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Entertainment & Internet

Needham Insights

Providing in-depth analysis of significant industry issues

Thought Leader Series

The Future of TV: Mobile, Live, Immersive, Social

Our research coverage focuses on the intersection of technology, consumer adoption, and economics. The US TV ecosystem is an excellent case study of the interplay of these three dynamics.

Device Proliferation (Technology). Consumers are adopting an ever broader range of devices, which are creating "new windows of time" for video consumption, both inside and outside the home. The average US household now has over 7 active devices in use each day, with 6% of households having more than 15 active devices. Globally, devices used per capita are projected to grow by 55% from 2.2 in 2015 to 3.4 by 2020, and faster in the US. Devices monetize at different rates and content consumed also differs by device. Apple is a pure-play mobile platform company that targets the wealthiest 15% of consumers worldwide, yet it trades at a P/E of only 11x.

Viewing Shifts (Consumer Adoption). Video audiences are more global, more mobile, and more selective. Live TV consumption by US adults averaged 4 hours and 31 minutes per day in 1Q16, flat year over year (Nielsen), although demo shifts are key and connected devices add time. For example, viewing by teens of TV content on a TV fell by 6 hours/week while smartphone viewing of identical content rose by 7 hours/week between 2011 and 2015. Mobile is a "must buy" for advertisers to reach young audiences. With 92% of users and 84% of ad revenue from mobile, Facebook is a "must-buy" for mobile advertisers.

Marketplace Trends (Economics). We calculate that OTT adds $4-8B/year, plus the recent TV upfront implies that incumbent content conglomerates will report $1B higher revenue in the next TV season. After a decade competing, YouTube will represent only 4% of total US TV revenue in 2016. Most digital competitors, including YouTube, will lose money in 2016, which elongates the incumbents' ability to experiment with new content and distribution bundles designed to re-engage younger viewers. We are most positive about the market position, leadership, and libraries of CBS and SNI.

Relevant disclosure information begins on page 22.

Executive Summary

Summary stats and conclusions from this report include:

- **Technology.** Mobile data volumes rose by 60% year over year between 1Q15 and 1Q16, driven by smartphone adoption and video consumption, according to Ericsson. Cisco estimates that video will represent 80% of global Internet traffic by 2020.
- **Consumer Adoption.** Unique aspects of smartphones include: 1) they are always on; 2) they are always with the person who owns them; and 3) they are virtually never shared. Millennials say they are twice as willing to share their toothbrush than their smartphone. Because smartphones can be used out of the home, this creates "new windows of time" for content viewing, although videos viewed on small screens are typically short-form, 1-5 minutes long.
- **Economics: Valuation.** Companies with potential upside from global revenue streams will be valued 10-50% above companies limited to revenue sources from within a single country's borders, we believe. Additionally, we expect companies that have two revenue streams to command 30% valuation multiple premiums above single-revenue stream business models.
- **Economics: OTT.** Netflix, Hulu+ and Amazon Prime will represent an extra $4-8B of revenue to the $150B US TV ecosystem in 2016, we estimate.
- **Economics: Few Winners.** Digital ad markets are "winner-take-most" markets. The 10 largest online companies garnered 75% of total online ad revenue in 4Q15, about flat over the past decade. Online video is similarly concentrated with YouTube at 33% and FB at 10% of total digital video viewing minutes among adults 18 to 49 years old.
- **Economics: Platforms.** We calculate that content companies earn $0.30 per person for each hour of content viewed on linear TV. This compares to $0.11 per person for each hour of content viewed on Netflix and $0.03 per person per hour for content viewed on YouTube. The most revenue upside should accrue to US content companies that treat small screens as an adjacency to the $0.30/person/hour (dual revenue stream) linear TV platform.
- **Economics: Reach.** The top 20% of heaviest users of TV represent 52% of total TV minutes viewed. Digital media is much more concentrated, with the heaviest 20% of users (i.e., power users) representing 87% of total minutes of streaming video viewed on a PC and 83% of video minutes viewed on a smartphone. By implication, the high concentration of power users on digital platforms (i.e., narrowness of reach) negatively impacts their advertising attractiveness.
- **Economics: Personal.** Because smartphones are always with their owner and these devices are personal, this creates options for new types of content that could never exist in the home environment, where more than one person is often watching the TV simultaneously. Personalized content and advertising suggests greater targeting and pricing upside.
- **What's Next?** Technology supercharges corporate lifecycles. Ubiquitous mobile device adoption by consumers threatens revenue of companies dependent on desktop revenue rather than mobile. Ad blocking endangers many internet sites' revenue growth. In the video marketplace, we believe economics will be driven by engagement length, which in turn will be tied to immersive (i.e., mobile and social) content optimized for each device and consumer use case.
- **Unbundling** destroys $100B of market capitalization and even more value for consumers as channels below the top 50 disappear, we calculate. (Please see our report entitled "Valuing Consumers' TV Choices.")

