Thanks

**Kleiner Perkins Partners**
Ansel Parikh & Michael Brogan helped steer ideas and did a lot of heavy lifting. Other contributors include: Daegwon Chae, Mood Rowghani, Eric Feng (E-Commerce) & Noah Knauf (Healthcare). In addition, Bing Gordon, Ted Schlein, Ilya Fushman, Mamoon Hamid, Juliet deBaubigny, John Doerr, Bucky Moore, Josh Coyne, Lucas Swisher, Everett Randle & Amanda Duckworth were more than on call with help.

**Hillhouse Capital**
Liang Wu & colleagues’ contribution of the China section provides an overview of the world’s largest market of Internet users.

**Participants in Evolution of Internet Connectivity**
From creators to consumers who keep us on our toes 24x7 + the people who directly help us prepare the report. And, Kara & team, thanks for continuing to do what you do so well.
We use data to tell stories of business-related trends we focus on. We hope others take the ideas, build on them & make them better.

At 3.6B, the number of Internet users has surpassed half the world’s population. When markets reach mainstream, new growth gets harder to find - evinced by 0% new smartphone unit shipment growth in 2017.

Internet usage growth is solid while many believe it’s higher than it should be. Reality is the dynamics of global innovation & competition are driving product improvements, which, in turn, are driving usage & monetization. Many usability improvements are based on data - collected during the taps / clicks / movements of mobile device users. This creates a privacy paradox...

Internet Companies continue to make low-priced services better, in part, from user data. Internet Users continue to increase time spent on Internet services based on perceived value. Regulators want to ensure user data is not used ‘improperly.’

Scrutiny is rising on all sides - users / businesses / regulators. Technology-driven trends are changing so rapidly that it’s rare when one side fully understands the other...setting the stage for reactions that can have unintended consequences. And, not all countries & actors look at the issues through the same lens.

We focus on trends around data + personalization; high relative levels of tech company R&D + Capex Spending; E-Commerce innovation + revenue acceleration; ways in which the Internet is helping consumers contain expenses + drive income (via on-demand work) + find learning opportunities. We review the consumerization of enterprise software and, lastly, we focus on China’s rising intensity & leadership in Internet-related markets.
Internet Trends 2018

1) Users
2) Usage
3) Innovation + Competition + Scrutiny
4) E-Commerce
5) Advertising
6) Consumer Spending
7) Work
8) Data Gathering + Optimization
9) Economic Growth Drivers
10) China (Provided by Hillhouse Capital)
11) Enterprise Software
12) USA Inc. + Immigration
INTERNET DEVICES + USERS =

GROWTH CONTINUES TO SLOW
Global New Smartphone Unit Shipments = No Growth @ 0% vs. +2% Y/Y

New Smartphone Unit Shipments vs. Y/Y Growth

Source: Katy Huberty @ Morgan Stanley (3/18), IDC.
Global Internet Users = Slowing Growth @ +7% vs. +12% Y/Y
Global Internet Users = 3.6B @ >50% of Population (2018)

Internet Penetration

Source: CIA World Factbook, United Nations / International Telecommunications Union, USA Census Bureau. Internet user data is as of mid-year. Internet user data: Pew Research (USA), China Internet Network Information Center (China), Islamic Republic News Agency / InternetWorldStats / KP estimates (Iran), KP estimates based on IAMAI data (India), & APJII (Indonesia). Note: Historical data (particularly in Sub-Saharan Africa) revised by ITU in 2017 to better account for dual-SIM subscriptions (i.e. two Internet subscriptions per single smartphone user).
Internet Users…

Growth Harder to Find After Hitting 50% Market Penetration
INTERNET USAGE =

GROWTH REMAINS SOLID
Digital Media Usage @ +4% Growth...
5.9 Hours per Day (Not Deduped)

Daily Hours Spent with Digital Media per Adult User

Internet Usage…

How Much = Too Much?
Depends How Time is Spent
INNOVATION + COMPETITION =

DRIVING PRODUCT IMPROVEMENTS / USEFULNESS / USAGE +

SCRUTINY
Innovation + Competition = Driving Product Improvements / Usefulness / Usage

Devices
Access
Simplicity
Payments
Local
Messaging
Video
Voice
Personalization
Devices = Better / Faster / Cheaper

Apple iPhone

- 2016: 'Portrait' Photos, Water Resistant
- 2017: Face Tracking, Full Device Display, Wireless Charging

Google Android

- 2016: Google Assistant, 'AI-Assisted' Photo Editing
- 2017: 'Lens' Smart Image Recognition, Always-On Display

New Smartphone Shipments – ASP

Source: Apple, Google, Kat Huberty @ Morgan Stanley, IDC. *ASP Based on Morgan Stanley's new smartphone shipment breakdown by taking the midpoint of each $50 price band & assuming a $1,250 ASP for smartphones over $1,000. Note: Deloitte estimates that 120MM used smartphones were traded in 2016 and 80MM in 2015 which may further reduce smartphone costs to consumers as the ratio of used to new devices rises. Apple 2016 = iPhone 7 Plus, 2017 = iPhone X. Google 2016 = Pixel, 2017 = Pixel 2.
Access = WiFi Adoption Rising

Source: WiGLE.net as of 5/29/18. Note: WiGLE.net is a submission-based catalog of wireless networks that has collected >6B data points since launch in 2001. Submissions are not paired with actual people, rather name / password identities which people use to associate their data.
Simplicity = Easy-to-Use Products Becoming Pervasive

**Messaging**
Telegram

**Commerce**
Square Cash

**Media**
Spotify

Source: Telegram (5/18), Square (5/18), Spotify (5/18).
Transactions by Payment Channel

Thinking of your past 10 everyday transactions, how many were made in each of the following ways?

- In-Store: 40%
- Other Online: 15%
- Buy Buttons: 9%
- Other Mobile Payments: 8%
- P2P Transfer: 7%
- Mobile Messenger Apps: 7%
- Other In-App Payments: 4%
- QR Codes: 4%
- Smart Home Device: 3%
- Wearables / Contactless: 2%
- Other: 1%

60% = Digital

Source: Visa Innovations in a Cashless World 2017. Note: Full question was ‘Please think about the payments you make for everyday transactions (excluding rent, mortgage, or other larger, infrequent payments). Thinking of your past 10 everyday transactions, how many were made in each of the following ways?’, GfK Research conducted the survey with n = 9,200 across 16 countries (USA, Canada, UK, France, Poland, Germany, Mexico, Brazil, Argentina, Australia, China, India, Japan, South Korea, Russia, UAE), between 7/27/17 – 9/5/17. All respondents do not work in Financial Services, Marketing, Marketing Research, Advertising, or Public Relations, own and currently use a smartphone, have a savings or checking account; own/use a computer or tablet, and own a credit or debit card.
…Payments = Friction Declining...

China Mobile Payment Users

Source: China Internet Network Information Center (CNNIC). Note: User defined as active user of mobile-passed payment technology for everyday transactions, as well as more complex transactions, such as bill paying in the relevant period. Includes all forms of transactions on mobile (e.g., QR codes, P2P, etc.)
Payments = Digital Currencies Emerging

Coinbase Users

Source: Coinbase. Note: Registered users defined as users that have an account on Coinbase.
Local = Offline Connections Driven by Online Network Effects

Nextdoor Active Neighborhoods

Source: Nextdoor (5/18). Note: There are ~130MM households in USA. Nextdoor estimates that there are ~650 households per average neighborhood (~290K USA neighborhoods).
Messaging = Extensibility Expanding

**Messaging**

Tencent (2000 → 2018)

QQ  

WeChat

**Messenger MAUs**

Source: Facebook, WhatsApp, Tencent, Instagram, Twitter, Morgan Stanley Research. Note: 2013 data for Instagram & Facebook Messenger are approximated from statements made in early 2014. Twitter users excludes SMS fast followers. MAUs (Monthly Active Users) are defined as users who log into a messenger on the web or through an application.
Video = Mobile Adoption Climbing...

Source: Zenith Online Video Forecasts 2017 (7/17). Note: Based on a study across 63 countries. The historical figures are taken from the most reliable third-party sources in each market including Nielsen and comScore. The forecasts are provided by local experts, based on the historical trends, comparisons with the adoption of previous technologies, and their judgement.
...Video =
New Content Types Emerging

Fortnite Battle Royale
Most Watched Game on Twitch

Twitch Streaming Hours

Source: Twitch (3/18). Note: Tyler "Ninja" Blevins Twitch stream has 7MM+ followers (#1 ranked) as of 5/29/18 based on Social Blade data.
Voice = Technology Lift Off…

Google Machine Learning Word Accuracy

Source: Google (5/17). Note: Data as of 5/17/17 & refers to recognition accuracy for English language. Word error rate is evaluated using real world search data which is extremely diverse & more error prone than typical human dialogue.
…Voice = Product Lift Off

Amazon Echo Installed Base

![Graph showing the growth of Amazon Echo installed base from Q2 2015 to Q4 2017.]

Amazon Echo Skills

![Graph showing the growth of Amazon Echo skills from 2015 to 2018.]

Source: Consumer Intelligence Research Partners LLC (Echo install base, 2/18), Various media outlets including Geekwire, TechCrunch, and Wired (Echo skills, 3/18)
Innovation + Competition = Driving Product Improvements / Usefulness / Usage

Devices
Access
Simplicity
Payments
Local
Messaging
Video
Voice
Personalization
Personalization = Data Improves Engagement + Experiences… Drives Growth + Scrutiny
Personal + Collective Data = Provide Better Experiences for Consumers...

2.2B Facebooks

200MM Pинтерests

170MM Spotifys

125MM Netfixes

Newsfeed

Discovery

Music

Video

Source: Facebook (5/18), Pinterest (5/18), Spotify (5/18), Netflix (5/18).
Note: Facebook Q1:18 MAU (4/18), Pinterest MAU (9/17), Spotify Q1:18 MAU (5/18), Netflix Q1:18 global streaming memberships (4/18).
Personal + Collective Data = Provide Better Experiences for Consumers

<table>
<thead>
<tr>
<th>100MM+ Waze Drivers</th>
<th>20% UberPOOL Share of All Rides, Where Available*</th>
<th>100MM+ Snap Map MAUs</th>
<th>17MM** Nextdoor Recommendations</th>
</tr>
</thead>
</table>

**Real-Time Navigation**

Share your ride and save
uberPOOL matches you with other riders heading your way, so you get where you’re going for less.
- New co-riders may be added to your trip
- Estimated arrival time is shown in-app
- Destination can’t be changed after requesting

**Real-Time Transportation**

**Real-Time Social Stories**

**Often Real-Time Local News**

Internet Companies

Making Low-Priced Services Better, in Part, from User Data

Internet Users

Increasing Time on Internet Services Based on Perceived Value

Regulators

Want to Ensure User Data is Not Used ‘Improperly’
Rising User Engagement = Drives Monetization + Investment in Product Improvements...
Rising Monetization + Data Collection = Drives Regulatory Scrutiny

**Data / Privacy**

The European Data Protection Regulation will be applicable as of May 25th, 2018 in all member states to harmonize data privacy laws across Europe.

- European Union, 5/18

Facebook’s collection & use of data from third-party sources is abusive.

- German Federal Cartel Office, 12/17

**Safety / Content**

The Germany Network Enforcement Act will require for-profit social networks with >2MM registered users in Germany to remove unlawful content within 24 hours of receiving a complaint.

- German Federal Ministry of Justice & Consumer Protection, 10/17

**Competition**

Commission fines Google €2.42 billion for abusing dominance as search engine by giving illegal advantage to its own comparison shopping service.

- European Commission, 6/17

Commission approves acquisition of LinkedIn by Microsoft, subject to conditions.

- European Commission, 12/16

**Taxes**

Commission finds Luxembourg gave illegal tax benefits to Amazon worth around €250 million.

- European Commission, 10/17
We’re an idealistic & optimistic company. For the first decade, we really focused on all the good that connecting people brings. But it’s clear now that we [Facebook] didn’t do enough.

We didn’t focus enough on preventing abuse & thinking through how people could use these tools to do harm as well.

- Mark Zuckerberg, Facebook CEO, 4/18
This month, the European Union will embark on an expansive effort to give people more control over their data online...

As it comes into force, Europe should be mindful of unintended consequences & open to change when things go wrong.

- Bloomberg Opinion Editorial, 5/8/18
It’s Crucial To Manage For Unintended Consequences…

But It’s Irresponsible to Stop Innovation + Progress
USA Internet Leaders =

Aggressive + Forward-Thinking
Investors for Years
Investment (Public + Private) Into Technology Companies = High for Two Decades

Global USA-Listed Technology IPO Issuance & Global Technology Venture Capital Financing

Technology Companies = 25% & Rising % of Market Cap, USA

USA Information Technology % of MSCI Market Capitalization

![Graph showing USA Information Technology % of MSCI Market Capitalization from 1997 to 2017. The graph indicates a rising trend with a peak of 33% in March, 2000 and a current reading of 25% in April, 2018.]

Source: FactSet, Katy Huberty @ Morgan Stanley. MSCI, Formerly Morgan Stanley Capital International = American provider of equity, fixed income, hedge fund stock market indexes, and equity portfolio analysis tools. Data refers to MSCI's index of USA publicly traded companies.
Technology Companies = 6 of Top 15 R&D + Capex Spenders, USA

USA Public Company Research & Development Spend + Capital Expenditures (2017)

- Amazon: +45% Y/Y
- Google / Alphabet: +23%
- Intel: +11%
- Apple: +5%
- Microsoft: +6%
- AT&T: -4%
- Verizon: +1%
- Exxon Mobil: -4%
- General Motors: +5%
- Ford: +5%
- Facebook: +40%
- Chevron: -26%
- Johnson & Johnson: +12%
- General Electric: +2%
- Merck: +3%

Source: SEC Edgar, Katy Huberty @ Morgan Stanley. Note: All figures are calendar year 2017. Amazon R&D = Tech & Content spend. General Motors does not include purchases of leased vehicles. AT&T capex does not include interest during construction, just purchases of property, plant, & equipment. Verizon capitalizes R&D expense (i.e. reported as capex). General Electric R&D = GE funded, not government or customer. Bold indicates tech companies.
Technology Companies = Largest + Fastest Growing R&D + Capex Spenders, USA

Research & Development Spend + Capital Expenditures – Select USA GICS Sectors

Source: ClariFi, Katy Huberty @ Morgan Stanley. GICS = Global Industry Classification Standard, an industry taxonomy developed in 1999 by MSCI and Standard & Poor’s (S&P) for use by the global financial community. CAGR = Compounded annual growth rate from 2007-2017. Note: Amazon, Netflix and Expedia removed from Discretionary Sector & added to Technology. Discretionary includes companies that sell goods & services that are considered non-essential by consumers such as Starbucks (restaurants) & Nike (apparel). See appendix for detailed GICS definition. ClariFi does not have R&D or Capex data from Financial Services. *Healthcare includes pharmaceutical companies.
Technology Companies = Rising R&D + Capex as % of Revenue…18% vs. 13% (2007)

USA Technology Company Research & Development Spend + Capital Expenditures vs. % of Revenue

Source: ClariFi, Katy Huberty @ Morgan Stanley. GICS = Global Industry Classification Standard, an industry taxonomy developed in 1999 by MSCI and Standard & Poor's (S&P) for use by the global financial community. Note: Amazon, Netflix and Expedia removed from Discretionary Sector & added to Technology. Discretionary includes companies that sell goods & services that are considered non-essential by consumers such as Starbucks (restaurants) & Nike (apparel). See appendix for detailed GICs definition.
USA Tech Companies…

Aggressive Competition + Spending on R&D + Capex =

Driving Innovation + Growth
E-COMMERCE = 
TRANSFORMATION ACCELERATING
E-Commerce = Acceleration Continues @ +16% vs. +14% Y/Y, USA

Source: St. Louis Federal Reserve FRED database. Note: Historic data (Pre-2016) adjusted / back-casted in 2017 by USA Census Bureau to better align with Annual Retail Trade + Monthly Retail Trade Survey data.
E-Commerce vs. Physical Retail = Share Gains Continue @ 13% of Retail

E-Commerce as % of Retail Sales

Source: USA Census Bureau, St. Louis Federal Reserve FRED database.
Note: 13% = Annualized share. Penetration calculated by dividing E-Commerce sales by “Core” Retail Sales (excluding food services, motor vehicles / auto parts, gas stations & fuel). All figures are seasonally adjusted.
Amazon = E-Commerce Share Gains Continue @ 28% vs. 20% in 2013

E-Commerce Gross Merchandise Value (GMV) – Amazon vs. Other

- **Amazon**: $52B GMV = 20% Share
  - 2013: $25B
  - 2017: $52B

- **Other**: $129B GMV = 28% Share
  - 2013: $100B
  - 2017: $129B

Source: St. Louis Federal Reserve FRED database, Brian Nowak @ Morgan Stanley (5/18). Morgan Stanley Amazon USA GMV estimates exclude in-store GMV and assume 90% of North American GMV is USA. Market share calculated using FRED E-Commerce sales data.
E-Commerce = Evolving + Scaling
E-Commerce = Mobile / Interactive / Personalized / In-Feed + Inbox / Front-Doored

Instacart

Find
Local Store

Explore
Custom Savings

View + Share
Recommendations

Pay
Seamlessly

Update

Source: Instacart (5/18)
E-Commerce =
A Look @ Tools + Numbers…

Payment

Online Store

Online Payment

Fraud Prevention

Purchase Financing

Customer Support

Finding Customers

Delivering Product
Offline Merchants = Set Up Payment System…

Square
Points of Sale (POS)

Software Services

Payroll

 Loans

Invoices

 Analytics

Estimated Active Sellers & Gross Payment Volume (GPV)

Source: Square (5/18). Note: Active Sellers have accepted five or more payments using Square in the last 12 months. In 11/15 Square disclosed it had 2MM users and in 3/16 disclosed it was adding 100K sellers per quarter – assuming seller trends remained constant, Square had approximately 2.8MM active sellers at the end of 2017. (~2.8MM = 2017E)
Shopify Online Stores

Active Merchants & Gross Merchandise Volume (GMV)

Source: Shopify, Brian Essex @ Morgan Stanley. Note: Active Merchants refers to merchants with an active Shopify subscription at the end of the relevant period. 2017 Active merchants and GMV are estimates based on periodic disclosures. (609K = 2017E)
Integrate Online Payment System...

