

Chinese Tech Landscape Overview

NSCAI Presentation

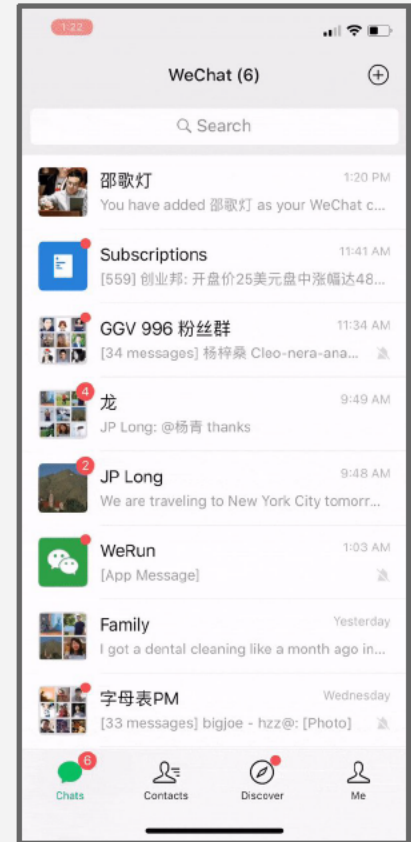
“Core tech” vs. “tech enabled” businesses

- Being regarded as a core-tech business is glamorous -- everyone wants to believe and talk about their **technological capabilities as a moat**. But there are few industries where that's actually the case.
 - e.g. mass deployment of machine vision for medical diagnosis is not blocked by the tech.
 - There are relatively few “core tech businesses” that compete in markets where cutting edge technology is the primary axis of competition and barrier to entry (e.g. Intel, Nvidia, Waymo,)
- It is **more useful to understand most of these companies as “tech-enabled businesses”**.
 - e.g. Facebook, Uber, LinkedIn, and Airbnb derive their power from network effects. Amazon’s e-commerce platform derives its power from heavy capex.

The Players

BAT (Baidu, Alibaba, Tencent) - The Big 3

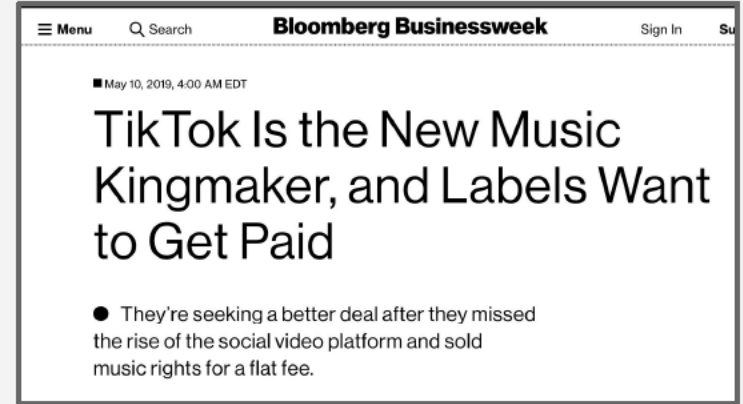
- **Tencent (\$504B Valuation): Social and gaming.** Best known for creating WeChat. Also the largest gaming company in the world.
60% of all mobile time in China is spent on Tencent properties.
- **Alibaba (\$470B Valuation): Ecommerce.** Moves more merchandise in China than Amazon and Ebay do in the rest of the world... combined.
Also the owner of Alipay, a payments app that is functionally the world's largest digital bank.
- **Baidu (\$78B Valuation): Search.** Search is much less relevant in the Chinese market, so Baidu is much smaller than its contemporaries.



WeChat is a platform -- Here is
the hit game Monument Valley
running within the app.
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Bytedance, Meituan, Didi - The New Generation

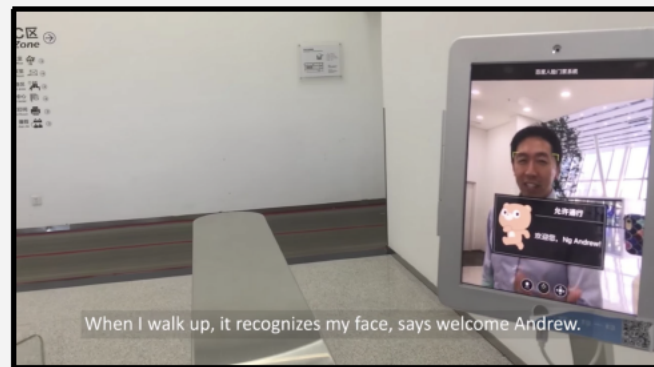
- **Bytedance (\$75B valuation):** Owner of several other media platforms that serve content based on AI recommendations (rather than social graph), including TikTok, the fastest growing social video app in the world.
- **Meituan (\$40B Valuation):** Started out in group buying (Groupon) and restaurant reviews (Yelp), they own food delivery, and are expanding into other on-demand services.
- **Didi (\$70B valuation):** Ridesharing giant with roughly 1.5x the volume of Uber and Lyft combined. They call themselves "the world's largest transportation platform."



Global pop culture is being minted on Chinese platforms -- "Old Town Road" Billboard's #1 song in the US, got its initial virality on TikTok.

SenseTime, Yitu, Face++, Cloudwalk - AI Surveillance Unicorns

- China's surveillance boom has created an anchor customer for cloud machine vision services, birthing companies like **SenseTime (>\$4.5B)**, **Yitu (\$2.4B)**, **Face++ (\$2B)**, **Cloudwalk (\$2B)**.
 - "When we talk about data resources, really the largest data source is the government." -SenseTime CEO Xu Liu ([Source](#))
- Now that these companies are operating at scale they are building a host of other services (e.g. facial recognition for office buildings, augmented reality)
- They are also expanding into other countries, and verticals.



Andrew Ng demonstrating facial recognition for office building entry.

Xiaomi, BYD, DJI - Hardware giants

- **Xiaomi (\$36B):** One of the world's fastest growing smartphone brands, recently became the biggest smartphone maker in India. They also own 20% of Ninebot, the company that makes
- **BYD (\$21B):** China is the world's leading electrical vehicle market, and BYD is the largest manufacturer (by volume). More than 500,000 electric buses in China vs. <1,000 in the US.
- **DJI (\$15B):** short for "Dà Jiāng Innovation" (大疆创新), is the first Chinese company to build a globally dominant consumer brand, running away with the consumer drone market (72% market share).



DJI's Mavic drone is being issued by the Israeli Defense Force for recon.

International Expansion and its Consequences

China's Tech Presence Abroad - Examples

- **Strategic investments:** Tencent has deployed \$62B in over 350 companies since 2012 in disclosed deals alone. They have strategic stakes in GoJek, Snapchat, Reddit, Tesla.
- **Acquisitions:** Alibaba owns PayTM (India's largest payment app), Lazada (Indonesian ecommerce). Didi owns 99, the largest ride-sharing app in Brazil.
- **Direct product launches:** TikTok is the world's hottest new social app, with hundreds of millions of users and significant cultural relevance.
- **Pilots:** Surveillance is being piloted by various governments around the world. Kuala Lumpur (Malaysia's capital) is piloting Alibaba's City Brain smart city system.



New Escalation Paths in the Global Tech Ecosystem

Bytedance confronts the same problems with moderation as Facebook.

- Bytedance's Helo news app in India is being lampooned for being a breeding ground for sensationalist inflammatory content.
- Indonesian authorities said on Wednesday they had banned Chinese video app Tik Tok for containing "pornography, inappropriate content and blasphemy". (SCMP) (Tech in Asia)

What happens when the company in charge is Chinese?

- What decisions will their leadership make? (given a different ideological vantage point)
- To what extent could the government compel Chinese tech giants to take action with their foreign properties?
- How much control do the Chinese players have in companies they've invested in given the leadership and employees are still based in other countries?

Appendix

Creation, Adoption, Iteration.

