set_size_inches(16, 20)
width = 0.4
fig.suptitle('Vinamilk Group (VNM)', fontsize=20, weight='bold', color = 'r')
```

```
'----------plot 1 --------------'
plt.subplot(3,3,1)

plt.bar(revenue.index, revenue['revenue'], label = 'Net revenue')
plt.plot(revenue_growth.index, revenue_growth['quarterRevenueGrowth'], color =␣
 ↪'red', label = 'Net revenue', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
plt.ylim(-5000, 20000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng doanh thu', weight='bold')
'------------------------'
plt.subplot(3,3,2)

plt.bar(profit.index, profit['postTaxProfit'], label = 'Profit after tax')
plt.plot(profit_growth.index, profit_growth['quarterOperationProfitGrowth'],␣
 ↪color = 'red', label = 'Profit after tax', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
plt.ylim(-1000, 4000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng lợi nhuận',weight='bold')

'---------------------------'
plt.subplot(3,3,3)

x = np.array([i for i in range (len (profit.index))])
xnew = np.linspace(x.min(), x.max(), 200)

spl = make_interp_spline(x, profit['gross_margin'], k=3)
y_1= spl(xnew)

plt.plot(xnew, y_1, color = 'red')
plt.plot(profit.index, profit['gross_margin'], ls = '', color = 'r', label =␣
 ↪'Gross profit margin', marker = 'o')
spl2 = make_interp_spline(x, profit['EBIT'], k=3)
y_2= spl2(xnew)
plt.plot(xnew, y_2, color = 'green')
plt.plot(profit.index, profit['EBIT'], ls = '', color = 'g', label = 'EBITDA/
 ↪Net revenue', marker = 'o')
spl3 = make_interp_spline(x, profit['net_margin'], k=3)
y_3= spl3(xnew)
plt.plot(xnew, y_3, color = 'b')
plt.plot(profit.index, profit['net_margin'],ls = '', color = 'b', label = 'Net␣
 ↪profit margin', marker = 'o')
plt.xticks(rotation = 40)
plt.ylim(10, 50)
```

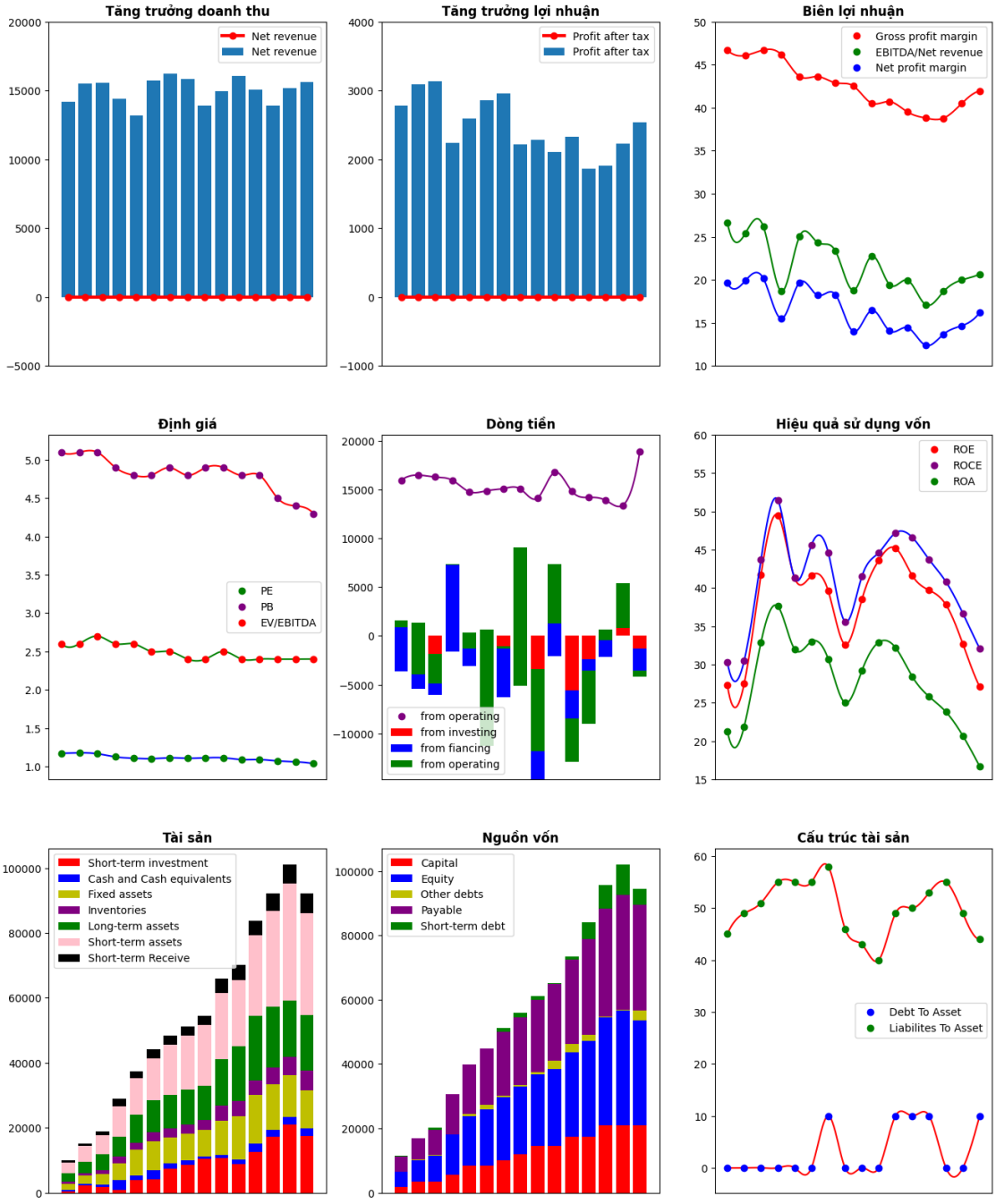
```
plt.legend()
plt.xticks([])
plt.title('Biên lợi nhuận',weight='bold')