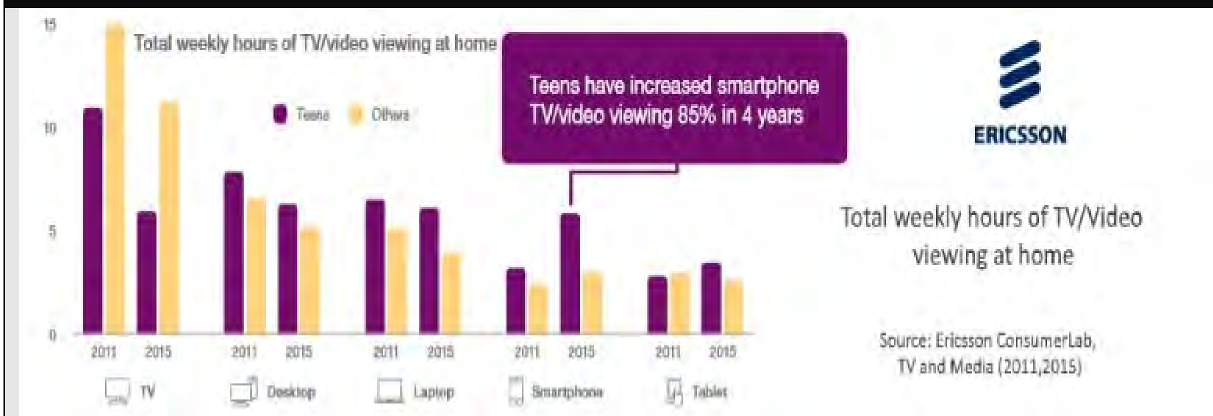
Cover photo credit: ©iStockphoto.com/PetarChenaev

Technology: Device Proliferation

Consumer adoption of new screens has been nothing short of breathtaking. A 3Q16 study by Sandvine concluded that the average household in North America uses 7 active devices every day, with 6% of households reporting 15 devices used daily. They also found that laptop and desktop PC usage has fallen to 25% of traffic while mobile has grown to 30% of North American fixed internet traffic, up from 9% in 2011.

Similarly, a recent Ericsson study, which analyzed 9 different countries (including the US), documented a shift away from the device called the TV toward the device called the smartphone, especially for teens. Globally, viewing of TV/video content on a television halved among teenagers between 2011 and 2015, falling to around 6 hours/week, while smartphone viewing of TV/video content more than doubled to 7 hours/week. Importantly, these young viewers are watching more TV/video content, but across a wider array of screens. Globally, 80% of TV/video content consumed by teenagers in 2015 was on a device other than the television (see Figure 1).

TV/Video Viewing by Device ***Figure 1***



Source: Ericsson ConsumerLab, TV and Media Viewing.

