

What makes



People



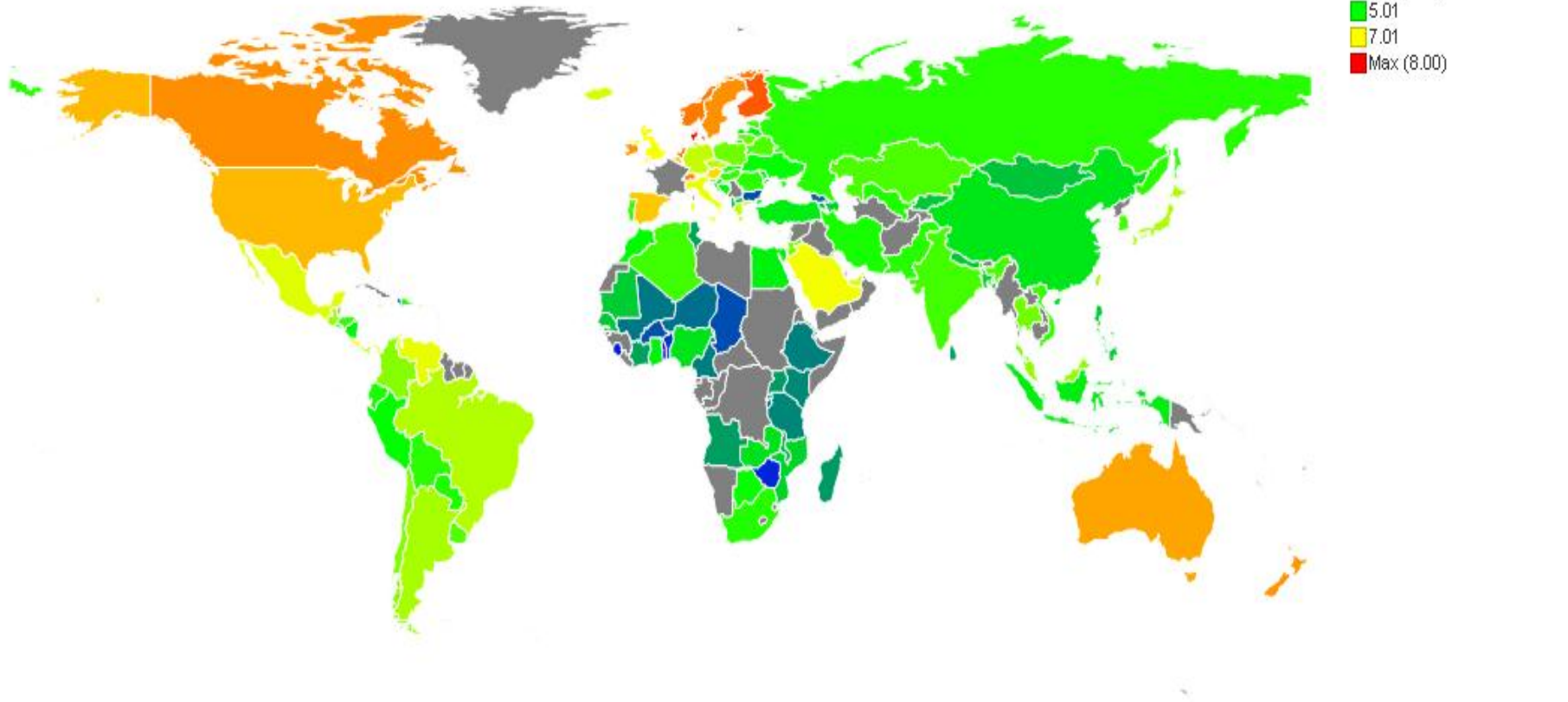
“HAPPY”