**Stripe**

Payment API Implementation

```
<form action="your-server-side-code" method="POST">
  <script
    src="https://checkout.stripe.com/checkout.js" class="stripe-button"
    data-key="pk_test_6pRNASCoBOKtlshFeQd4XMuH"
    data-amount="999"
    data-name="Stripe.com"
    data-description="Example charge"
    data-image="https://stripe.com/img/documentation/checkout/marketplace.png"
    data-locale="auto"
    data-zip-code="true">
    </script>
  </form>
```
...Integrate Fraud Prevention...

Signifyd Fraud Prevention

**Increase Revenue**

- **Guaranteed:** $454,808.68

<table>
<thead>
<tr>
<th>Decision</th>
<th>Amount</th>
<th>Count</th>
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<tbody>
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<td>Canceled</td>
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<td>0</td>
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<tr>
<td>All Orders</td>
<td>$457,554.00</td>
<td>48,860</td>
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</tbody>
</table>

99.4% Approval Rate

**Fast Decisions (milliseconds)**

- 250 milliseconds
- 300 milliseconds
- 350 milliseconds
- 400 milliseconds
- 450 milliseconds

**Shift Liability**

- **Paid:** $653.00

<table>
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<tr>
<th>Decision</th>
<th>Amount</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>0</td>
</tr>
<tr>
<td>All Claims</td>
<td>$653.00</td>
<td>5</td>
</tr>
</tbody>
</table>

0.08% Fraud Chargeback Rate

Source: Signifyd (5/18). Note: Merchants refers to retailers using Signifyd services to monitor for fraud @ period end. (10K = 2017)
Integrate Purchase Financing…

Affirm Financing

1,200+ = Merchants

Source: Affirm (5/18).
Intercom Real-Time Support

...Integrate Customer Support...

![Conversation example](image)

**Customer Conversations**

- Conversations Started, Global

Source: Intercom (5/18). Note: Conversations started include messages initiated by business & customers. (500MM = 2018)
…Find Customers…

Criteo
Customer Targeting

Source: Criteo (5/18). Note: Clients defined as active clients @ relevant period end. (18K = 2017)
...Deliver Products to Customers

**Product Delivery**

![UPS Delivery Truck](image1)

![Caviar Delivery](image2)

**Parcel Volume**

<table>
<thead>
<tr>
<th>Volume, USA*</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<td>1B</td>
<td>1B</td>
<td>1B</td>
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</tbody>
</table>

*Combines USPS's domestic shipping & package services volumes, FedEx's domestic package volumes, and UPS's domestic package volumes. All figures are calendar year end except FedEx which includes LTM figures ending November 30 due to offset fiscal year.
E-Commerce =  
A Look @ Tools + Numbers

Payment

Online Store

Online Payment

Fraud Prevention

Purchase Financing

Customer Support

Finding Customers

Delivering Product
Building / Deploying Online Stores = Trend Evinced by Shopify Storefront Exchange

Shopify Storefront Exchange (Launched 6/17)

Browse Businesses for Sale

Fuel your business ambitions

Exchange is Shopify's marketplace to buy and sell businesses for entrepreneurs like you.

<table>
<thead>
<tr>
<th>Price</th>
<th>Revenue</th>
<th>Age</th>
<th>Business Type</th>
<th>Industry</th>
</tr>
</thead>
</table>

Established stores for sale

Use your expertise to grow a business to the next level

- **STO0FS**
  - stoofs.com
  - (Electronics and gadgets)
  - Revenue (USD): $18.5K
  - Traffic: 25.0K
  - Profit (USD): $33.0K
  - Inventory Value (USD): n/a
  - Business is featured
  - Price: $50,000 USD

- **Loopies.com**
  - loopies.com
  - (Health and beauty)
  - Revenue (USD): $4.9K
  - Traffic: 5.5K
  - Profit (USD): $1.6K
  - Inventory Value (USD): n/a
  - Price: $75,000 USD

- **Nabee Socks**
  - nabeesocks.com
  - (Fashion and apparel)
  - Revenue (USD): $4.8K
  - Traffic: 2.8K
  - Profit (USD): $2.7K
  - Inventory Value (USD): $60.0K
  - Price: $150,000 USD

- **Canadian Made Company**
  - canadianmade.co
  - (Fashion and apparel)
  - Revenue (USD): $4.8K
  - Traffic: 2.2K
  - Profit (USD): $9.6K
  - Inventory Value (USD): $24.3K
  - Price: $49,000 USD

Source: Shopify (5/18)
Online Product Finding Evolution =

Search Leads…

Discovery Emerging

Getting More…
Data Driven / Personalized / Competitive
Product Finding = Often Starts @ Search (Amazon + Google...)

Where Do You Begin Your Product Search?

- 49% Amazon
- 36% Search Engine
- 15% Other

Source: Survata (9/17). Note: n = 2,000 USA customers.
Product Finding (Amazon) = Started @ Search...Fulfilled by Amazon

Product Search

1-Click Purchasing

Prime Fulfillment

Sponsored Product Listings

Voice Search + Fulfillment

Source: The Internet Archive, Amazon.
Product Finding (Google) = Started @ Search...Fulfilled by Others

Organic Search

Paid Search

Google Shopping

Product Listing Ads

Shopping Actions

Source: The Internet Archive, Google.
Online Product Finding Evolution =

Search Leads…

Discovery Emerging

Getting More…
Data Driven / Personalized / Competitive
Product Finding (Facebook / Instagram) = Started @ Personalized Discovery in Feed

Source: Facebook (5/18), Instagram (5/18).
Online Product Finding Evolution =

Search Leads…

Discovery Emerging

Getting More…

Data Driven / Personalized / Competitive
Google = Ad Platform to a Commerce Platform...
Amazon = Commerce Platform to an Ad Platform

1997...2000
AdWords

Google Home Ordering

2018

1-Click Checkout

Sponsored Products

Source: Advia (Google 2000 image), TechCrunch (2/17), Amazon (5/18).
E-Commerce-Related Advertising Revenue = Rising @ Google + Amazon + Facebook

Google
3x = Engagement Increase
For Top Mobile Product Listing Ad*

Amazon
$4B +42% Y/Y = Ad Revenue

Facebook
>80MM +23% Y/Y = SMBs with Pages

Source: Google (7/17), Brian Nowak @ Morgan Stanley (Amazon Ad revenue estimate, 5/18), Facebook (4/18).
*Google disclosed that the leftmost listing in a mobile product listing ad experiences 3x engagement.
Social Media =

Enabling More Efficient Product Discovery / Commerce
Social Media = Driving Product Discovery + Purchases

**Social Media Driving Product Discovery…**

- **Facebook**: 78%
- **Instagram**: 59%
- **Pinterest**: 59%
- **Twitter**: 34%
- **Snap**: 22%

% of Respondents that Have Discovered Products on Platform, USA (18-34 Years Old)

**…Social Media Discovery Driving Purchases**

- **Bought Online Later**: 44%
- **Bought Online Immediately**: 45%
- **Never Bought / Other**: 11%

55% = Bought Product Online After Social Media Discovery

Source: Curalate Consumer Survey 2017 (8/17). Note: n = 1,000 USA consumers ages 18-65. Left chart question: “In the last 3 months, have you discovered any retail products that you were interested in buying on any of the following social media channels?” Right chart question: “What action did you take after discovering a product in a brand’s social media post?” Never Bought / Other includes offline purchases made later.
Social Media = Share of E-Commerce Referrals Rising @ 6% vs. 2% (2015)

Social / Feed Referrals to E-Commerce Sites

Source: Adobe Digital Insights (5/18). Note: Adobe Digital Insights based on 50B+ online USA page visits since 2015. Data is collected on a per-visit basis across all internet connected devices and then aggregated by Adobe. Data reflects 5/1/18 measurements.
Social Media = Helping Drive Growth for Emerging DTC Retailers / Brands

Select USA Direct-to-Consumer (DTC) Brands – Revenue Ramp to $100MM Since Inception*

Source: Internet Retailer 2017 Top 1,000 Guide. *Data only for E-Commerce sales and shown in 2017 dollars. Chart includes pure-play E-Commerce retailers and evolved pure-play retailers. The Top 1,000 Guide uses a combination of internal research staff and well-known e-commerce market measurement firms such as Compete, Compuware APM, comScore, ForeSee, Experian Marketing Services, StellaService and ROI Revolution to collect and verify information.
Social Media = Ad Engagement Rising…Facebook E-Commerce CTRs Rising

Facebook E-Commerce CTRs (Click-Through Rates)

Source: Facebook, Nanigans Quarterly Facebook Benchmarking Data. Note: Click-Through Rate is defined as the percentage of people visiting a web page who access a hyperlink text from a particular advertisement. CTR figures based on $600MM+ of ad spend through Nanigans’ platform.
Return on Ad Spend = Cost Rising @ Faster Rate than Reach

In performance-based [digital advertising] channels, competition for top placement has reduced ROIs over the years & been a source of margin pressure…

- Glenn D. Fogel, CEO & President, Booking Holdings Q3:17 Earnings Call, (11/17)

Source: Booking Holdings Inc. (11/17), Nanigans Quarterly Facebook Benchmarking Data. Note: eCPMs are defined as the effective (blended across ad formats) cost per thousand ad impressions. Click-Through Rate is defined as the percentage of people visiting a web page who access a hyperlink text from a particular advertisement. CTR figures based on $600MM+ of ad spend through Nanigan’s platform. In 2017, Booking Holdings spent $4.1B on online performance advertising which is primarily focused on search engine marketing (SEM) channels. The quote on the left relates to historical long-term ad ROI trends as competition across performance channels intensified.
Customer Lifetime Value (LTV) = Importance Rising as... Customer Acquisition Cost (CAC) Increases

What Do You Consider To Be Important Ad Spending Optimization Metrics?

<table>
<thead>
<tr>
<th>Metric</th>
<th>% of Respondents, Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Lifetime Value</td>
<td>27%</td>
</tr>
<tr>
<td>Impressions / Web Traffic</td>
<td>19%</td>
</tr>
<tr>
<td>Brand Recognition &amp; Lift</td>
<td>18%</td>
</tr>
<tr>
<td>Closed-Won Business</td>
<td>15%</td>
</tr>
<tr>
<td>Last-Click Attribution</td>
<td>13%</td>
</tr>
<tr>
<td>Multi-touch Attribution</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: Salesforce Digital Advertising 2020 Report (1/18). Note: n = 900 full-time advertisers, media buyers, and marketers with the title of manager and above. Respondents are from companies in North America (USA, Canada), Europe (France, Germany, Netherlands, UK, Ireland) and Asia Pacific (Japan, Australia, New Zealand) with each region having 300 participants. The survey was done online via FocusVision in 11/17.
Lifetime Value / Customer Acquisition Cost (LTV / CAC) = Increasingly Important Metric for Retailers / Brands

Facebook Ad Analytics Tools LTV Integration

What is customer lifetime value (LTV)?
LTV is a value associated with your customers based on how much and how often they spend with your business over the course of their relationship with you. People with high LTV may be more expensive to acquire, but lead to greater value over time.

Source: Facebook (3/17).
Data-Driven Personalization / Recommendations =

Early Innings @ Scale
Evolution of Commerce Drivers (1890s -> 2010s) = Demographic -> Brand -> Utility -> Data

<table>
<thead>
<tr>
<th>1890s - 1940s</th>
<th>1940s - 1990s</th>
<th>1990s - 2010s</th>
<th>2010s - …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>Brand</td>
<td>Utility</td>
<td>Data</td>
</tr>
<tr>
<td>Catalogs</td>
<td>Department Stores / Malls</td>
<td>E-Commerce – Transactional</td>
<td>E-Commerce – Personalized</td>
</tr>
<tr>
<td>Limited product selection + shopping moments</td>
<td>Rising product selection + shopping moments</td>
<td>Massive product selection + 24x7 shopping moments</td>
<td>Curated product discovery + 24x7 recommendations</td>
</tr>
</tbody>
</table>

- Sears Roebuck
- Montgomery Ward
- Macy’s
- GAP
- Nike
- Amazon
- eBay
- Amazon
- Facebook
- Stitch Fix

Source: Eric Feng @ Kleiner Perkins
Wikimedia, eBay, Stitch Fix.
Product Purchases =

Many Evolving from Buying to Subscribing
Subscription Service Growth = Driven by...
Access / Selection / Price / Experience / Personalization

<table>
<thead>
<tr>
<th>Online Subscription Services</th>
<th>Subscribers 2017</th>
<th>Growth Y/Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netflix</td>
<td>118MM</td>
<td>+25%</td>
</tr>
<tr>
<td>Amazon</td>
<td>100MM</td>
<td>--</td>
</tr>
<tr>
<td>Spotify</td>
<td>71MM</td>
<td>+48%</td>
</tr>
<tr>
<td>Sony PlayStation Plus</td>
<td>34MM</td>
<td>+30%</td>
</tr>
<tr>
<td>Dropbox</td>
<td>11MM</td>
<td>+25%</td>
</tr>
<tr>
<td>The New York Times</td>
<td>3MM</td>
<td>+43%</td>
</tr>
<tr>
<td>Stitch Fix</td>
<td>3MM</td>
<td>+31%</td>
</tr>
<tr>
<td>LegalZoom</td>
<td>550K</td>
<td>+16%</td>
</tr>
<tr>
<td>Peloton</td>
<td>172K</td>
<td>+173%</td>
</tr>
</tbody>
</table>

Free-to-Paid Conversion = Driven by User Experience...
Spotify Subscribers @ 45% of MAUs vs. 0% @ 2008 Launch

Spotify Subscribers % of MAU

Source: Spotify (5’18). Note: MAU = Monthly Active Users.
Shopping = Entertainment...
Mobile Shopping Usage = Sessions Growing Fast

Mobile Shopping App Sessions – Growth Y/Y

Session Growth Y/Y (Global, 2017 vs. 2016)

Shopping
- Music / Media / Entertainment
- Business / Finance
- Utilities / Productivity
- News / Magazine
- Sports
- Photography
- Personalization
- Games
- Lifestyle

Average = 6%

Source: Flurry Analytics State of Mobile 2017 (1/18). Note: n = 1MM applications across 2.6B devices globally. Sessions defined as when a user opens an app.
Product + Price Discovery = Often Video-Enabled…

