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Do IPOs offer a degree of market dominance?

- 1058 Initial Public Offerings in 2021
- IPOs close 2021 with over $300 billion in market share for the year
- $153.5 Billion in traditional offerings
- $162 Billion in blank check companies (SPAC)
- Overall market performance at all time highs

What's the scoop?

- Fundamental data points can correlate to predict potential outcomes
  - Annual Financials, Offer Date, Industry, S&P Returns
- Using machine learning and neutral network models we can analyze these fundamentals
  - Voting classifier, PyTorch, Logistic Regression, SVC, Adaboost, Xgboost, Random Forest
- Can a lucrative trading strategy be developed?
  - Getting in on a stock pre-IPO usually comes with the caveat that it cannot be traded for a period of time.

DATA PREP

IPOScoop.com

306 Stocks

	Symbol	Industry	Offer Date	Shares (millions)	Offer Price
1	ABOS	Health Care	7/1/2021	10	$16.00
2	ABSI	Health Care	7/22/2021	12.5	$16.00
3	ACHL	Health Care	3/31/2021	9.8	$18.00
4	ACT	Financials	9/16/2021	13.3	$19.00
5	ACVA	Other	3/24/2021	16.6	$25.00
6	ACXP	Health Care	6/25/2021	2.5	$6.00
7	AIP	Technology	10/27/2021	5	$14.00
8	AIRS	Health Care	10/29/2021	7	$11.00
9	AKA	Consumer Goods	9/22/2021	10	$11.00
10	ALHC	Health Care	3/26/2021	27.2	$18.00

Yahoo Finance *Plus*

Annual Income Statement

Balance Sheet

Cash Flows

	name	12/31/2020	12/31/2019
1	TotalAssets	44,429,000	7,322,000
2	CurrentAssets	44,429,000	7,178,000
3	CashCashEquivalen...	43,777,000	6,552,000
4	CashAndCashEquiv...	43,777,000	6,552,000
5	Receivables	109,000	30,000
6	OtherReceivables	109,000	30,000
7	PrepaidAssets	91,000	49,000
8	OtherCurrentAssets	452,000	547,000
9	TotalNonCurrentAssets	0	144,000
10	NonCurrentDeferred...	0	0
11	OtherNonCurrentAs...		144,000
12	TotalLiabilitiesNetMin...	63,020,000	18,742,000
13	CurrentLiabilities	6,367,000	1,342,000
14	PayablesAndAccrue...	864,000	728,000
15	Payables	531,000	223,000
16	AccountsPayable	531,000	223,000
17	CurrentAccruedExp...	333,000	505,000
18	PensionandOtherPo...	0	0
19	OtherCurrentLiabilities	5,503,000	614,000
20	TotalNonCurrentLiabi...	56,653,000	17,400,000
21	PreferredSecurities...	56,653,000	17,400,000
22	TotalEquityGrossMino...	-18,591,000	-11,420,000
23	StockholdersEquity	-18,591,000	-11,420,000
24	CapitalStock	0	0
25	CommonStock	0	0
26	AdditionalPaidInCap...	8,374,000	8,220,000
27	RetainedEarnings	-26,965,000	-19,640,000
28	TotalCapitalization	-18,591,000	-11,420,000
29	CommonStockEquity	-18,591,000	-11,420,000
30	NetTangibleAssets	-18,591,000	-11,420,000
31	WorkingCapital	38,062,000	5,836,000
32	InvestedCapital	-18,591,000	-11,420,000
33	TangibleBookValue	-18,591,000	-11,420,000
34	ShareIssued	38,651,795	36,985,129
35	OrdinarySharesNumber	38,651,795	36,985,129

