Shoe Resale Market Model

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Introduction

Background

- Estimated 1 Billion USD of sneaker resale activity this year
- Exclusive colors and models can be sold for over 1000% more than original retail price
- Emergence in past 3 years of dedicated shoe resale sites: Stockx.com , Goat.com , Fightclub.com , and more
- Interesting new market which has not been studied academically

STREETWEAR
HANDBAGS
WATCHES

ADIDAS
AIR JORDAN
NIKE
OTHER BRANDS

SIZE TYPES

- Men
- Women
- Child
- Preschool
- Infant
- Toddler

SIZES

3.5	4	4.5	5
5.5	6	6.5	7
7.5	8	8.5	9

Sort By: Price Premium

A measure of how much more a new, unworn item currently sells for, as compared to its original retail price. An item with a Price Premium of 100% means that the average price of that item right now sells for twice as much as its original retail price.

JORDAN 1 OG CHICAGO (1985)
LOWEST ASK
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PREMIUM: 7592%

NIKE SB DUNK LOW REESE FORBES DENIM
LOWEST ASK
$4,999
PREMIUM: 6514%

NIKE DUNK SB LOW STAPLE "NYC PIGEON"
LOWEST ASK
$5,500
PREMIUM: 5650%

NIKE SB DUNK LOW TOKYO
LOWEST ASK
$5,000
PREMIUM: 4900%

NIKE SB DUNK LOW LONDON
LOWEST ASK
$5,500
PREMIUM: 4067%

NIKE DUNK SB LOW MEDICOM 2
LOWEST ASK
$2,500
PREMIUM: 3592%

NIKE DUNK LOW SP CHOCOLATE
LOWEST ASK
$2,000
PREMIUM: 3233%

JORDAN 1 RETRO HIGH SOLEFLY ART BASEL
LOWEST ASK
$4,900
PREMIUM: 3025%

NIKE DUNK SB LOW SUPREME BLACK
LOWEST ASK
$1,800
PREMIUM: 2746%

NIKE SB DUNK HIGH SUPREME ORANGE
LOWEST ASK
$1,550
PREMIUM: 2670%

Image Source: https://stockx.com/sneakers/price-premium

Previous Literature

- “Agent Based Simulation of a Financial market”
  - Agents are traders in a market
  - A fixed amount of capital and assets are traded
  - Prices are set based on supply and demand of the stocks
  - Random variables to differentiate agents desire to buy a stock
- “Price Variations in a Stock Market with Many Agents”
  - Research on “bubbles” in prices
  - Two types of agents: “rational” and “noise” traders
  - Isolating market factors which impact price in uncertain ways

Challenges

- Incorporating qualitative factors like style into the model
- Creating distinct and useful representations of different types of players in the market
- Avoiding arbitrary decisions to simplify the market model

Community Relevance

- Understand if current growth in the market is sustainable
- Identify ideal production level for sneaker manufacturers
- Modeling this non-traditional market could be useful to identify important dynamics in other market types

Fundamental Questions

- How does the proportion of sneakers to agents affect price?
- How is price affected by the number of competing sneaker brands?
- Which market parameters are the most impactful on price?
- What behaviors of the sneaker market differ from a standard stock market model?

Initial Hypothesis I

How does the proportion of sneakers to agents affect price?