- **The US leads in the “Creation” stage.** Core technology and new user paradigms are still largely invented here.
- **But “Adoption” happens far more quickly in China** due to structural factors. The most significant of these are...
 1. **Lack of legacy systems** *e.g. lack of credit cards = mobile payment*
 2. **Scale of consumer market** *e.g. extreme urban density = on-demand service adoption*
 3. **Explicit government support** and involvement *e.g. facial recognition deployment*
- **Iteration:** What happens when you have a huge highly receptive user-base to iterate on, and the investment that justifies? Eventually, the resultant experience has evolved so much that it is nearly unrecognizable...

Digital Payments - An Adoption Defined Vertical

- **Creation:** Paypal pioneered the digital payments space.
- **Adoption:** Payment app volume in China was **\$12.8T in 2018 (vs. \$578B for Paypal in 2018)**. The **lack of legacy banking systems** in China combined with the insatiable demand of a **huge e-commerce and digital services market** led to the mass adoption of digital payments.
- **Iteration:** When everyone handles money in the same 2 apps, many things can be built on top. **Alipay's Yu'e Bao savings feature is the biggest money market fund** in the world at **\$233B** (passing JP Morgan)
- **Heavy Investment:** In 2018 Ant Financial raised as much as all other fintech companies globally combined at a purported \$150B valuation.
- **Global Expansion:** PayTM, **India's largest payment app, is >50% owned by Alibaba**. They are following a similar playbook in another market that has leapfrogged from cash to digital (skipping credit cards altogether)

Invalid American Advantages

- **Capital:** This is no longer a meaningful constraint on either side of the ecosystem. The Chinese venture ecosystem is at the same scale as the US.
- **Market size:** During the dot-com boom, the US had the largest domestic market of internet users, allowing new paradigms to scale faster here than anywhere else. This has been turned upside down.
- **“Culture of innovation”:** both China (e.g. Confucian values, 4 ancient inventions, the Middle Kingdom etc.) and the US (e.g. Puritanical work ethic, nation born from rebellious spirit, etc.) confidently claim cultural exceptionalism in their societal psychology that makes them uniquely conducive to innovation. But it’s not clear to me that one culture is concretely more exceptional than the other, or that this framing is a compelling way to explain what is going on or predict what will happen next.

In China, there are more than 20 apps with 150+ million users (!!!). Of the 20 top apps by time spent, a whopping **13 are owned by BAT** and 4 have received a significant operational investment from BAT. The remaining 3 are owned by Toutiao. 6 video platforms are among the top 20 apps in China.



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*these stats are only ballpark estimates from a 3rd party data aggregator.

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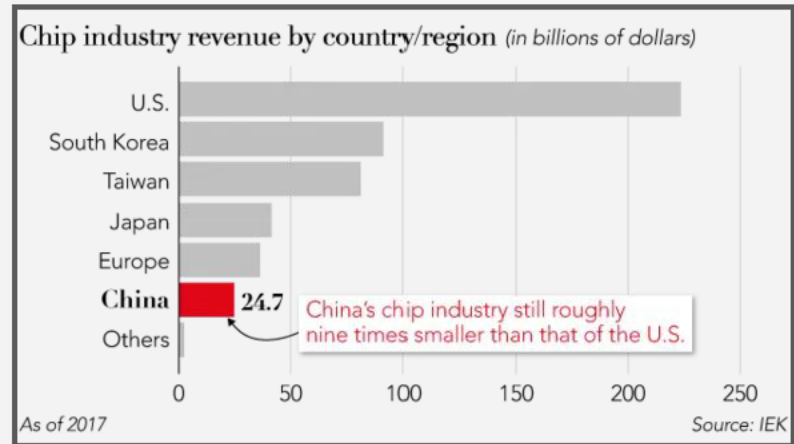
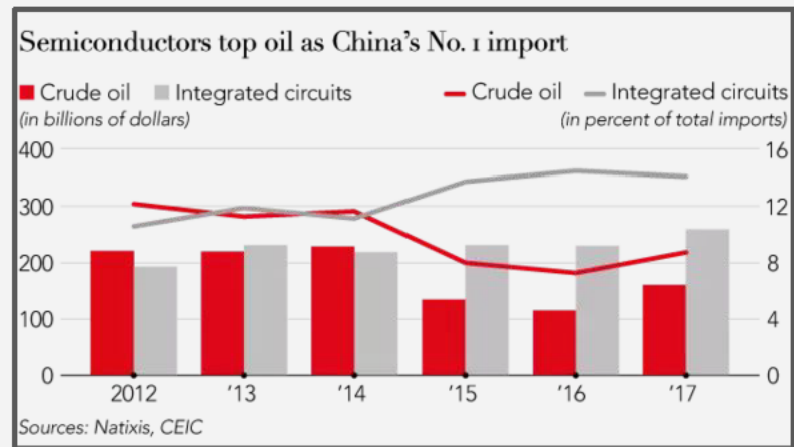
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Relative Competencies: “Core tech” vs. “tech enabled” businesses

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Semiconductors are the canonical vertical where the **bottleneck is core tech**, not adoption.

Hence the US leads the world, and chips are a larger import than oil for China.



Open Questions for the Future of Technology

- In which other “tech-enabled” verticals will China’s adoption advantage allow it to leapfrog the US?
 - My predictions: AI medical diagnosis, smart cities
- How does the US defend its advantage in core creation?
- For verticals where Chinese companies are world leaders expand beyond Chinese borders?
 - What does it mean for Chinese tech giants to have control of pieces of critical digital infrastructure in other countries? (e.g. Indian financial system)
 - Who makes decisions? To what extent can they stand up to the government?

The Importance of a US / China AI Cooperation

- *“I supervised an arms control negotiation with Russia, but we have no way of talking about this with AI.” -Henry Kissinger*
- Today, we can't even get everyone in the same room to set international norms on global problems...
 - **Immediate Term:** ML fairness, interpretability, data privacy etc.
 - **Medium Term:** cyber warfare, social upheaval from automation of labor, autonomous weapons, AI applications in diplomacy, etc.
- The future will be decided at the **intersection of private enterprise and policy leaders between China and the US**. We risk being left out of the discussions where norms around AI are set for the rest of our lifetimes. Apple, Amazon, Alibaba, and Microsoft will not be.

1) Social Credit

Social Credits

- Western media coverage of China's "social credit system" goes something like this -- there is a system being instrumented where each **citizen is given a 3 digit score based on everything they do** (what they buy, where they go, who they associate themselves with) and this score **decides their lives** (where they work, where their kids go to school, whether they can ride trains).
- **This does not reflect the situation on the ground.** Confusion is rooted in the **conflation of 2 distinct pieces** -- the government's digital **blacklists** aimed at making law enforcement more efficient, and **Alibaba's Sesame Credit** initiative which functions like a FICO score combined with a customer loyalty program.
- There *are* experimental initiatives by local governments to rate citizens. But so far these are inconsequential pilot programs, with no real punishment for having a low score.

Judgement Default Blacklist (失信被执行人名单)

- The notorious blacklist of "people deemed untrustworthy" refers to the **Supreme People's Court Nationwide Judgement Default Blacklist (失信被执行人名单)**. ([viewable at this link](#)) Contrary to popular belief, being blacklisted is not caused by a government issued score falling below a certain threshold; in reality, **citizens are placed here for failing to follow a court order**. This is a binary decision made by humans, with no algorithmic decision making involved.
- The blacklist is primarily an effort to **combat China's rampant fraud and white collar crime**. Court orders specifically mentioned in the plan include evading taxes, not paying debt, not paying fines, and selling fraudulent goods. Most punishments for being on this list are business-related also -- e.g. being unable to serve as a corporate director, purchase real estate, getting permits in regulated sectors, receive government subsidies and, of course, the notorious train and air travel restrictions.
- **US Equivalent:** In the state of New York if you owe >\$10K in taxes, you can have your driver's license suspended.

Alibaba's Sesame Credit (芝麻信用)

US Equivalent: Customer Loyalty Program (e.g. Amex Platinum Card) / Amazon Seller Ratings / mini-FICO (score can only be used on Alibaba's platform)

There are no consequences for having a low Sesame Credit score

- Benefits for a good score are similar to what you'd find in a credit card reward program.
- The biggest one is not having to pay upfront deposits for services like bike sharing, hotels, and other groups Alibaba has partnered with.