Device proliferation for video viewing is expected to accelerate:

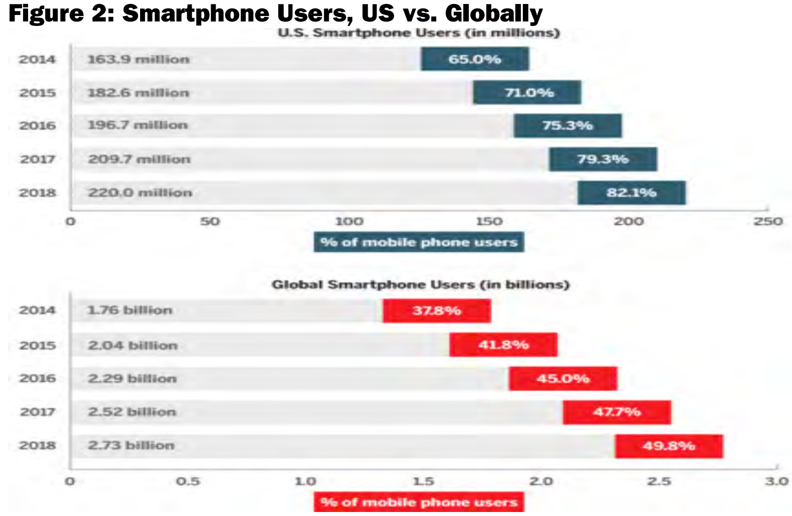
- **Device Proliferation**. Cisco's Visual Networking Index (VNI), published in June 2016, projects that: 1) devices used per capita will grow from 2.2 in 2015A to 3.4 by 2020E, and higher in the US; and 2) global IP traffic will nearly triple, growing at a compound annual growth rate (CAGR) of 22% between 2015A and 2020E, driven by mobile video consumption.
- **Smartphones**. Ericsson projects that 5 years from now (i.e., 2021), 90% of global mobile data traffic will be on smartphones (not tablets or laptops). Similarly, Cisco's VNI projects that by 2020, 71% of total IP traffic will originate with non-PC devices, such as tablets and smartphones, up from 47% in 2015.
- **Mobile Video** will continue to be the dominant consumer use case. Cisco's VNI estimates that digital video will increase four-fold between 2015 and 2020 and that online video will represent about 80% of global Internet traffic by 2020, up from 63% in 2015. It projects 3 trillion Internet video minutes viewed per month globally by 2020, which is 5 million years of video viewed per month. Ericsson projects that smartphone video growth will drive a 10-fold increase in mobile data demands (to 52 ExaBytes a month by 2021). Ericsson expects compound average growth of 55% for video data and that 70% of total mobile data traffic will be related to video by 2021, compared to the next largest volume driver, social media, which will be only 10%.

Smartphones Create a Global Distribution Network

Smartphones represent a globally-scaled distribution platform that has an option on global revenue streams. Unique aspects of smartphones include: 1) they are always on; 2) they are always with the person who owns them; and 3) they are almost never shared. According to a Mobile Life Report released in June 2016, millennials are twice as willing to share their toothbrush (9%) than their smartphone (5%). Implications of Figure 2 include:

- Total smartphone users globally will reach 2.3B in 2016. US users will account for less than 10% of the global total in 2016, at about 200MM.
- Smartphones represent new windows of time for video consumption, but they also fracture audiences away from the TV screen. This makes consumers harder to reach so broad reach becomes more valuable.
- Companies with potential upside from global revenue streams will be valued above companies gated by revenue from within a single country's borders, we believe.

Figure 2: Smartphone Users, US vs. Globally



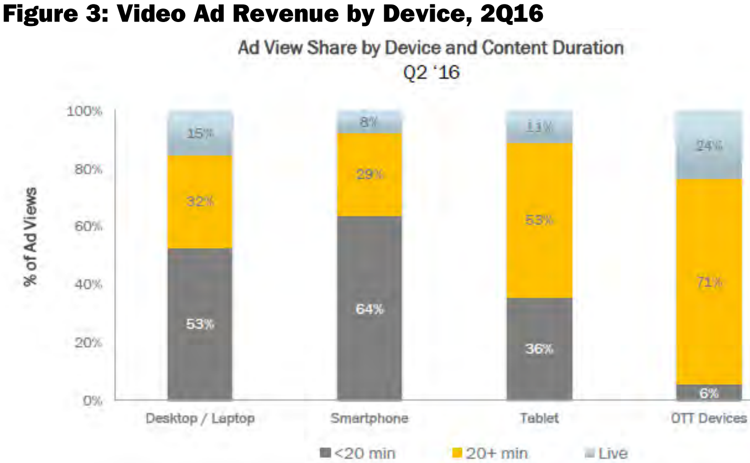
Source: Media Strategies 360, 12/15.