Higher Sneaker to Agent Ratio should reduce price and may decrease volatility

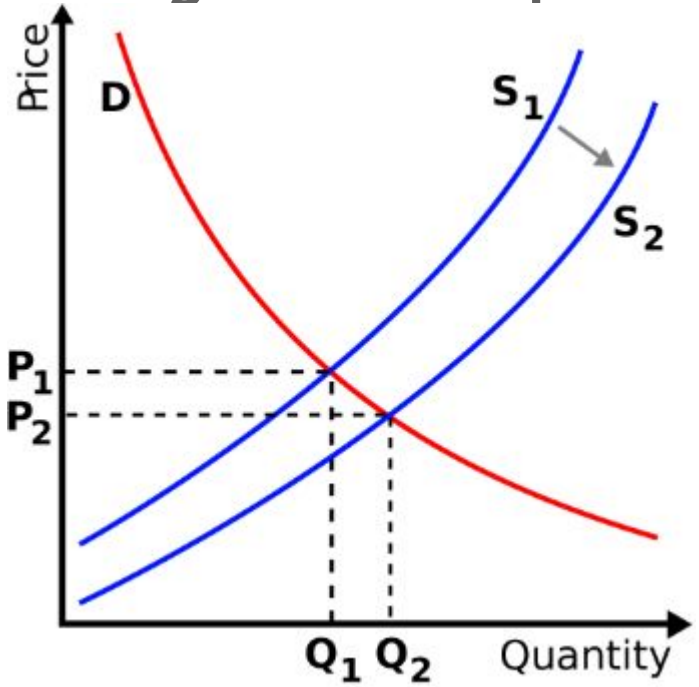


Image Source: https://www.toppr.com/guides/economics/market-equilibrium/shifts-in-demand-and-supply/

Initial Hypothesis II

How is price affected by the number of sneaker brands?

Prices decrease due to agent's preferences for variety

Which market parameters are the most impactful on price?

Sneaker to Agent Ratio

What behaviors of the sneaker market differ from a standard stock market model?

Agents' profit rates vary due to non-price preferences

Methods & Implementation

Simulation Methodology

AGENT BASED MODEL

TRENDSETTERS

PROFITEERS

SOCIALITES

COLLECTORS

SELLERS

Selling price

Depending on demand and seller's social status

Social status

Depending on agent's sneakers and their social status

BUYERS

Buying price

Depending on buyer's *desire* and offer

How far they are from their objective

Depreciation

Vintageness

Simulation Parameters

NUMBER OF AGENTS

Divided into the four types according to proportion

NUMBER OF SNEAKERS

Distributed among the trendsetters. Given initial parameters based on brand

INITIAL BUYING PRICE

Estimated value for the buyer's buying price. Determines the behavior in the beginning