Agenda

- The Question
- Data
- Data Details
- Exploration
- Model
- Results

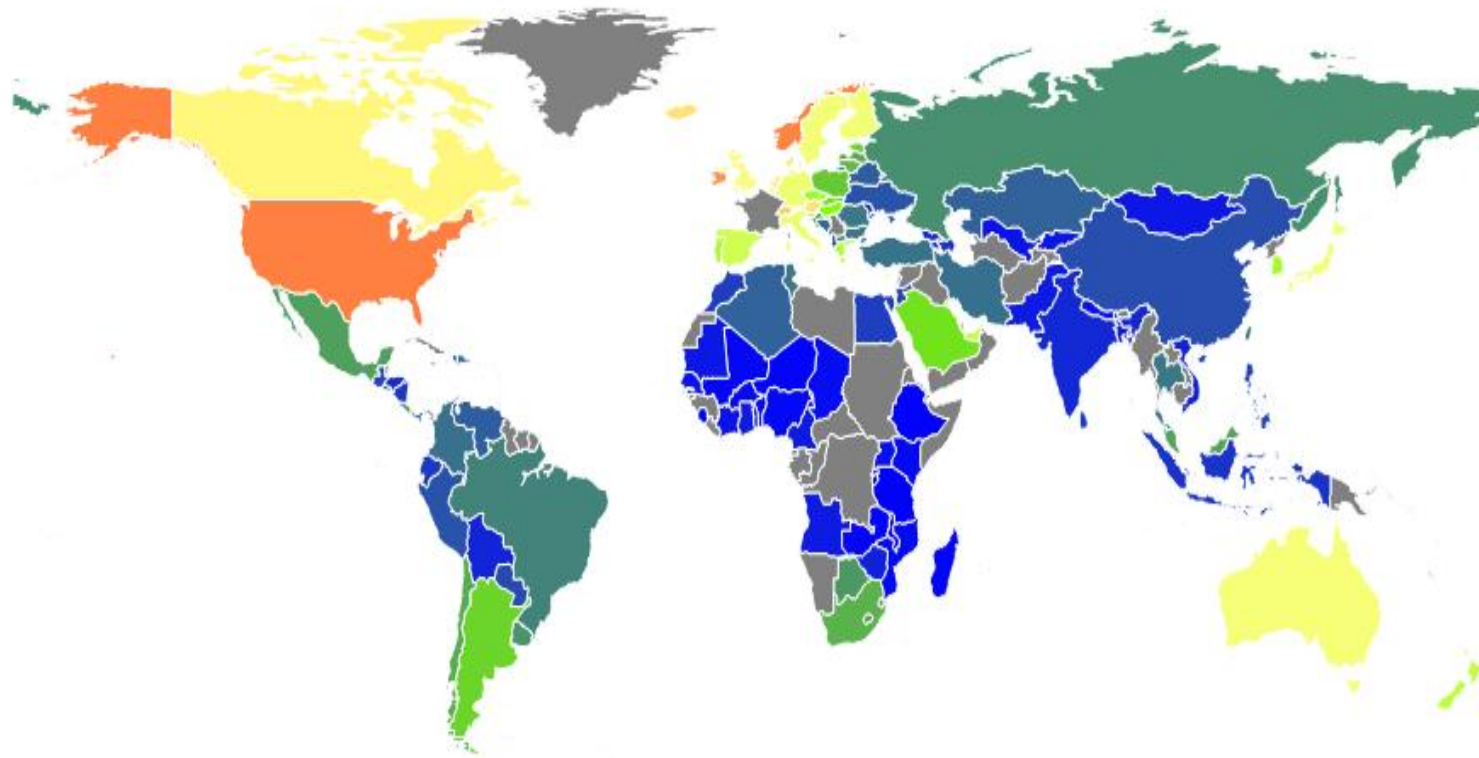
Happiness

What macroeconomic, cultural, and political factors contribute most to the overall happiness of a nation?



GDP

GDP is important, but its not the whole story.



Data table:
Data Table (2)

Marking:
Marking

Color by
Avg(RGDP_2000_04)