# '----------------------'
plt.subplot(3,3,4)

x = np.array([i for i in range (len (value.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, value['PE'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'blue')
plt.plot(value.index, value['PE'],ls = '', color = 'green', label = 'PE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['PB'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(value.index, value['PB'],ls = '',  color = 'purple', label = 'PB',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['EV/EBITDA'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(value.index, value['EV/EBITDA'],ls = '', color = 'red', label = 'EV/
 ↪EBITDA', marker = 'o')
plt.legend()
plt.title('Định giá',weight='bold')
plt.xticks([])


'----------------------'
plt.subplot(3,3,5)
plt.bar(cash_flow.index, cash_flow['fromInvest'], color='r', label = 'from␣
 ↪investing')
plt.bar(cash_flow.index, cash_flow['fromFinancial'],␣
 ↪bottom=cash_flow['fromInvest'], color='b', label = 'from fiancing')
plt.bar(cash_flow.index, cash_flow['fromSale'],␣
 ↪bottom=cash_flow['fromInvest']+cash_flow['fromFinancial'], color='g',label =␣
 ↪'from operating')

x = np.array([i for i in range (len (cash.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, cash[0], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'purple')
```

```
plt.plot(cash.index, cash[0], color = 'purple',ls = '', label = 'from␣
 ↪operating', marker = 'o')
plt.xticks(rotation = 40)
plt.legend()
plt.title('Dòng tiền',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,6)
x = np.array([i for i in (roa.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roe['roe'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(roa.index, roe['roe'],ls = '', color = 'red', label = 'ROE', marker =␣
 ↪'o')

x = np.array([i for i in (roce.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roce['roe'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'blue')
plt.plot(roce.index, roce['roe'],ls = '', color = 'purple', label = 'ROCE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, roa['roa'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(roa.index, roa['roa'], ls = '',color = 'green', label = 'ROA', marker␣
 ↪= 'o')
plt.legend()
plt.ylim(15, 60)
plt.title('Hiệu quả sử dụng vốn',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,7)
plt.bar(asset.index, asset['shortInvest'], color='r', label = 'Short-term␣
 ↪investment')
plt.bar(asset.index, asset['Cash'], bottom=asset['shortInvest'], color='b',␣
 ↪label = 'Cash and Cash equivalents')
plt.bar(asset.index, asset['Fixed assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest'], color='y', label = 'Fixed assets')
plt.bar(asset.index, asset['Inventories'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed assets'],␣
 ↪color='purple', label = 'Inventories')
```

```
plt.bar(asset.index, asset['Long-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories'], color='green', label = 'Long-term assets')
plt.bar(asset.index, asset['Short-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets'], color='pink', label␣
 ↪= 'Short-term assets')
plt.bar(asset.index, asset['Short-term Receive'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets']+asset['Short-term␣
 ↪assets'], color='black', label = 'Short-term Receive')
plt.legend()
plt.xticks([])
plt.title('Tài sản',weight='bold')

'------------------------'
plt.subplot(3,3,8)
plt.bar(cap.index, cap['capital'], color='r', label = 'Capital')
plt.bar(cap.index, cap['equity'], bottom=cap['capital'], color='b', label =␣
 ↪'Equity')
plt.bar(cap.index, cap['otherDebt'], bottom=cap['capital']+cap['equity'],␣
 ↪color='y', label = 'Other debts')
plt.bar(cap.index, cap['payable'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt'], color='purple', label␣
 ↪= 'Payable')
plt.bar(cap.index, cap['shortDebt'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt']+cap['payable'],␣
 ↪color='green', label = 'Short-term debt ')
plt.legend()
plt.title('Nguồn vốn',weight='bold')
plt.xticks([])

# '------------------------'
plt.subplot(3,3,9)

x = np.array([i for i in (to_asset.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, to_asset['debtOnAsset'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(to_asset.index, to_asset['debtOnAsset'],ls = '',  color = 'blue',␣
 ↪label = 'Debt To Asset', marker = 'o')
spl = make_interp_spline(x, to_asset['Liabilites to assets'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
```

```
plt.plot(to_asset.index, to_asset['Liabilites to assets'],ls = '', color =␣
 ↪'green', label = 'Liabilites To Asset', marker = 'o')
plt.legend()
plt.title('Cấu trúc tài sản',weight='bold')
plt.xticks([])

fig.savefig('VNM.png', dpi=400)
```

Vinamilk Group (VNM)



Vietnam Airline

[71]:
```
from vnstock import *
import talib
import matplotlib.pyplot as plt