NUMBER OF BRANDS

Trendsetters are assigned randomly to one. Need to ensure a minimum number

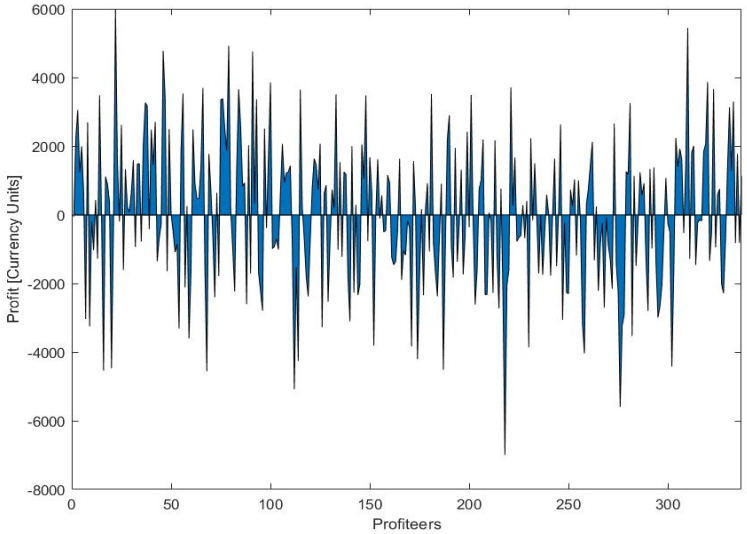
TIME STEPS

Duration of the simulation
1 time step = 1 day

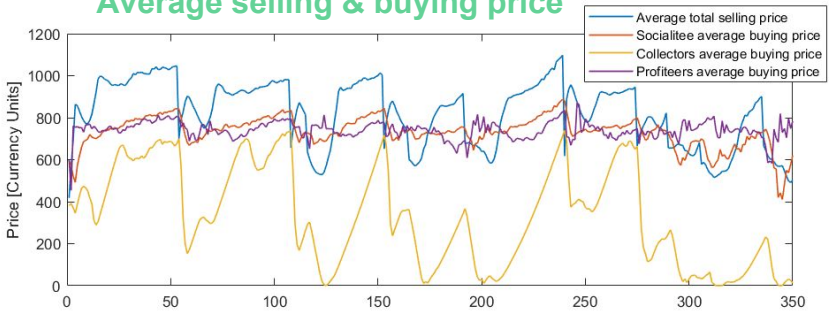
Nominal Simulation Case

1000 agents, 800 items, initial buying price of 700CU, 4 brands, 150 time steps

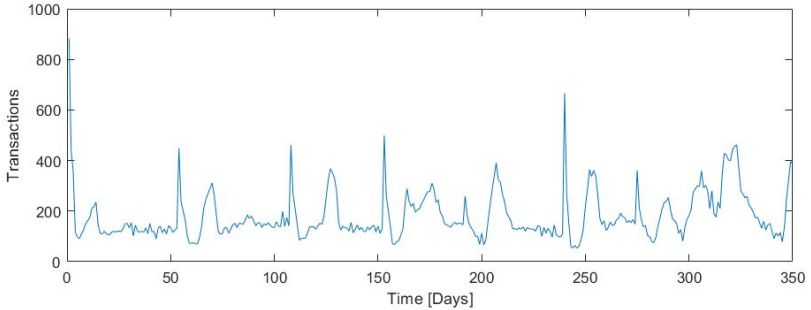
Profit by profiteers



Average selling & buying price



Transactions per day

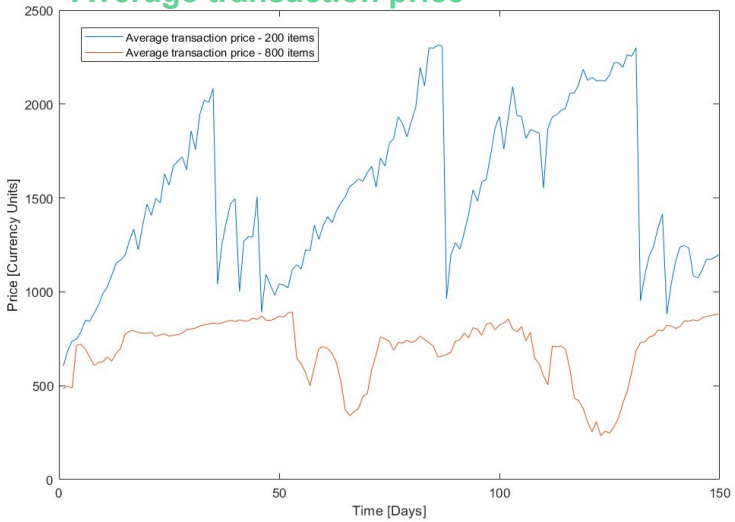


Results

Varying the Ratio of Sneakers to Agents

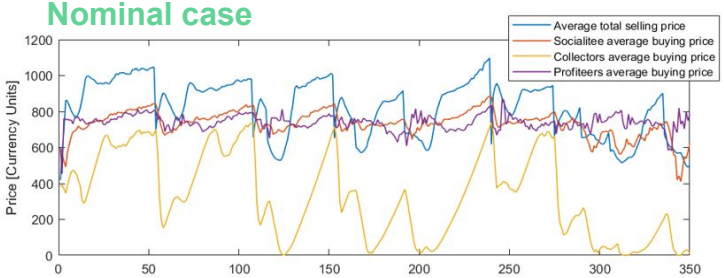
1000 agents, *200 items*, initial buying price of 700CU, 4 brands, 150 time steps