**YouTube**

*Many USA Consumers View YouTube Before Purchasing Products*

**Taobao**

*1.5MM+ Active Content Creators*

---

*Source: YouTube (3/16, 5/18), Alibaba (3/18), Right image: South China Morning Post (2/18). Note: Many USA customers refers to data in a report published by Google, based on Google / Ipsos Connect, YouTubeSports Viewers Study conducted on n = 1,500 18-54 year old consumers in the USA in 3/16.*
…Product + Price Discovery = Often Social + Gamified

**Wish**

*Hourly Deals*

*300MM+ Users*

---

**Pinduoduo**

*Refer Friends to Reduce Price*


Note: Wish user figures are cumulative users, not MAU.
Physical Retail Trending =

Long-Term Growth Deceleration
Physical Retail = Long-Term Sales Growth Deceleration Trend

Physical Retail Sales + Y/Y Growth, USA

Volume  Growth Y/Y

Source: St. Louis Federal Reserve FRED Database.  Note: Physical Retail includes all retail sales excluding food services, motor vehicles / auto parts & fuel.
‘New Retail’ =
Alibaba View from China
Alibaba = Building E-Commerce Ecosystem Born in China

Alibaba & Amazon = Similar Focus Areas…

Alibaba = Higher GMV…Amazon = Higher Revenue (2017)

<table>
<thead>
<tr>
<th>Alibaba</th>
<th>Amazon</th>
</tr>
</thead>
<tbody>
<tr>
<td>$509B = Market Capitalization</td>
<td>$783B = Market Capitalization</td>
</tr>
<tr>
<td>$701B = GMV(E) +29% Y/Y</td>
<td>$225B = GMV(E) +25% Y/Y</td>
</tr>
<tr>
<td>$34B = Revenue +31% Y/Y</td>
<td>$178B = Revenue +31% Y/Y</td>
</tr>
<tr>
<td>60% = Gross Margin</td>
<td>37% = Gross Margin</td>
</tr>
<tr>
<td>$14B = Free Cash Flow</td>
<td>$4B = Free Cash Flow</td>
</tr>
<tr>
<td>8% = Non-China Revenue as % of Total**</td>
<td>31% = Non-USA Revenue as % of Total**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tmall / Taobao / AliExpress / Lazada / Alibaba.com / 1688.com / Juhuasuan / Daraz</th>
<th>Online Marketplace</th>
<th>Amazon.com</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intime / Suning* / Hema</td>
<td>Physical Retail</td>
<td>Whole Foods / Amazon Go / Amazonbooks</td>
</tr>
<tr>
<td>Ant Financial* / Paytm*</td>
<td>Payments</td>
<td>Amazon Payments</td>
</tr>
<tr>
<td>Youku / UCWeb / Alisports / Alibaba Music / Damai / Alibaba Pictures*</td>
<td>Digital Entertainment</td>
<td>Amazon Video / Amazon Music / Twitch / Amazon Game Studios / Audible</td>
</tr>
<tr>
<td>Ele.Me (Local) / Koubei (Local) / Alimama / Alimama (Marketing) / Cainiao (Logistics) / Autonavi (Mapping) / Tmall Genie (IoT)</td>
<td>Other</td>
<td>Alexa (IoT) / Ring (IoT) / Kindle + Fire Devices (Hardware)</td>
</tr>
<tr>
<td>Alibaba Cloud</td>
<td>Cloud Platform</td>
<td>Amazon Web Services (AWS)</td>
</tr>
</tbody>
</table>

Source: Grace Chen (Alibaba) + Brian Nowak (Amazon) @ Morgan Stanley. *Alibaba has invested but does not have a majority ownership. **Alibaba Non-China revenue = Alibaba International Commerce revenue (AliExpress, Lazada, & Alibaba.com). Amazon Non-USA revenue = Retail sales of consumer products & subscriptions through internationally-focused websites outside of North America. Note: All figures reflect calendar year 2017. Alibaba GMV includes Non-China GMV estimates. Y/Y Growth is FX adjusted using 6.76 RMB / USD average exchange rate for 2017. All figures refer to calendar year. Market cap as of 5/29/18. Amazon GMV includes in-store GMV. FCF = Cash flow from operations - stock-based compensation - capital expenditures.
…through technology & consumer insights, we [Alibaba] put the right products in front of right customers at the right time… our ‘New Retail’ initiatives are substantially growing Alibaba’s total addressable market in commerce…

in this process of digitizing the entire retail operation, we are driving a massive transformation of the traditional retail industry.

It is fair to say that our e-commerce platform is fast becoming the leading retail infrastructure of China.

Since Jack Ma coined the term ‘New Retail’ in 2016, the term has been widely adopted in China by traditional retailers & Internet companies alike. New Retail has become the most talked about concept in business…

Alibaba has three unique success factors that are enabling us to realize the New Retail vision.
…Alibaba’s marketplace platforms handle billions of transactions each month in shopping, daily services & payments. These transactions provide us with the best insights into consumer behavior & shifting consumption trends. This puts us in the best position to enable our retail partners to grow their business.

…Alibaba is a deep technology company. We contribute expertise in cloud, artificial intelligence, mobile transactions & enterprise systems to help our retail partners improve their businesses through digitization & operating efficiency.

…Alibaba has the most comprehensive ecosystem of commerce platforms, logistics & payments to support the digital transformation of the retail sector.
Alibaba Non-China E-Commerce Highlights

<table>
<thead>
<tr>
<th>Company</th>
<th>Country</th>
<th>Category</th>
<th>Type</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daraz.pk</td>
<td>Pakistan</td>
<td>Marketplace</td>
<td>M&amp;A</td>
<td>5/18</td>
</tr>
<tr>
<td>Tokopedia</td>
<td>Indonesia</td>
<td>Marketplace</td>
<td>Equity</td>
<td>8/17</td>
</tr>
<tr>
<td>Paytm</td>
<td>India</td>
<td>Payments</td>
<td>Equity</td>
<td>4/17</td>
</tr>
<tr>
<td>Lazada</td>
<td>Singapore</td>
<td>Marketplace</td>
<td>M&amp;A</td>
<td>4/16</td>
</tr>
</tbody>
</table>

International Revenue = 8.4% vs. 7.9 Y/Y*

Source: Alibaba, Pitchbook. *Percentages represent international commerce revenue proportion of total revenue. Note: All figures are calendar year. Revenue figures translated using the USD / CNY = 6.76, the average rate for 2017. Grey indicates a majority control stake, all others are minority investments. Country based on headquarters, not countries of operation. Alibaba International Commerce revenue includes revenue generated from AliExpress, Lazada, and Alibaba.com.
INTERNET ADVERTISING =
GROWTH CONTINUING...
ACCOUNTABILITY RISING
Advertising $ = Shift to Usage (Mobile) Continues

% of Time Spent in Media vs. % of Advertising Spending

Source: Internet and Mobile advertising spend based on IAB and PwC data for full year 2017. Print advertising spend based on Magna Global estimates for full year 2017. Print includes newspaper and magazine. ~$7B opportunity calculated assuming Mobile (IAB) ad spend share equal its respective time spent share. Time spent share data based on eMarketer (9/17). Arrows denote Y/Y shift in percent share. Excludes out-of-home, video game & cinema advertising.
Internet Advertising = +21% vs. +22% Y/Y

Advertisers / Users vs. Content Platforms = Accountability Rising...

Many Americans Believe Fake News Is Sowing Confusion

Pew Research Center, December 2016

Procter & Gamble Cut Up to $140 Million in Digital Ad Spending Because of Brand Safety Concerns

Adweek, July 2017

Unilever Threatens to Reduce Ad Spending on Tech Platforms That Don’t Combat Divisive Content

The Wall Street Journal, February 2018
...Advertisers / Users vs. Content Platforms = Accountability Rising

Content Initiatives

Google / YouTube

8MM = Videos Removed (Q4:17)…
81% Flagged by Algorithms…
75% Removed Before First View

2MM = Videos De-Monetized For Misleading Content Tagging (2017)

10K = Content Moderators (2018 Goal)

Facebook (Q1:18)

583MM = Fake Accounts Removed…
99% Flagged Prior To User Reporting

21MM = Pieces of Lewd Content Removed…
96% Flagged by Algorithms

3.5MM = Pieces of Violent Content Removed…
86% Flagged by Algorithms

2.5MM = Pieces of Hate Speech Removed…
38% Flagged by Algorithms

+7,500 = Content Moderators…
3,000 Hired (5/17–2/18)

Source: YouTube (5/18, 12/17), Facebook (Transparency Report: 5/18, 5/17, 2/18). Note: All Google content moderators represent full-time hires but Facebook content moderators are not all full-time.
CONSUMER SPENDING =

DYNAMICS EVOLVING…
INTERNET CREATING OPPORTUNITIES
Consumers...

Making Ends Meet = Difficult
Household Debt = Highest Level Ever & Rising…
Change vs. Q3:08 = Student +126%...Auto +51%...Mortgage -4%

Source: Federal Reserve Bank of New York Consumer Credit Panel / Equifax. Quarterly Household Debt and Credit Report, Q4:17; St. Louis Federal Reserve FRED Database.
Personal Saving Rate = Falling @ 3% vs. 12% Fifty Years Ago…
Debt-to-Annual-Income Ratio = Rising @ 22% vs. 15%

Source: St. Louis Federal Reserve FRED Database, USA Federal Reserve Bank. “Consumer debt-to-annual-income ratio reflects outstanding credit extended to individuals for household, family, and other personal expenditures, excluding loans secured by real estate vs. average annual personal income. Personal saving rate is shown as a percentage of disposable personal income (DPI), frequently referred to as “the personal saving rate.” (i.e. the annual share of disposable income dedicated to saving).
Relative Household Spending = Shifting Over Past Half-Century
Relative Household Spending *Rising Over Time* = Shelter + Pensions / Insurance + Healthcare…

<table>
<thead>
<tr>
<th>Category</th>
<th>1972</th>
<th>1990</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Expenditure</td>
<td>$11K</td>
<td>$31K</td>
<td>$68K</td>
</tr>
</tbody>
</table>

Source: USA Bureau of Labor Statistics (BLS), Consumer Expenditure Survey. *Pensions + Insurance includes deductions for private retirement accounts, social security, and life insurance. *"Other Includes education and miscellaneous other expenses. Note: Results based on Surveys of American Urban & Rural Households (Families & Single Consumers). 1972 data reflects non-annual survey conducted by BLS + Census Bureau to adjust CPI. 1990 and 2017 Data Based on Annual Survey performed by BLS + Census Bureau. Healthcare costs include insurance, drugs, out-of-pocket medical expenses, etc. 2017 = mid-year figures.
...Relative Household Spending *Falling Over Time* = Food + Entertainment + Apparel

![Relative Household Spending](chart)

*Source: USA Bureau of Labor Statistics (BLS), Consumer Expenditure Survey. *Pensions + Insurance includes deductions for private retirement accounts, social security, and life insurance. **Other Includes education and miscellaneous other expenses. Note: Results based on Surveys of American Urban & Rural Households (Families & Single Consumers). 1972 data reflects non-annual survey conducted by BLS + Census Bureau to adjust CPI. 1990 and 2017 Data Based on Annual Survey performed by BLS + Census Bureau. Healthcare costs include insurance, drugs, out-of-pocket medical expenses, etc. 2017 = mid-year figures.*
Food =

12% vs. 15% of Household Spending 28 Years Ago...
Grocery Price Growth = Declining Trend… Owing To Grocery Competition

Grocery Price Change Y/Y & Market Share of Top 20 Grocers

Source: USDA Research Services, using data from the USA Census Bureau’s Annual Retail Trade Survey + Company Reports, USA Bureau of Labor Statistics (BLS). *Grocery Price growth refers to the growth in prices for “Food at Home” as reported by the USA Census Bureau. Note: Includes all food purchases in CPI, other than meals purchased away from home (e.g., Restaurants). Grocery @ 56% of Food Spend in 2017 vs. 58% in 1990 per BLS.
Walmart = Helped Reduce Grocery Prices via Technology + Scale... per Greg Melich @ MoffettNathanson

By using technology to reduce inventory, expenses & shrinkage, we can create lower prices for our customers.

- Walmart 1999 Annual Report
E-Commerce =

Helping Reduce Prices for Consumers
E-Commerce sales have risen rapidly over the past decade.

Online prices are falling – absolutely & relative to – traditional inflation measures like the CPI.

Inflation online is, literally, 200 basis points lower per year than what the CPI has been showing.

To better understand the economy going forward, we will need to find better ways to measure prices & inflation.

- Austan Goolsbee, Professor of Economics, University of Chicago Booth School of Business, 5/18
Consumer Goods Prices = Have Fallen…
-3% Online & -1% Offline Over 2 1/4 Years per Adobe DPI…

Source: Adobe Digital Economy Project  Note: Adobe Digital Economy Project measures prices and sales volume for 80% of online transactions at top 100 USA retailers (15B site visits & 2.2MM products) then calculates a Digital Price Index (DPI) using a Fisher Ideal model. CPI calculates USA prices using a basket of 83K goods, tracked monthly, & applied to a Laspeyeres model. DPI Excludes Apparel. Austan Goolsbee serves as strategic advisor to Adobe DPI project.
Online vs. Offline Price Decline Leaders = TVs / Furniture / Computers / Sporting Goods per Adobe DPI

Price Change, Y/Y
(DPI vs. CPI), USA, 3/17-3/18

DPI vs. CPI Difference (%)

Toys: 5%
Pet Products: 1%
Auto Parts: 1%
Medical Equipment: 0%
Personal Care Products: 0%
Drugs - Nonprescription: 0%
Grocery: -1%
Appliances: -1%
Apparel: -1%
Sporting Goods: -2%
Computers: -3%
Furniture: -2%
Televisions: -4%

Source: Adobe Digital Economy Project. Note: Adobe Digital Economy Project measures prices and sales volume for 80% of online transactions at top 100 USA retailers (15B site visits & 2.2MM products) then calculates a Digital Price Index (DPI) using a Fisher Ideal model. CPI calculates USA prices using a basket of 83K goods, tracked monthly, & applied to a Laspeyres model. DPI excludes Apparel. Austan Goolsbee serves as strategic advisor to Adobe DPI project.
We've seen how technology can make online shopping more efficient, with lower prices, more selection & increased convenience.

We are about to see the same thing happen to offline shopping.

- Hal Varian, Chief Economist @ Google, 5/18
Relative Household Spending = How Might it Evolve?

Shelter Spend = Rising
Transportation Spend = Flat
Healthcare Spend = Rising
Shelter as % of Household Spending = 17% vs. 12% (1972)...

Largest Segment in % + $ Growth

Relative Household Spending

- Shelter: 17% in 1972, 12% in 1990, 15% in 2017
- Taxes: 15% in 1972, 15% in 1990, 15% in 2017
- Transportation: 12% in 1972, 15% in 1990, 15% in 2017
- Food: 15% in 1972, 15% in 1990, 15% in 2017
- Household Operations + Insurance: 12% in 1972, 15% in 1990, 15% in 2017
- Healthcare: above 15% in 1972, below 15% in 1990, above 15% in 2017
- Entertainment: above 15% in 1972, below 15% in 1990, below 15% in 2017
- Apparel: above 15% in 1972, below 15% in 1990, below 15% in 2017
- Other**: above 15% in 1972, below 15% in 1990, below 15% in 2017

Source: USA Bureau of Labor Statistics (BLS), Consumer Expenditure Survey. *Pensions + Insurance includes deductions for private retirement accounts, social security, and life insurance. **Other Includes education and miscellaneous other expenses. Note: Results based on Surveys of American Urban & Rural Households (Families & Single Consumers). 1972 data reflects non-annual survey conducted by BLS + Census Bureau to adjust CPI. 1990 and 2017 Data Based on Annual Survey performed by BLS + Census Bureau. Healthcare costs include insurance, drugs, out-of-pocket medical expenses, etc. 2017 = mid-year figures.
Shelter…
USA Cities = Less Densely Populated vs. Developed World

Population Density – Urban Areas*

- South Korea: 17x
- Japan: 9x
- UK: 6x
- Italy: 5x
- Germany: ~3x
- Spain: ~3x
- France: ~2x
- Australia: ~2x
- USA: ~2x

*Urban areas defined as “Functional Urban Areas” per OECD/EU with greater than 500K residents.
**IMF determines ‘Advanced Economies’ designation using a combination of GDP per Capita, Export Diversity, and integration into the global financial system.