Economic Implications of Device Proliferation

There are important economic implications of consumers adopting a broader array of devices to watch video content, because different devices monetize differently. In addition, the length and types of video that consumers watch differ by device. Figure 3 from FreeWheel shows that:

- Smartphone monetization (column 2 of Figure 3) comes primarily (64%) from ads shown in video content that is shorter than 20 minutes long, such as YouTube and user-generated videos.
- In contrast, monetization on OTT devices (far right column) like Roku and AppleTV come primarily (71%) during video content that is longer than 20 minutes, implying traditional TV shows and films.

Figure 3: Video Ad Revenue by Device, 2Q16



Source: FreeWheel Video Monetization Report, 2Q16.

Investment Conclusions. We calculate that US content companies receive approximately $0.30 of revenue/hour/person of linear TV viewed, compared with $0.11 of revenue/hour on Netflix, versus $0.03/hour on YouTube. (Please see our "Future of TV: Follow the Money" report dated December 10, 2015 for this calculation.) The most revenue upside will come to US content companies that treat small screens as an adjacency to the dual-revenue stream $0.30/hour/person linear TV ecosystem, in our view. New forms of short-form content that are created specifically for the smartphone, especially when it pushes viewers back to linear TV, adds the most value, we believe. Finally, because smartphones are always with their owner and these devices are personal, this creates options for new types of content that could never exist in the home environment of the TV screen, which often has several people watching it simultaneously. Personalized content and advertising suggests greater targeting and higher prices per ad unit sold.

Stocks: We Recommend Apple (AAPL)

Consumers are creating a new global distribution network over connected mobile devices, primarily smartphones. We recommend investors have exposure to this important trend. AAPL is an arms dealer that dominates the wealthiest segment of this rapidly growing consumer market. We expect smartphone adoption globally to be a growing economic driver for video content and viewing, as well as other consumer-facing entertainment content like Pokemon Go, because AAPL gets 30% of its revenue.

Our research suggests that iOS platform churn is only about 12% annually, suggesting fewer competitive pressures, higher pricing power, more predictable revenue streams, and a halo effect that drives sister-device sales and higher ancillary revenue than AAPL's current share price implies. Through its iTunes store, AAPL takes 15-30% of any revenue earned on every iOS device, worldwide.

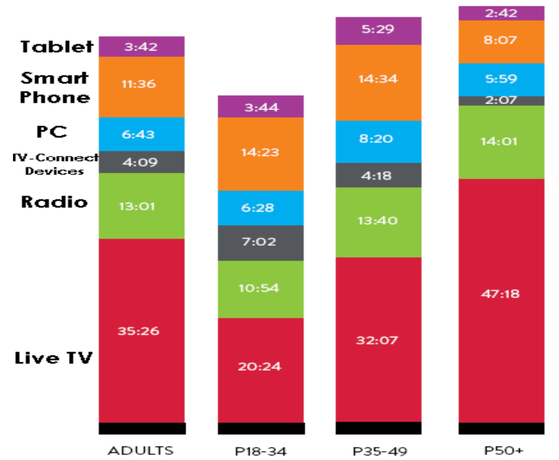
Valuation: Our AAPL FY17E P/E of 11x is less than half the current S&P 500 average of over 24x 2017E earnings, and AAPL's net cash balance of about $150B maximizes flexibility amid global economic uncertainty. Downside protection for shareholders is enhanced by AAPL's 2.1% dividend yield, 9% FCF yield, and the fact that AAPL is repurchasing shares, which shrinks claims on future earnings and implies a floor under its share price.