Average transaction price



Average selling & buying price

Nominal case

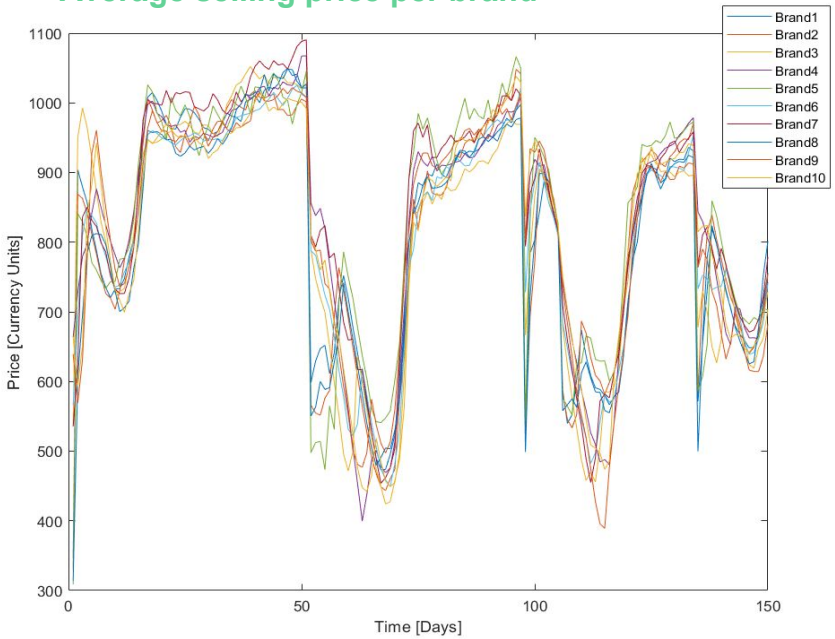


Results as expected! The average selling price *increases*

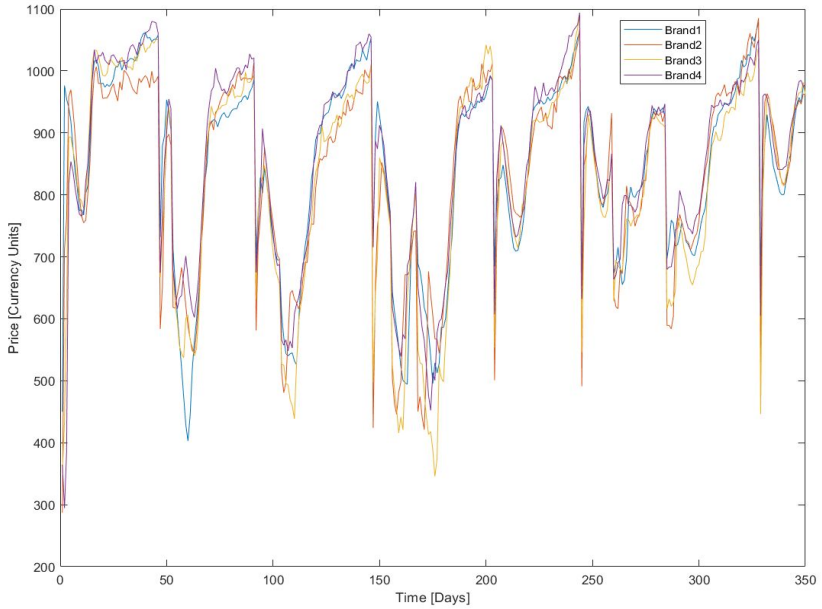
Varying the Number of Brands

1000 agents, 800 items, initial buying price of 700CU, *10 brands*, 150 time steps