'--prep---'
df1 = financial_flow(symbol="HVN", report_type='incomestatement',␣
 ↪report_range='quarterly').T

revenue = df1.loc['revenue'][:15]
revenue_growth = df1.loc['quarterRevenueGrowth'][:15]
revenue = revenue.to_frame().loc[::-1]
revenue_growth = revenue_growth.to_frame().loc[::-1]
profit = df1.loc['postTaxProfit']
profit_growth = df1.loc['quarterOperationProfitGrowth']
profit = profit [:15]
profit =profit.to_frame().loc[::-1]
profit_growth = profit_growth [:15]
profit_growth =profit_growth.to_frame().loc[::-1]

gross_profit = df1.loc['grossProfit'][:15]
gross_profit = gross_profit.to_frame().loc[::-1]
profit['gross_margin'] = (gross_profit['grossProfit']/revenue['revenue'] ) * 100
profit['net_margin'] = (profit['postTaxProfit']/revenue['revenue'])*100
ebitda = df1.loc['ebitda'][:15]
ebitda = ebitda.to_frame().loc[::-1]
profit['EBIT'] = (ebitda['ebitda']/revenue['revenue']) * 100

df3 = stock_evaluation (symbol='HVN', period=1, time_window='W')
value = abs(df3['PE'][:15] / 17)
value = value.to_frame()
value['PB'] = df3['PB'][:15]
value['EV/EBITDA'] = df3['industryPB'][:15]

df4 = financial_flow(symbol="HVN", report_type='balancesheet',␣
 ↪report_range='quarterly')[:15].T
cash = df4.loc['cash'][:15] + df4.loc['fixedAsset'][:15]
cash = cash.to_frame().loc[::-1]
cash_flow = financial_flow(symbol="HPG", report_type='cashflow',␣
 ↪report_range='quarterly')[:15]
cash_flow = cash_flow.drop(['ticker', 'investCost', 'freeCashFlow'], axis = 1).
 ↪loc[::-1]

df = financial_ratio('HVN', 'yearly', is_all = True)
# df5
roe = df.loc['roe'][:8]
b = [2, -3, -1,0,0,0,0,0]
roce = roe + b
```

```
roce = roce.to_frame().loc[::-1][:8] * 100
roe = roe.to_frame().loc[::-1][:8]*100
roa = df.loc['roa'].to_frame()[:8].loc[::-1]*100

df5 = financial_flow(symbol="HVN", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T

short_invest = df5.loc['shortInvest']
asset = short_invest.to_frame().loc[::-1]
asset['Cash'] = df5.loc['cash'].to_frame().loc[::-1]
asset['Fixed assets'] = df5.loc['fixedAsset'].to_frame().loc[::-1]
asset['Inventories'] = df5.loc['shortReceivable'].to_frame().loc[::-1]
asset['Long-term assets'] = df5.loc['longAsset'].to_frame().loc[::-1]
asset['Short-term assets'] = df5.loc['shortAsset'].to_frame().loc[::-1]
asset['Short-term Receive'] = df5.loc['shortReceivable'].to_frame().loc[::-1]


cap = df5.loc['capital'].to_frame().loc[::-1]
cap['equity'] = df5.loc['equity'].to_frame().loc[::-1]
cap ['otherDebt'] = df5.loc['otherDebt'].to_frame().loc[::-1]
cap ['payable'] = df5.loc['equity'].to_frame().loc[::-1]
# cap ['debt'] = df5.loc['debt'].to_frame().loc[::-1]

cap['shortDebt'] = df5.loc['shortDebt'].to_frame().loc[::-1]

'Tai san'
# df6 = financial_flow(symbol="HSG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T
df6 = financial_ratio('HVN', 'yearly', is_all = True)
to_asset = df6.loc['debtOnAsset'].to_frame().loc[::-1][:8] * 100
b = [86,83,80,77,76,90,99,117]
to_asset['Liabilites to assets'] = b
```

[72]:
```
import numpy as np
from scipy.interpolate import make_interp_spline, BSpline
fig = plt.gcf()
# ax = f.add_subplot(111)
# ax.yaxis.tick_right()
fig.set_size_inches(16, 20)
width = 0.4
fig.suptitle('Vietnam Airline (HVN)', fontsize=20, weight='bold', color = 'r')



'----------plot 1 --------------'
plt.subplot(3,3,1)
```

```
plt.bar(revenue.index, revenue['revenue'], label = 'Net revenue')
plt.plot(revenue_growth.index, revenue_growth['quarterRevenueGrowth'], color =␣
 ↪'red', label = 'Net revenue', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
# plt.ylim(-5000, 20000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng doanh thu', weight='bold')
'------------------------'
plt.subplot(3,3,2)

plt.bar(profit.index, profit['postTaxProfit'], label = 'Profit after tax')
plt.plot(profit_growth.index, profit_growth['quarterOperationProfitGrowth'],␣
 ↪color = 'red', label = 'Profit after tax', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
# plt.ylim(-1000, 4000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng lợi nhuận',weight='bold')

