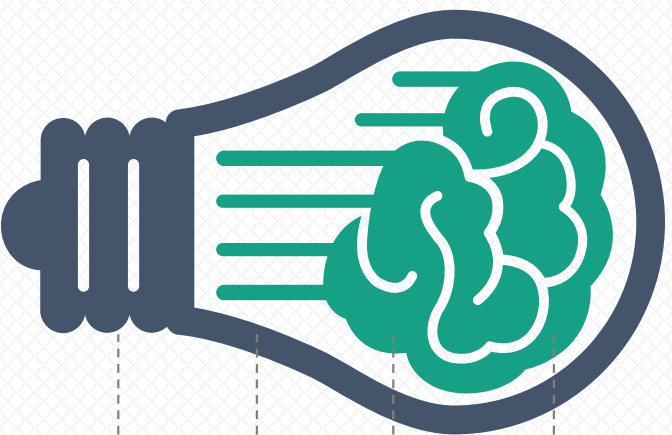


Analysis of relation between PepsiCo's stock price and obesity in the United States: the role of ill-fitting fashion as a factor of influence in weight gain.

Shan S. Bala

December 15, 2014

GENERAL OVERVIEW



Intuition

Obesity creates a niche market opportunity for designers within fashion industry



Sensemaking

Counterintuitive: Did fashion fads initiated by designers have a hand in the obesity epidemic?



Plan

Gather and interpret data pertaining to fashion trends and obesity. Use appropriate technique to derive insights.



Present

Encountered issues, limitations, findings and implications.



Plus-Size, Big & Tall relatively new consumer categories



Obesity: multifactor influence
Correlation analysis



Timeline: 1960 – turn of century
Regression analysis
Experiment design & discuss

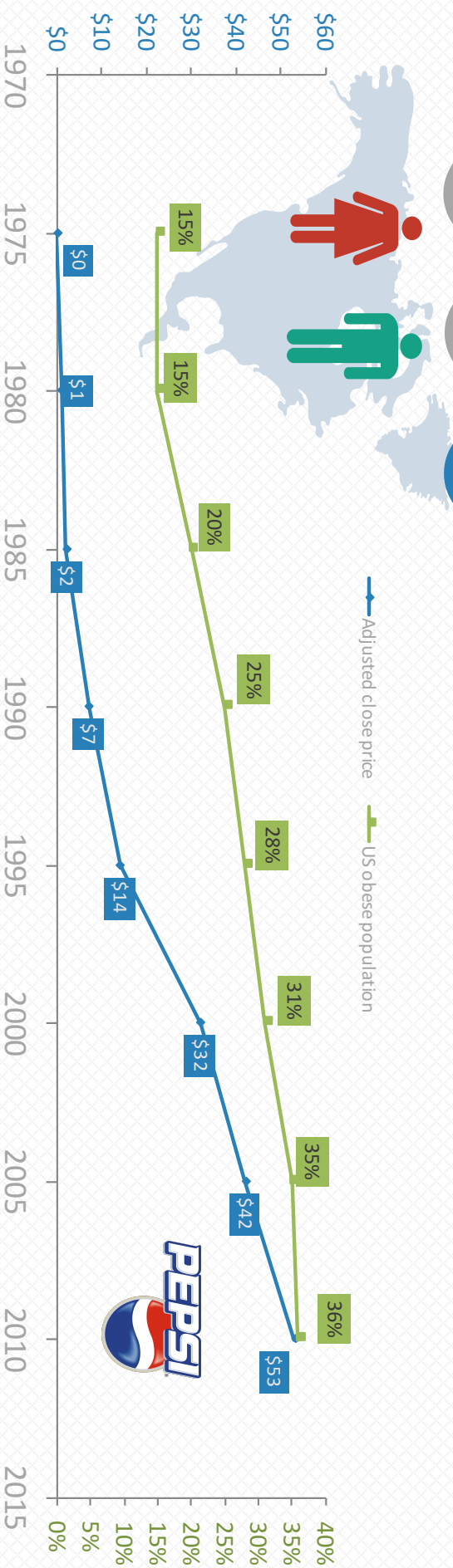
Discussed within context in future slides