Source: OECD, International Monetary Fund (IMF).
USA Homes = Bigger vs. Developed World…

Average Home Size* (Square Feet) – Select Countries

USA
~1,500

Japan
~1,015

UK
~990

South Korea
~725

USA Homes =
Getting Bigger...Residents Falling @ 2.5 vs. 3.0 (1972)

**Average New Home Square Footage & Residents**

- **New Home Square Footage**
- **Residents per Home**

Source: USA Census Bureau (6/17). Note: Data reflects newly built housing stock. Single Family homes includes newly built single family homes. Similar growth trends are seen across all housing units, as single-family homes are the majority of new USA housing stock. Average size of multifamily new dwelling in USA = 1,095 square feet in 1999 (earliest data available), 1,207 square feet in 2016. Residents per household based on all households.
USA Office Space = Steadily Getting Denser / More Efficient

Occupied Office Space per Employee – Square Feet

…Shelter…

To Contain Spending…

Consumers May Aim to Increase Utility of Space
Airbnb = Provides Income Opportunities for Hosts…

Airbnb = Provides Income Opportunities for Hosts…

Source: Airbnb, TechCrunch. Note: Airbnb disclosed in 2017 ~660K listings were in USA. A 2017 CBRE study of ~256K USA Airbnb listings + ~177K Airbnb hosts in Austin, Boston, Chicago, LA, Miami, Nashville, New Orleans, New York City, Oahu, Portland, San Francisco, Seattle, & Washington D.C. found that 83% of listings are made by single-listing hosts, or are listings for spaces within otherwise occupied dwellings. This implies that there >500K individuals listing spaces on Airbnb in USA as of 2018.
Airbnb Consumer Benefits = Can Offer Lower Prices for Overnight Accommodations

Airbnb vs. Hotel – Average Room Price per Night

Source: AirDNA, HRS, Originally Compiled by Statista. Note: Hotel data based on HRS’s inventory of hotels. Euro prices converted to USD on 1/22/18.
Relative Household Spending = How Might it Evolve?

Shelter Spend = Rising
Transportation Spend = Flat
Healthcare Spend = Rising
Transportation as % of Household Spending = 14% vs. 14% (1972)

#3 Segment of $ Spending Behind Shelter + Taxes

Relative Household Spending

Transportation…

To Contain Spending…

Consumers Reducing Relative Spend on Vehicles + Increasing Utility of Vehicles
Transportation as % of Household Spending = Vehicle Purchase % Declining…Other Transportation % Rising

Relative Transportation Spending =

Vehicles Stay On Road Longer…
@ 12 vs. 8 Years (1995)
Average Car Lifespan

…Other Transportation Rising
+30% vs. 1995
Public Transit Usage

~2x Y/Y (2017)
Ride-Share Rides
Uber Can Provide Work Opportunities for Driver-Partners...

Uber Gross Bookings & Driver-Partners

3MM Global Driver-Partners +50*%

Source: Uber. *Approximately +50% Y/Y. Note: ~900K USA Driver-Partners. Note: As of Jan 2015, ~85% of Uber driver-partners drove for UberX – based on historical growth rates, it is estimated that >90% of USA Uber driver-partners drive for UberX.
…Uber Consumer Benefits = Lower Commute Cost vs. Personal Cars – 4 of 5 Largest USA Cities

**UberX / POOL vs. Personal Car** – Weekly Commute Costs

5 Largest USA Cities, 2017

- **New York City**: $218
- **Chicago**: $142 ($116)
- **Washington D.C.**: $130 ($96)
- **Los Angeles**: $89 ($62)
- **Dallas**: $181

*Note: Commute distances are from 2015 Brookings analysis. Uber data is based on a suburbs-to-city-center trip mirroring average commute distance for a metro. Data collected at peak commute times in February 2017. Cheapest Option (UberX, UberPOOL, etc.) selected for Uber costs.*

Relative Household Spending = How Might it Evolve?

Shelter Spend = Rising
Transportation Spend = Flat
Healthcare Spend = Rising

CREATED BY NOAH KNAUF @ KLEINER PERKINS
Healthcare as % of Household Spending = 7% vs. 5% (1972)...

Fastest Relative % Grower

Relative Household Spending

Source: USA Bureau of Labor Statistics (BLS), Consumer Expenditure Survey. *Pensions + Insurance includes deductions for private retirement accounts, social security, and life insurance. **Other includes education and miscellaneous other expenses. Note: Results based on Surveys of American Urban & Rural Households (Families & Single Consumers). 1972 data reflects non-annual survey conducted by BLS + Census Bureau to adjust CPI. 1990 and 2017 Data Based on Annual Survey performed by BLS + Census Bureau. Healthcare costs include insurance, drugs, out-of-pocket medical expenses, etc. 2017 = mid-year figures.
Healthcare Spending =

*Increasingly Shifting to Consumers…*
USA Healthcare Insurance Costs = Rising for All… Consumers Paying Higher Portion @ 18% vs. 14% (1999)…

Annual Health Insurance Premiums vs. Employee Contribution

Source: Kaiser Family Foundation Employer Health Benefits Survey (9/17). Note: n = 2,000 private, non-federal businesses with at least 3 employees. Employers are asked for full person costs of healthcare coverage and the employee contribution.
USA Healthcare Deductible Costs = Rising A Lot… Employees @ >$2K Deductible = 22% vs. 7% (2009)

Annual Deductibles vs. % of Covered Employees with >$2K Deductibles

Source: Kaiser Family Foundation Employer Health Benefits Survey (9/17). Note: n = 2,000 private, non-federal businesses with at least 3 employees. Employers are asked for full person costs of healthcare coverage and the employee contribution.
When Consumers Start Spending More
They Tend To Pay More
Attention to Value + Prices…

Will Market Forces
Finally Come to Healthcare &
Drive Prices Lower for Consumers?
Healthcare Patients Increasingly Developing Consumer Expectations…

Modern Retail Experience

Digital Engagement

On-Demand Access

Vertical Expertise

Transparent Pricing

Simple Payments
Healthcare Consumerization...

**Modern Retail Experience**

*One Medical*

- **Office Locations**
  - 2014: 0
  - 2016: 40
  - 2018: 80

- **Memberships**
  - 2014: 0
  - 2016: 200K
  - 2018: 300K

- **Unique Conversations**
  - 2016: 5K
  - 2017: 15K

**Digital Healthcare Management**

*Oscar*

**On-Demand Pharmacy**

*Capsule*

Source: One Medical, WebArchive.org, Oscar, Capsule. Note: Oscar data as of the first month of each year based on enrollments timing.
…Healthcare Consumerization

**Women’s Healthcare Specific Solutions**

*Nurx*

- Medical Interactions*

- Transparent Pricing

- Simplified Healthcare Billing

*Source: Nurx, Dr. Consulta, Cedar. *Medical interactions include prescriptions, lab orders, & messages from MDs / RNs. **Cedar data represents the % of total collections using Cedar over time at a multispecialty group with 450 physicians and an ambulatory surgical center.*
Consumerization of Healthcare + Rising Data Availability =

On Cusp of Reducing Consumer Healthcare Spending?
WORK =

CHANGING RAPIDLY…
INTERNET HELPING, SO FAR…
Technology Disruption =
Not New...But Accelerating
Technology Disruption = Not New…

New Technology Proliferation Curves*

Source: ‘Our World In Data’ collection of published economics data including Isard (1942), Grubler (1990), Pew Research, USA Census Bureau, and others. *Proliferation defined by share of households using a particular technology. In the case of features (e.g., Automatic Transmission), adoption refers to share of feature in available models.
…Technology Disruption = Accelerating…Internet > PC > TV > Telephone

New Technology Adoption Curves

Note: Starting years based on invention year of each consumer product.
Technology Disruption Drivers = Rising & Cheaper Compute Power + Storage Capacity...

$1,000 of Computer Equipment

Storage Price vs. Hard Drive Capacity

Source: John McCallum @ IDC, David Rosenthal @ LOCKSS Program – Stanford); Kryder’s Law. Time + Ray Kurzweil analysis of multiple sources, including Gwennap (1996); Kempt (1961) and others. Note: All figures shown on logarithmic scale.
...Technology Disruption Drivers = Rising & Cheaper Connectivity + Data Sharing

Internet + Social Media – Global Penetration

Source: United Nations / International Telecommunications Union, USA Census Bureau. Internet user data is as of mid-year Internet user data: Pew Research (USA), China Internet Network Information Center (China), Islamic Republic News Agency / InternetWorldStats / KP estimates (Iran), KP estimates based on IAMAI data (India), & APJII (Indonesia). Population sourced from Central Intelligence Agency database. eMarketer estimates for Social Media users based on number of active accounts, not unique users. Penetration calculated as a % of total population based on the CIA database.
New Technologies = Created / Displaced Jobs Historically
New Technologies = Job Concerns / Reality Ebb + Flow Over Time

1920
1940
1960
1980
2000
2020

New Technologies = Aircraft Jobs Replaced Locomotive Jobs...

Source: ITIF analysis of IPUMS data (Atkinson + Wu); St. Louis Federal Reserve FRED Database. Note: IPUMS data tracks historical employment (since 1950) using 2010 Census occupational codes. (7140: Aircraft Mechanics + Service Technicians; 9030: Aircraft Pilots + Flight Engineers; 9200: Locomotive Engineers + Operators; 9230: Railroad Brake, Signal, + Switch Operators; 9240: Railroad Conductors + Yardmasters).
New Technologies = Services Jobs Replaced Agriculture Jobs …

Agriculture vs. Services Jobs

Source: Growth & Structural Transformation – Herrendorf et al. (NBER, 2013). Services includes all non-farm jobs except goods-producing industries such as natural resources / mining, construction and manufacturing.
Agriculture = <2% vs. 41% of Jobs in 1900

Agriculture vs. Services Jobs

Will Technology Impact Jobs Differently This Time?

Perhaps...But It Would Be Inconsistent With History as...

New Jobs / Services + Efficiencies + Growth Typically Created Around New Technologies
Job Market =

Solid Based on Traditional High-Level Metrics, USA
Unemployment @ 3.9% = Well Below 5.8% Seventy Year Average

Unemployment Rate

Average = 5.8%

Source: St Louis Federal Reserve FRED Database, Bureau of the Budget (1957). Note: Unemployment rate calculated by dividing the total workforce by the total number of unemployed people. People are classified as unemployed if they do not have a job, have actively looked for work in the prior 4 weeks and are currently available for work.
Consumer Confidence = High & Rising…
Index @ 100 vs. 87 Fifty-Five Year Average

Source: St. Louis Federal Reserve FRED Database. Note: Indexed to Q1:66 = 100. Consumer Confidence Index (Michigan Consumer Sentiment Index) is a broad measure of American consumer sentiment, as measured through a 50-question telephone survey of at least 500 USA residents each month.
Job Openings = 17 Year High…@ 7MM…~3x Higher vs. 2009 Trough

Job Openings* – USA

6.6MM Job Openings (3/18)

1.4MM = Professional Services + Finance
1.3MM = Healthcare + Education
1.2MM = Trade / Transportation / Utilities
879K = Leisure / Hospitality
661K = Mining / Construction / Manufacturing
622K = Government
486K = Other

Source: St Louis Federal Reserve FRED Database. *A job opening is defined as a non-farm specific position of employment to be filled at an establishment. Conditions include the following: there is work available for that position, the job could start within 30 days, and the employer is actively recruiting for the position.
Job Growth = Stronger in Urban Areas Where 86% of Americans Live

Job / Population Growth – Urban vs. Rural (Indexed to 2001)

Source: USDA ERS, BLS. Note: LAUS county-level data from BLS are aggregated into urban (metropolitan/metro) and rural (nonmetropolitan / non-metro), based on the Office of Management and Budget’s 2013 metropolitan classification. Metro areas defined as counties with urban areas >50K in population and the outlying counties where >35% of population commutes to an urban center for work. ‘Rural’ data reflects total non-metro employment, where population has been declining since 2011.
Labor Force Participation Rate**

Source: St Louis Federal Reserve FRED Database, BLS. *In March 2018, ~161.8MM Americans were in the labor force (62.9% participation). Participation @ 50-year average of 64.3% would imply a labor force of 165.3MM. The labor force participation rate is defined as the section of working population in the age group of 16+ in the economy currently employed or seeking employment. **For data from 1900-1945 the labor force participation rate includes working population over the age of 10.
Most Common Activities For Many Who Don’t Work* = Leisure / Household Activities / Education

Males* (Ages 25-54) – Daily Time Use

- **Not In Labor Force**
- **In Labor Force**

- **Watching TV**: +3 Hours
- **Other Socializing, Relaxing, Leisure**: +0.7
- **Other (Including Sleep)**: +0.6
- **Household Activities & Services**: +0.5
- **Education**: +0.3
- **Caring For Non-Household Members**: +0.01
- **Caring for Household Members**: -0.02
- **Work**: -5

Source: 2014 American Time Use Survey, CEA calculations, BLS. Note: Prime-age males defined as men between the ages of 25-54. Daily hours may not add up to 24 since some individuals do not report all time spent. Household activities include cleaning, cooking, yardwork & home maintenance not related to caregiving.
Job Expectations = Evolving
Most Desired Non-Monetary Benefit for Workers = Flexibility per Gallup

Would You Change Jobs to Have Access To...

- Health Insurance: 61%
- Monetary Bonuses: 54%
- Paid Vacation: 53%
- Flexible Schedule: 51%
- Pension: 51%
- Paid Leave: 48%
- Profit Sharing: 40%
- Working From Home: 35%

Source: Gallup 2017 State of the American Workplace Note: “Flexible schedule defined as ability to choose own hours of work. Gallup developed State of the American Workplace using data collected from more than 195,600 USA employees via the Gallup Panel and Gallup Daily tracking in 2015 and 2016, and more than 31 million respondents through Gallup’s Q12 Client Database. First launched in 2010, this is the third iteration of the report.”
Technology = Makes Freelance Work Easier to Find…
Freelance Workforce = 3x Faster Growth vs. Total Workforce

**Has Technology Has Made It Easier To Find Freelance Work?**

- % Responding Positively, USA:
  - 2014: 69%
  - 2015: 75%
  - 2016: 77%
  - 2017: 100%

**Workforce Growth – Freelance vs. Total**

- 2014:
  - Total: 100%
  - Freelance: 100%

- 2015:
  - Total: 102%
  - Freelance: 104%

- 2016:
  - Total: 106%
  - Freelance: 108%

- 2017:
  - Total: 110%
  - Freelance: 110%

Source: ‘Freelancing in America: 2017’ survey conducted by Edelman Research, co-commissioned by Upwork and Freelancers Union. Note: Survey conducted 7/17-8/17, n = 2,173 Freelance Employees who have received payment for supplemental temporary, or project-oriented work in the past 12 months.

On-Demand Jobs =

Big Numbers + High Growth

Increasingly Filling Needs for Workers Who Want Extra Income / Flexibility... Have Underutilized Skills / Assets
On-Demand Workers = 5.4MM +23%, USA per Intuit

Preliminary 2018 results appear to be in line with forecast as of 5/16/18.

On-demand workers defined as online marketplace workers including transportation and/or logistics for people or products, online talent marketplaces, renting out space. Providing other miscellaneous consumer and business services (e.g. TaskRabbit, Gigwalk, Wonolo, etc.). Workers defined as ‘active’ employees that have done ‘significant’ on-demand work within the preceding 6 months.