'---------------------------'
plt.subplot(3,3,3)

x = np.array([i for i in range (len (profit.index))])
xnew = np.linspace(x.min(), x.max(), 200)

spl = make_interp_spline(x, profit['gross_margin'], k=3)
y_1= spl(xnew)

plt.plot(xnew, y_1, color = 'red')
plt.plot(profit.index, profit['gross_margin'], ls = '', color = 'r', label =␣
 ↪'Gross profit margin', marker = 'o')
spl2 = make_interp_spline(x, profit['EBIT'], k=3)
y_2= spl2(xnew)
plt.plot(xnew, y_2, color = 'green')
plt.plot(profit.index, profit['EBIT'], ls = '', color = 'g', label = 'EBITDA/
 ↪Net revenue', marker = 'o')
spl3 = make_interp_spline(x, profit['net_margin'], k=3)
y_3= spl3(xnew)
plt.plot(xnew, y_3, color = 'b')
plt.plot(profit.index, profit['net_margin'],ls = '', color = 'b', label = 'Net␣
 ↪profit margin', marker = 'o')
plt.xticks(rotation = 40)
# plt.ylim(10, 50)
plt.legend()
plt.xticks([])
plt.title('Biên lợi nhuận',weight='bold')
```

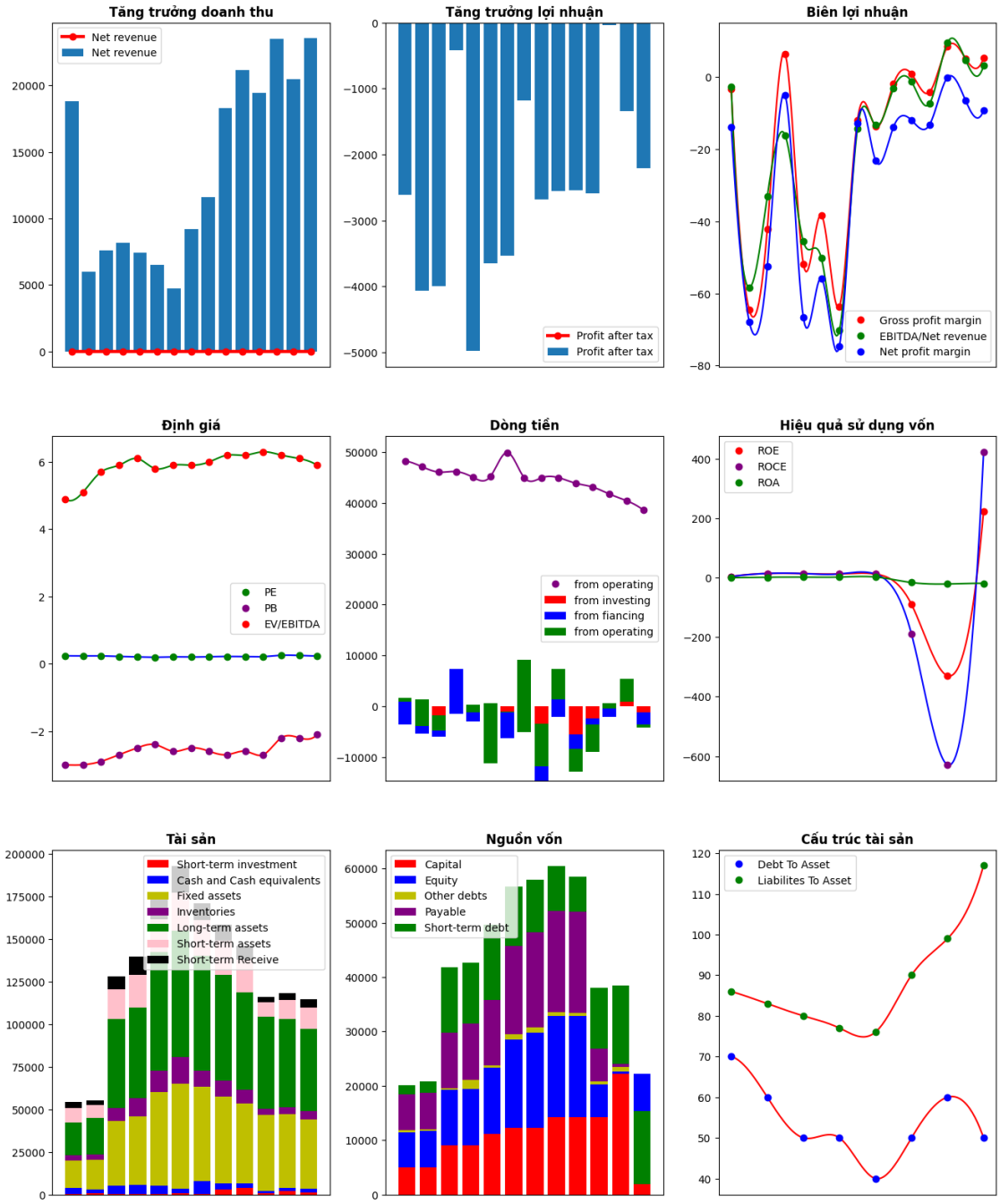
```
# '-----------------------'
plt.subplot(3,3,4)

x = np.array([i for i in range (len (value.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, value['PE'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'blue')
plt.plot(value.index, value['PE'],ls = '', color = 'green', label = 'PE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['PB'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(value.index, value['PB'],ls = '',  color = 'purple', label = 'PB',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['EV/EBITDA'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(value.index, value['EV/EBITDA'],ls = '', color = 'red', label = 'EV/
 ↪EBITDA', marker = 'o')
plt.legend()
plt.title('Định giá',weight='bold')
plt.xticks([])