DATA



⦿ Stock price used as proxy due to lack of sales & marketing data

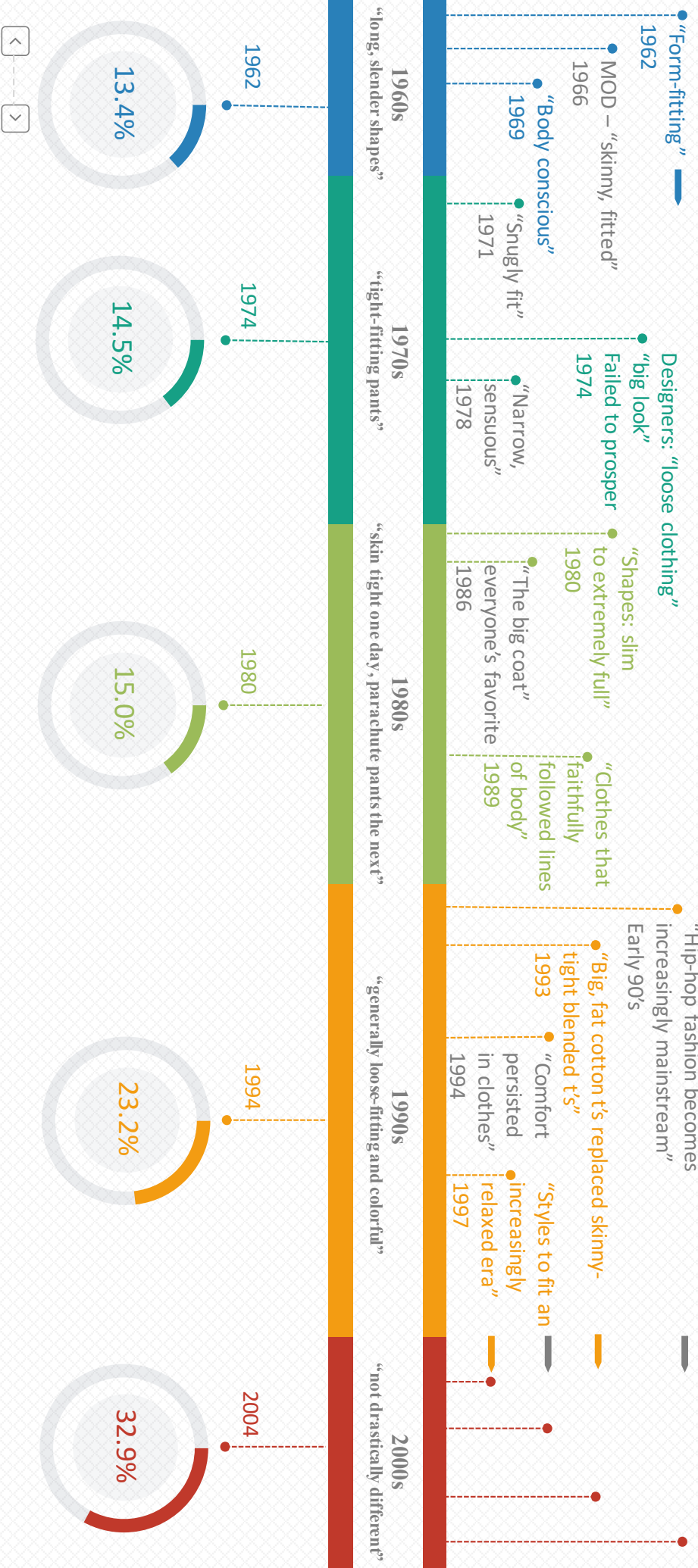


CORRELATION ANALYSIS

n	α	i	t	p	$\langle - \rangle$	H_0
SAMPLE SIZE	ALPHA	CRITICAL VALUE	T-STATISTIC	P-VALUE	CORR. COEFF.	NULL HYP.
8	0.1	5.96	6.09	.09%	0.93	REJECT

Fashion trends & obesity epidemic

Timeline overview



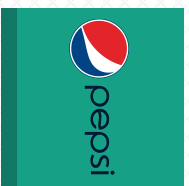
Adding some complexity

Linear regression analysis

Linear regression function

*with Pepsi more or less standing in as
proxy for entire industry*

$$\text{Obesity}\% = \beta_0 + \beta_1 \text{stockprice} + u$$



Introduce fashion trend variable

as a dichotomous attribute

$$\text{ill} - \text{fit} = \begin{cases} 1 & \text{if ill - fitting fashion trends} \\ 0 & \text{if it does not (snug - fit)} \end{cases}$$