Note: On-demand workers defined as online marketplace workers including transportation and/or logistics for people or products, online talent marketplaces, renting out space. Providing other miscellaneous consumer and business services (e.g. TaskRabbit, Gigwalk, Wonolo, etc.). Workers defined as ‘active’ employees that have done ‘significant’ on-demand work within the preceding 6 months.
On-Demand Jobs = >15MM Applicants on Checkr Platform Since 2014, USA

Checkr Background Check On-Demand Applicants – Top 100 Metro Areas, USA

Source: Checkr (2018)
On-Demand Jobs = Big Numbers + High Growth

Real-Time Platforms

Uber @ 3MM Driver-Partners
- Gross Bookings: $0, $15B, $30B, $45B
- Driver-Partners: 0, 1MM, 2MM, 3MM

DoorDash @ 200K Dashers
- Dashers: 0, 50K, 100K, 150K, 200K

Internet-Enabled Marketplaces

Etsy @ 2MM Sellers
- Gross Merchandise Sales (GMS): $0, $1B, $2B, $3B, $4B
- Sellers: 0, 1MM, 2MM

Upwork @ 16MM Freelancers
- Freelancers: 0, 5MM, 10MM, 15MM, 20MM

Airbnb @ 5MM Listings
- Guest Arrivals: 0, 30MM, 60MM, 90MM
- Active Listings: 0, 2MM, 4MM, 6MM

Uber Source: Uber. Note: ~900K USA Uber Driver-Partners. As of 1/15, based on historical growth rates, it is estimated that >90% of USA Uber driver-partners drive for UberX.
DoorDash Source: DoorDash. Note: Lifetime Dashers defined as the total number of people that have dashed on the platform, most of which are still active.
Etsy Source: Etsy. Note: In 2017, 65% of Etsy Sellers were USA-based (1.2MM).
Upwork Source: Upwork.
Airbnb Source: Airbnb. Note: Airbnb disclosed in 2017 that ~860K of their listings were in USA. A 2017 CBRE study of ~256K USA Airbnb listings + ~177K Airbnb hosts in Austin, Boston, Chicago, LA, Miami, Nashville, New Orleans, New York City, Oahu, Portland, San Francisco, Seattle, & Washington D.C. found 83% of hosts are single-listing hosts / non-full-home hosts. This implies >500K USA hosts.
On-Demand Jobs =

Big Numbers + High Growth

Filling Needs for Workers Who Want Extra Income / Flexibility...
Have Underutilized Skills / Assets
On-Demand Work Basics + Benefits = Extra Income + Flexibility, USA per Intuit

<table>
<thead>
<tr>
<th>Extra Income</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basics</strong></td>
<td></td>
</tr>
<tr>
<td>37% = Run Own Business</td>
<td>71% = Always Wanted To Be Own Boss</td>
</tr>
<tr>
<td>33% = Use Multiple On-Demand Platforms</td>
<td>46% = Want To Control Schedule</td>
</tr>
<tr>
<td>26% = Employed Full-Time (W2 Wages)</td>
<td>19% = Responsible for Family Care</td>
</tr>
<tr>
<td>14% = Employed Part-Time (W2 Wages)</td>
<td>9% = Active Student</td>
</tr>
<tr>
<td>5% = Retired</td>
<td></td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td></td>
</tr>
<tr>
<td>57% = Earn Extra Income</td>
<td>91% = Control Own Schedule</td>
</tr>
<tr>
<td>21% = Make Up For Financial Hardship</td>
<td>50% = Do Not Want Traditional Job</td>
</tr>
<tr>
<td>19% = Earn Income While Job Searching</td>
<td>35% = Have Better Work / Life Balance</td>
</tr>
<tr>
<td>$34 Average Hourly Income</td>
<td>11 Average Weekly Hours With Primary On-Demand Platform</td>
</tr>
<tr>
<td>$12K Average Annual Income</td>
<td>37 Average Weekly Hours of Work (All Types / Platforms)</td>
</tr>
<tr>
<td>24% Average Share of Total Income</td>
<td></td>
</tr>
</tbody>
</table>

Source: Intuit, 2017. Note: Intuit partnered with 12 On-Demand Economy platforms which provided access to their provider email lists. (n = 6,247 respondents who had worked on-demand within the past 6 months). The survey focused on online talent marketplaces. Airbnb and other online capital marketplaces were not included.
On-Demand
Platform Specifics…
Uber =
3MM Global Driver-Partners ~+50% Y/Y (2017)

Uber Driver-Partners (USA = 900K)...

$21 = Average Hourly Earnings  
17 = Average Weekly Hours  
30 = Average Trips Per Week

<table>
<thead>
<tr>
<th>Basics</th>
<th>Motivations</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% = Had Job Before Starting Uber</td>
<td>91% = Earn Extra Income</td>
</tr>
<tr>
<td>72% = Not Professional Driver</td>
<td>87% = Set Own Hours</td>
</tr>
<tr>
<td>71% = Increased Income Driving Uber</td>
<td>85% = Work / Life Balance</td>
</tr>
<tr>
<td>66% = Have Other Job</td>
<td>74% = Maintain Steady Income</td>
</tr>
<tr>
<td></td>
<td>32% = Earn Income While Job Searching</td>
</tr>
</tbody>
</table>
Etsy = 2MM Global Active Sellers +9% (Q1)

Etsy Sellers (USA = 1.2MM)...

$1.7K = Annualized Gross Merchandise Sales (GMS) per Seller
$3.4B = Annualized GMS +20% (Q1)
99.9% = USA Counties with Etsy Seller(s)

<table>
<thead>
<tr>
<th>Basics</th>
<th>Motivations</th>
</tr>
</thead>
<tbody>
<tr>
<td>97% = Operate @ Home</td>
<td>68% = Creativity Provides Happiness</td>
</tr>
<tr>
<td>87% = Identify as Women</td>
<td>65% = Way to Enjoy Spare Time</td>
</tr>
<tr>
<td>58% = Sell / Promote Etsy Goods Off Etsy.com</td>
<td>51% = Have Financial Challenges</td>
</tr>
<tr>
<td>53% = Started Their Business on Etsy</td>
<td>43% = Flexible Schedule</td>
</tr>
<tr>
<td>49% = Use Etsy Income for Household Bills</td>
<td>30% = Use Etsy Income for Savings</td>
</tr>
<tr>
<td>32% = Etsy Sole Occupation</td>
<td></td>
</tr>
<tr>
<td>32% = Have Traditional Full-Time Job</td>
<td></td>
</tr>
<tr>
<td>28% = Operate From Rural Location</td>
<td></td>
</tr>
<tr>
<td>27% = Have Children @ Home</td>
<td></td>
</tr>
<tr>
<td>13% = Etsy Portion of Annual Household Income</td>
<td></td>
</tr>
</tbody>
</table>

Source: “Etsy SEC filings + “Crafting the future of work: the big impact of microbusinesses: Etsy Seller Census 2017” Published by Etsy. Survey measured 4,497 USA-based sellers on Etsy’s marketplace In 2017, 65% of Etsy Sellers were USA-based (1.2MM).
**Airbnb = 5MM Global Active Listings (5/18)**

**Airbnb Hosts (USA Listings = 600K+)…**

- $6,100 = Average Annual Earnings per Host Sharing Space
- 97% = Price of Listing Kept by Hosts (9/17)
- 43% = Airbnb Income Used for Rent / Mortgage / Home Improvement

### Basics

- 80%+ = Share Home in Which They Live
- 60%+ = ‘Superhosts’ Who Identify as Women
- 29% = Not Full-Time Employed
- 18% = Retirees

### Motivations

- 57% = Use Earnings to Stay in Home
- 36% = Spend >30% of Total Income on Housing
- 12% = Avoided Eviction / Foreclosure Owing to Airbnb Earnings

Source: Average Earnings + Foreclosure Avoidance = ‘Introducing The Living Wage Pledge’ Airbnb (9/17), Superhost Gender Identity = ‘Women Hosts & Airbnb’ (3/17), Employment Status & Earning Usage = ‘2017 Seller Census Survey’ (5/18). Note: A Superhost is an Airbnb host with a 4.8+ rating, 90% response rate, 10+ stays/year, and 0 cancellations. Superhosts are marked as such on Airbnb.com.
No [Uber] driver-partner is ever told where or when to work. This is quite remarkable – an entire global network miraculously ‘level loads’ on its own.

 Driver-partners unilaterally decide when they want to work and where they want to work.

 The flip side is also true – they have unlimited freedom to choose when they do NOT want to work…

 The Uber Network…is able to elegantly match supply & demand without ‘schedules’ & ‘shifts’…

 That worker autonomy of both time & place simply does not exist in other industries.

 - Bill Gurley – The Thing I Love Most About Uber – Above the Crowd, 4/18
On-Demand + Internet-Related Jobs =

Scale Becoming Significant
DATA GATHERING + OPTIMIZATION =
YEARS IN MAKING…
INCREASINGLY GLOBAL + COMPETITIVE
Data Gathering + Optimization =

Accelerates With Computer Adoption...

Mainframes (Early 1950s*→)...

* In 1952 IBM launched the first fully electronic data processing system, the IBM 701.
Data Gathering + Optimization (1950s →) = Enabled by Mainframe Adoption…

Mainframe Shipment Value & Units

…Data Gathering + Optimization (1950s $\rightarrow$) = Government Mainframe Deployment…

1955

Social Security
Calculate Benefits for 15MM Recipients (62MM Now)

1960

NASA
Calculate Real-Time Orbital Determination

1965

IRS
Calculate / Store 55MM Records (126MM Now)

Source: Social Security Administration (75th Anniversary Retrospective), NASA – ‘Computers in Spaceflight’, CNET – “IRS Trudges on With Aging Computers” (5/08). Note: Social Security includes Americans receiving retirement benefits, old-age / survivors insurance, unemployment benefits, or disability benefits. Tax records includes include total households since all are required to file taxes regardless of amount owed.
…Data Gathering + Optimization (1950s) = Business Mainframe Deployment

1955

**Banks**
- Bank of America
  - Process Checks

**Telecom**
- Bell Labs / AT&T
  - Optimize Telephone Switching

1965

**Insurance**
- Aetna
  - Optimize Insurance Policies

**Airlines**
- American Airlines
  - Process Transactions / Data

1975

**Credit Cards**
- Visa
  - Manage Merchant Network

**Retail**
- Walmart
  - Track Inventory / Logistics

**Hospitals**
- Tulane Medical School System
  - Manage Patient Data

...Data Gathering + Sharing + Optimization =

Accelerates With Computer Adoption...

Consumer Mobiles + The Cloud (2006→)...
Until now, a sophisticated & scalable data storage infrastructure has been beyond the reach of small developers.

- Amazon S3 Launch FAQ, 2006

Why run such a sophisticated operating system on a mobile device? Well, because it’s got everything we need.

- Steve Jobs, iPhone Launch, 2007

### Amazon AWS – # of Services

- **2006**: 1 Service
- **2018**: 140+ Services

### Apple iOS – # of Apps

- **2008**: <5,000 Apps
- **2018**: 2MM+ Apps

Source: Amazon, The Internet Archive, Apple; AppleInsider. Note: Based on Apple releases. Includes all iPhone/iPad/Apple TV applications available for download. Data as of 5/18.
...Computing Big Bangs Volume Effects = Cloud Compute Cost Declines Continue -11% vs. -10% Y/Y...

AWS Compute Cost + Growth*

Source: The Internet Archive. *Cost data reflects price of 'current generation' m.large on-demand Linux instance in USA-East Virginia (m1.large = 2008-2013, m3.large = 2014-2015, m4.large = 2016-2017, m5.large = 2018). m.large chosen as a representative instance of general purpose compute; pricing does not account for increasing instance performance.
...Computing Big Bangs Volume Effects = Cloud Revenue Re-Accelerating +58% vs. +54% Q/Q

Cloud Service Revenue – Amazon + Microsoft + Google

Source: Amazon AWS = Company filings, Microsoft Azure = Keith Weiss @ Morgan Stanley (4/18), Google Cloud = Brian Nowak @ Morgan Stanley (5/18). Note: Google Cloud revenue excluded in Y/Y growth rate calculation due to limited quarterly estimates.
Data Gathering + Sharing + Optimization (2006 →) = Enabled by Consumer Mobile Adoption...

Source: Morgan Stanley (Katy Huberty, 3/18), IDC.
...Data Gathering + Sharing + Optimization (2006 →) = Enabled by Social Media Adoption…

Source: Global Web Index (9/17), Telegram (2/16), Line (10/17), WeChat (11/17), Whatsapp (7/17).

...Data Gathering + Sharing + Optimization (2006 →) = Enabled by Sensor Pervasiveness...

**MEMS Sensor / Actuator Shipments**

<table>
<thead>
<tr>
<th>Year</th>
<th>Global Shipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>5B</td>
</tr>
<tr>
<td>2013</td>
<td>10B</td>
</tr>
<tr>
<td>2014</td>
<td>15B</td>
</tr>
</tbody>
</table>

**Sensors + Data = In More Places**

- **Visual Navigation**
  - Google Maps

- **Shared Transportation**
  - Mobike

- **Home Temperature**
  - Nest

- **Predictive Maintenance**
  - Samsara

- **Fitness Tracking**
  - Motiv

- **Precision Cooking**
  - Joule

Source: IC Insights (2018), Google Maps, Mobike, Nest, Samsara, Motiv, Joule. Note: MEMS sensors and actuators includes all MEMS-based sensors (e.g., Accelerometers, Gyroscopes, etc.), but does not include optical sensors, like CMOS image sensors, also includes actuators made using MEMs processes, per IC Insights.
...Data Gathering + Sharing + Optimization (2006 →) = Ramping @ Torrid Pace

Information Created Worldwide
(per IDC)

Amount, % Structured

Zettabytes (ZB)


Source: IDC Data Age 2025 Study, sponsored by Seagate (4/17). Note: 1 petabyte = 1MM gigabytes, 1 zetta byte = 1MM petabytes. The grey area in the graph represents data generated, not stored. Structured data indicates data that has been organized so that it is easily searchable and includes metadata and machine-to-machine (M2M) data.
Data =

Can Be Important Driver of Customer Satisfaction
USA Internet Data Leaders = Relatively High Customer Satisfaction

American Customer Satisfaction Index (ASCI) Scores
(Internet Data Companies >$100B Market Capitalization, 5/18, USA)

Source: American Customer Satisfaction Index (ASCI). *Netflix data from 2016, as ASCI score was not tracked in 2017. Instagram / Facebook average score used as 'Facebook' score. Priceline.com used as 'Booking Holdings' score. Note: ASCI is a tool first developed by The University of Michigan to measure consumer satisfaction with various companies, brands, and industries. ASCI surveys 250K USA customers annually via email, responses to weighted questions are used to create a cross-industry score on a scale of 0-100. Top 2017 Score = 87 (Chick-fil-A).
Google Personalization = Queries… Drive Engagement + Customer Satisfaction

Data-Driven Personalization

![Google search for movies near me](image)


- **For Me**: 60%
- **Should I**?: 65%
- **Near Me***: 900%

Source: Google (5/18). Note: Google queries only personalized for geo-location data. *Reflects mobile queries, where location data is readily available / important.
Spotify Personalization = Preferences…
Drive Engagement + Customer Satisfaction

User Preferences

Data-Driven Personalization

Spotify Daily Engagement

Unique Artist Listening

Source: Spotify, Benjamin Swinburne @ Morgan Stanley (4/18)
Note: Monthly unique artists listened to per user as of 5/18.
Data-Driven Personalization

Toutiao Personalization = Interests...
Drive Engagement + Customer Satisfaction

Source: Toutiao (5/18), Snap (5/18), Instagram (8/17).
*Instagram data reflects time spent by users under the age of 25, assumed to be representative of all Instagram users.
Data = 

Improves Predictive Ability of Many Services
Data Volume = Foundational to Algorithm Refinement + Artificial Intelligence (AI) Performance…

Object Detection - Performance vs. Dataset Size
Google Research & Carnegie Mellon, 2017

Source: Revisiting Unreasonable Effectiveness of Data in Deep Learning Era – Sun, Shrivastava, Singh, & Gupta, 2017

Note: Chart reflects object detection performance when initial checkpoints are pre-trained on different subsets of JFT-300M tagged image dataset. X-axis is the data size in log-scale, y-axis is the detection performance in mAP@[.5,.95] on “COCO minival” testing set.
...Data Volume = Foundational to Tool / Product Improvement...
Artificial Intelligence (AI) Predictive Capability

AWS ‘Data Flywheel’ – Amazon Rekognition*

More Data

<table>
<thead>
<tr>
<th>Pricing</th>
<th>More Uploads = Lower Average Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Image Analysis Tiers</td>
</tr>
<tr>
<td></td>
<td>First 1 million images processed* per month</td>
</tr>
<tr>
<td></td>
<td>Next 9 million images processed* per month</td>
</tr>
<tr>
<td></td>
<td>Next 90 million images processed* per month</td>
</tr>
<tr>
<td></td>
<td>Over 100 million images processed* per month</td>
</tr>
</tbody>
</table>

Better Analytics

Accuracy
Regular Improvements

More Customers

Customers
Large / Small Enterprises + Public Agencies

Better Products

Features
Regular Improvements

Source: Amazon Artificial Intelligence on AWS Presentation (6/17).  *Amazon Rekognition enables users to detect objects, people, text, scenes, and activities in their photos and videos using machine learning.
Artificial Intelligence (AI) Service Platforms for Others =

Emerging from Internet Leaders
Amazon AWS AI Services / Infrastructure

**Rekognition** Image Recognition

**AI Hardware – Scalable GPU Compute Clusters**

<table>
<thead>
<tr>
<th>Model</th>
<th>GPUs</th>
<th>vCPU</th>
<th>Mem (GiB)</th>
<th>GPU Mem (GiB)</th>
<th>GPU P2P</th>
</tr>
</thead>
<tbody>
<tr>
<td>p3.2xlarge</td>
<td>1</td>
<td>8</td>
<td>61</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>p3.8xlarge</td>
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<td>32</td>
<td>244</td>
<td>64</td>
<td>ML.INK</td>
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<td>8</td>
<td>64</td>
<td>488</td>
<td>128</td>
<td>ML.INK</td>
</tr>
</tbody>
</table>

**Comprehend** Language Processing

**SageMaker** Machine Learning Framework

Source: Amazon. AWS = Amazon Web Services.
Google Cloud AI Services / Infrastructure

Google Cloud Vision API

AI Hardware – Tensor Processing Units

Dialogflow Conversational Platform

Cloud AutoML – Custom Models

Source: Google
AI in Enterprises = Small But Rapidly Rising Spend Priority… Per Morgan Stanley CIO Survey (4/18 vs 1/18)

Which IT Projects Will See The Largest Spend Increase in 2018?