	name	ttm	12/31/2020	12/31/2019
1	TotalRevenue	329,000	1,436,000	1,697,000
2	OperatingRevenue	329,000	1,436,000	1,697,000
3	OperatingExpense	12,839,000	9,348,000	9,502,000
4	SellingGeneralAndA...	5,181,000	1,351,000	926,000
5	GeneralAndAdminist...	5,181,000	1,351,000	926,000
6	OtherGandA	5,181,000	1,351,000	926,000
7	ResearchAndDevelo...	7,658,000	7,997,000	8,576,000
8	OperatingIncome	-12,510,000	-7,912,000	-7,805,000
9	NetNonOperatingInter...	22,000	1,000	45,000
10	InterestIncomeNonO...	45,000	1,000	45,000
11	OtherIncomeExpense		586,000	-147,000
12	GainOnSaleOfSecurity		586,000	-147,000
13	PretaxIncome	-93,012,000	-7,325,000	-7,907,000
14	NetIncomeCommonS...	-93,598,000	-7,911,000	-7,686,000
15	NetIncome	-93,012,000	-7,325,000	-7,907,000
16	NetIncomeIncluding...	-93,012,000	-7,325,000	-7,907,000
17	NetIncomeContinuo...	-93,012,000	-7,325,000	-7,907,000
18	OtherunderPreferred...		586,000	-221,000
19	DilutedNIAvailtoCom...	-93,598,000	-7,911,000	-7,686,000
20	BasicEPS		-0.28	-0.268
21	DilutedEPS		-0.28	-0.268
22	BasicAverageShares		28,651,796	28,651,796
23	DilutedAverageShares		28,651,796	28,651,796
24	TotalOperatingIncome...	-12,510,000	-7,912,000	-7,805,000
25	TotalExpenses	12,839,000	9,348,000	9,502,000
26	NetIncomeFromConti...	-93,012,000	-7,325,000	-7,907,000
27	NormalizedIncome	-12,441,000	-7,911,000	-7,760,000
28	InterestIncome	45,000	1,000	45,000
29	NetInterestIncome	22,000	1,000	45,000
30	EBIT	-93,576,000	-7,912,000	-7,805,000
31	EBITDA	-93,576,000		
32	NetIncomeFromConti...	-93,012,000	-7,325,000	-7,907,000
33	TotalUnusualItemsEx...	-80,571,000	586,000	-147,000
34	TotalUnusualItems	-80,571,000	586,000	-147,000
35	NormalizedEBITDA	-13,005,000	-8,498,000	-7,658,000
36	TaxRateForCalcs	0	0	0
37	TaxEffectOfUnusualIt...	0	0	0

	name	ttm	12/31/2020	12/31/2019
1	OperatingCashFlow	-17,179,000	-7,450,000	-6,818,000
2	CashFlowFromConti...	-17,179,000	-7,450,000	-6,818,000
3	NetIncomeFromCon...	-93,012,000	-7,325,000	-7,907,000
4	OperatingGainsLosses		-586,000	147,000
5	GainLossOnInvest...		-586,000	147,000
6	StockBasedCompen...	595,000	154,000	174,000
7	ChangeInWorkingCa...	-5,328,000	307,000	768,000
8	ChangeInReceivables	108,000	-79,000	200,000
9	ChangeInPrepaidAs...	-4,705,000	53,000	6,000
10	ChangeInPayables...	-1,240,000	189,000	642,000
11	ChangeInPayable	-1,072,000	308,000	110,000
12	ChangeInAccount...	-1,072,000	308,000	110,000
13	ChangeInAccruedE...	-168,000	-119,000	532,000
14	ChangeInOtherCurr...	509,000	144,000	-80,000
15	FinancingCashFlow	245,131,000	44,675,000	6,239,000
16	CashFlowFromConti...	245,131,000	44,675,000	6,239,000
17	NetPreferredStockIs...	74,706,000	44,675,000	6,232,000
18	PreferredStockIssu...	74,706,000	44,675,000	6,232,000
19	ProceedsFromStock...	1,866,000	0	7,000
20	EndCashPosition	135,802,000	43,777,000	6,552,000
21	ChangesInCash	133,843,000	37,225,000	-579,000
22	BeginningCashPosition	1,959,000	6,552,000	7,131,000
23	IncomeTaxPaidSuppl...	0	0	0
24	InterestPaidSupplem...	0	0	0
25	IssuanceOfCapitalStock	243,265,000	44,675,000	6,232,000
26	FreeCashFlow	-17,193,000	-7,450,000	-6,818,000