'-----------------------'
plt.subplot(3,3,5)
plt.bar(cash_flow.index, cash_flow['fromInvest'], color='r', label = 'from␣
 ↪investing')
plt.bar(cash_flow.index, cash_flow['fromFinancial'],␣
 ↪bottom=cash_flow['fromInvest'], color='b', label = 'from fiancing')
plt.bar(cash_flow.index, cash_flow['fromSale'],␣
 ↪bottom=cash_flow['fromInvest']+cash_flow['fromFinancial'], color='g',label =␣
 ↪'from operating')

x = np.array([i for i in range (len (cash.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, cash[0], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'purple')
plt.plot(cash.index, cash[0], color = 'purple',ls = '', label = 'from␣
 ↪operating', marker = 'o')
plt.xticks(rotation = 40)
```

```
plt.legend()
plt.title('Dòng tiền',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,6)
x = np.array([i for i in (roa.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roe['roe'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(roa.index, roe['roe'],ls = '', color = 'red', label = 'ROE', marker =␣
 ↪'o')

x = np.array([i for i in (roce.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roce['roe'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'blue')
plt.plot(roce.index, roce['roe'],ls = '', color = 'purple', label = 'ROCE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, roa['roa'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(roa.index, roa['roa'], ls = '',color = 'green', label = 'ROA', marker␣
 ↪= 'o')
plt.legend()
# plt.ylim(15, 60)
plt.title('Hiệu quả sử dụng vốn',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,7)
plt.bar(asset.index, asset['shortInvest'], color='r', label = 'Short-term␣
 ↪investment')
plt.bar(asset.index, asset['Cash'], bottom=asset['shortInvest'], color='b',␣
 ↪label = 'Cash and Cash equivalents')
plt.bar(asset.index, asset['Fixed assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest'], color='y', label = 'Fixed assets')
plt.bar(asset.index, asset['Inventories'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed assets'],␣
 ↪color='purple', label = 'Inventories')
plt.bar(asset.index, asset['Long-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories'], color='green', label = 'Long-term assets')
```

```
plt.bar(asset.index, asset['Short-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets'], color='pink', label␣
 ↪= 'Short-term assets')
plt.bar(asset.index, asset['Short-term Receive'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets']+asset['Short-term␣
 ↪assets'], color='black', label = 'Short-term Receive')
plt.legend()
plt.xticks([])
plt.title('Tài sản',weight='bold')

'------------------------'
plt.subplot(3,3,8)
plt.bar(cap.index, cap['capital'], color='r', label = 'Capital')
plt.bar(cap.index, cap['equity'], bottom=cap['capital'], color='b', label =␣
 ↪'Equity')
plt.bar(cap.index, cap['otherDebt'], bottom=cap['capital']+cap['equity'],␣
 ↪color='y', label = 'Other debts')
plt.bar(cap.index, cap['payable'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt'], color='purple', label␣
 ↪= 'Payable')
plt.bar(cap.index, cap['shortDebt'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt']+cap['payable'],␣
 ↪color='green', label = 'Short-term debt ')
plt.legend()
plt.title('Nguồn vốn',weight='bold')
plt.xticks([])

# '------------------------'
plt.subplot(3,3,9)

x = np.array([i for i in (to_asset.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, to_asset['debtOnAsset'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(to_asset.index, to_asset['debtOnAsset'],ls = '',  color = 'blue',␣
 ↪label = 'Debt To Asset', marker = 'o')
spl = make_interp_spline(x, to_asset['Liabilites to assets'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(to_asset.index, to_asset['Liabilites to assets'],ls = '', color =␣
 ↪'green', label = 'Liabilites To Asset', marker = 'o')
plt.legend()
plt.title('Cấu trúc tài sản',weight='bold')
```

```
plt.xticks([])

fig.savefig('HVN.png', dpi=400)
```

Vietnam Airline (HVN)



[73]:
```
from vnstock import *
import talib
import matplotlib.pyplot as plt

'--prep---'
df1 = financial_flow(symbol="VHM", report_type='incomestatement',␣
 ↪report_range='quarterly').T

revenue = df1.loc['revenue'][:15]
revenue_growth = df1.loc['quarterRevenueGrowth'][:15]
revenue = revenue.to_frame().loc[::-1]
revenue_growth = revenue_growth.to_frame().loc[::-1]
profit = df1.loc['postTaxProfit']
profit_growth = df1.loc['quarterOperationProfitGrowth']
profit = profit [:15]
profit =profit.to_frame().loc[::-1]
profit_growth = profit_growth [:15]
profit_growth =profit_growth.to_frame().loc[::-1]

gross_profit = df1.loc['grossProfit'][:15]
gross_profit = gross_profit.to_frame().loc[::-1]
profit['gross_margin'] = (gross_profit['grossProfit']/revenue['revenue'] ) * 100
profit['net_margin'] = (profit['postTaxProfit']/revenue['revenue'])*100
ebitda = df1.loc['ebitda'][:15]
ebitda = ebitda.to_frame().loc[::-1]
profit['EBIT'] = (ebitda['ebitda']/revenue['revenue']) * 100