Consumer Adoption: Viewing Shifts

Paths to the consumer are proliferating, driven by technology. Although total viewing of TV and film content (also called long-form premium video content) is growing, it is being spread across a myriad of devices, adding to measurement complexity, and downward pressure on ratings that have been largely offset by pricing increases to date. According to Nielsen's 1Q16 Comparable Metrics report:

- The average US adult (column 1) spends more than 75 hours each week on measured media, across all devices.
- TV still dominates media usage in the US, with the average US adult watching about 35.5 hours of live TV each week, representing nearly 50% of weekly media usage. Recall that DVR penetration in the US is only 50%, so half of US homes never record any shows for later playback.
- Column 2 demonstrates that US Young Adults (18-34) are device omnivores, using their smartphones about 14 hours/week, plus TV-connected devices 7 hours/week, plus their PC 6½ hours/week, plus tablets 3 hours and 44 minutes/week which together exceeds their 20½ hours/week of live TV viewing. Worse yet, their total media consumption time is about 15% below average, at about 64 hours/week.
- Column 3 shows that US Adults 35-49 (greatest spending power) consume 5% more media than average at about 78.5 hours/week, and TV represents 40% of their media consumption at 32 hours/week. Smartphones are next at 14.3 hours/week.

Figure 4: Weekly Hours:Minutes



Source: Nielsen, 1Q16, US only.

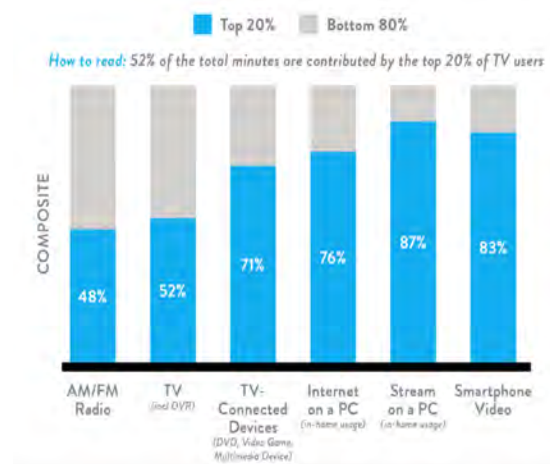
Power Users

A key insight is the influence of "power users." As shown in Figure 5, TV has much broader reach than other devices where power users dominate consumption. That is:

- 52% of total TV minutes are contributed by the top 20% of TV users.
- 83% of minutes are contributed by the top 20% of users who watch video on their smartphone.
- 87% of minutes reported are contributed by the top 20% of users who stream video on a PC.
- 71% of minutes consumed are contributed by the top 20% of TV-connected device users.

By implication, the narrowness of reach negatively impacts the advertising attractiveness of digital platforms.

Figure 5: Power Users Dominate Time



Source: Facebook and Millward Brown, 2014.

The Rise of Live Viewing

We believe that video consumption is in the midst of a long-term pendulum swing toward authenticity. This pendulum swing began with reality TV, then YouTube, and now live streaming. Recent examples that underscore the rising adoption and value of live video include:

- **CBS Live.** CBS's show Big Brother has four live camera feeds running all the time over the Internet, which users can watch through CBS All Access, CBS's OTT service. CBS has seen hours watched (i.e., engagement) rise meaningfully. Viewers come to OTT and they watch every move these people make. CBS's experience is relevant to all other US media conglomerates, as it supports our view that content that is immersive on all platforms will garner the most audience adoption and economics.
- **YouTube Live**. From Google's 2Q16 earnings transcript, YouTube is the first major platform that supports live content in 360 degrees, and live-stream time has increased 3x since the beginning of 2016. On August 30, YouTube stated that live video postings rose 130% year over year and live video views rose 80% year over year in August, and that the top-rated live program was the UEFA Champions League final, which had 2.2MM viewers.
- **Facebook Live.** We cover Facebook and we think what FB is doing in live video is particularly interesting. During December 2015, Facebook reported having 8B daily video views (3 seconds or more), about double the year-earlier period. Growth is being driven largely by live video viewing. FB has stated that users will spend 3x longer (on average) watching a live video than a pre-recorded video. FB is paying media companies to broadcast live on the FB platform. As a result, FB will make Live videos appear higher in News Feed when those videos are actually live, compared to after they are no longer live. Another growth driver is that the number of videos posted per person on FB rose by 75% globally and by 94% in the United States in 2015.
- **Convention Stats**. Facebook Live showed 28MM Live Video streams during the Republican and Democratic conventions, in partnership with ABC News. In addition, YouTube had 9MM live streams from the two conventions, each with an average 25 minutes of viewing time. By contrast, ABC News' live linear TV viewing (excluding DVRs) of the Republican National Convention reached an average of 17MM adults aged 25-54 over the four days, according to Nielsen.
- **US Politics.** On June 22, U.S. House Democrats live-streamed their gun-control sit-in on Periscope and Facebook Live, from the US House of Representatives, to advocate for a vote on gun control.