DATA PREP

```
# Use Yahoo Finance data to measure returns for above-mentioned 100 day period
for ticker in ipo_df.index:
    data = yf.download('SPY',ipo_df.loc[ticker,'T-90D'],ipo_df.loc[ticker,'T-10D'],progress=False)
    spy_return = (data.iloc[-1,-2] - data.iloc[0,-2])/data.iloc[0,-2]
    ipo_df.loc[ticker,'SPY 90D Return'] = spy_return

#Use Yahoo Finance data to measure returns for +100 days
    data2 = yf.download(ticker,ipo_df.loc[ticker,'Offer Date'],ipo_df.loc[ticker,'T+100D'], progress=False)
    stock_return = (data2.iloc[-1,-2] - data2.iloc[0,-2])/data2.iloc[0,-2]
    ipo_df.loc[ticker,'100 day Return'] = stock_return
```

```
bz_ipo_df['100D Y/N'].value_counts()

0.0    214
1.0     92
Name: 100D Y/N, dtype: int64
```

```
# Use RandomOverSampler to balance data
ros = RandomOverSampler(random_state=1)
X_resampled, y_resampled = ros.fit_resample(X_train, y_train)
```

431 Features → 201

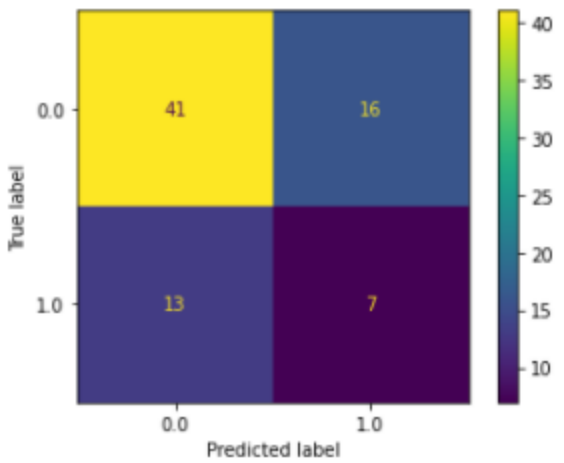
```
    # Loop through columns and drop columns that have 0 for more than 20% of the data therein
    for column in df.columns[1:]:
        zeros = (df[column]==0).sum()
        if zeros >= 0.80*len(df.index):
            df.drop(columns = column, inplace = True)
        else:
            pass

    return df
```

Feature Importance

Offer Date	0.043421
InvestedCapital	0.013331
SPY 90D Return	0.013099
TotalLiabilitiesNetMinorityInterest	0.012707
CashAndCashEquivalents	0.011619
TotalRevenue	0.011036
ChangeInWorkingCapital	0.010986
CashFlowFromContinuingFinancingActivities	0.010420
OperatingRevenue	0.009763
RetainedEarnings	0.009601

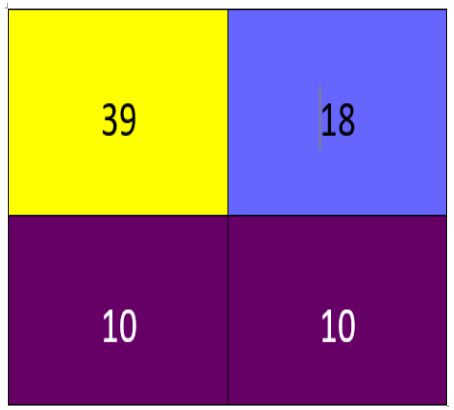
Xg Boost



XGB Classification Report

	precision	recall	f1-score	support
0.0	0.76	0.72	0.74	57
1.0	0.30	0.35	0.33	20
accuracy			0.62	77
macro avg	0.53	0.53	0.53	77
weighted avg	0.64	0.62	0.63	77

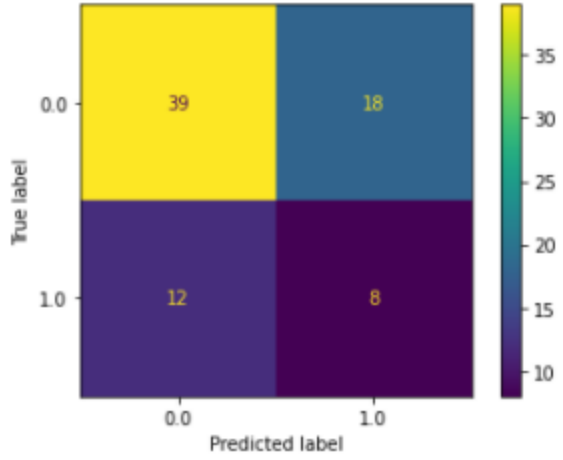
Pytorch



PyTorch Model Classification Report

	precision	recall	f1-score	support
0.0	0.80	0.68	0.74	57
1.0	0.36	0.50	0.42	20
accuracy			0.64	77
macro avg	0.58	0.59	0.58	77
weighted avg	0.68	0.64	0.65	77