This score is not calculated as a result of being a "good citizen"

- It's based on activity within Alibaba's platform (digital payments and e-commerce) and primarily driven by financial activity (history of repayment, purchases, income etc.)

There is no evidence that Alibaba is helping to build the national social credit system

- This misunderstanding stems from a pilot program by the National Internet Finance Association to create a new *financial* credit rating system (i.e. FICO)
- All 8 participants (including Alibaba) were denied a license to establish an official credit rating company -- meaning these Sesame Credit scores can't even be used at traditional banks to get a loan.

Real Name Verification (实名认证),

Today, as a result of new regulations around **Real Name Verification (实名认证)**, to get a phone number or use online services in China you needed to register with your real name and unique government ID number. This creates a centralized identity layer with major consequences...

1. **Destroying the concept of anonymity on the internet.** Every username can be traced back to a government ID.
2. **Trivial reconciliation of individual data across disparate systems** (government and private) thanks to a universal unique key -- the government ID number.

How could this become draconian?

1. **A standardized nationwide system is deployed** contingent on the success of local pilots
2. **Material consequences for citizens with bad scores** are put in place afterwards.
3. **Citizens are tracked across all surfaces** with data integration across government (municipal and national) and private tech company data.
4. **Algorithmic decision making processes are put into place.** Right now scores are determined by decisions from human bureaucrats.
5. **Extrapolation based on user profile.** The government could start scoring citizens based on demographic profile and predicted future actions. (effectively predictive policing)

2) Strategic Investments

Strategic Investment

- Chinese tech giants expand to new verticals and locales by making strategic investments.
-
- Tencent has deployed [\\$62B in over 350 companies](#) since 2012 in disclosed deals alone.
- Globally they are finding local champions analogous to their core businesses.
 - Alibaba: PayTM and Lazada
 - Tencent: League of Legends, Fortnite
 - Strategic Stake: GoJek, Snapchat, Reddit
- Open Questions
 - How much control do the Chinese players have? Although they own equity stakes, the leadership and employees are still based in other countries
 - To what extent could the government compel Chinese tech giants to take action with their foreign properties?

Spectrum of Investments

Passive ROI Investment

Sequoia invests in a startup in hopes that the company will grow and they will profit.

This is **what we usually think of** when we hear the word “investment”, earning a positive return drives the deal.

The investor (usually) has limited operational involvement.

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Strategic Investment

Tencent bought 20% of e-commerce company JD.com, then gave JD prominent placement in WeChat.

A significant stake in another company to **lock-in an alliance.** The alliance drives the deal.

The smaller company still maintains autonomy, but the investor has significant operational influence and often increases its stake over time.

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Acquisition

Google acquires Nest to get into the smart home devices market.

One company takes full legal ownership and control of another.

Loss of autonomy is inherent since the investee is now a wholly owned subsidiary.

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Alibaba and Tencent were both jumpstarted by Strategic Investments

- In 2000, **Softbank** invested **\$20M** in Alibaba. That stake was worth **\$90B** at the time of Alibaba's IPO.
- Naspers invested **\$34M** in Tencent when it was just a start-up. That stake is **now worth \$114B.**
- These have been long, fruitful relationships.
 - Naspers still sits on Tencent's board.
 - Softbank CEO Masayoshi Son is on Alibaba's board
 - Alibaba founder Jack Ma is also on Softbank's board.
- So strategic investments are **embedded in their DNA.**



The original Alibaba team working in Jack Ma's apartment. (1999)

Softbank and Didi are carving up the world.

Didi Chuxing (\$50B valuation), China's dominant ridesharing company, is partnering with Softbank to make strategic investments in **ridesharing companies around the world.**

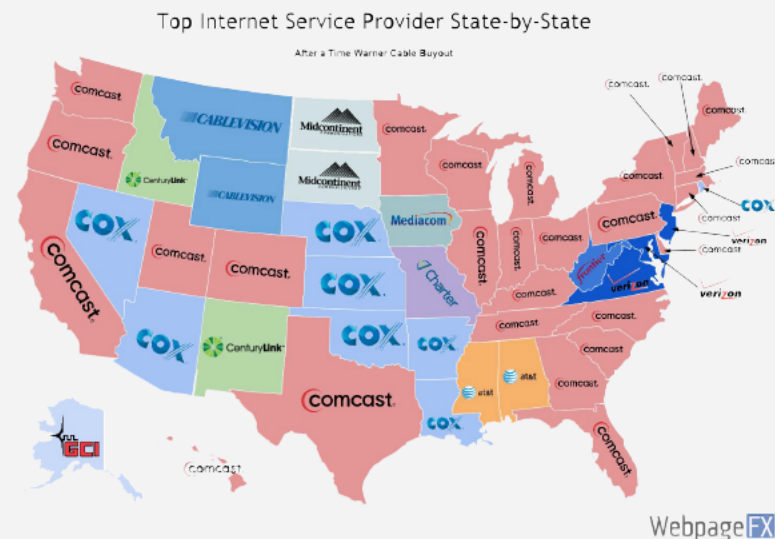


Didi President Jean Liu and Grab CEO Anthony Tan

- Softbank invested \$5B in Didi, and Uber owns 17.7% of Didi from the sale of their China operations in 2016.
- Baidu, Alibaba, and Tencent are all invested in Didi. Additionally, Softbank owns nearly a third of Alibaba, has had an alliance with them for nearly 2 decades, and their founders sit on each other's boards.
 - See also: [go/ChinaRises2](https://www.epic.org/ChinaRises2) - International Expansion Section
- Grab (Southeast Asia) - Didi and Softbank (combined \$2B investment)
- Ola (India) - Tencent and Softbank (combined \$1.1B investment), Didi (undisclosed amount invested)
- 99 (Brazil) - Didi (\$100M investment), Softbank (\$100M investment)

Cable Company Regional Monopolies

- Cable companies explicitly don't compete head on in each other's territory.
- American cable companies essentially make deals to grant each other **regional monopolies** and extract as much profit as possible from consumers.
- What is happening, and will continue to happen, in ridesharing is very similar in nature to these regional cable monopolies, but on a **country by country scale.**



3) PayTM

India's Mobile Wallet is Chinese Owned.

- **Ant Financial (Alipay)** made the initial strategic investment in February 2015 by buying 25% of Paytm for \$500M.
- Ant Financial and parent company Alibaba, have gradually upped their stakes and **now own a combined 62% of Paytm.**
- Paytm has established a **dominant position** — in 2016, transactions from their 218M users exceeded combined usage of credit and debit cards in India.
 - Remember the slide about following Alipay's footsteps?

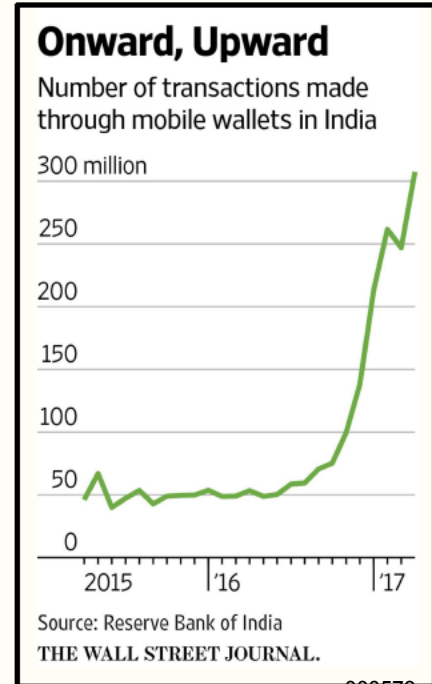


In the past, adoption of new paradigms always happened first in high end markets. But today, building for **emerging markets doesn't necessarily mean primitive functionality** for unsophisticated users anymore; in fact, the opposite is often true. **Paytm**, India's leading fintech company, is another example.

“We’re competing with cash, in India,
we’re not competing with cards.”

