



Enterprise Miner

How *not* to use it in a stock portfolio application

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TASS Interfaces - Dec 2015



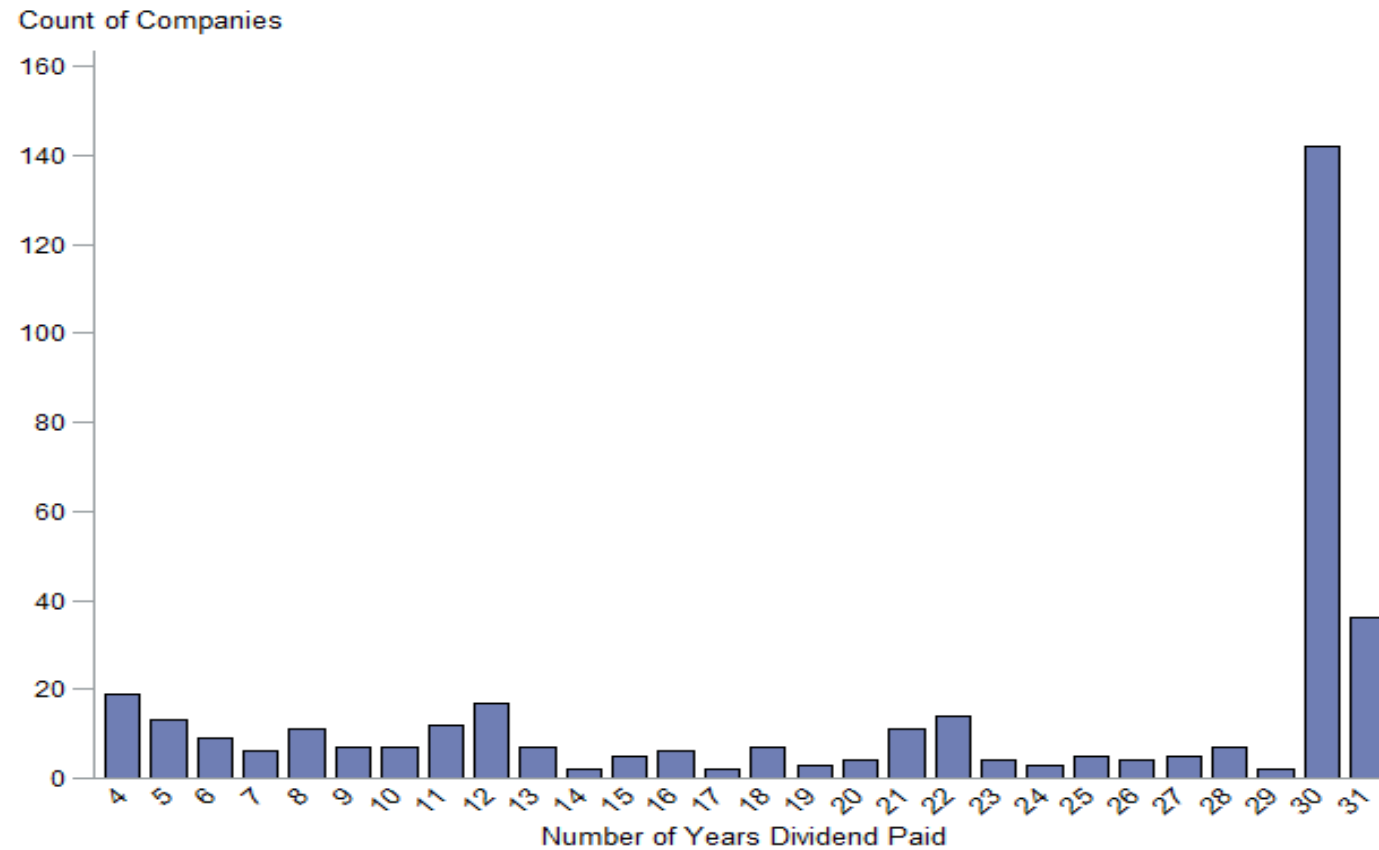
Objective



- ▶ Bristol Gate US Equity Strategy focused on investing in stocks with high dividend growth prospect
- ▶ Dividend is paid out of a company's earnings to its shareholders
- ▶ Dividend growing companies have been shown to produce higher returns
- ▶ How should we identify such companies?
- ▶ Quantitative model + Qualitative analysis