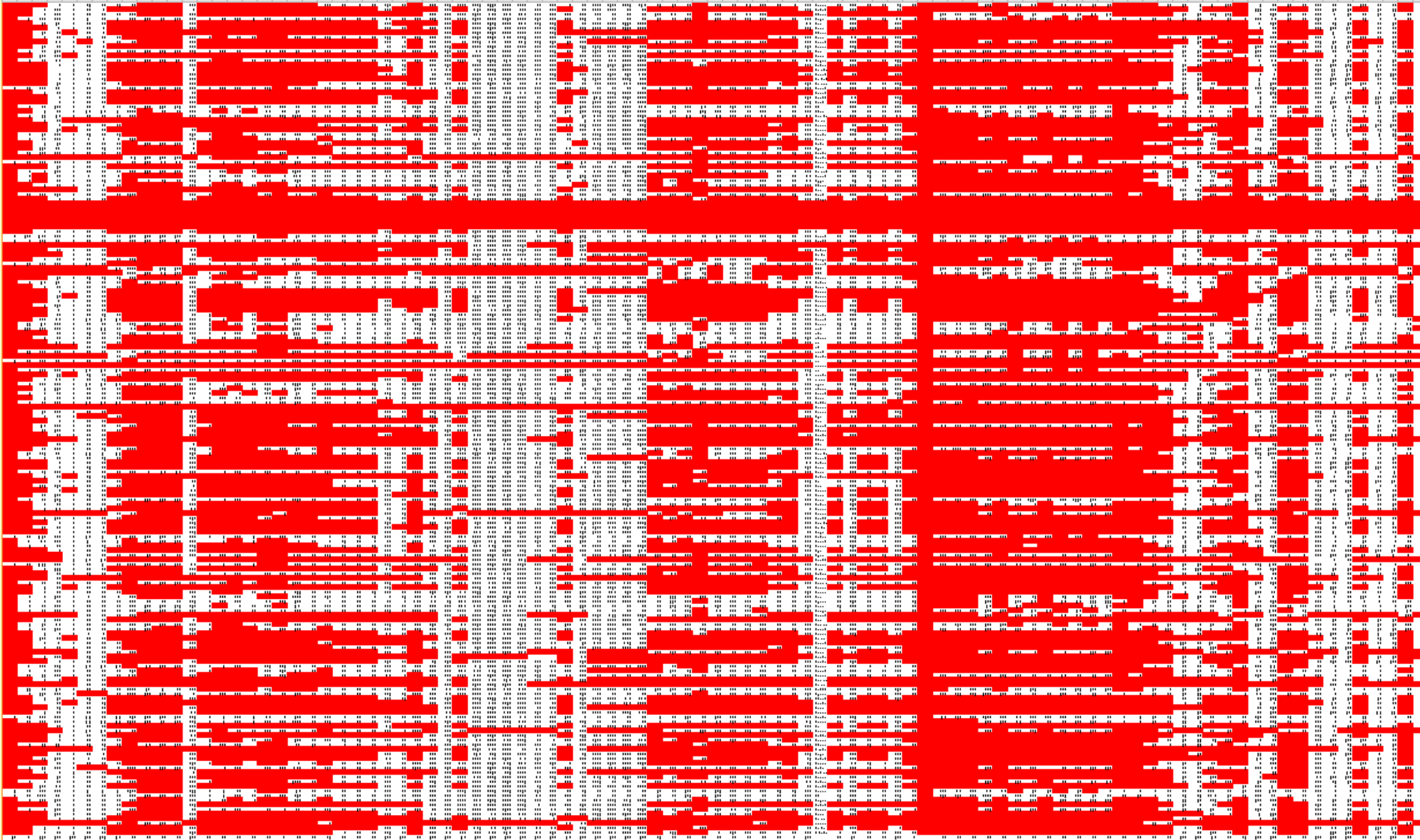
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Data Sources

- SPSS file sent by Veenhoven, R., *World Database of Happiness*, Erasmus University Rotterdam. Additional information related to the data file at: <http://worlddatabaseofhappiness.eur.nl> Assessed at: (date)
 - *The World Factbook 2009*. Washington, DC: Central Intelligence Agency, 2009. <https://www.cia.gov/library/publications/the-world-factbook/index.html>
 - *United Nations Human Development Report* (<http://hdr.undp.org/en/statistics/data/>)
 - Merged the data from these sources by country and eliminated those countries that didn't have the Happiness Index
- **What is the Subject matter?**
- Characteristics of nations; both societal characteristics and indicators of public well being.
 - Information on 155 present day nations of which we know average happiness.
- Grouped the variables in the dataset into three categories:
- Political
 - Economic
 - Demographic