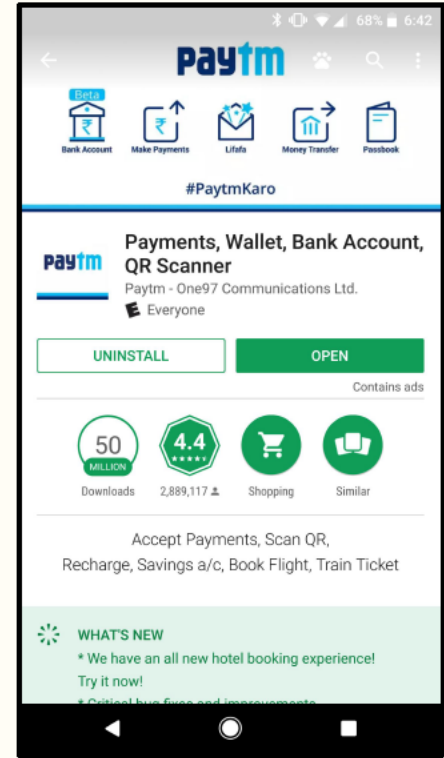
“A big break came late last year when India **canceled 86% of currency** in circulation in an effort to cut corruption and bring more people into the tax net by forcing them to use less cash.”

This would be **unfathomable** in the West. And unsurprisingly, when 86% of the cash got cancelled and nobody had a credit card, mobile wallets in India exploded, laying the groundwork for a far more advanced payments ecosystem in India than the US.



Paytm is following Alipay's footsteps

- China's Alipay is far more than just a payments app. It is one of the **world's largest financial institutions.**
 - Its savings feature "Yu'e Bao" is now the world's largest money market fund, with \$165.6B under management.
 - They issue hundreds of billions of dollars of loans online.
 - It is a gateway to Alibaba e-commerce properties.
- Paytm may not be a direct competitor building a search engine, but all of these use cases are **user journeys that never touch Google.**



Paytm's Play Store page advertises the app as a bank account.

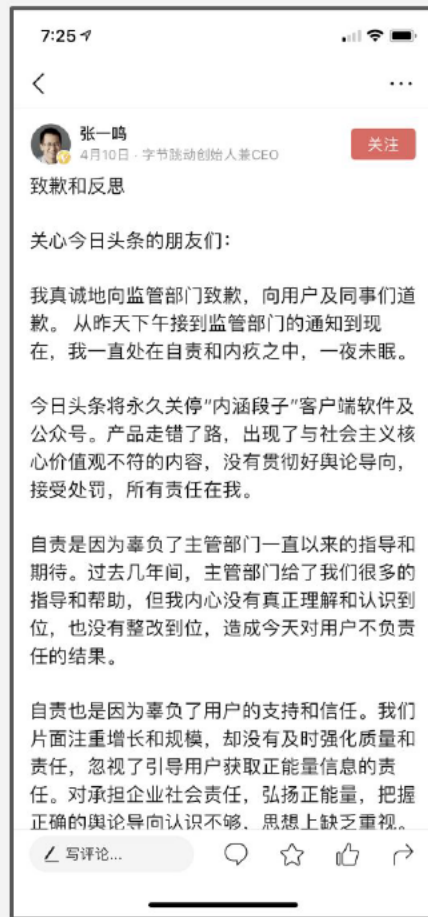
4) Why are Chinese tech companies going abroad?

Why are Chinese tech giants now pushing to expand abroad?

1. They are reaching saturation of the Chinese domestic market and need to seek growth elsewhere.
2. There is huge systemic regulatory risk of operating only in China, everyone wants to diversify (Tencent, Didi and Bytedance are the canonical examples)
3. There is cutthroat competition in China unlike anywhere else in the world. (e.g. Tencent cutting off all links to Alibaba and Bytedance properties within WeChat)

Bytedance's Regulatory Heat in China

- **Bytedance:** ran into issues with the Chinese government and their apps were pulled from Chinese app stores temporarily including their flagship Toutiao app. One of them (Duanzi) was even banned entirely.
- **Tencent** The Chinese government has frozen approval of new games due to concerns about the societal impact. **This has been incredibly disruptive for Tencent -- causing their first revenue drop in 10 years and a historic stock price drop of \$143B.**
- **Didi** has faced major threats over their safety record.
- **Takeaway:** **Success in the Chinese market is a fraught position.** So the new generation of Chinese tech companies looks outwards to greener pastures (NBU).



Cutthroat Competition in China

- Chinese tech companies will go to extraordinary lengths.
- Tencent essentially broke links sent within WeChat to ByteDance apps (Toutiao and TikTok). Tencent does with with links to Alibaba's ecommerce properties also...
- Unsurprisingly ByteDance has several lawsuits with Tencent and Baidu.

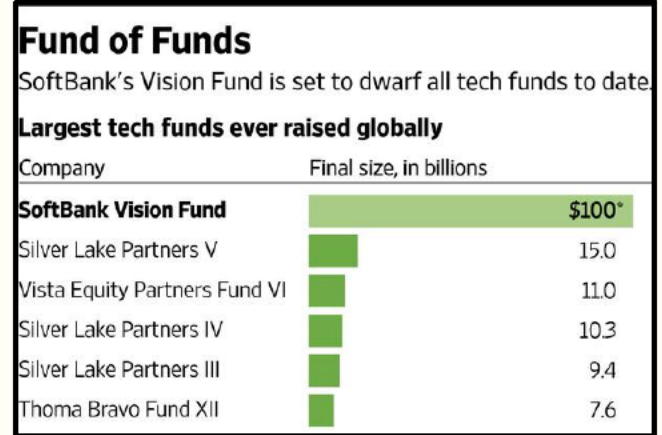
How should we look at the Chinese market?

- **Takeaway:** The hottest digital media fad since Snapchat originated in China, not the US.
- **Obsolete Assumption:** Only siloed entities and commodity hardware from China can successfully internationalize because of the cultural context and market dynamics are so different. (e.g. data saver apps like Clean Master)
 - Just like we see the market of teenagers as a harbinger for new trends, we should look at China.
- **Takeaway:** The main battlegrounds are not the domestic Chinese and US markets. Chinese players will aggressively challenge Silicon Valley in NBU markets because they see the same upside we do as both sides saturate their home markets. Competing head to head with them is necessary in NBU locales.

5) Softbank Vision Fund

Softbank — The Ultimate Strategic Investor

- Japanese tech conglomerate Softbank has raised the largest tech investment fund ever — **the \$100 Billion (!!!) “Vision Fund”**
 - Investors include Apple, Qualcomm and Saudi Arabia.
 - They plan to deploy all of this capital within 5 years.
- Softbank is **both a strategic investor in Chinese giants like Alibaba, and a co-investor** with them in other companies.
 - Softbank has also put \$1.4B into Paytm.
- They own a wide variety of assets worldwide including ARM, Boston Dynamics, and a \$4B stake in Nvidia.



Within its first year, the fund has **closed \$93B**, and **deployed \$14B** in at least 13 investments.

SoftBank's Vision Fund is in a league of its own

Circles sized by the amount each fund has raised



Source: FactSet

epic.org

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The tech fund to end all tech funds. ([Source](#))

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Softbank's strategic investments*
form the connective tissue for a
global federation of tech companies.
Competitive threats won't always
look like other search engines.



*Deep dive at [go/VisionFund](https://www.go-visionfund.com)

The Vision Fund is fundamentally not a traditional fund; but instead a multi-hundred billion dollar experiment based on Masayoshi Son's viewpoints on what corporate structure should look like in the information age.

“When we centralize to gain control, the centralization causes a bottleneck, and then we get big company disease.”



20th Century type

**Supervision/
control style**

over 51%

Management

% of Stakes



21st Century type

**Autonomous/
harmonious style**

Mainly 20 - 40%



Ties based on Capital



**multiplied by*



Ties based on Buddy-like Relations

6) Commodity Manufacturing

China is not competitive quite yet in the most **high tech** and **high value** forms of **manufacturing.**

E.g. Semiconductor Fabrication, Airplanes, OLED Screens

But China dominates the production of **commodity hardware**. And commoditization is steadily marching up the value chain.

E.g. Plastic Toys, Drywall, Glass, LCDs, PCs Smartphones, **Solar Panels**.

What is a Commodity?