- Networking Equipment
- Artificial Intelligence
- Hyperconverged Infrastructure

Source: AlphaWise, Morgan Stanley Research. Note: n = 100 USA / E.U. CIOs. Note: Full Question Text = "Which three External IT Spending projects will see the largest percentage increase in spending in 2018?"
AI is one of the most important things humanity is working on. It is more profound than electricity or fire…

We have learned to harness fire for the benefits of humanity but we had to overcome its downsides too.

…AI is really important, but we have to be concerned about it.

- Sundar Pichai, CEO of Google, 2/18
Data Sharing =

Creates Multi-Faceted Challenges
Data + Consumers = Love-Hate Relationship

"Just because I hate you doesn't mean I don't love you."
Most Online Consumers Share Data for Benefits…

USA Consumers per Deloitte

79%
Willing to Share Personal Data For ‘Clear Personal Benefit’

>66%
Willing To Share Online Data With Friends & Family

Source: USA Consumer Data = Deloitte To share or not to share (9/17)
Note: n = 1,538 USA customers surveyed in cooperation with SSI in 2016.
Consumers Taking Action To Address Data Privacy Concerns

- Deleted / Avoided Certain Apps: 64%
- Adjusted Mobile Privacy Settings: 47%
- Disabled Cookies: 28%
- Didn’t Visit / Closed Certain Websites: 27%
- Closely Read Privacy Agreements: 26%
- Did Not Buy Certain Product: 9%

% of Respondents that Took Action in the Last 12 Months Due to Data Privacy Concerns, USA

Source: Deloitte To share or not to share (9/17)
Note: n = 1,538 USA consumers in cooperation with SSI.
Internet Companies = Making Consumer Privacy Tools More Accessible (2018)

Source: Facebook, Google
Data Sharing = Varying Views
EU / Asia / Americas = Rising Regulatory Focus on Data Collection + Sharing…

Data Privacy Laws
- **Enacted in Past 10 Years**
- **Developing (2018)**

Privacy Act of 1974
Enacted = 12/31/74

General Data Protection Regulation
Enacted = 5/25/18

Act on Protection of Personal Information
Enacted = 5/30/17

Personal Information Protection Act
Enacted = 09/30/11

Note: Argentina proposed a 2017 draft amendment to the Personal Data Protection Act that would strengthen current regulation and align with most GDPR requirements. Japan enacted an amendment to its Act on Protection of Personal Information that went into effect on 5/30/17. All EU countries grouped due to passage of EU-wide GDPR laws.
[Xi Jinping] called for building high-speed, mobile, ubiquitous & safe information infrastructure, integrating government & social data resources, & improving the collection of fundamental information...

[Xi stated] The Internet, ‘Big Data,’ Artificial Intelligence, & ‘The Real Economy’ should be interconnected.

- Xinhua State News Agency, 12/9/17

Ministry of Industry & Information Training to Build ‘Big Data’ Datacenter
Xinhua State Press Agency, 5/07/17

China to Further Promote Government Information Sharing & Disclosure
Xinhua State Press Agency, 12/7/17

China Launches ‘Big Earth’ Big Data Project To Boost Science Data Sharing
Xinhua State Press Agency, 2/13/18

Source: Xinhua (PRC’s official Press Agency).
Adversaries are taking malware to unprecedented levels of sophistication & impact...

Weaponizing cloud services & other technology used for legitimate purposes...

And for some adversaries, the prize isn’t ransom, but obliteration of systems & data.

- Cisco 2018 Annual Cybersecurity Report, 2/18
Global Internet Leadership =

USA & China
Economic Leadership...
Relative Global GDP (Current $) = USA + China + India Gaining…Other Leaders Falling

Global GDP Contribution (Current $)

Source: World Bank (GDP in current $). Other countries account for ~30% of global GDP.
Cross-Border Trade = Increasingly Important to Global Economy

Trade as % of Global GDP

Source: World Bank. Note: ‘World Trade’ refers to the average of Imports & Exports (to account for goods in-transit between years) for all nations.
Internet Leadership =

A Lot’s Happened Over 5-10 Years…
**Public / Private Internet Companies, Ranked by Market Valuation (5/29/18)**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Region</th>
<th>Market Value ($B) 5/29/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Apple</td>
<td>USA</td>
<td>$418</td>
</tr>
<tr>
<td>2)</td>
<td>Amazon</td>
<td>USA</td>
<td>121</td>
</tr>
<tr>
<td>3)</td>
<td>Microsoft</td>
<td>USA</td>
<td>291</td>
</tr>
<tr>
<td>4)</td>
<td>Google / Alphabet</td>
<td>USA</td>
<td>288</td>
</tr>
<tr>
<td>5)</td>
<td>Facebook</td>
<td>USA</td>
<td>56</td>
</tr>
<tr>
<td>6)</td>
<td>Alibaba</td>
<td>China</td>
<td>--</td>
</tr>
<tr>
<td>7)</td>
<td>Tencent</td>
<td>China</td>
<td>71</td>
</tr>
<tr>
<td>8)</td>
<td>Netflix</td>
<td>USA</td>
<td>13</td>
</tr>
<tr>
<td>9)</td>
<td>Ant Financial</td>
<td>China</td>
<td>--</td>
</tr>
<tr>
<td>10)</td>
<td>eBay + PayPal**</td>
<td>USA</td>
<td>71</td>
</tr>
<tr>
<td>11)</td>
<td>Booking Holdings</td>
<td>USA</td>
<td>41</td>
</tr>
<tr>
<td>12)</td>
<td>Salesforce.com</td>
<td>USA</td>
<td>25</td>
</tr>
<tr>
<td>13)</td>
<td>Baidu</td>
<td>China</td>
<td>34</td>
</tr>
<tr>
<td>14)</td>
<td>Xiaomi</td>
<td>China</td>
<td>--</td>
</tr>
<tr>
<td>15)</td>
<td>Uber</td>
<td>USA</td>
<td>--</td>
</tr>
<tr>
<td>16)</td>
<td>Didi Chuxing</td>
<td>China</td>
<td>--</td>
</tr>
<tr>
<td>17)</td>
<td>JD.com</td>
<td>China</td>
<td>--</td>
</tr>
<tr>
<td>18)</td>
<td>Airbnb</td>
<td>USA</td>
<td>--</td>
</tr>
<tr>
<td>19)</td>
<td>Meituan-Dianping</td>
<td>China</td>
<td>--</td>
</tr>
<tr>
<td>20)</td>
<td>Toutiao</td>
<td>China</td>
<td>--</td>
</tr>
</tbody>
</table>

**Total** $1,429


*Only includes public companies in 2013. **eBay + PayPal combined for comparison purposes though PayPal spun-off of eBay on 7/20/15.*
Today’s Top 20 Worldwide Internet Leaders *Today = USA @ 11…China @ 9*

### Public / Private Internet Companies, Ranked by Market Valuation (5/29/18)

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<td>USA</td>
<td>121</td>
<td>783</td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>Microsoft</td>
<td>USA</td>
<td>291</td>
<td>753</td>
<td></td>
</tr>
<tr>
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<td>288</td>
<td>739</td>
<td></td>
</tr>
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<td>56</td>
<td>538</td>
<td></td>
</tr>
<tr>
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<td>Alibaba</td>
<td>China</td>
<td>--</td>
<td>509</td>
<td></td>
</tr>
<tr>
<td>7)</td>
<td>Tencent</td>
<td>China</td>
<td>71</td>
<td>483</td>
<td></td>
</tr>
<tr>
<td>8)</td>
<td>Netflix</td>
<td>USA</td>
<td>13</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>9)</td>
<td>Ant Financial</td>
<td>China</td>
<td>--</td>
<td>150</td>
<td></td>
</tr>
<tr>
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<td>eBay + PayPal*</td>
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<td></td>
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<td>34</td>
<td>84</td>
<td></td>
</tr>
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<td></td>
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<td>Toutiao</td>
<td>China</td>
<td>--</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

**Total** | **$1,429** | **$5,788**

Smartphones = China @ #1 Worldwide OEM...@ 40% vs. 0% Share Ten Years Ago...USA @ 15% vs. 3%

Source: Katy Huberty @ Morgan Stanley (3/18), IDC. Note: OEM = Original Equipment Manufacturer.
Internet Globally = USA Platforms = Lead User Numbers...

Active Users By Platform

Source: Facebook (4/18), Google (5/17), Tencent (3/18), Alibaba (5/18). Note: Facebook = MAUs, Google = MAUs, Tencent WeChat = MAUs, Alibaba = Mobile MAUs.
Active Users By Platform

Source: Hillhouse Capital. Facebook (4/18), Google (5/17), Newzoo (Google Android USA estimate, 1/18), Tencent (3/18), Alibaba (5/18). Note: Facebook = MAUs, Google = MAUs (Newzoo Global Mobile Market Report estimates that there are 125MM active Android smartphones in the USA in 2017), Tencent WeChat = monthly active accounts vs. users as many Chinese users have multiple accounts (ex. 688MM users sent red envelopes during the 2018 Chinese New Year), Alibaba = Annual active consumers. Estimated WeChat ex-China MAU <5% of total per Hillhouse. Estimate Alibaba ex-China annual active consumers (Lazada + Aliexpress) = 80MM annual active customers per Hillhouse.
China Feature + Data-Rich Internet Platforms = Largest # of Users in One Country

**Tencent**
WeChat + WeChat Pay

- Photos…Friends…Games…
- Apps…Finances…Bills…

**Alibaba**
TaoBao + Alipay

- Searches…News…Brands…
- Feedback…Finances…Bills…

Source: Tencent, Alibaba
Would you share personal data (financial, driving records, etc.) for benefits (e.g., lower cost, personalization, etc.)?

<table>
<thead>
<tr>
<th>Country</th>
<th>% of Global Respondents Very Willing to Share (6 or 7 on 7 Point Scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>25%</td>
</tr>
<tr>
<td>China</td>
<td>38%</td>
</tr>
<tr>
<td>Mexico</td>
<td>30%</td>
</tr>
<tr>
<td>Russia</td>
<td>29%</td>
</tr>
<tr>
<td>Italy</td>
<td>28%</td>
</tr>
<tr>
<td>Global</td>
<td>27%</td>
</tr>
<tr>
<td>Brazil</td>
<td>26%</td>
</tr>
<tr>
<td>South Korea</td>
<td>20%</td>
</tr>
<tr>
<td>Australia</td>
<td>17%</td>
</tr>
<tr>
<td>UK</td>
<td>16%</td>
</tr>
<tr>
<td>Spain</td>
<td>16%</td>
</tr>
<tr>
<td>France</td>
<td>15%</td>
</tr>
<tr>
<td>Canada</td>
<td>14%</td>
</tr>
<tr>
<td>Germany</td>
<td>12%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>12%</td>
</tr>
<tr>
<td>Japan</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: GfK Survey (1/17). Note: n = 22K of internet users ages 15+. A scale of 1-7 were used to identify the level of agreement with the following statement: “I am willing to share my personal data (health, financial, driving records, energy use, etc.) in exchange for benefits or rewards like lower costs or personalized service” – using a scale where “1” means “don’t agree at all” and “7” means “agree completely.”
China Digital Data Volume @ Significant Scale & Growing Fast =

Providing Fuel for Rapid Artificial Intelligence Advancements
Artificial Intelligence =

USA & China…
## Artificial Intelligence Competition = Increasingly Complex Tasks…China Momentum Strong

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>1985</th>
<th>1995</th>
<th>2005</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6th World Computer Chess Championship</td>
<td>Deep Thought (USA)</td>
<td>Bebe (USA)</td>
<td>Cray Blitz (USA)</td>
<td>No Entrants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>China = No Entrants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>RoboCup-99 Soccer Simulation League</td>
<td>CMUnited-99 (USA)</td>
<td>MagmaFreiburg (Germany)</td>
<td>Essex Wizards (UK)</td>
<td>No Entrants</td>
</tr>
<tr>
<td>2005</td>
<td>Large Scale Visual Recognition Challenge 2010</td>
<td>NEC-UIUC* (USA + Japan)</td>
<td>XRCE (France / EU)</td>
<td>University of Tokyo (Japan)</td>
<td>11th Place</td>
</tr>
<tr>
<td>2018</td>
<td>Stanford Question Answering Dataset (Ongoing)</td>
<td>Google + Carnegie Mellon (USA)</td>
<td>Microsoft* + NUDT (USA + China)</td>
<td>YUANFUDAO (China)</td>
<td>Alibaba (China)</td>
</tr>
</tbody>
</table>

*Note: Stanford Question Answering Dataset is a set of 100,000+ human-generated questions covering 500+ Wikipedia articles. Scores ranked by Exact Match Accuracy, which refers to the share of questions correctly parsed / answered. Highest Score included for teams with multiple results (i.e. Google + Carnegie Mellon) *National Affiliation refers to main campus of sponsoring Group / Company / University. Microsoft submitting team based in Beijing (lead by Feng-Hsiung Hsu who was lead developer of 'Deep Thought' while at Carnegie Mellon). NEC team based in USA.
Natural Science & Engineering Higher Education = China Graduation Rates Rising Rapidly per National Science Foundation

**Annual Natural Science & Engineering Degrees**

(Agricultural Sciences / Biological Sciences / Computer Sciences / Earth, Atmospheric & Ocean Sciences / Mathematics / Engineering)

**First University**
(Bachelor’s Equivalent)

**Doctoral**

Source: USA National Science Foundation analysis of National Bureau of Statistics (China), Government of Japan, UNESCO, OECD, National Center for Education Statistics, IPEDS, & National Center for Science / Engineering data. Note: Data for the majority of the countries were collected under same OECD, EU, and UIS guidelines & field groupings in the ISCED-F are similar to fields used in China, a major degree producer. Natural sciences include agricultural sciences; biological sciences; computer sciences; earth, atmospheric, and ocean sciences; & mathematics. EU-Top 8 for doctoral degrees includes UK / Germany / France / Spain / Italy / Portugal / Romania / Sweden. EU-Top 8 for first university degrees includes UK / Germany / France / Poland / Italy / Spain / Romania / The Netherlands. The # of S&E doctorates awarded rose from about 6K in 2000 to more than 34K in 2014. Despite the growth in the number of doctorate recipients, some question the quality of the doctoral programs in China (Cyranoski et al. 2011). The rate of growth in doctoral degrees in S&E and in all fields has considerably slowed starting in 2010, after an announcement by the Chinese Ministry of Education indicating that China would begin to limit admissions to doctoral programs & focus on quality of graduate education (Mooney 2007). Also in China, first university degrees increased greatly in all fields, with a larger increase in non-S&E than in S&E fields. China experienced an increase of almost 1.2MM degrees and up more than 400% from 2000 to 2014. China has traditionally awarded a large proportion of its first university degrees in engineering, but the percentage declined from 43% in 2000 to 33% in 2014.
Artificial Intelligence Focus = China Government Highly Focused on Developing AI

Artificial Intelligence - Next Generation Development Plan Goals

1) Build Open & Coordinated AI Innovation Systems

2) Foster a Highly Efficient Smart Economy

3) Construct Safe / Convenient Intelligent Society

4) Strengthen Military-Civilian Integration in AI

5) Build Safe & Efficient Information Infrastructure

6) Plan Next Generation AI Science & Technology Projects

I’m assuming that [USA’s] lead [in Artificial Intelligence] will continue over the next five years, & that China will catch up extremely quickly.