Missing Data

each empty cell in the original data colored red

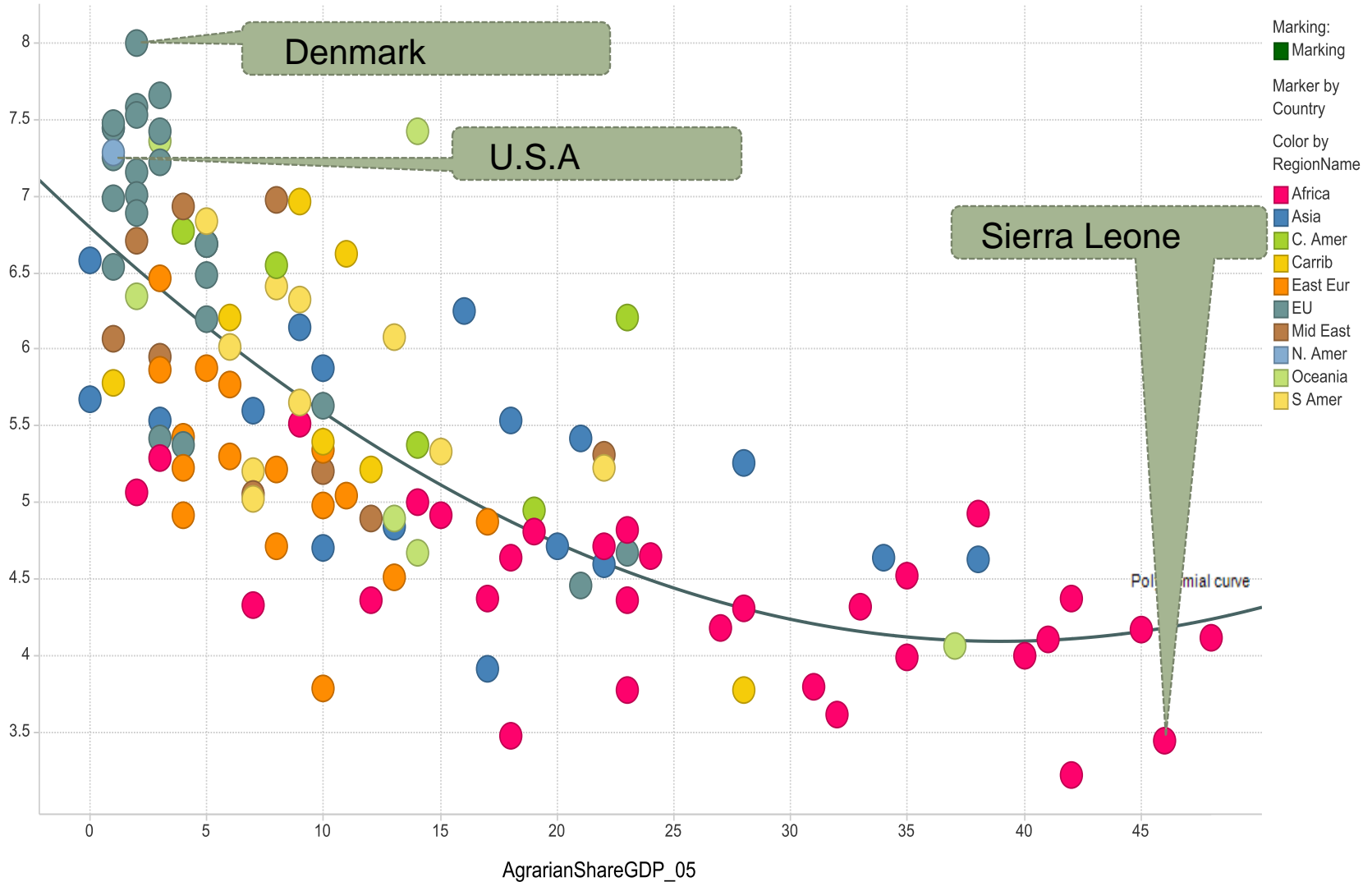


Data Details (PCA)

- We ran PCA on the categories and analyzed the output.
- In case of Economic and Demographic variables, a few attributes contributed significant variability. We kept those attributes and eliminated ones that had very low weights (between -0.0002 and 0.0002).
- In case of Political attributes, we were unable to observe such distinct separation, so we took the three PCA components that explained 84% of the variation.
 - PCA1 = Political Stability and Freedom: This component alone explained $\sim 71\%$ of the variance in the data set.
 - PCA2 = Rights and Liberties: This component explains $\sim 8\%$ of the variance
 - PCA3 = Lack of political and property rights: This component explains $\sim 5\%$ of the variance