- Commodity = **minimally differentiated** good or service such that no seller can charge a large premium.
- **Gross margins = ability to charge a premium**
 - If I'm buying a commodity, no one can charge a large premium; I could just buy from another vendor the same thing at a lower price.
- TSMC (Semiconductor Fabrication) - **51% gross margin**
- Yingli (Solar Panels) - **10% gross margin**
- The low cost producer wins when differentiation goes away.



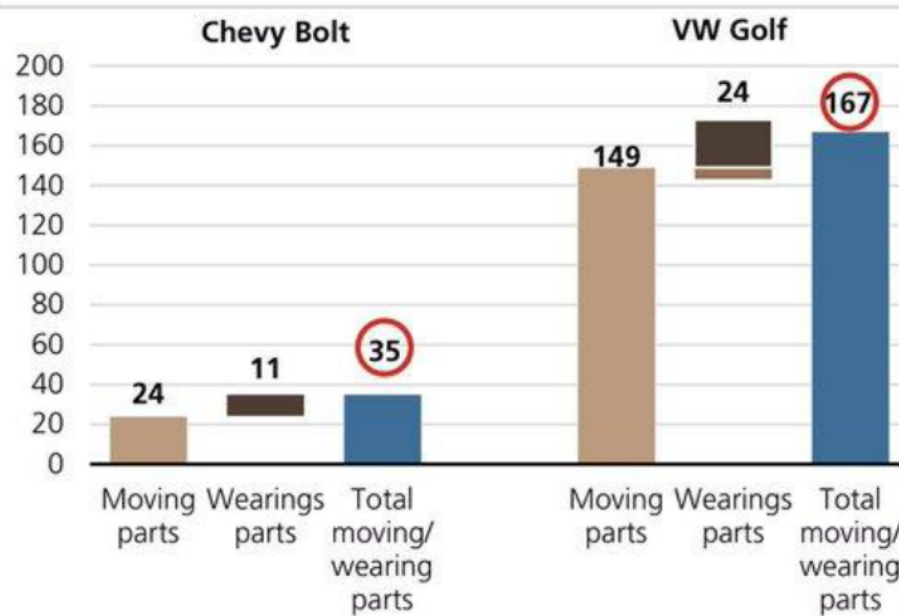
Even high tech hardware can become commoditized.

"Making standard efficiency solar panels is about as hard as making drywall. It's really easy. In fact, I'd say drywall is probably harder."

Macro Trend

Electric powered, autonomous vehicle hardware will become commoditized.

Figure 7: Number of parts in the powertrain



Source: UBS estimates

Supply Side Commoditization: Manufacturing electric vehicles has a **much lower barrier to entry** than internal combustion engine vehicles because EVs are an order of magnitude less mechanically complex.

But demand side commoditization caused
by autonomy is even more significant.

Why autonomous?

“Globally, 1.2 million die each year in road accidents. **95% of the time, it's human error.** Right now, there are about 1 billion cars on the planet. **95% of the time, they sit idly,** wasting capital and consuming valuable space in our cities. **We can do better :)”**

In an Autonomous World: Fleet Ownership > Individual Ownership

- **A centralized ridesharing network** is needed to coordinate cars to achieve near **100% utilization rates.** (Uber/Lyft/Didi/Ola/Grab etc.)
- **Human driving world:** Ridesharing networks get cars from individuals because they **need a human operator paired with each vehicle.**
- **Autonomous world:** Fleet ownership (e.g. Avis or Hertz) makes more sense because **professional fleets are better at dealing with...**
 - Mass purchasing
 - Depreciation of capital expenditures
 - Diversification of risk
 - Maintenance

Bad News for Incumbents: Key differentiators will become irrelevant....

- **Brand** becomes irrelevant because of ridesharing.
 - You don't care what car brand your Lyft is any more than you care about flying in a Boeing or an Airbus.
- **Driver experience** becomes irrelevant in a self driving pod that is owned by a fleet.
 - The Ultimate Driving Machine™ stops mattering.
- These two things are enormously difficult for new entrants to build. **Significant barriers to entry are dissolving.**



A Totally Different Purchaser:

Fleet buyers don't care what The

Rock drove in Fast and Furious.
000598
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In many ways, the car market mirrors the traditional CPG market. Car makers spend enormous amounts on brand advertising to develop an **affinity** for their products in end users that make purchasing decisions.

But the future of vehicle hardware looks a lot more like the enterprise PC market, where the purchaser is no longer the primary user. Instead corporate decision makers buy minimally differentiated commodities in bulk based on **explicitly specified criteria.**

A Textbook Example of Low End Disruption

“It is a story of rational managers facing the **innovator's dilemma**: Should we invest to **protect the least profitable end of our business**. (*cheap commodity cars*) so that we can retain our **least loyal most price sensitive customers?** (*fleet buyers*) or should we invest to strengthen our position in the **most profitable tiers of our business** (*highly branded luxury vehicles*), with customers who reward us with **premium prices for better products?**” (*The Ultimate Driving Machine™*)

-Clayton Christensen, The Innovator's Solution (2003)



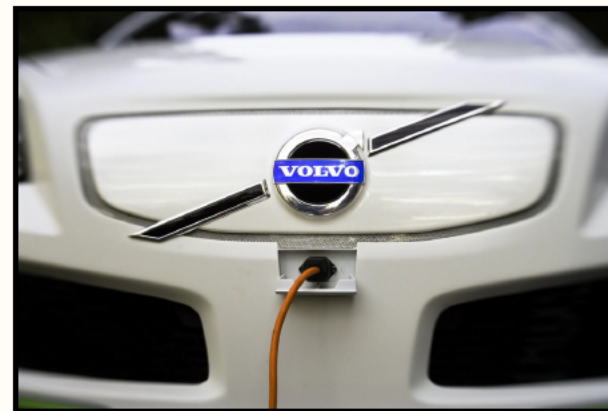
This is the bad news for **Tesla** — highly differentiated vehicles, built to signify status and deliver great driving experiences, will be disrupted by generic autonomous pods.

“[Companies] fail — not because they made the wrong decisions, but because they make the right decisions for circumstances that are about to become history.”

“The ruling Communist Party has the world’s most aggressive electric vehicle goals, both to clean up smog-shrouded cities and seeking the lead in an emerging industry.”

China's Electric Vehicle Gameplan

- China already buys more electric cars than the rest of the world combined.
- The plan is for domestic demand to accelerate Chinese battery and EV makers towards economies of scale.
 - A 25% tariff on imported cars makes it harder for foreigners to get a piece of the action.
 - At one point, EV production subsidies amounted to nearly 60% of an electric vehicle's price. ([Source](#))
- Their hope is this freshly built **commodity EV powerhouse** continues to **fuel the export machine** that underpins the Chinese economy.



Volvo (owned by a Chinese group) will stop making gas only cars by 2019.

Chinese Battery Boom

Elon Musk gets all the attention, but China is building factories that will swamp the market

MWh capacity of manufacturing factories

■ Under construction ■ Announced



Source: Bloomberg New Energy Finance

Bloomberg

The easiest part to predict, 50% of the cost of an electric car is the battery.