df3 = stock_evaluation (symbol='VHM', period=1, time_window='W')
value = abs(df3['PE'][:15] / 17)
value = value.to_frame()
value['PB'] = df3['PB'][:15]
value['EV/EBITDA'] = df3['industryPB'][:15]

df4 = financial_flow(symbol="VHM", report_type='balancesheet',␣
 ↪report_range='quarterly')[:15].T
cash = df4.loc['cash'][:15] + df4.loc['fixedAsset'][:15]
cash = cash.to_frame().loc[::-1]
cash_flow = financial_flow(symbol="HPG", report_type='cashflow',␣
 ↪report_range='quarterly')[:15]
cash_flow = cash_flow.drop(['ticker', 'investCost', 'freeCashFlow'], axis = 1).
 ↪loc[::-1]

df = financial_ratio('VHM', 'yearly', is_all = True)
# df5
roe = df.loc['roe'][:5]
```

```
b = [ -2,3,6,3,4]
roce = roe + b
roce = roce.to_frame().loc[::-1][:5] * 100
roe = roe.to_frame().loc[::-1][:5]*100
roa = df.loc['roa'].to_frame()[:5].loc[::-1]*100

df5 = financial_flow(symbol="VHM", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T

short_invest = df5.loc['shortInvest']
asset = short_invest.to_frame().loc[::-1]
asset['Cash'] = df5.loc['cash'].to_frame().loc[::-1]
asset['Fixed assets'] = df5.loc['fixedAsset'].to_frame().loc[::-1]
asset['Inventories'] = df5.loc['shortReceivable'].to_frame().loc[::-1]
asset['Long-term assets'] = df5.loc['longAsset'].to_frame().loc[::-1]
asset['Short-term assets'] = df5.loc['shortAsset'].to_frame().loc[::-1]
asset['Short-term Receive'] = df5.loc['shortReceivable'].to_frame().loc[::-1]


cap = df5.loc['capital'].to_frame().loc[::-1]
cap['equity'] = df5.loc['equity'].to_frame().loc[::-1]
cap ['otherDebt'] = df5.loc['otherDebt'].to_frame().loc[::-1]
cap ['payable'] = df5.loc['equity'].to_frame().loc[::-1]
# cap ['debt'] = df5.loc['debt'].to_frame().loc[::-1]

cap['shortDebt'] = df5.loc['shortDebt'].to_frame().loc[::-1]

'Tai san'
# df6 = financial_flow(symbol="HSG", report_type='balancesheet',␣
 ↪report_range='yearly')[:15].T
df6 = financial_ratio('HVN', 'yearly', is_all = True)
to_asset = df6.loc['debtOnAsset'].to_frame().loc[::-1][:8] * 100
b = [86,83,80,77,76,90,99,117]
to_asset['Liabilites to assets'] = b
```

[74]:
```
import numpy as np
from scipy.interpolate import make_interp_spline, BSpline
fig = plt.gcf()
# ax = f.add_subplot(111)
# ax.yaxis.tick_right()
fig.set_size_inches(16, 20)
width = 0.4
fig.suptitle('VinHomes (VHM)', fontsize=20, weight='bold', color = 'r')



'----------plot 1 --------------'
```

```
plt.subplot(3,3,1)

plt.bar(revenue.index, revenue['revenue'], label = 'Net revenue')
plt.plot(revenue_growth.index, revenue_growth['quarterRevenueGrowth'], color =␣
 ↪'red', label = 'Net revenue', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
# plt.ylim(-5000, 20000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng doanh thu', weight='bold')
'------------------------'
plt.subplot(3,3,2)

plt.bar(profit.index, profit['postTaxProfit'], label = 'Profit after tax')
plt.plot(profit_growth.index, profit_growth['quarterOperationProfitGrowth'],␣
 ↪color = 'red', label = 'Profit after tax', marker = 'o', linewidth = 3)
plt.xticks(rotation = 40)
# plt.ylim(-1000, 4000)
plt.legend()
plt.xticks([])
plt.title('Tăng trưởng lợi nhuận',weight='bold')

'----------------------------'
plt.subplot(3,3,3)

x = np.array([i for i in range (len (profit.index))])
xnew = np.linspace(x.min(), x.max(), 200)

spl = make_interp_spline(x, profit['gross_margin'], k=3)
y_1= spl(xnew)