In five years we’ll kind of be at the same level, possibly.

It’s hard to see how China would have passed us in that period, although their rate of improvement is so impressively good.

- Eric Schmidt, Chairman, US Defense Innovation Advisory Board, Keynote Address at Artificial Intelligence & Global Security Summit, 11/13/17
ECONOMIC GROWTH DRIVERS =

EVOLVE OVER TIME...
<table>
<thead>
<tr>
<th>Century</th>
<th>Economic Growth Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-18th</td>
<td>Cultivation &amp; Extraction</td>
</tr>
<tr>
<td>19-20th</td>
<td>Manufacturing &amp; Industry</td>
</tr>
<tr>
<td>21st…</td>
<td>Compute Power &amp; Human Potential</td>
</tr>
</tbody>
</table>
Lifelong Learning =

Crucial in Evolving Work Environment &

Tools Getting Better + More Accessible
Lifelong Learning = 33MM Learners +30% (Coursera)…

Top Courses, 2017

- **Machine Learning** Stanford
- **Neural Networks & Deeper Learning** Deeplearning.ai
- **Learning How to Learn: Powerful Mental Tools to Help You Master Tough Subjects** UC San Diego
- **Introduction to Mathematical Thinking** Stanford
- **Bitcoin & Cryptocurrency Technologies** Princeton
- **Programming for Everybody** University of Michigan
- **Algorithms, Part I** Princeton
- **English for Career Development** University of Pennsylvania
- **Neural Networks / Machine Learning** University of Toronto
- **Financial Markets** Yale

Learners by Geography

- **North America**: 30%
- **Asia**: 28%
- **Europe**: 20%
- **South America**: 11%
- **Africa**: 5%

Source: Coursera. Note: Course popularity based on average daily enrollments. Graph shows learners as of 5/18.
Lifelong Learning = Educational Content Usage Ramping Fast (YouTube)...

1B Daily Learning Video Views

70% Viewers Use Platform to Help Solve Work / School / Hobby Problems

+38% Growth Y/Y (2017) Job Search Video Views (e.g., Resume-Writing Guides)

Source: YouTube (5/18).
‘Workforce 2020’ / ‘Future Ready’ Programs

$1B
Allocated for web-based employee training.
Partners = Coursera / Udacity / Universities.

2.9MM
Emerging tech courses completed by employees.
Most popular courses = Cyber Security / Machine Learning / Data-Driven Decision Making / Virtual Collaboration.

194K
Employees (77% of workforce) actively engaged in re-training.

61%
Share of promotions received by re-trained employees (2016-Q1:18)

Source: AT&T (4/18).
Lifelong Learning = >50% of Freelancers Updated Skills Within Past 6 Months

When Did You Last Participate in Skill-Related Training?

<table>
<thead>
<tr>
<th>Freelancers</th>
<th>Non-Freelancers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Past 6 Months</td>
<td>&gt;6 Months Ago / Never</td>
</tr>
<tr>
<td>55%</td>
<td>30%</td>
</tr>
<tr>
<td>45%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Source: Edelman Research / Upwork ‘Freelancing In America: 2017.’ Note: Survey conducted July-August 2017 on 2,173 Freelance Employees who have received payment for supplemental temporary, or project-oriented work in the past 12 months.
CHINA INTERNET =

ROBUST ENTERTAINMENT +
RETAIL INNOVATION
China Macro Trends =

Strong
China Consumer Confidence Index + Manufacturing Purchasing Managers' Index (PMI)

China Consumer Confidence Index (LHS) - China Manufacturing PMI (RHS)

Source: China National Bureau of Statistics (CNNIC), Morgan Stanley Research. Note: The Purchasing Managers Index is measured by China National Bureau of Statistics based on new orders, inventory levels, production, supplier deliveries & the employment environment. Score of 50+ indicates an expanding manufacturing sector. Consumer Confidence is a measure of consumers' sentiment about the current / future state of the domestic economy, indexed to 100.
China GDP Growth = Increasingly Driven by Domestic Consumption…
@ 62% vs. 35% of GDP Growth (2003)

China Domestic Consumption Contribution to GDP Growth

China Internet Usage = Accelerating
China Mobile Internet Users = 753MM…+8% vs. 12% Y/Y

Source: China Internet Network Information Center (CNNIC).
Note: Mobile Internet User Data is as of Year-End.
China Mobile Internet (Data) Usage = Accelerating…+162% vs. +124% Y/Y
China Online Entertainment =

Long + Short-Form Video &
Team-Based Multiplayer Mobile Games

Growing Quickly
China Mobile Media / Entertainment Time Spent = +22% Y/Y…Mobile Video Growing Fastest

China Mobile Media / Entertainment Daily Time Spent

March 2016
2.0B Hours

- Social Networking: 60%
- Video: 13%
- Game: 13%
- Reading: 3%
- Audio: 4%
- News: 7%

March 2018
3.2B Hours, +22% Y/Y

- Social Networking: 47%
- Video: 22%
- Game: 13%
- News: 11%
- Audio: 4%
- Reading: 3%

Source: QuestMobile (3/18).
China Short-Form Video = Usage Growing Rapidly…

China Daily Mobile Media Time Spent

Source: QuestMobile (3/18). Note: Short-Form Videos are typically <5 Minute in Length and include companies such as Kuaishou, Douyin, Xigua. Long-Form Videos include companies such as iQiyi, Tencent Video, Youku, Bilibili.
China Short-Form Video Leaders = 100MM+ DAU… Massive Growth + High Engagement (50 Minute Daily Average)

**Douyin (Tik-Tok)**
AI-Augmented Mobile Video Creation / Personalized Feed

DAU = 95MM +78x Y/Y  
Daily Time Spent = 52 Minutes  
DAU / MAU Ratio = 57%

**Kuaishou**
De-Centralized / Personalized / Location-Based Mobile Video Discovery

DAU = 104MM +2x Y/Y  
Daily Time Spent = 52 Minutes  
DAU / MAU Ratio = 46%

Source: QuestMobile (4/18).
China Online Long-Form Video Content Budgets = Exceeded TV Networks (2017)…

China TV Networks* vs. Online Video Platform** Content Budget

Source: Public disclosures, Goldman Sachs, Bank of America, Hillhouse estimates. *Includes estimates from CCTV, provincial satellite TV channels and major local TV networks. **Includes iQiyi + Tencent Video + Youku.
China Online Long-Form Video Original / Exclusive Content = Driving Industry-Wide Paying Subscriber Growth

Source: Subscriber data per iQiyi (3/18). Tencent Video and Youku are not standalone publicly listed companies hence do not provide regular disclosure on paying subscribers. Tencent Video last announced more than 62MM subscribers in 2/18.
China Team-Based Multiplayer Mobile Games = Lead Game Time Spent in China

Honor of Kings
80MM+ China DAU

PUBG Mobile
50MM+ China DAU

China Mobile Games Daily Hours

Source: Questmobile (3/18). *MOBA is Multiplayer Online Battle Arena; **FPS is First Person Shooting; FPS / Survival games include Tencent's PUBG Mobile and NetEase’s Rules of Survival. ***Other genre includes RPG, action, racing, strategy, card battle, and other games.
Global Interactive Game Revenue = China #1 Market in World* > USA (2017)

Interactive Game Software Revenue

Source: Newzoo. *Excludes console / gaming PC hardware revenue.
China Retail Innovation =

Spreading from Online to Offline
Worldwide E-Commerce Share Gains Continue…
China @ 20% = Highest Penetration Rate + Fastest Growing

E-Commerce % of Retail Sales

Source: Euromonitor. Note data excludes certain consumer-to-consumer (C2C) transactions.
China E-Commerce = Strong Growth +28% Y/Y… Mobile = 73% of GMV

China B2C E-Commerce Gross Merchandise Value

Source: iResearch. Note: Assumes constant USD / RMB rate = 6.9.
Hema Stores = Re-Imagining Grocery Retail Experience…
High Quality + Convenience + Digital…

**Digital Grocery Store**
SKU Selection = Based on Customer Data..
Alipay Membership To Pay

**Restaurant**
Cook To Order Chefs / Eat-in-Shop

**Real-Time E-Commerce**
Ceiling-Conveyor System / In-Store Fulfillment / 30-Minute Delivery

Source: Hillhouse. Note: As of 4/18, there are 37 Hema stores in China.
Daily Retail Transactions per Store, 11/17

Source: Bernstein Research. Note: Hema data points in chart came from stores in Shanghai and Hangzhou in 11/17. In Q1:18, more than 50% of Hema store orders were placed online for home delivery.
Belle = Re-Imagining Offline Retail Experience with Online Analytics

**Traffic Heat Map**
- Optimize Layout

![Traffic Heat Map Image]

**RFID in Shoes / Floor Mat**
- Conversion Analysis

- 138 fittings / 37 sales
  - 27% conversion

- 168 fittings / 5 sales
  - 3% conversion

**3D Foot Scan**
- Personalization

![3D Foot Scan Image]

Source: Belle, Hillhouse Capital.
China
Online Payments / Advertising / On-Demand Transportation =
Growing Rapidly
China Mobile Payment Volume = +209% vs. +116% Y/Y Led by Alipay + WeChat Pay

China Online Advertising Revenue = +29% vs. 29% Y/Y

Source: iResearch. Note: Assumes constant USD / RMB rate = 6.9.
China On-Demand Transportation (Cars + Bikes) = +96%... 68% Global Share & Rising

On-Demand Transportation Trip Volume by Region

Source: Hillhouse Capital estimates. Note: Includes on-demand taxi, private for-hire vehicles, as well as on-demand for-hire motorbike and bike trips booked through smartphone apps.
ENTERPRISE SOFTWARE =

USABILITY / USAGE IMPROVING
Consumer-Like Apps =

Changed Enterprise Computing
Dropbox (2007) = Pioneered…
Consumer-Grade Product With Enterprise Appeal…

Dropbox synchronizes files across your / your team's computers…files are securely backed up to Amazon S3.

*It takes concepts that are proven winners from the dev community & puts them in a package that my little sister can figure out…*

*Competing products force the user to constantly think & do things…*

*With Dropbox, you hit "Save," as you normally would & *everything just works.*

- Drew Houston, Founder, Y Combinator Application, Summer 2007
Inflection Points

2008 = Consumer / Individual
Free Premium Features for Referral Launch…
8 Months to 1MM Users

2013 = Enterprise / Team
Dropbox for Business Launch…

2015 = Revenue / Sales Efficiency
Free-to-Pay User Conversion Launch…
90% = Revenue From Self-Serve Channels (2018)…

2018 = Platform
Integrated Product Suite Launch…
3 = Major Product Launches Since 2017*

When you want something really bad, you will put up with a lot of flaws.

But if you do not yet know you want something, your tolerance will be much lower.

That’s why it is especially important for us to build a beautiful, elegant and considerate piece of software.

Every bit of grace, refinement, & thoughtfulness on our part will pull people along.

Every petty irritation will stop them & give the impression that it is not worth it.

- Stewart Butterfield, Slack Founder / CEO (2013)
...Slack = Pioneered…
Consumerization of Enterprise Software Business Model

Slack Inflection Points

2013 = Small Teams
Consumer-Like Onboarding Launch…
128K Users 6 Months Post-Launch (2014)

2015 = Platform
3rd-Party App Directory Launch…
>1.5K Apps in Slack App Directory (2018)
>200K Developers on Slack Platform (2018)

2015 = Revenue / Sales Efficiency
Free-to-Pay User Conversion Launch…
>400% = 2015 Y/Y Paid Subscription Growth

2017 = Enterprise / Large Teams
Enterprise Features Plan Launch…
>70K = Paid Teams (2018)…
>500K = Organizations Using Slack (2018)
>150 = Large Enterprises Using Slack Grid (2018)

Source: Slack.
Enterprise Software Success Formula

Build Amazing Consumer-Grade Product

Leverage Virality Across Individual Users To Grow Personal + Professional Adoption @ Low Cost

Harvest Individual Users for Enterprise Go-to-Market With Dedicated Product + Inside / Outbound Sales

Build Enterprise-Grade Platform + Ecosystem

Net = Low Cost Product-Driven Customer Acquisition + Strong / Sticky Business Model

- Ilya Fushman @ Kleiner Perkins
Messaging Threads =

Transforming Collaboration...
Distributing + Increasing Productivity
Messaging Threads = Increasingly Foundational for Consumers + Enterprises

Consumer Services...

- Snapchat
  - Social
  - Workouts

- Square Cash
  - Payments

- Strava
  - Workouts

...Enterprise Services

- Dropbox
  - File Management

- Slack
  - Communication

- Intercom
  - Customer Interactions

Source: Snapchat, Square, Strava, Dropbox, Slack, Intercom.
Google Set Out to…

‘Organize the World’s Information & Make It Universally Accessible & Useful’

Now Apps…

Organize Business Information & Make It Accessible & Useful Within Enterprises
Enterprise Messaging Threads =

Organizing Information + Teams…
Providing Context + History…
Slack Benefits

- **32%** Decline in Email Usage
- **24%** Reduction in Employee Onboarding Time
- **23%** Faster Time to Market For Development Teams
- **23%** Decline in Meetings
- **10%** Rise in Employee Satisfaction

Dropbox Benefits

- **6x** Rise in Employees on Multi-Department Teams
- **31%** Decline in IT Time Spent Supporting Collaboration
- **3.7K** Hours Saved Annually Per Organization in Document Management
- **6%** Rise in Sales Team Productivity

Teams % of Paid Users

Source: Dropbox. Piper Jaffray (4/18, Teams % of paid users), Dropbox + IDC commissioned study for Dropbox on effects of enterprises using Dropbox (Dropbox benefits, 2016).
Zoom Benefits

- 85% Improved Collaboration
- 71% Improved Productivity
- 62% Supported Flexible Work Schedule
- 58% Built Trust Among Remote Workers
- 58% Reduced Meeting Times
- 48% Removed Company Silos
- 72 Net Promoter Score

Annualized Meeting Minutes

Source: Survey conducted by Zoom Video Communications of Zoom customers +700 responses (2/18).
Intercom Benefits

• **82%** Rise in Conversion For Customers Chatting In Intercom

• **36%** Rise in Conversion For Customers Assisted by ‘Operator’ Chatbot

• **13%** Rise in Order Value for Customers Chatting in Intercom
...Enterprise Messaging Threads =

Helping Improve Productivity + Collaboration
USA INC.* =

WHERE YOUR TAX DOLLARS GO

USA Income Statement

-19% Average Net Margin Over 30 Years...