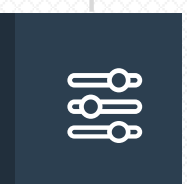
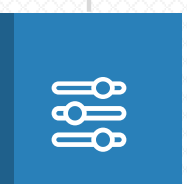
$$\text{Obesity}\% = \beta_0 + \delta_0 \text{ill} - \text{fit} + \beta_1 \text{stockprice} + u$$

Year	PepsiSP	Ill-fitting trend	ObesePopulation
1975	0.43	0	15%
1980	0.56	0	15%
1985	1.72	0	20%
1990	7.37	1	25%
1995	14.06	1	28%
2000	32.07	1	31%
2005	41.82	1	35%
2010	53.34	1	36%

$$\text{Obesity}\% = \beta_0 + \delta_0 \text{ill} - \text{fit} + \beta_1 \text{stockprice} + u$$

Explaining Pepsi's Coeff.

For every \$1 increase in Pepsi's stock the obese population increases by 0.24%, at a 98% confidence level



Revised function & key takeaways

$$\text{Obesity}\% = 0.1628 + 0.0735 * \text{Ill-fit} + 0.0024 * \text{StockPrice}$$

$$H_0 : \text{Rejected at an } \alpha = .02.$$

	Coefficients	Standard Error	t Stat	p-level
Intercept	0.1628	0.01142	14.25708	0.00003
Ill-fit	0.07352	0.02077	3.54007	0.01656
PepsiSP	0.00243	0.00052	4.69335	0.00537

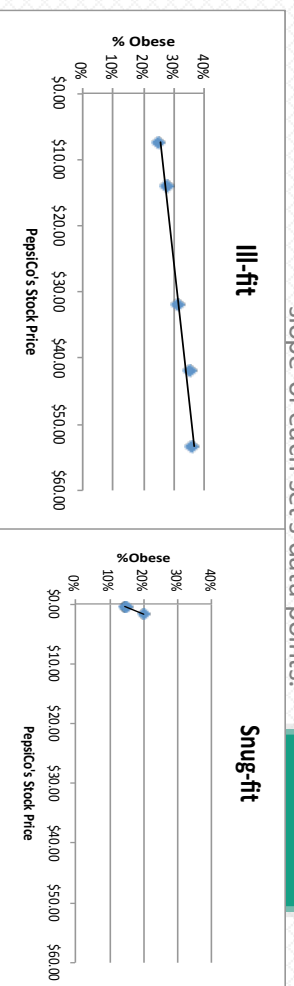
Critical value=3.36493

Improving the model

Discussed model lacks predictive value. Considering the very small sample size, "logging" the dependent variable (obesity%) and Pepsi's stock price "normalizes" the distribution and offers insight into the elasticity between StockPrice and Obesity%

Graphs of data points

In separating the ill-fit trend from the snug-fit trend, it is clear there is a difference in both the intercept and slope of each set's data points.



Apply LN and Regress

$$\ln(\text{Obesity}\%) = \beta_0 + \delta_{\text{ill}} - \text{fit} + \ln(\beta_1 \text{stockprice}) + u$$

OVERALL FIT

Multiple R	0.984418526
R Square	0.969079834
Adjusted R Square	0.956711767
Standard Error	0.070606881
Observations	8

Transforming the model

Converting the model to reflect data behavior, albeit still within a linear realm, helps bring the setup closer to a z-distribution (previous regression function conforms to a t-distribution). Another benefit is being able to determine “odds” for purposes of inference.