Facebook Ties Economics to Live Video

FB is in beta to insert mid-roll video ads into live video streams. Specifically, FB is currently allowing a handful of publishers to insert ads into their live video streams. The ads may be inserted any time after 5 minutes into a live stream and they may last up to 15 seconds. Publishers may turn it off, and can control which advertising categories they allow during their streams. FB shares this ad revenue with the publisher (i.e., content creator).

What's Next? Immersive and Omni-Channel Content

Because smartphones are always with their owner and always on, this creates new windows of time to engage audiences. Content that is omni-channel should have a competitive advantage over content that is only available on a subset of devices because it can engage its fans all day. Brands tell us that identical social content does not work equally well across FB, Instagram, Pinterest, SnapChat, etc. We expect this to be true for video content as well, suggesting that teams of 1-3 people must be dedicated to editing TV content into shorter clips to maximize engagement across each digital device. We expect different lengths, genres and interactivity levels to work better on different video sites.

The best example (our view) of an immersive content strategy today is World Wrestling Entertainment (WWE). WWE has an OTT channel that costs consumers $10/month in addition to 5-7 hours/week aired on US linear cable TV channels, plus it has the top sports channel on YouTube. WWE's content strategy is to create unique WWE content optimized for each distribution platform. WWE fans have 360 degrees of content (i.e., immersive) but no two platforms show identical content. WWE maximizes revenue per hour by optimizing content and length (i.e., slicing their content) for each device. They avoid commoditizing their content by never putting identical content on multiple platforms. In 2015, by our calculation, WWE garnered $0.67/viewer hour from its OTT platform, $0.12/viewer hour from its linear TV deals globally, and $0.06/viewer hour from YouTube. Interestingly, WWE reported 7.3B streams viewed globally on YouTube in 2015, but got paid only $7MM for these.

Rapid Adoption of "Authenticated Viewing"

Our work calculates that content companies are paid approximately $0.30/hour/person for their content when it is viewed on linear TV. This is nearly 3x higher than what Netflix pays them per hour at $0.11 and it is 10x higher than $0.03/hour paid for average content viewed on YouTube. A key value driver of the superior economics of the linear TV ecosystem in the US is payments to content owners from satellite, cable and telcos, which represent about one-half of the total revenue, or about $0.15/hour of content viewed.

TV Everywhere

In reaction to consumer-facing services that aggregate film and TV libraries, such as Netflix, MVPDs (multi-channel pay TV distributors) have put thousands of hours (Comcast has 20,000 hours) of video-on-demand (VOD) content behind its pay-wall in a product called TV Everywhere (TVE). TVE is the ability for a consumer to watch linear TV on any device, inside or outside the home. We believe the TV Everywhere product adds to consumers' price/value assessment of the TV bundle, especially for young viewers. We calculate that the value of every "saved" 24-year-old that subscribes to a cable, telco or satellite TV service when he/she forms his/her first independent household is approximately $40,000 of revenue to the TV ecosystem over their lifetime (calculated as 50 years of TV subscription fees times $70/month). If TV Everywhere helps "save" 5% of TV households that would have otherwise defected, TV Everywhere adds $4.2 billion for each year that it elongates TV ecosystem subscriptions (100MM multi-channel households x 5% x $70 per month x 12 months per year).

According to a FreeWheel whitepaper, based on 55 billion online video views during 1Q16:

- **Consumer Adoption.** 72% of all "TV-style" viewing online happens via authentication and authenticated viewing grew 142% year over year in 1Q16. Offering consumers a show's full library (like Netflix does) drives 4x the audience and 50% more viewing than offering only a handful of episodes (like Hulu) at a time, and audience size doubles in returning seasons compared to programs in their freshman season.
- **Economics.** Authenticated economics reached an all-time high in 1Q16 with almost 3 of 4 ad views now coming from "behind the pay wall." Authenticated users are much more valuable to content owners as they get 2x more ad views (i.e., revenue) than unauthenticated users. An authenticated viewer sees an average of 24 ad views per session, more than 2x higher than a non-authenticated user's 10.6 ads per session viewed.