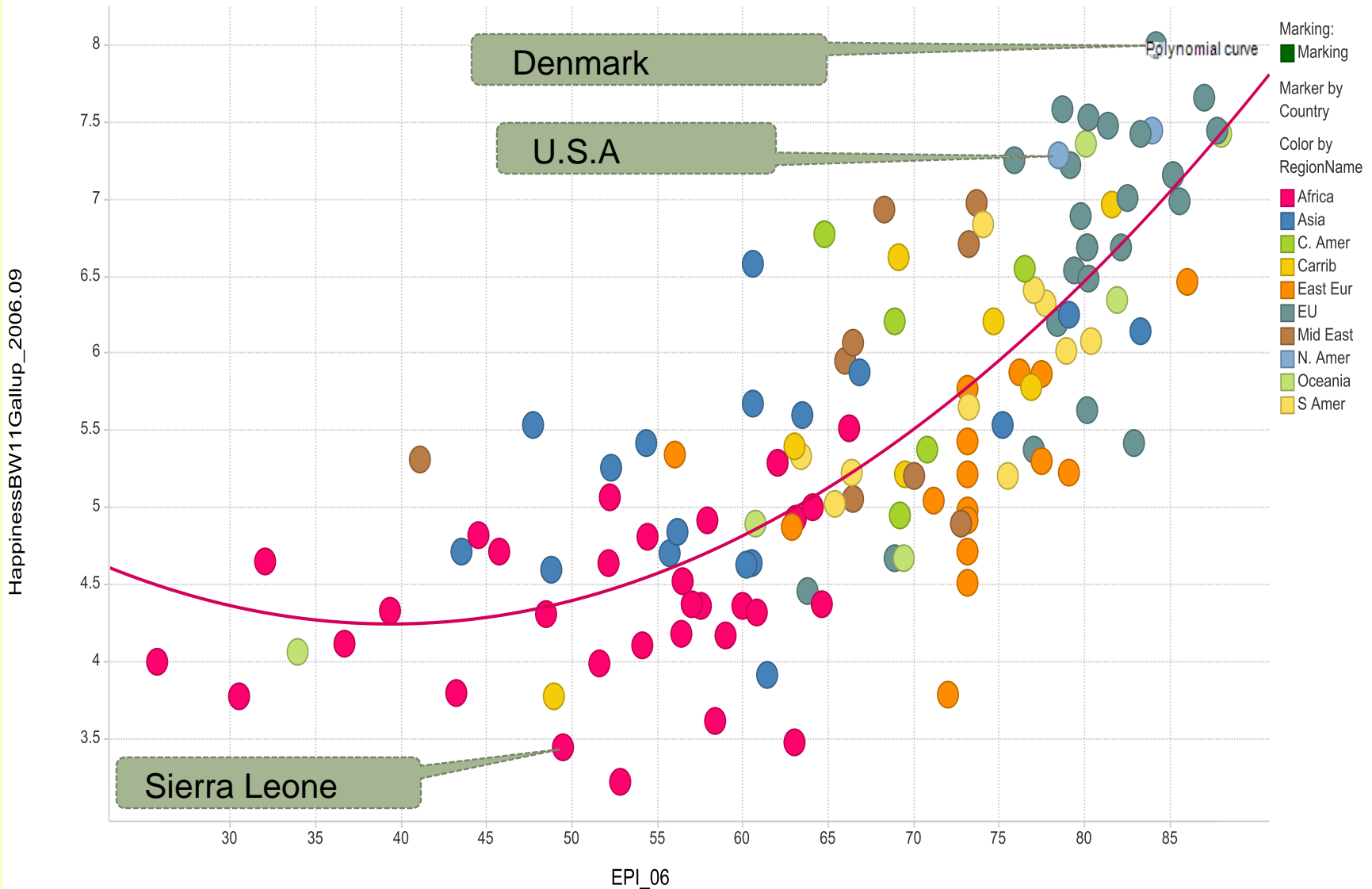
Exploration: Agrarian Share of GDP

Scatter Plot



Exploration: Environmental Performance Index

Scatter Plot



Results

Logistic Regression

Input variables	Coefficient	Std. Error	p-value	Odds
Constant term	-1.73085833	2.2630105	0.44436225	*
AgrarianShareGDP_05	-0.16430622	0.04305735	0.00013564	0.84848219
EPI_06	0.06760561	0.02974937	0.02305598	1.06994331

Residual df	124
Residual Dev.	84.18389893
% Success in training data	62.20472441
# Iterations used	9
Multiple R-squared	0.5001415

Error Report			
Class	# Cases	# Errors	% Error
HAPPY	79	6	7.59
UNHAPPY	48	10	20.83
Overall	127	16	12.60

Multiple Linear Regression

Input variables	Coefficient	Std. Error	p-value	SS
Constant term	4.18116808	0.45729885	0	3851.309814
AgrarianShareGDP_05	-0.02031319	0.00636658	0.00180527	82.82048035
FreePress3_00s	0.01224261	0.00364597	0.00104823	3.48459291
EPI_06	0.01981876	0.00591475	0.00107318	13.61553097
PCA1	0.19501545	0.02575184	0	19.14657021

Residual df	122
Multiple R-squared	0.745107884
Std. Dev. estimate	0.57780957
Residual SS	40.73139572

Total sum of squared errors	RMS Error	Average Error
40.73139282	0.566321135	-1.90405E-07

Classification Tree (5 Nodes)

Error Report			
Class	# Cases	# Errors	% Error
HAPPY	79	5	6.33
UNHAPPY	48	11	22.92
Overall	127	16	12.60

First Node: AgrarianShareGDP_05

Conclusion

All models agree: Countries with higher Agrarian % of GDP aren't as happy as industrialized nations

But: Countries with strong environmental performance are also happier,

So:

Balance between Industry and Environment is the key to happiness – and you need political stability to achieve this balance.