Divided History Payment

Histogram of dividend history payments by S&P 500 stocks



* As of Dec 2015

Original Model



Regression model using many years of data to predict next year dividend growth

Original Model Issues

Too many data points of different nature lead to noisy predictions

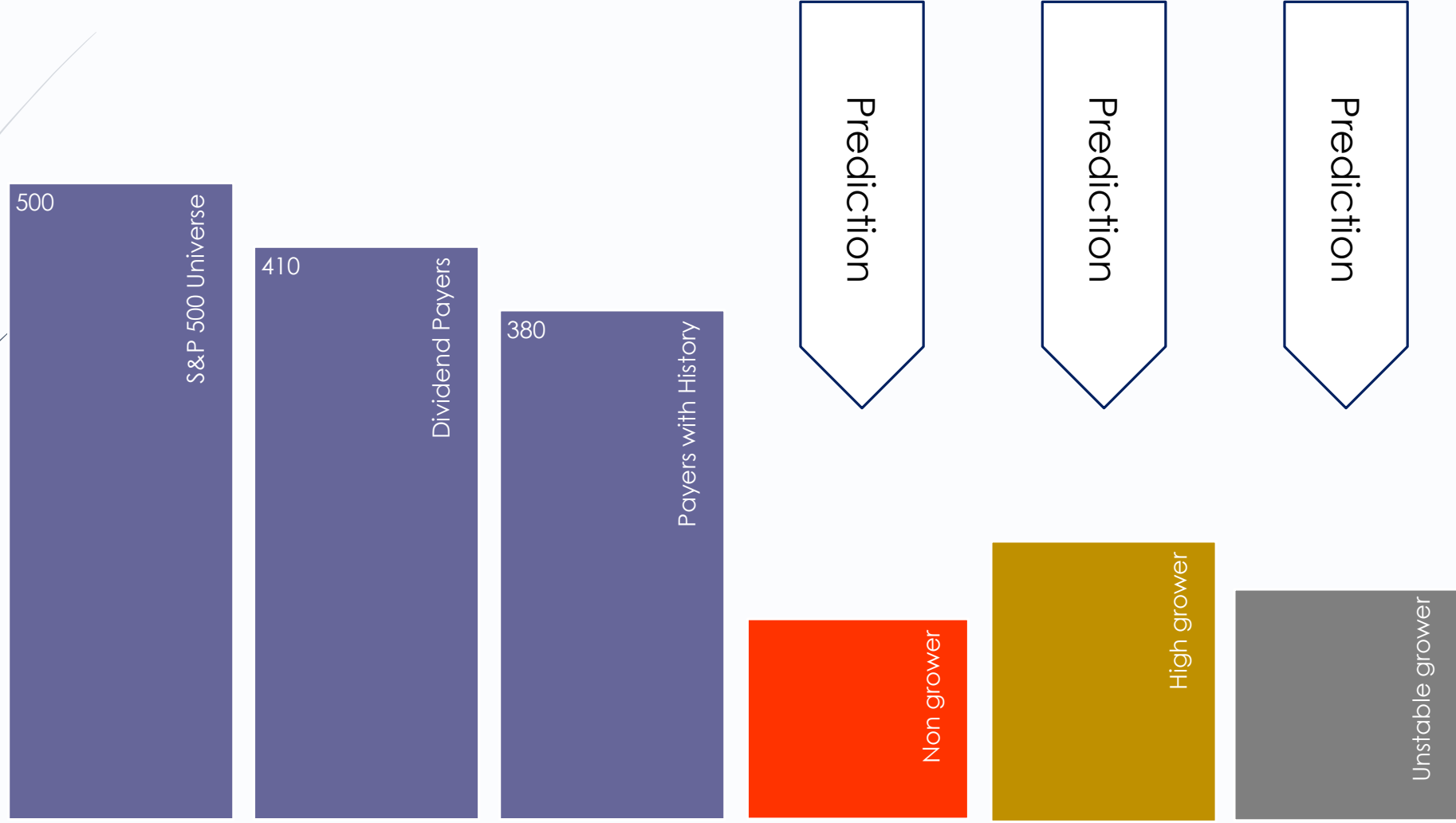
Too much emphasis on history, may not be relevant anymore

Revision

Good prediction, bad stock

Some non-growers show up in the list

Model Revised



Model Development (Two Stage)

The screenshot displays the SAS Enterprise Miner interface for a project named "DivGrowthModel". The left-hand pane shows a project tree with "Diagrams" containing "explore_input", "final_model", "sample_model", and "two step". Below this is a property table for the selected "final_model".