plt.plot(xnew, y_1, color = 'red')
plt.plot(profit.index, profit['gross_margin'], ls = '', color = 'r', label =␣
 ↪'Gross profit margin', marker = 'o')
spl2 = make_interp_spline(x, profit['EBIT'], k=3)
y_2= spl2(xnew)
plt.plot(xnew, y_2, color = 'green')
plt.plot(profit.index, profit['EBIT'], ls = '', color = 'g', label = 'EBITDA/
 ↪Net revenue', marker = 'o')
spl3 = make_interp_spline(x, profit['net_margin'], k=3)
y_3= spl3(xnew)
plt.plot(xnew, y_3, color = 'b')
plt.plot(profit.index, profit['net_margin'],ls = '', color = 'b', label = 'Net␣
 ↪profit margin', marker = 'o')
plt.xticks(rotation = 40)
# plt.ylim(10, 50)
plt.legend()
```

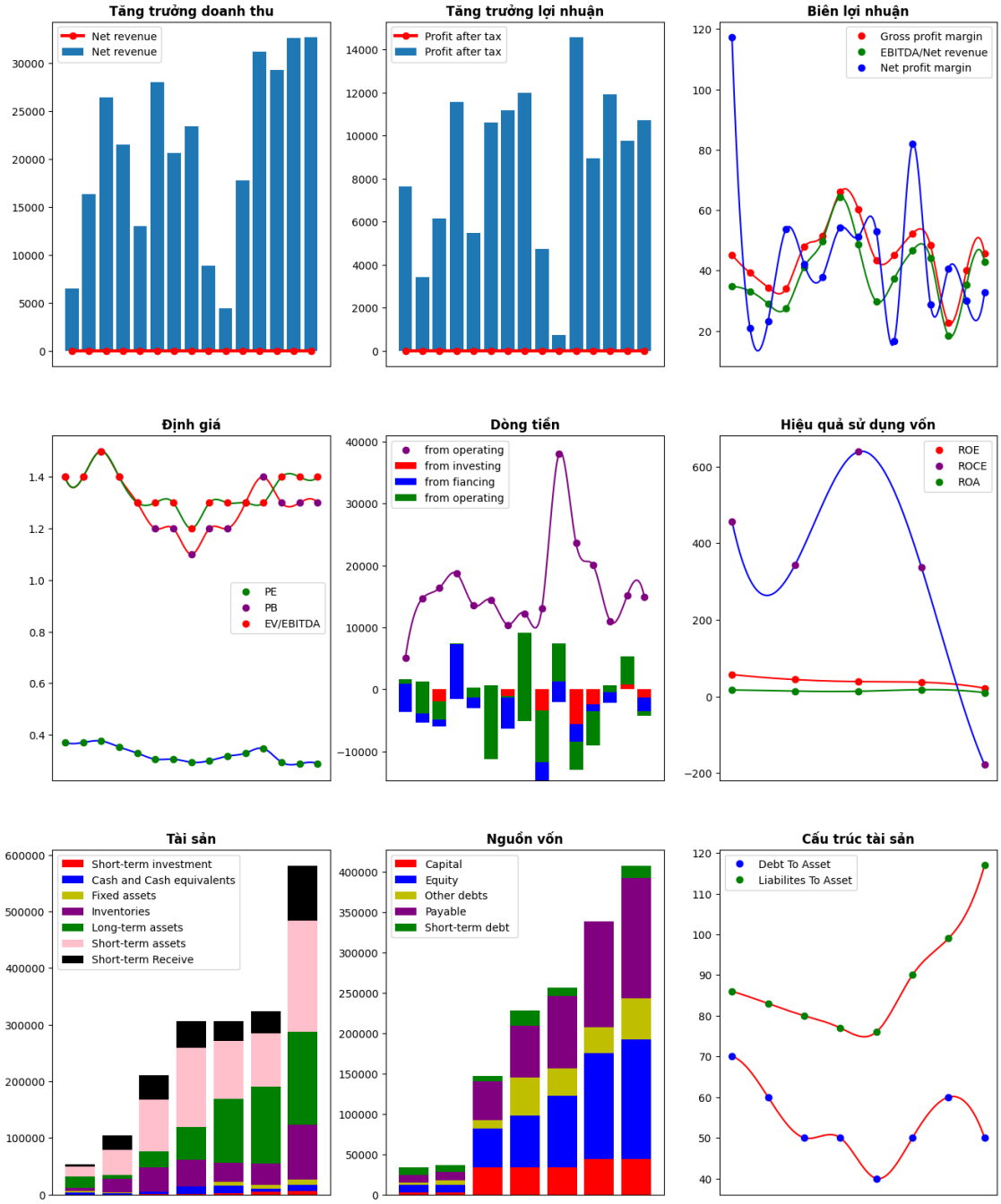
```
plt.xticks([])
plt.title('Biên lợi nhuận',weight='bold')

# '-----------------------'
plt.subplot(3,3,4)

x = np.array([i for i in range (len (value.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, value['PE'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'blue')
plt.plot(value.index, value['PE'],ls = '', color = 'green', label = 'PE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['PB'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
plt.plot(value.index, value['PB'],ls = '',  color = 'purple', label = 'PB',␣
 ↪marker = 'o')

spl = make_interp_spline(x, value['EV/EBITDA'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(value.index, value['EV/EBITDA'],ls = '', color = 'red', label = 'EV/
 ↪EBITDA', marker = 'o')
plt.legend()
plt.title('Định giá',weight='bold')
plt.xticks([])


'-----------------------'
plt.subplot(3,3,5)
plt.bar(cash_flow.index, cash_flow['fromInvest'], color='r', label = 'from␣
 ↪investing')
plt.bar(cash_flow.index, cash_flow['fromFinancial'],␣
 ↪bottom=cash_flow['fromInvest'], color='b', label = 'from fiancing')
plt.bar(cash_flow.index, cash_flow['fromSale'],␣
 ↪bottom=cash_flow['fromInvest']+cash_flow['fromFinancial'], color='g',label =␣
 ↪'from operating')

x = np.array([i for i in range (len (cash.index))])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, cash[0], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'purple')
```