Average selling price per brand

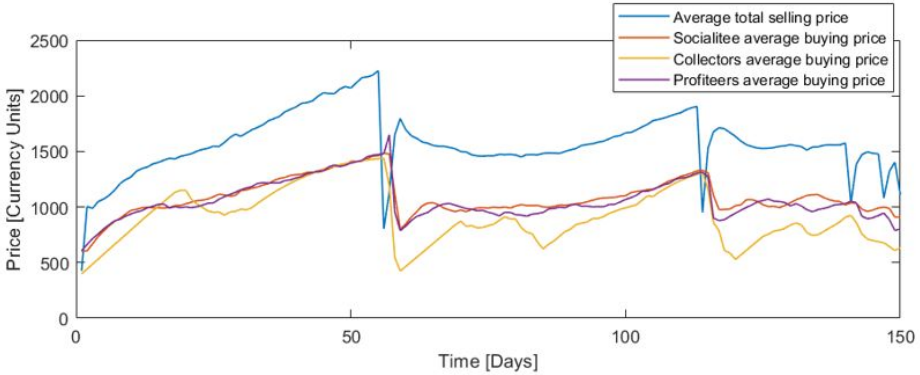


Nominal case

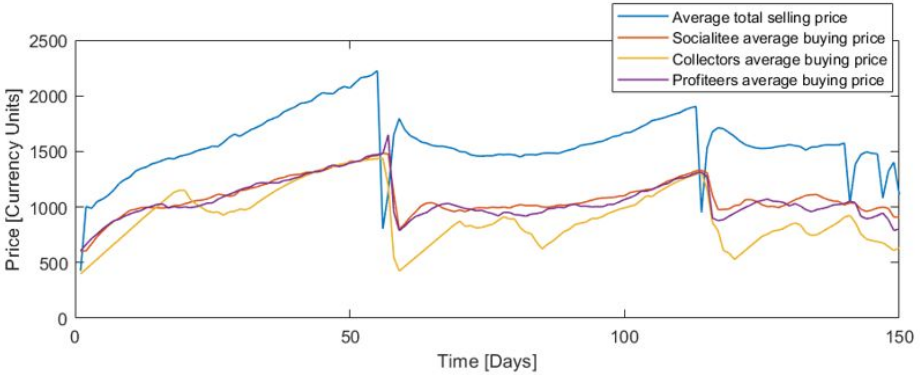


Most Influential Parameters

Low ratio sneakers/agents



High number of brands



Effect of *low* sneaker to agent ratio **>** **Effect of *high* number of brands**

Other parameters may be influential (i.e. decrease or increase in buying price) → **Change in the intrinsic behavior of the market. Different nominal results**

Shoe Market **vs** Stock Market

The Retail Shoe Market has associated an *intangible value*

VALUE

- The **owner**

- The **time** in the market
- **Vintageness** and **Depreciation**

Discussion

Limitations

- Limited Number of Agents Simulated
- Arbitrary parameters for style and fashion
- Exclusion of counterfeit goods and scammers
- Market has seasonal effects
- Real people aren’t trading every day

Future Improvements

- Optimize Code Data Structure
- Source real world data from social media and marketplaces
- Refine arbitrary parameters for greater meaning