ANOVA & other stats

ANOVA		Alpha 0.02				
	df	SS	MS	F	p-value	sig
Regression	2	0.78123518	0.39061759	78.333815	0.00016811	yes
Residual	5	0.02492666	0.00498533			
Total	7	0.80616183				

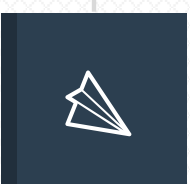
	coeff	std err	t-stat	p-value	lower	upper
Intercept	-1.7626524	0.04213381	-41.834632	1.4722E-07	-1.904297	-1.6208751
PepsiSP	0.13339319	0.03625579	3.67922444	0.01430516	0.01139499	0.25539139
Ill-fit trend	0.15576596	0.13554773	1.14915945	0.30747458	-0.3003427	0.6118746

The F-Stat Inference

The F-Statistic is extremely large in this case at 78+

Variance, according to the F distribution, is mostly between the fashion trend variable and stock price, as opposed to the variances within each variable.

Need more data.



Unfinished analysis

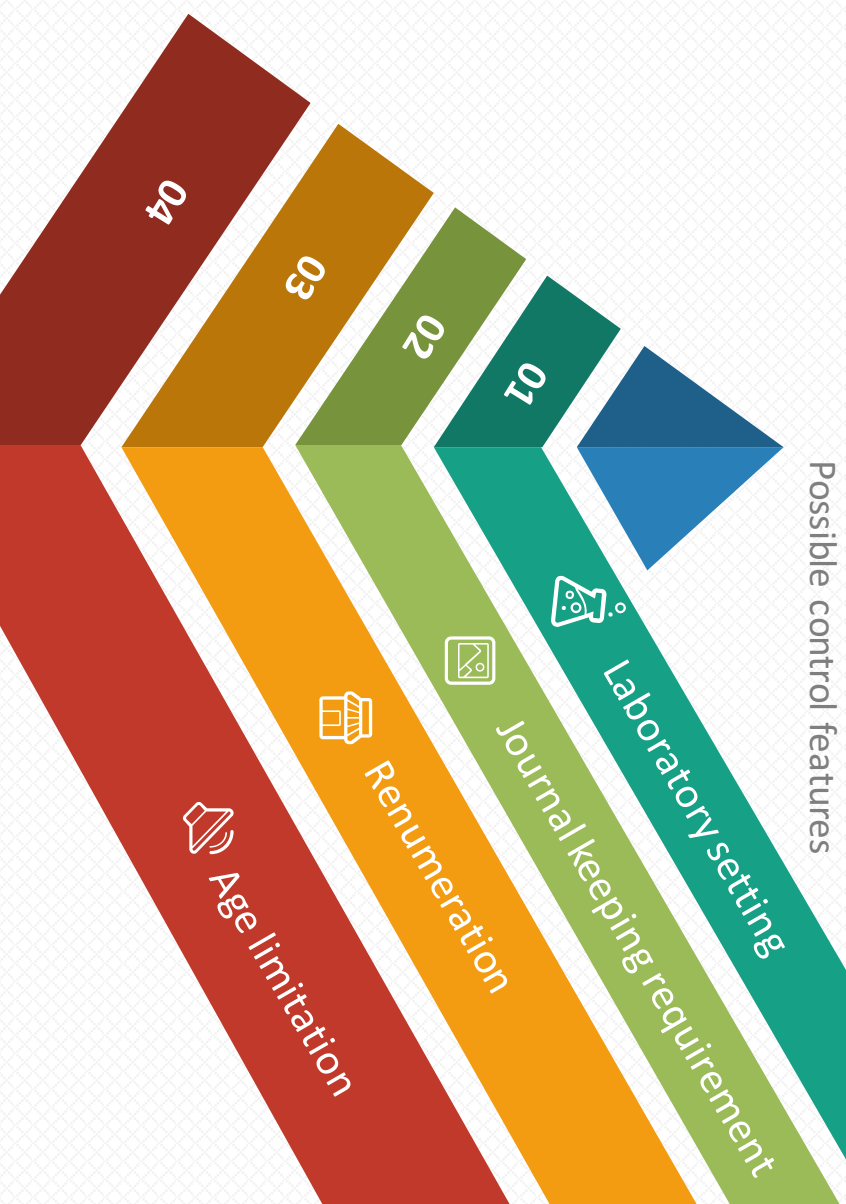
Experiment suggestion

How does the relative fit of one's attire impact the feeling of fullness?
The volume of food intake?

Experiment design

Controlled double-blind

- Random selection
 - Obese, overweight, normal
- $n > 100$ for each bucket
- Vary time-span
 - Short-term, long-term
- Initial & on-going Surveys





Questions?
Comments?