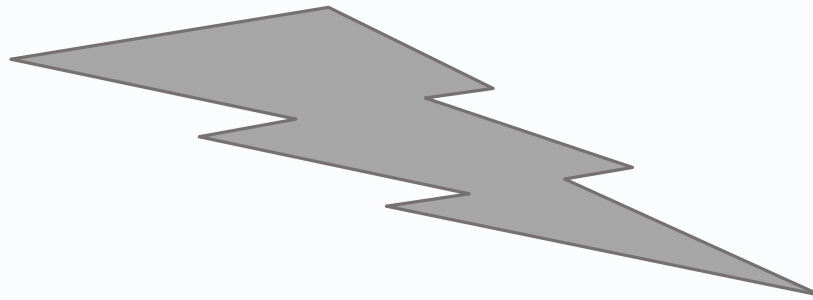
Property	Value
General	
Node ID	TwoStage
Imported Data	
Exported Data	
Notes	
Train	
Variables	
Model Type	Sequential
Class Model	Tree
Transfer	Classification
Filter	None
Value Model	Regression
Bias	None
Concurrent Training	
Concurrent Model	Multilayer Perceptron
Concurrent Hidden Units	3
Tree Class Model	
Tree Value Model	
Regression Class Model	
Regression Value Model	
Neural Class Model	
Neural Value Model	

The right-hand pane shows a workflow diagram for "final_model" with three nodes: "Control Point", "TwoStage", and "SAS Co". The "Control Point" and "TwoStage" nodes have green checkmarks, indicating they are active or completed. The "SAS Co" node is partially visible. The interface includes a menu bar (File, Edit, View, Actions, Options, Window, Help), a toolbar, and a bottom status bar with "Diagram" and "Log" options.

Strategy Back-testing

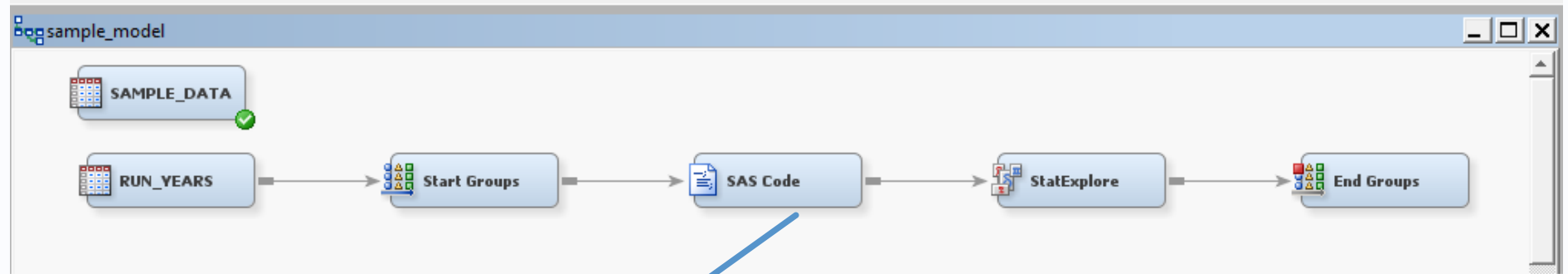
- ▶ We have a model which needs to be tested in a portfolio construction application
- ▶ Run for each year, or every other year, and calculate portfolio metrics
- ▶ A simple for loop, how hard can it be? Not so easy in EM!