Conclusions

- Agent based model approximated behavior of the sneaker resale market

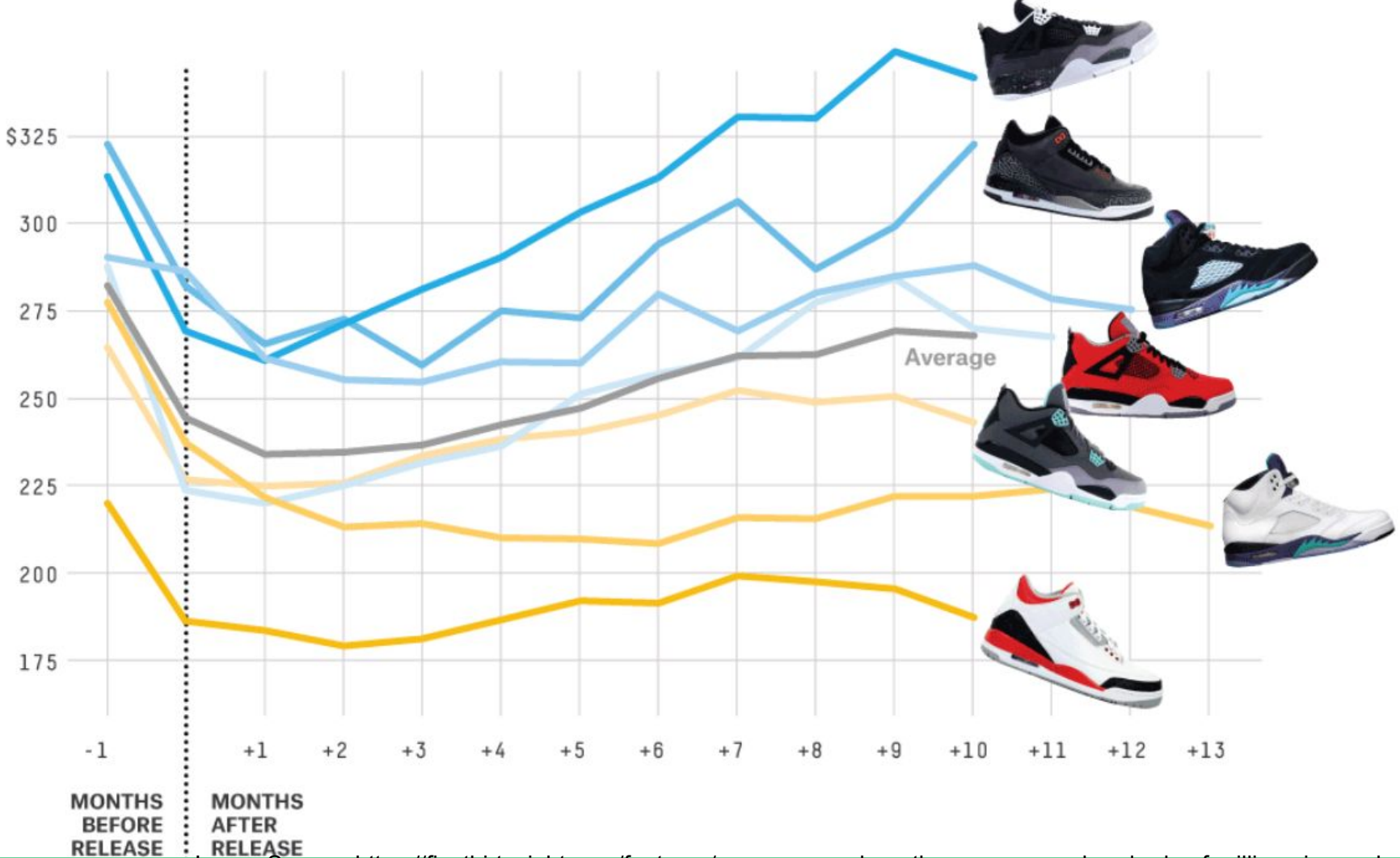


Image Source: https://fivethirtyeight.com/features/you-see-sneakers-these-guys-see-hundreds-of-millions-in-resale-profit/

Conclusions

- Agent based model approximated behavior of the sneaker resale market
- Identified scarcity of shoes as most important price factor

Conclusions

- Agent based model approximated behavior of the sneaker resale market
- Identified scarcity of shoes as most important price factor
- Agents behavior is distinct based on their type

References

1. L. Chow. You See Sneakers, These Guys See Hundreds Of Millions In Resale Profit, October 2014. URL https://fivethirtyeight.com/features/you-see-sneakers-these-guys-see-hundreds-of-millions-in-resale-profit/
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3. M. Raberto, S. Cincotti, S. M. Focardi, and M. Marchesi. Agent Based Simulation of a Financial market. Physica A Statistical Mechanics and its Applications, October 2001.
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Nike Logo Source: http://www.pngall.com/wp-content/uploads/2016/06/Nike-Logo-PNG.png

Questions?