Ada Boost

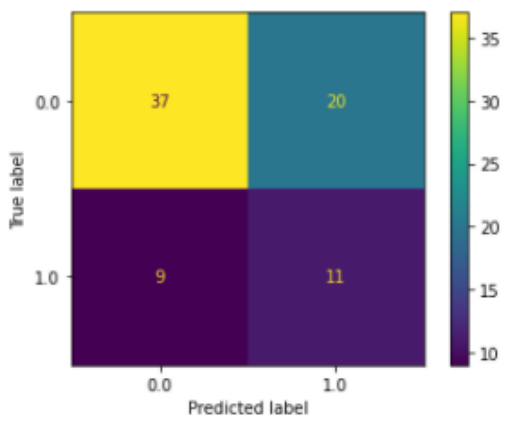


ADA + SVC Classification Report

	precision	recall	f1-score	support
0.0	0.76	0.68	0.72	57
1.0	0.31	0.40	0.35	20
accuracy			0.61	77
macro avg	0.54	0.54	0.54	77
weighted avg	0.65	0.61	0.62	77

Voting Classifier with SVC, Random Forest, and Logistic Regression

```
clf1 = LogisticRegression(multi_class='multinomial', random_state=1)
clf2 = RandomForestClassifier(n_estimators=1000, random_state=1)
clf3 = SVC(probability = True, kernel = 'sigmoid', random_state=1)
```



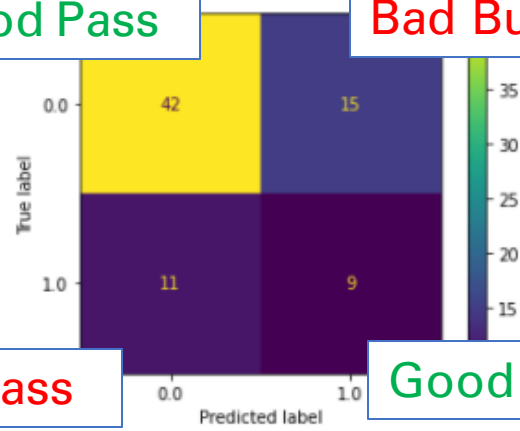
VotingClassifier Classification Report

	precision	recall	f1-score	support
0.0	0.80	0.65	0.72	57
1.0	0.35	0.55	0.43	20
accuracy			0.62	77
macro avg	0.58	0.60	0.57	77
weighted avg	0.69	0.62	0.64	77

```
eclf1 = VotingClassifier(estimators=[
       ('lr', clf1), ('rf', clf2), ('svc', clf3)], voting='hard')
eclf1 = eclf1.fit(X_resampled, y_resampled)
eclf1_pred = eclf1.predict(X_test)
```

Good Pass

Bad Buys



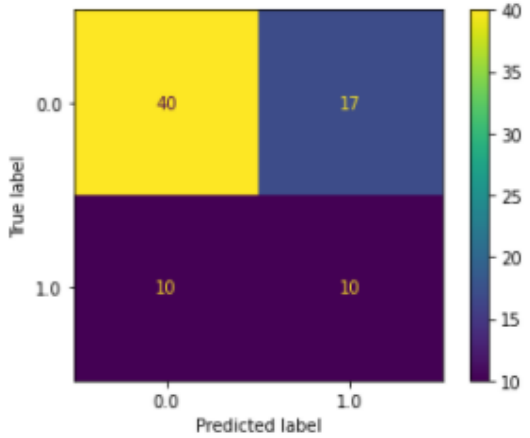
Bad Pass

Good Buys

VotingClassifier Classification Report

	precision	recall	f1-score	support
0.0	0.79	0.74	0.76	57
1.0	0.38	0.45	0.41	20
accuracy			0.66	77
macro avg	0.58	0.59	0.59	77
weighted avg	0.68	0.66	0.67	77