Start Groups



End Groups

For Loop Implementation



```
Training Code

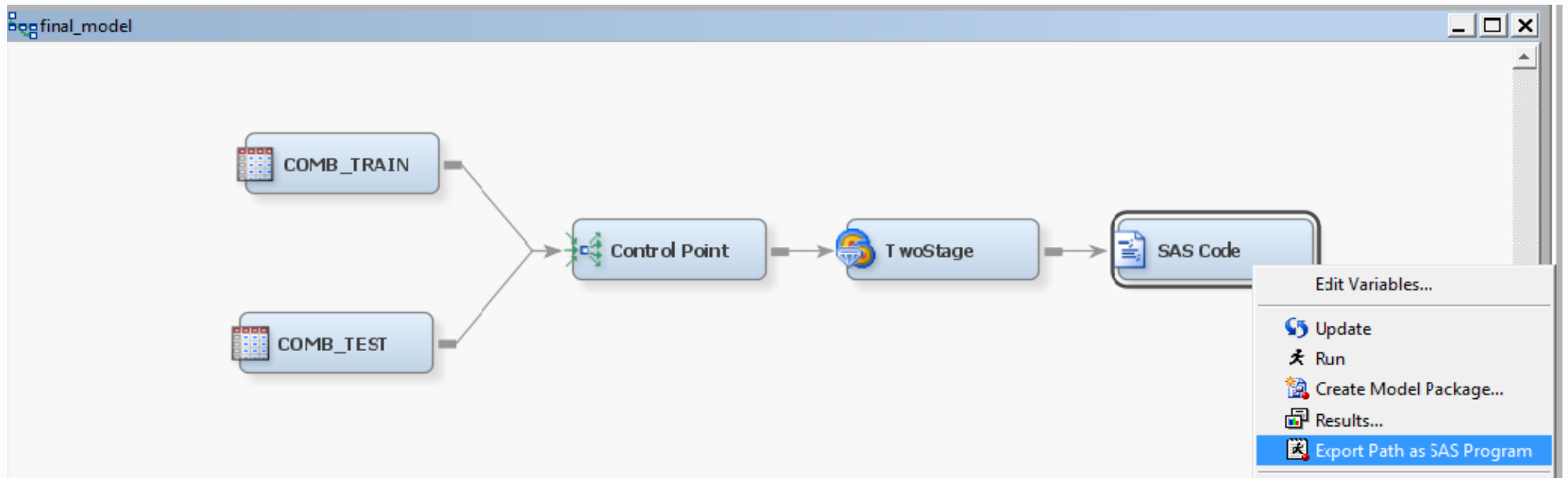
proc sql;
  create view traindata as
  select c.*, r.years
  from &EM_IMPORT_DATA r, &EM_LIB..Ids_DATA c
  where c.data_year<r.data_year;
quit;

data &EM_EXPORT_TRAIN;
  set traindata;
run;
```



For Loop Implementation Cont'd

- ▶ SAS program to create datasets and run the model in a loop
- ▶ Remember to enable re-run option on input data and save the output after each run



Back-testing Result

<i>Year</i>	<i>S&P 500 Total Return Index</i>	<i>Original Model Annual Performance</i>	<i>New Model Annual Performance</i>
1998	28.6%	16.0%	22.8%
1999	21.0%	-1.0%	6.4%
2000	-9.1%	27.5%	21.1%
2001	-11.9%	10.6%	-0.6%
2002	-22.1%	-10.1%	-10.9%
2003	28.7%	26.9%	24.5%
2004	10.9%	22.2%	16.0%
2005	4.9%	9.1%	13.5%
2006	15.8%	22.5%	11.1%
2007	5.5%	-10.5%	9.9%
2008	-37.0%	-41.0%	-38.8%
2009	26.5%	35.6%	42.3%
2010	15.1%	20.6%	16.1%
2011	2.1%	3.1%	4.3%
2012	16.0%	10.4%	12.2%
2013	32.4%	49.9%	42.5%
2014	13.7%	15.5%	14.2%
Annualized	6.46%	10.11%	10.44%



Conclusion



- ▶ A toolset at our disposal, always a dilemma what to use in each application
- ▶ Model testing can be a project in itself, don't underestimate its required resources
- ▶ Statistical tests are not the only measure of success
- ▶ Engage tech support when in doubt or agony