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China will likely be the world's largest battery producer for the foreseeable future

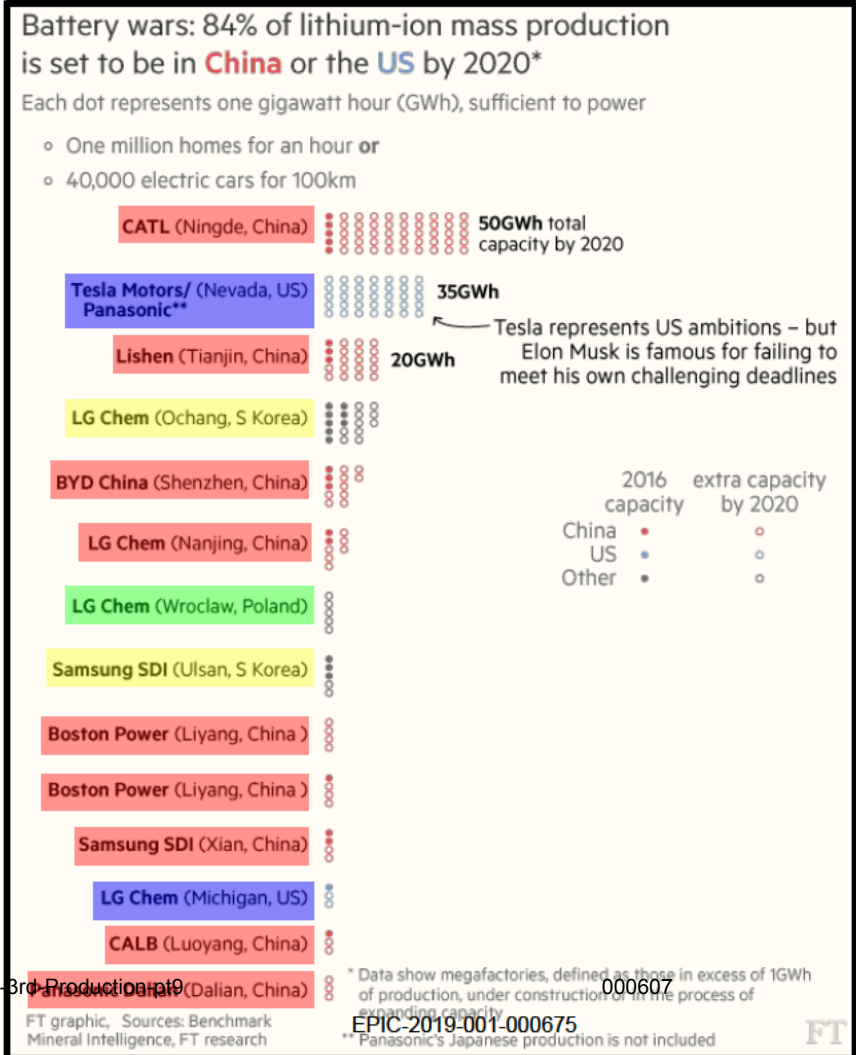
(Source)

Looks like lithium-ion batteries are commodities also...

- And remember, due to perfect competition, in commodity markets, the **low cost producer** wins the day.
- “China’s approach [to batteries] has echoes of the one it took on **solar power a decade ago**. It dominated the industry by lowering costs and driving **prices down by 70 per cent.**”

-Gordon Orr

former Asia chairman of McKinsey ([Source](#))



“Since 2012 China has spent billions of renminbi subsidizing its electric carmakers, turning **Shenzhen-based BYD**, in which Warren Buffett’s Berkshire Hathaway has a stake of about 10 per cent, into **the world’s largest electric car and bus maker.**”



BYD delivers a fleet of all-electric trucks to work in yards in California



Uber drivers in Chicago are testing **BYD** E6 electric cars



BYD inked a deal with the State of Washington for up to 800 electric buses

7) Comparative Advantage Framework -- Case Studies

Ridesharing [China Leads Today]

1. **Creation:** Ridesharing happened first in the US.
2. **Adoption:** But due to a lack of mass car ownership (**Lack of legacy systems**) and extreme urban density (**Scale of consumer market**) ridesharing volume in China is 2x the rest of the world... combined.
3. **Iteration:** With this much penetration Didi has begun building tons of new features on top of basic ridesharing, including a smart city platform.

Infrastructure [China Leads Today]

1. **Creation:** Modern infrastructure like highways, high speed rail and bridges were developed in the West.
2. **Adoption:** But China needed to build all of its infrastructure from the ground up in essentially a generation (photo of Shanghai in 1990 vs. 2010). They poured more concrete in 3 years than the US did in the entire 20th century because they lacked existing infrastructure (**Lack of legacy systems**) and there was a need to service the massive population (**Scale of consumer market**). Which led to unprecedented government investment (**Explicit government support**).
 - a. Shanghai's population is on the order of 4 times the size of New York City based on mobile phone data (more people than the entirety of Canada). Urban infrastructure challenges of this scale simply don't exist in the West.
3. **Iteration:** It turns out, after this historic construction boom China has become world class at building infrastructure.
 - a. An especially surreal example is this train station that was assembled in 9 hours by 1500 workers. (Video)
 - b. China is now leveraging this expertise as a way to accumulate and exert geopolitical power by exporting infrastructure (i.e. One Belt One Road)

Autonomous Vehicles [Prediction]

1. **Creation:** Created at Google, and Waymo is unambiguously the leader.
2. **Adoption:** I fully expect China to achieve mass autonomous adoption before the US. Explicit government support will mean the **clearing of regulatory barriers** will happen easily, and perhaps cities will be re-architected around AVs (**Explicit government support**). Crucially, the lack of mass car ownership leads to far more consumer receptiveness to AVs. (**Lack of legacy systems**)
3. **Iteration:** It's very possible that earlier mass adoption leads to a virtuous cycle that allows Chinese core self-driving tech to accelerate beyond western counterparts.

State Datasets: Surveillance = Smart Cities

- Alibaba has been selected to the **National AI Team** for smart city applications. **It turns out that having streets carpeted with cameras is good infrastructure for smart cities as well.**
 - Close collaboration with the government allows Alibaba to gather information like car and foot traffic data based on surveillance cameras.
 - Government data mixed with Alibaba's own data and expertise in computing is a potent combination.
- Alibaba's "City Brain" product is being used in pilot cities like their home city of Hangzhou to optimize the timing of red lights for traffic flow and ambulances, and to redirect traffic if certain areas are under construction.
- It's purportedly reduced traffic time by 15.3% and cut ambulance arrival time by 50% in pilot areas.
- Soon, municipalities will be able to make every infrastructure decision, from filling potholes to building subway lines, based on complete data of how every person is moving through the city in

AI for Medical Diagnosis [Prediction]

1. **Creation:** A new field born from breakthroughs in the West.
2. **Adoption:** But again I would expect these systems to reach mass deployment in China first. There are far too few doctors for the population, increasing the incentive to seek alternative treatment (**Lack of legacy systems**) the government is explicitly supportive, naming Tencent to the National AI team to solve this problem (**Explicit government support**) and they have the authority to quickly **clear regulatory barriers** while American initiatives are mired in HIPPA compliance and FDA approval.
3. **Iteration:** It's possible that the flywheel could start spinning, and China could lead the world in this sector as well. This could lead to them exporting their tech and setting international norms.

State Datasets: Biotech and Healthcare

- The potential impact of government supplied data is even more significant in biology and healthcare.
 - In the near future, it wouldn't be a surprise to see the Chinese government require every single citizen to have their DNA sequenced and stored in government databases, something nearly impossible to imagine in places as privacy conscious as the US and Europe.
- The Chinese apparatus is well-equipped to take advantage. Tencent has already been named to the **National AI Team** for medical diagnosis using computer vision and a logical next step would be medical advancements utilizing government DNA data.

Immigration

- **The critical driving factor will be the extent to which China can overcome its deficit of top talent by fostering talent domestically, convincing top overseas Chinese talent to come home, and attracting international talent.**
 - Also, to what extent will the latent anti-immigrant cultural force in the US force us to throw this advantage away?

Neutral Factors

2 things that are discussed a lot but are not meaningful advantages on either side.

1. **Capital:** No longer a meaningful constraint on either side of the ecosystem.
2. **Culture of innovation:** both China (e.g. Confucian values, 4 ancient inventions, the Middle Kingdom etc.) and the US (e.g. Puritanical work ethic, nation born from rebellious spirit, etc.) confidently claim cultural exceptionalism in the social psychology of their societies that make them conducive to innovation. Both are fairly interesting, but it's not clear to me that one culture is concretely more exceptional than the other, or that this framing provides compelling explanations for what is going on, or predictors for what will happen next.

The Lifecycle of New Tech

Creation

Breakthroughs in core technology...

Deep learning breakthroughs, facial recognition, TPUs, 7nm semiconductors, autonomous vehicles

or the invention of new paradigms for user interaction.

Digital payments, ridesharing, dockless bikesharing, public cloud, Face ID

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Adoption

Go to market, getting that technology or paradigm into the hands of real users.

US: Paypal, Uber, Limebike, AWS, Face ID

China: Alipay, Didi, Mobike, Tencent Cloud, mass deployment of facial recognition

Iteration

Improving on top of an existing commercialized technology product at scale. At a certain point this bleeds into the creation of new paradigms also.