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y/Y Growth</td>
<td>11%</td>
<td>3%</td>
<td>9%</td>
<td>-7%</td>
<td>7%</td>
<td>6%</td>
<td>2%</td>
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<tr>
<td>Individual Income Taxes*</td>
<td>$393</td>
<td>$476</td>
<td>$737</td>
<td>$858</td>
<td>$1,163</td>
<td>$1,132</td>
<td>$1,587</td>
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<tr>
<td>% of Revenue</td>
<td>46%</td>
<td>44%</td>
<td>47%</td>
<td>46%</td>
<td>45%</td>
<td>46%</td>
<td>48%</td>
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<tr>
<td>Social Insurance Taxes</td>
<td>$303</td>
<td>$414</td>
<td>$539</td>
<td>$701</td>
<td>$870</td>
<td>$845</td>
<td>$1,162</td>
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<tr>
<td>% of Revenue</td>
<td>36%</td>
<td>38%</td>
<td>34%</td>
<td>38%</td>
<td>34%</td>
<td>35%</td>
<td>35%</td>
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<tr>
<td>Corporate Income Taxes*</td>
<td>$84</td>
<td>$100</td>
<td>$182</td>
<td>$148</td>
<td>$370</td>
<td>$242</td>
<td>$297</td>
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<tr>
<td>% of Revenue</td>
<td>10%</td>
<td>9%</td>
<td>12%</td>
<td>8%</td>
<td>14%</td>
<td>10%</td>
<td>9%</td>
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<tr>
<td>Other</td>
<td>$74</td>
<td>$101</td>
<td>$120</td>
<td>$146</td>
<td>$165</td>
<td>$229</td>
<td>$270</td>
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<tr>
<td>% of Revenue</td>
<td>9%</td>
<td>9%</td>
<td>8%</td>
<td>8%</td>
<td>6%</td>
<td>9%</td>
<td>8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expense ($B)</th>
<th>$1,004</th>
<th>$1,382</th>
<th>$1,601</th>
<th>$2,011</th>
<th>$2,729</th>
<th>$3,537</th>
<th>$3,982</th>
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<tbody>
<tr>
<td>Y/Y Growth</td>
<td>1%</td>
<td>4%</td>
<td>3%</td>
<td>8%</td>
<td>3%</td>
<td>-2%</td>
<td>3%</td>
</tr>
<tr>
<td>Entitlement / Mandatory</td>
<td>$421</td>
<td>$648</td>
<td>$810</td>
<td>$1,106</td>
<td>$1,450</td>
<td>$2,030</td>
<td>$2,519</td>
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<tr>
<td>% of Expense</td>
<td>42%</td>
<td>47%</td>
<td>51%</td>
<td>55%</td>
<td>53%</td>
<td>57%</td>
<td>63%</td>
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<tr>
<td>Non-Defense Discretionary</td>
<td>$162</td>
<td>$231</td>
<td>$275</td>
<td>$385</td>
<td>$494</td>
<td>$616</td>
<td>$610</td>
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<tr>
<td>% of Expense</td>
<td>16%</td>
<td>17%</td>
<td>17%</td>
<td>19%</td>
<td>18%</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>Defense</td>
<td>$283</td>
<td>$303</td>
<td>$272</td>
<td>$349</td>
<td>$548</td>
<td>$671</td>
<td>$590</td>
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<tr>
<td>% of Expense</td>
<td>28%</td>
<td>22%</td>
<td>17%</td>
<td>17%</td>
<td>20%</td>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>Net Interest on Public Debt</td>
<td>$139</td>
<td>$199</td>
<td>$244</td>
<td>$171</td>
<td>$237</td>
<td>$220</td>
<td>$263</td>
</tr>
<tr>
<td>% of Expense</td>
<td>14%</td>
<td>14%</td>
<td>15%</td>
<td>9%</td>
<td>9%</td>
<td>6%</td>
<td>7%</td>
</tr>
</tbody>
</table>

| Surplus / Deficit ($B) | $-150 | $-290 | $-22 | $-158 | $-161 | $-1,088 | $-666 |
| Net Margin (%)         | -18%  | -27%  | -1%  | -9%   | -6%   | -44%   | -20%  |

Comments

+5% Y/Y average over 25 years

Largest Driver of Revenue
Social Security & Medicare Payroll Tax
Fluctuates with Economic Conditions
Estate & Gift Taxes / Duties / Fees / etc.

Entitlement / Mandatory
Risen Owing to Rising Healthcare Costs + Aging Population
Education / Law Enforcement / Transportation / Government Administration...
2007 increase driven by War on Terror
Has Benefited from Declining Interest Rates Since Early 1980s

Net Margin (%)
-19% Average Net Margin, 1987-2017

Source: Congressional Budget Office, White House Office of Management and Budget. *Individual & corporate income taxes include capital gains taxes. Note: USA federal fiscal year ends in September. Non-defense discretionary includes federal spending on education, infrastructure, law enforcement, judiciary functions.
USA Income Statement = Net Losses in 45 of 50 Years

USA Annual Profits & Losses

Source: Congressional Budget Office, White House Office of Management and Budget. Note: USA federal fiscal year ends in September.
Real GDP Growth @ 2.3% (Q1)...
1988-2003 @ 3.0%...2003-2018 @ 2.0% Average

Source: Bureau of Economic Analysis (BEA). Note: Real GDP based on chained 2009 dollars. Growth defined as growth over preceding period, seasonally adjusted annual rate.
USA Rising
Debt Commitments =

Non-Trivial Challenge
USA Net Debt / GDP Ratio

World War II = ~105%
Civil War = ~30%
World War I = ~30%

Source: Congressional Budget Office Long-Term Outlook (3/18).

Net Debt / GDP Ratio = Highest Level Since WWII
USA Public Debt / GDP Level = 7th Highest vs. Major Economies

<table>
<thead>
<tr>
<th>Country</th>
<th>Government Debt</th>
<th></th>
<th>Country</th>
<th>Government Debt</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of GDP</td>
<td>2017 ($B)</td>
<td></td>
<td>% of GDP</td>
<td>2017 ($B)</td>
</tr>
<tr>
<td>1) Japan</td>
<td>240%</td>
<td>$12,317</td>
<td>11) Egypt</td>
<td>101%</td>
<td>$199</td>
</tr>
<tr>
<td>2) Greece</td>
<td>180</td>
<td>403</td>
<td>12) Spain</td>
<td>99</td>
<td>1,412</td>
</tr>
<tr>
<td>3) Lebanon</td>
<td>152</td>
<td>80</td>
<td>13) France</td>
<td>97</td>
<td>2,730</td>
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<tr>
<td>4) Italy</td>
<td>133</td>
<td>2,798</td>
<td>14) Jordan</td>
<td>96</td>
<td>39</td>
</tr>
<tr>
<td>5) Portugal</td>
<td>126</td>
<td>301</td>
<td>15) Bahrain</td>
<td>91</td>
<td>31</td>
</tr>
<tr>
<td>6) Singapore</td>
<td>111</td>
<td>362</td>
<td>16) Canada</td>
<td>90</td>
<td>1,482</td>
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<tr>
<td>7) USA</td>
<td><strong>108</strong></td>
<td><strong>20,939</strong></td>
<td>17) UK</td>
<td>89</td>
<td>2,532</td>
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<tr>
<td>8) Jamaica</td>
<td>107</td>
<td>16</td>
<td>18) Mozambique</td>
<td>88</td>
<td>12</td>
</tr>
<tr>
<td>9) Cyprus</td>
<td>106</td>
<td>24</td>
<td>19) Ukraine</td>
<td>86</td>
<td>92</td>
</tr>
<tr>
<td>10) Belgium</td>
<td>104</td>
<td>561</td>
<td>20) Yemen</td>
<td>83</td>
<td>30</td>
</tr>
</tbody>
</table>

USA Rising
Debt Drivers =

Spending on
Healthcare Entitlements
(Medicare + Medicaid)
USA Entitlements = 63% vs. 42% of Government Spending Thirty Years Ago...

USA Expenses by Category

1987 → 2017 Change

- Debt* +$13T (+650%)
- Entitlements +$2.1T (+498%)
- Non-Defense Discretionary +$448B (+277%)
- Defense +$308B (+109%)
- Net Interest Cost: +$124B (+89%)

Source: Congressional Budget Office, White House Office of Management and Budget, USA Treasury

*Debt reflects net debt (i.e., excludes debt issued by The Treasury and owned by other Government accounts)

Note: Yellow line represents yield on 10-year USA Treasury bill from 12/31/86 to 12/31/17.
USA Entitlements = Medicare + Medicaid Driving Most Spending Growth...

USA Entitlements by Category

1987 Entitlements* = $349B / 35% of Expenses

2017 Entitlements* = $2.2T / 56% of Expenses

USA Entitlements Growth Over 30 Years = Looking @ Numbers…Closer to Home

2016

$59K = Median USA Household Income

$20K = Average Entitlement Payout per Household from Federal Government…

Scale = Equivalent to 34% of Household Income

1986

$25K = Median USA Household Income

$5K = Average Entitlement Payout per Household from Federal Government…

Scale = Equivalent to 19% of Household Income

Source: Congressional Budget Office, White House Office of Management and Budget, US Census Bureau
IMMIGRATION = IMPORTANT FOR USA TECHNOLOGY JOB CREATION
USA = 56% of Most Highly Valued Tech Companies Founded By 1st or 2nd Generation Americans…1.7MM Employees, 2017

Immigrant Founders / Co-Founders of Top 25 USA Valued Public Tech Companies, Ranked by Market Capitalization

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Mkt Cap (SMM)</th>
<th>LTM Rev (SMM)</th>
<th>Employees</th>
<th>Founder / Co-Founder (1st / 2nd Gen Immigrant)</th>
<th>Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>$923,554</td>
<td>$239,176</td>
<td>123,000</td>
<td>Steve Jobs</td>
<td>2nd – Syria</td>
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<tr>
<td>4</td>
<td>Amazon.com</td>
<td>782,608</td>
<td>177,866</td>
<td>566,000</td>
<td>Jeff Bezos</td>
<td>2nd – Cuba</td>
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<tr>
<td>3</td>
<td>Microsoft</td>
<td>753,030</td>
<td>95,652</td>
<td>124,000</td>
<td></td>
<td>--</td>
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<tr>
<td>2</td>
<td>Alphabet / Google</td>
<td>739,122</td>
<td>110,855</td>
<td>80,110</td>
<td>Sergey Brin</td>
<td>1st – Russia</td>
</tr>
<tr>
<td>5</td>
<td>Facebook</td>
<td>537,648</td>
<td>40,653</td>
<td>25,105</td>
<td>Eduardo Saverin</td>
<td>1st – Brazil</td>
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<tr>
<td>6</td>
<td>Intel</td>
<td>257,791</td>
<td>62,761</td>
<td>102,700</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7</td>
<td>Cisco</td>
<td>202,083</td>
<td>48,096</td>
<td>72,900</td>
<td></td>
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<tr>
<td>8</td>
<td>Oracle</td>
<td>188,848</td>
<td>39,472</td>
<td>138,000</td>
<td>Larry Ellison / Bob Miner</td>
<td>2nd – Russia / 2nd – Iran</td>
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<tr>
<td>11</td>
<td>Netflix</td>
<td>152,025</td>
<td>11,693</td>
<td>4,850</td>
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<tr>
<td>10</td>
<td>NVIDIA</td>
<td>150,894</td>
<td>9,714</td>
<td>10,299</td>
<td>Jensen Huang</td>
<td>1st – Taiwan</td>
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<tr>
<td>9</td>
<td>IBM</td>
<td>129,635</td>
<td>79,139</td>
<td>366,600</td>
<td>Herman Hollerith</td>
<td>2nd – Germany</td>
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<tr>
<td>12</td>
<td>Adobe Systems</td>
<td>119,271</td>
<td>7,699</td>
<td>17,973</td>
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<td>13</td>
<td>Booking.com</td>
<td>100,013</td>
<td>12,681</td>
<td>22,900</td>
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<tr>
<td>15</td>
<td>PayPal</td>
<td>95,858</td>
<td>13,094</td>
<td>18,700</td>
<td>Max Levchin / Luke Nosek / Peter Thiel / Elon Musk***</td>
<td>1st – Ukraine / 1st – Poland / 1st – Germany / 1st – South Africa</td>
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<td>16</td>
<td>Salesforce.com</td>
<td>94,260</td>
<td>10,840</td>
<td>25,000</td>
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<td>17</td>
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<td>33,800</td>
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<td>Automatic Data Processing</td>
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<td>58,000</td>
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<td>2nd – Poland</td>
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<td>21</td>
<td>VMware</td>
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<td>20,615</td>
<td>Edouard Bugnion</td>
<td>1st – Switzerland</td>
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<td>20</td>
<td>Activation Blizzard</td>
<td>53,772</td>
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<td>9,625</td>
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<td>18</td>
<td>Applied Materials</td>
<td>52,439</td>
<td>15,463</td>
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<td>8,200</td>
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<tr>
<td>22</td>
<td>Cognizant Technology</td>
<td>43,597</td>
<td>14,810</td>
<td>260,000</td>
<td>Francisco D’Souza / Kumar Mahadeva</td>
<td>1st – India / 1st – Sri Lanka</td>
</tr>
<tr>
<td>24</td>
<td>eBay</td>
<td>37,304</td>
<td>9,567</td>
<td>14,100</td>
<td>Pierre Omidyar</td>
<td>1st – France</td>
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<tr>
<td>25</td>
<td>Electronic Arts</td>
<td>34,763</td>
<td>4,845</td>
<td>8,800</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Source: CapIQ as of 4/16/18. "The New American: Fortune 500" (2011), a report by the Partnership for a New American Economy, as well as "Reason for Reform: Entrepreneurship" (10/16); "American Made, The Impact of Immigrant Founders & Professionals on U.S. Corporations." "While Andy Grove (from Hungary) is not a co-founder of Intel, he joined as COO on the day it was incorporated. **Francisco D’Souza is a person of Indian origin born in Kenya. ***Max Levchin / Luke Nosek / Peter Thiel’s startup Confinity merged with Elon Musk’s startup X.com to form PayPal in 3/00."
USA = Many Highly Valued Private Tech Companies Founded By... 1st Generation Immigrants

<table>
<thead>
<tr>
<th>Company</th>
<th>Immigrant Founder / Co-Founder</th>
<th>Country of Origin</th>
<th>Market Value ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uber</td>
<td>Garrett Camp</td>
<td>Canada</td>
<td>$72</td>
</tr>
<tr>
<td>SpaceX</td>
<td>Elon Musk</td>
<td>South Africa</td>
<td>25</td>
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Source for Valuation and Founders Backgrounds: Based on analysis by the Wall Street Journal, CB Insights, Forbes and Business Insider. Note: Due to varying definitions of unicorns, may not align with various unicorn lists. As of April 2018 there are 105 US-based, venture-backed unicorns (including rumored valuations). *UiPath is headquartered in New York, NY but was originally founded in Romania.
APPENDIX
GICS is a four-tiered, hierarchical industry classification system. It consists of 11 sectors, 24 industry groups, 68 industries and 157 sub-industries. The GICS methodology is widely accepted as an industry analytical framework for investment research, portfolio management and asset allocation. Companies are classified quantitatively and qualitatively. Each company is assigned a single GICS classification at the sub-industry level according to its principal business activity. MSCI and S&P Global use revenues as a key factor in determining a firm’s principal business activity. Earnings and market, however, are also recognized as important and relevant information for classification purposes.

Global industry coverage is comprehensive and precise. The classification system is comprised of over 50,000 trading securities across 125 countries, covering approximately 95% of the world’s equity market capitalization. Company classifications are regularly reviewed and maintained. Specialized teams from two major index providers — MSCI and S&P Global — have defined review procedures, refined over nearly 15 years.

Each sector includes the following industries:

- **Energy** = Energy Equipment & Services, Oil, Gas & Consumables Fuels
- **Materials** = Chemicals, Construction Materials, Containers & Packaging, Metals & Mining, Paper & Forest Products
- **Industrials** = Aerospace & Defense, Building Products, Construction & Engineering, Electrical Equipment, Industrial Conglomerates, Machinery, Trading Companies & Distributors, Commercial Services & Suppliers, Professional Services, Air Freight & Logistics, Airlines, Marine, Road & rail, Transportation Infrastructure
- **Consumer Discretionary** = Auto Components, Automobiles, Household Durables, Leisure Products, Textiles, Apparel & Luxury Goods, Hotels, Restaurants & Leisure, Diversified Consumer Services, Media, Distributors, Internet & Direct Marketing Retail, Multiline Retail, Specialty Retail
- **Consumer Staples** = Food & Staples Retailing, Beverages, Food Products, Tobacco, Household Products, Personal Products
- **Healthcare** = Healthcare Equipment & Supplies, Healthcare Providers & Services, Healthcare Technology, Biotechnology, Pharmaceuticals, Life Sciences Tools & Services
- **Financials** = Commercial Banks, Thrifts & Mortgage Finance, Diversified Financial Services, Consumer Finance, Capital Markets, Mortgage Real Estate Investment Trusts (REITs), Insurance
- **Information Technology** = Internet Software & Services, IT Services, Software, Communications Equipment, Computers & Peripherals, Electronic Equipment & Instruments, Semiconductors & Semiconductors Equipment
- **Telecommunication Services** = Diversified Telecommunication Services, Wireless Telecommunication Services
- **Utilities** = Electric Utilities, Gas Utilities, Multi-Utilities, Water Utilities, Independent Power & Renewable Electricity Producers
- **Real Estate** = Equity Real Estate Investment Trusts (REITs), Real Estate Management & Development

Source: MSCI, S&P 500
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