```
plt.plot(cash.index, cash[0], color = 'purple',ls = '', label = 'from␣
 ↪operating', marker = 'o')
plt.xticks(rotation = 40)
plt.legend()
plt.title('Dòng tiền',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,6)
x = np.array([i for i in (roa.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roe['roe'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(roa.index, roe['roe'],ls = '', color = 'red', label = 'ROE', marker =␣
 ↪'o')

x = np.array([i for i in (roce.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, roce['roe'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'blue')
plt.plot(roce.index, roce['roe'],ls = '', color = 'purple', label = 'ROCE',␣
 ↪marker = 'o')

spl = make_interp_spline(x, roa['roa'], k=3)
y_3= spl(xnew)
plt.plot(xnew, y_3, color = 'green')
plt.plot(roa.index, roa['roa'], ls = '',color = 'green', label = 'ROA', marker␣
 ↪= 'o')
plt.legend()
# plt.ylim(15, 60)
plt.title('Hiệu quả sử dụng vốn',weight='bold')
plt.xticks([])

'-----------------------'
plt.subplot(3,3,7)
plt.bar(asset.index, asset['shortInvest'], color='r', label = 'Short-term␣
 ↪investment')
plt.bar(asset.index, asset['Cash'], bottom=asset['shortInvest'], color='b',␣
 ↪label = 'Cash and Cash equivalents')
plt.bar(asset.index, asset['Fixed assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest'], color='y', label = 'Fixed assets')
plt.bar(asset.index, asset['Inventories'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed assets'],␣
 ↪color='purple', label = 'Inventories')
```

```
plt.bar(asset.index, asset['Long-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories'], color='green', label = 'Long-term assets')
plt.bar(asset.index, asset['Short-term assets'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets'], color='pink', label␣
 ↪= 'Short-term assets')
plt.bar(asset.index, asset['Short-term Receive'],␣
 ↪bottom=asset['Cash']+asset['shortInvest']+asset['Fixed␣
 ↪assets']+asset['Inventories']+asset['Long-term assets']+asset['Short-term␣
 ↪assets'], color='black', label = 'Short-term Receive')
plt.legend()
plt.xticks([])
plt.title('Tài sản',weight='bold')

'------------------------'
plt.subplot(3,3,8)
plt.bar(cap.index, cap['capital'], color='r', label = 'Capital')
plt.bar(cap.index, cap['equity'], bottom=cap['capital'], color='b', label =␣
 ↪'Equity')
plt.bar(cap.index, cap['otherDebt'], bottom=cap['capital']+cap['equity'],␣
 ↪color='y', label = 'Other debts')
plt.bar(cap.index, cap['payable'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt'], color='purple', label␣
 ↪= 'Payable')
plt.bar(cap.index, cap['shortDebt'],␣
 ↪bottom=cap['capital']+cap['equity']+cap['otherDebt']+cap['payable'],␣
 ↪color='green', label = 'Short-term debt ')
plt.legend()
plt.title('Nguồn vốn',weight='bold')
plt.xticks([])

# '------------------------'
plt.subplot(3,3,9)

x = np.array([i for i in (to_asset.index)])
xnew = np.linspace(x.min(), x.max(), 200)
spl = make_interp_spline(x, to_asset['debtOnAsset'], k=3)
y_1= spl(xnew)
plt.plot(xnew, y_1, color = 'red')
plt.plot(to_asset.index, to_asset['debtOnAsset'],ls = '',  color = 'blue',␣
 ↪label = 'Debt To Asset', marker = 'o')
spl = make_interp_spline(x, to_asset['Liabilites to assets'], k=3)
y_2= spl(xnew)
plt.plot(xnew, y_2, color = 'red')
```

```
plt.plot(to_asset.index, to_asset['Liabilites to assets'],ls = '', color =␣
 ↪'green', label = 'Liabilites To Asset', marker = 'o')
plt.legend()
plt.title('Cấu trúc tài sản',weight='bold')
plt.xticks([])
fig.savefig('VHM.png', dpi=400)
```

VinHomes (VHM)



1 Do their stock prices have any correlation with their P/E index? Why? Clearly explain.

P/E có mối tương quan đáng kể đối với giá cổ phiếu. Công thức của P/E là :

P/E = Giá thị trường của cổ phiếu / Thu nhập trên một cổ phiếu

- Chỉ số P/E cao thường thể hiện sự kì vọng của nhà đầu tư về việc tăng trưởng thu nhập từ cổ phiếu sẽ cao hơn trong tương lai. Nhưng đôi khi P/E cao là biểu hiện việc doanh nghiệp kinh doanh kém hiệu quả, giá cổ phiếu được thổi phồng quá mức
- Chỉ số P/E thấp có thể do doanh nghiệp thu lợi nhuận bất thường nhưng không bền (không đến từ hoạt động kinh doanh) hoặc do cổ đông bán cổ phiếu lấy lời, khiến giá giảm.

Tuy nhiên, chỉ số P/E thấp hay cao không phản ánh bức tranh toàn cảnh về doanh nghiệp. Ta cần so sánh P/E của doanh nghiệp đó với P/E toàn ngành cũng như tốc độ tăng trưởng lợi nhuận và thu nhập dự kiến của doanh nghiệp