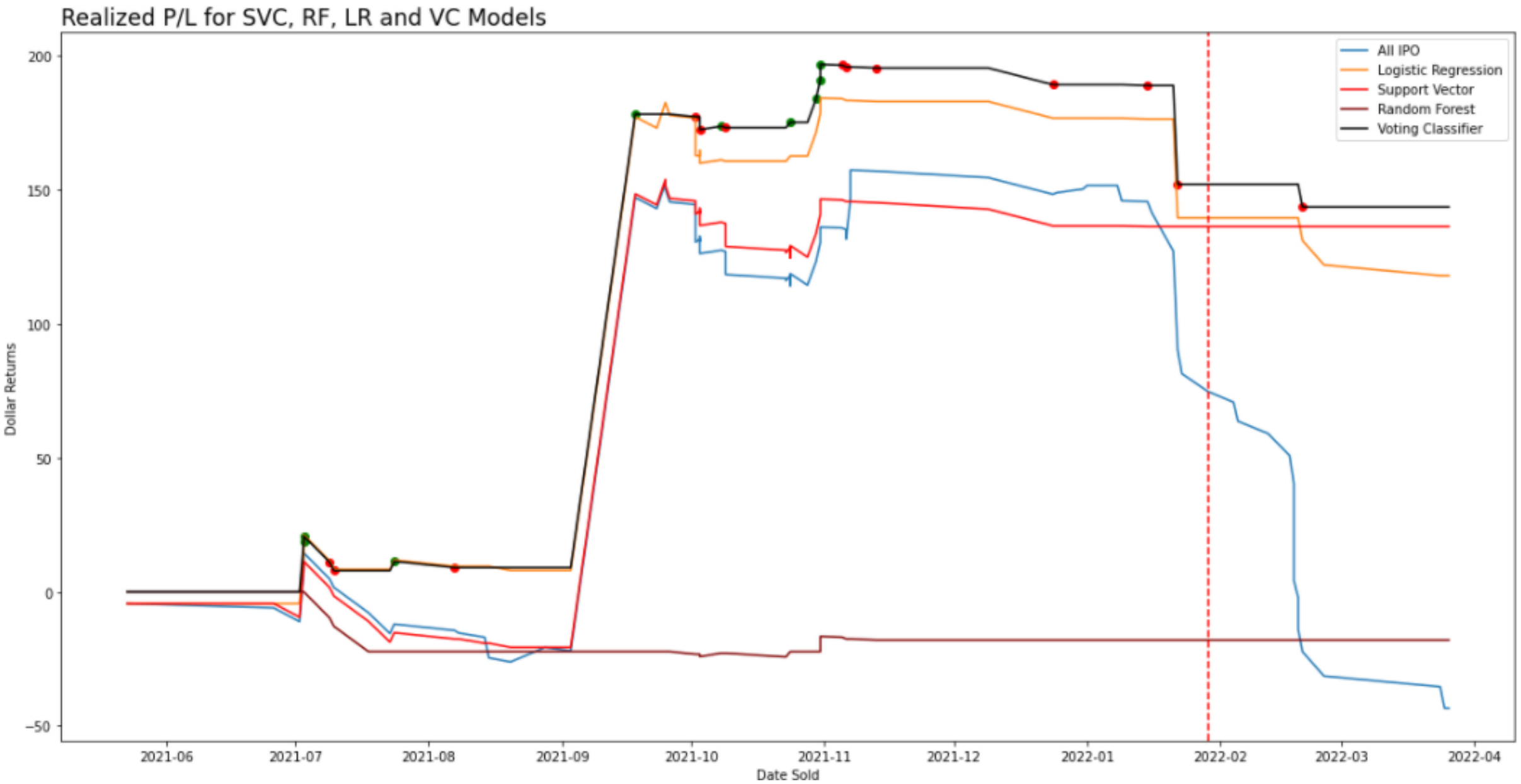
```
eclf3 = VotingClassifier(estimators=[
       ('lr', clf1), ('rf', clf2), ('svc', clf3)],
       voting='soft', weights=[1,2,2],
       flatten_transform=True)
eclf3 = eclf3.fit(X_resampled, y_resampled)
eclf3_pred = eclf3.predict(X_test)
```