Uber Pool, Alipay investment platform,

8) AI / Surveillance/ Government as an Anchor Customer

In the press and politics of America and Europe, AI is painted as **something to be feared** that is eroding privacy and stealing jobs. Conversely, China views it as both **a tool** for solving major macroeconomic challenges in order to sustain their economic miracle, and **an opportunity** to take technological leadership on the global stage.

Surveillance is one of the “first-and-best customers” for AI

- Mass surveillance is a killer application for deep learning.
- So an entire generation of AI unicorns is collecting the bulk of their early revenue from government security contracts.
- AI companies Yitu (\$2.4B) and SenseTime (\$4.5B) advertise on their websites that police departments are using their facial recognition tech to assist in everything from catching traffic law violators to resolving murder cases.
- State-owned papers have reported that police are making convictions based on phone calls monitored with iFlyTek’s voice-recognition technology.

Government investment and contracts allow AI projects to **justify the initial fixed cost of development.** Once they are at scale, the marginal economics of software make propagating to other use cases much more economically practical.

Facial recognition expands beyond surveillance

1. **Creation:** Breakthroughs in using machine learning for image recognition initially occurred in the US.
2. **Adoption:** Surveillance use cases (**Clearing of regulatory barriers**) and enormous government stores of data (**Explicit government support**) on a huge population base (**Scale of consumer market**) have allowed China to leap ahead.
3. **Iteration:** Facial recognition is being deployed all across China (e.g. at office buildings, making payments).
 - a. There is a very real possibility that the investment surveillance has justified could allow China to leap ahead in image recognition and biometrics.

National AI Team: Government partnership can be even more explicit

- **China's Ministry of Science and Technology is hand-picking companies to be a part of the National AI Team (人工智能国家队), and handing them key areas of focus:**
 1. **Baidu:** Autonomous Vehicles
 2. **Alibaba:** Smart Cities
 3. **Tencent:** Computer Vision for Medical Diagnosis
 4. **iFlyTek:** Voice Recognition
- Tencent and Alibaba executives have proudly voiced public support for their collaboration with the government around national security initiatives.
 - Outwardly embracing this level of public private cooperation serves as a **stark contrast** to the controversy around Silicon Valley selling to the US government.

Explicit Government Support

State Datasets

- A national database purportedly contains over 1 billion faces of everyone over 18 with an official ID.
- The Chinese Police has a dataset of 40M DNA samples that their official website boasts is the largest dataset in the world of its kind.
- For private companies, collecting databases of this size and fidelity would be arduous and capital intensive, if not impossible.

Direct Government Investment

- Ownership often blurs together with the state.
- iFlyTek boasts 70% market share in China for voice recognition, 3000 employees, and a \$12B valuation on the public markets. Their largest shareholder (12.9% ownership) is the state-owned telecom provider China Mobile.
- Facial recognition company Face++ recently raised \$460M in a round led by a Chinese state fund.

A lot of government data may have been gathered with surveillance as a motivation, but there are many applications that can be built on top now that the datasets exist.

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- The Chinese apparatus is well-equipped to take advantage. Tencent has already been named to the **National AI Team** for medical diagnosis using computer vision and a logical next step would be medical advancements utilizing government DNA data.

Simultaneously, the Chinese government can take advantage of the pace of private industry while exerting control through their leverage as a customer, direct ownership interest, and regulatory power.

China Exporting AI Globally

- China could end up writing much of the rulebook of international norms around the deployment of AI, especially for nations that are aligned ideologically with Beijing.
- Chinese AI is already crossing borders — Cloudwalk is helping to build a national facial database in Zimbabwe, and Yitu has begun selling image recognition tech to the Malaysian police; Kuala Lumpur, Malaysia's capital, is integrating with Alibaba's City Brain product.
- Being the unambiguous world leader in AI would broaden China's sphere of influence amongst an international community that increasingly looks to the pragmatic authoritarianism of China and Singapore as an alternative to Western liberal democracy.
 - The global balance of power is shifting — as the US tilts increasingly isolationist, and Pax Americana potentially gasps its last breaths, an opportunistic China dreams of filling the void.

Too soon to say what will happen: Most cutting-edge research and development is still happening in the West for both algorithms and semiconductors; and history is littered with well-funded, centrally planned initiatives that have failed spectacularly.

The big question: Could unique conditions around AI, such as data collection and privacy regulation, distinguish this initiative from the wide assortment of failed Chinese mega-projects?

9) Bytedance

TikTok goes global

- TikTok is a short video app from Chinese. 1B users
 - Takeaway: The hottest digital media fad since Snapchat originated in China, not the US.
- **Controversies have also coincided with huge global traction for Chinese media apps. In the Play Store...**
 - 2017: **2** of the top **10** apps in India are Chinese, **18** of the top **100**.
 - 2018, **5** of the top **10** apps in India are Chinese, **44** of the top **100**
 - Many of these are media apps that are not well known in the West (i.e. TikTok, NewsDog, Vigo Video, LiveMe)

Moederation

- Bytedance moderation issues... These moderation issues are not limited to China.
 - **Major controversy in Q2 2018** led to the Chinese **government temporarily banning their apps** for showing content deemed harmful to society.
 - In the **US journalists have found a plethora of hate speech on TikTok**. Radicalization of youth is a clear concern.
 - Bytedance's **Helo app in India** (Toutiao-like newsfeed) is being lampped for being a breeding ground for sensationalist inflammatory content.
 - **Indonesian authorities temporarily banned Chinese video app Tik Tok** for containing “pornography, inappropriate content and blasphemy”. (SCMP) (Tech in Asia)

The Future of Global Media Distribution

- **Prediction:** within the next 5 years, there will be international scandals in the media space similar to what is happening with Facebook (e.g. 2016 Election, Myanmar with the Rohingya Muslims) but **instead of occurring on Western platforms some issues will also occur on Chinese platforms, with a company based in China bearing responsibility and making decisions.**
- What decisions will they make? Who will make them? To what extent will the Chinese government be involved? And how will the response differ from what western platforms would do? In the near future, these are the questions we will be asking for the first time.

They refer to themselves as an “AI first content platform.”

- **Core competence of Bytedance = applied machine learning for the content lifecycle** (creation, moderation, dissemination, consumption).
- With **3000 engineers and data scientists**, Toutiao is one of the largest applied machine learning projects in the world.
 - They're aiming to hire >200 more AI engineers.
 - See also: [Toutiao AI Lab Website](#), a [Bloomberg article about Bytedance's \\$1M - \\$3M pay for AI engineers](#).
- Toutiao's feed is living proof that algorithms can drive massive usage **without human curation or much of a social graph.**



This sounds familiar...

The Recommendations Engine is their Core

- Onboarding is seamless and the app jumps straight into content with no need to register an account, follow users, or tell Toutiao what topics you are interested in.
- Retention threshold = 100 headlines. If a user sees 100 headlines they are likely to retain long term. This is similar to Facebook's famous "10 friends" rule.
- Virtuous Cycle: More usage -> more data -> better recommendations -> more engaging feeds -> more usage.
- Toutiao claims to be able to learn a user's preferences after just 24 hours of use. The recommendations engine is built on a **deep understanding of users, content and context.**



"The things you care about are the real real headlines." -Toutiao's slogan

But Toutiao is afflicted by many of the same issues as Facebook's Newsfeed. Serving users what they want leads to rabbit holes and echo chambers. In a study, 14% of users claimed to receive more than 50% of content from the same category. Additionally, engagement over everything is a slippery slope to **trashy clickbait.**

So in a major philosophical reversal, Bytedance has hired over 4000 human moderators with future plans to have a staff of over 10,000 on their moderation team.

10) Legacy Systems

Δ in user experience drives adoption

Shopping Online

Great experience

- Super convenient
- Unbeatable prices
- Infinite selection

Online shopping is great!

epic.org

Shopping at Walmart

Good experience

- Fairly convenient
- Good price
- Good selection

A consumer might **choose this option over buying online.** (need the product ASAP, a great discount, see it in person etc.)

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Not available in my small Chinese city

Terrible experience

When **buying online is literally the only way** to get what you want, **consumers go online.**

000642

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"In America, e-commerce is dessert.
In China, it is the main course."