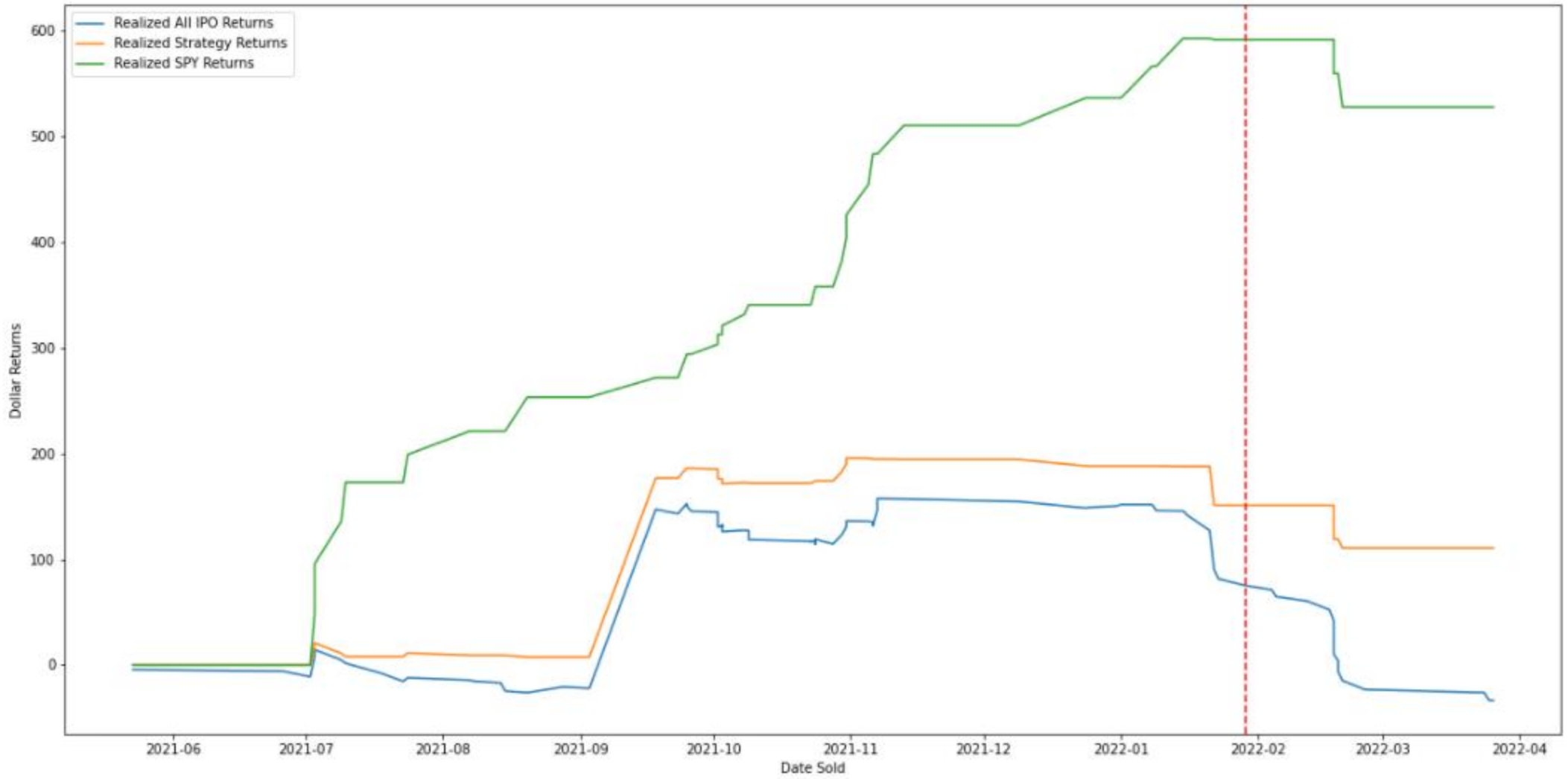
VotingClassifier Classification Report

	precision	recall	f1-score	support
0.0	0.80	0.70	0.75	57
1.0	0.37	0.50	0.43	20
accuracy			0.65	77
macro avg	0.59	0.60	0.59	77
weighted avg	0.69	0.65	0.66	77

```
eclf2 = VotingClassifier(estimators=[
       ('lr', clf1), ('rf', clf2), ('svc', clf3)],
       voting='soft')
eclf2 = eclf2.fit(X_resampled, y_resampled)
eclf2_pred = eclf2.predict(X_test)
```


Realized P/L for SVC, RF, LR and VC Models
All IPO
Logistic Regression
Support Vector
Random Forest
Voting Classifier
Dollar Returns
200
150
100
50
0
−50
2021-06
2021-07
2021-08
2021-09
2021-10
2021-11
2021-12
2022-01
2022-02
2022-03
2022-04
Date Sold

Voting Classifier vs DCA SPY



QUESTIONS WE STILL HAVE

IDEAS FOR IMPROVEMENT

QUESTIONS YOU MAY HAVE

SUGGESTIONS?