-Jack Ma, Founder of Alibaba

China's Consumer Economy is Unhindered by Past Prosperity

- “China’s e-commerce market is now **bigger than** those of the U.S., U.K., Japan, Germany, France and South Korea **combined**, according to consultancy McKinsey.” -WSJ
 - And 71% of Chinese e-commerce is on mobile vs. 19% of US e-commerce.
- Digital Media > TV - **social media influencers run 5 out of the top 10 female clothing brands** on China’s largest e-commerce platform.
 - These influencers are the Chinese equivalent of

Youtubers and Instagram models



Leapfrogging in emerging markets is not driven by individual brilliance. Instead it's the **natural consequence of structural conditions** that exist within certain markets.

China E-Commerce Companies = Dominate Top Retailer Rankings vs. USA Peers...



Singles Day 11/11

Alibaba's massive shopping holiday

- Amazon on Prime Day: **\$525 million**
- Alibaba on Singles Day: **\$14.3 billion (!!!)**
- American companies have **a lot to gain by adopting ideas from Chinese companies also**

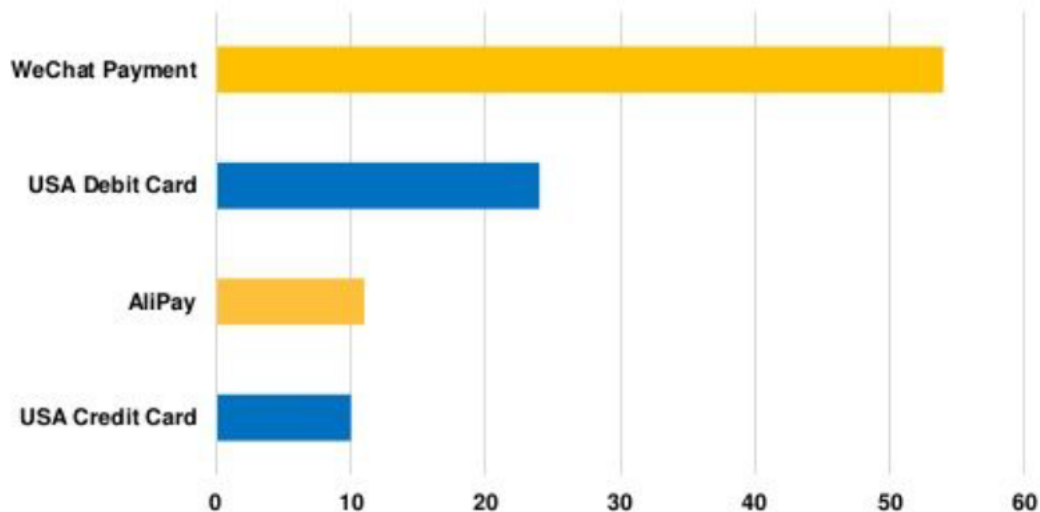


Actor Daniel Craig (aka James Bond) at the 11/11 Global Shopping Festival. Broadcasted across China.

And when no one has a credit
card to pay for all of this...

China Smartphone-Based Payment Solutions = High Engagement

Estimated Monthly Payment Transactions per User



WeChat started as smaller P2P transactions, Alipay started as an escrow service for Ecommerce.

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The US, has many legacy systems that are
“good enough”

- **Retail** - Malls, Walmart
- **Messaging** - Unlimited texting plans
- **Payments** - Credit cards
- **Banking** - Retail banking locations
- **Video** - TV networks
- **Computing** - Widespread use and understanding of the PC

And “good enough” **hinders adoption** of new things

That’s why in China...

- E-Commerce **leapfrogs** mass retail
- WeChat **leapfrogs** SMS
- Alipay **leapfrogs** the credit card system
- Mobile banking **leapfrogs** retail banking
- Online video **leapfrogs** TV
- Smartphone **leapfrogs** PC

MPesa (Mobile Payments) in Kenya

An even better example

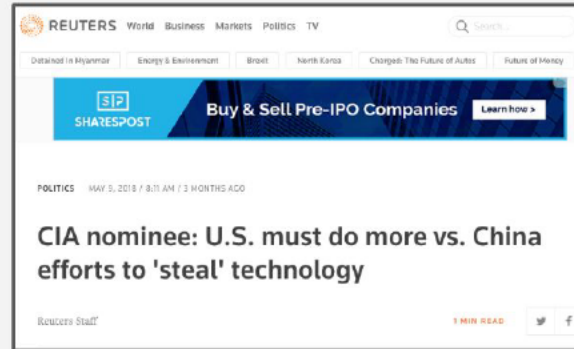
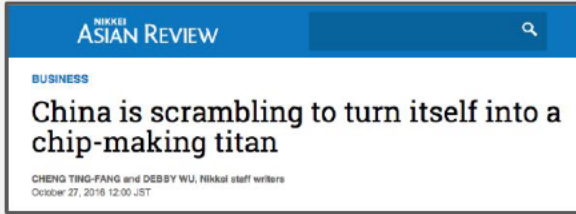
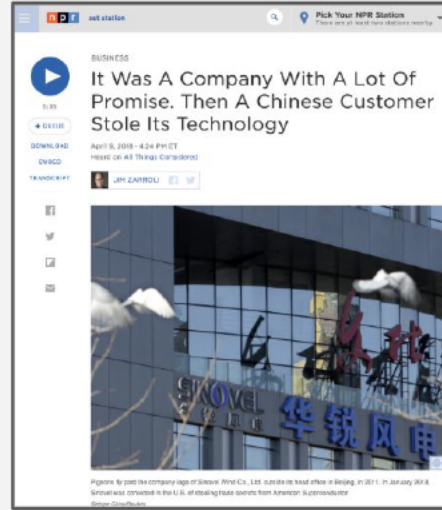
- Only 15-20% of Africans have bank accounts but 60-70% have mobile phones
- **Eighty-seven percent (!!!!!)** of the country's \$55-billion GDP passed through M-Pesa in 2014



11) Semiconductor Independence

ZTE: The Cautionary Tale of Semiconductor Import Dependency

- ZTE is one of the largest telecommunications equipment makers in the world. Consequently they're key to China's One Belt One Road initiatives to export infrastructure and grow China's geopolitical power.
- ZTE depends on chips from American companies to manufacture their products. So in the heat of the trade war, when the Commerce Department **banned US companies from selling to ZTE, they were forced to shut down their operations.**
- The ban was eventually lifted, but the situation underscored China's dependence on foreign chips.
 - **Historical Corollary:** Members of the Organization of Arab Petroleum Exporting Countries proclaimed an **oil embargo on the US causing a crisis in October 1973.** After the 1973 oil crisis, the United States Department of Energy and Synthetic Fuels Corporation was created to address the problem of fuel import dependency.



Semiconductors and Reunification with Taiwan

- Reunification with Taiwan is a non-negotiable issue for China. Deng Xiaoping proclaimed that China could wait 100 years to reunify.
- Taiwan is the 3rd biggest semiconductor maker in the world. The desire to lessen dependency on foreign rivals like the US and South Korea, could provide pressure for China to reunify with Taiwan sooner.
- A modern corollary is infrastructure One Belt One Road which aims to build eastwards. But needs to go through Xinjiang, home to a minority group that wants to secede from China.
- One Belt One Road provides more pressure to crack down in Xinjiang.

TPUs: An Obvious Target for IP Transfer

- *“As a result, in order to comply with Chinese law, AWS sold certain physical infrastructure assets to Sinnet, its longtime Chinese partner.” -AWS Spokesperson*
 - To be clear this is not IP transfer (yet) AWS still has owns and controls all of their tech, but they have taken the first step down what could be a slippery slope.
- **If we take Amazon’s approach, we need to situation plan for the possibility where we are asked to give TPU technology to a local partner company.**
- Regardless of if this materializes, the perception risk in policy circles is guaranteed -- In March 2017, **50 US lawmakers wrote a letter to China’s Ambassador to the US** expressing concern about Chinese regulations around forced collaboration with rivals and technology transfer in cloud computing.



Cartoon thief stealing TPUs for comedic relief :)