An Adobe study concluded that authenticated viewing grew 58% quarter over quarter between 4Q15 and 1Q16, and rose 107% year over year. In addition, Adobe found that 72% of all mobile users only watch from a single location and, since most mobile video viewing occurs on Wi-Fi networks, Adobe concluded that single location was home. Adobe also found that in the average TVE household, 43% of access came from a smartphone, 38% from a PC, and 19% from a connected TV, implying that devices act primarily as extra screens inside the home used to watch TV and film content. What is driving authenticated viewing?

- **Live Sports** is FreeWheel's answer.
- **Binge viewing** is Adobe's answer. There is enormous value of in-season stacking rights and complete libraries of recent shows. The value of any individual episode is much higher if the earlier episodes are available, so consumers can discover a TV series at any time and then watch it from beginning to end. As evidence, a 1Q16 survey from E-poll Market Research found that 51% of Netflix viewers, 39% of Hulu users and 22% of Amazon users say that all-episode stacking rights are the most important reason they subscribe to the service.

Economic Impact of SVOD Entrants

Our math (see below) concludes that SVOD entrants add about $4-8B of revenue annually to the TV ecosystem in the US.

Economic Calculations

Methodology #1: Although consumers are rapidly adopting new screens and devices, the money from these new services goes largely back to the public US content conglomerates. By our estimates, US households paying for the linear television bundle in the US peaked at 100MM in 2012, and fell by 3MM to 97MM by 2Q16, implying $210MM lower revenue per month ($70/month x 3MM subs lower) to the US TV ecosystem. Offsetting this decline, Netflix reported that 47MM US homes paid an average of $10/month, or $470MM/month in 2Q16. In addition, FOXA disclosed that Hulu had 11MM US homes paying Hulu $9/month on June 30, 2016, implying revenue of about $100MM/month. Together, these 2 SVOD services are adding about $570MM of revenue monthly to the US TV ecosystem, partially offset by the decline of $210MM/month from fewer linear subs. This implies a net addition to the US TV ecosystem of about $4.3B of revenue annually ($570MM/month-$210MM/month x 12 months/year). By implication, household payments for SVOD services have been additive to the TV ecosystem, so far.

Methodology #2: SVOD services generally pay out 70% or more of their revenue to the large US content conglomerates to license their films, TV shows, plus library content. In total, we estimate that the largest digital distribution platforms represent $7-8B annually (5%) of the $150B of revenue that traditional US media conglomerates will report in 2016, calculated as follows:

- **Netflix** will generate $8.5B revenue in 2016, by our estimate, and has stated they expect to pay out $6B (70%) in content fees. The majority of this is paid to DIS, CBS, etc. for premium TV and film library content that is old (18 months to 40 years since initial release). Netflix is now trying to buy global rights, so we expect the amount it pays the traditional media companies to rise over the next 12-24 months.
- **Hulu** is owned by ABC/DIS, FOXA, and NBC/Comcast so its $2B content spending in 2016 is subsidized by the strategic goal that these traditional media conglomerates have to create a consumer-facing service that is better than Netflix in order to move much of Netflix's $40B market cap to Hulu and its owners. Time Warner announced in August 2016 that it had bought about 10% of Hulu for $583MM. Hulu's distribution "window" tends to be in the first 6 weeks after airing, much earlier than Netflix's distribution window (i.e., more expensive content rights). Hulu had 11MM paying subscribers in May 2016, priced at either $8/month including commercials or $12/month with no commercials.
- **Amazon Prime's** content budget of about $2B in 2016 is also spending on Viacom, CBS and other conglomerates' library product. The cost of a Prime subscription (which includes video for free) is $99/year. In April 2016, Amazon launched a video-only product ("Prime Video") for about $9/month, to better compete with Netflix. Our channel checks indicate that the consumer adoption of this new video-only service has been weak.

Why Isn't Money Moving to Digital Video Faster?

According to an IAB study of 194 small advertising companies and brands, in May 2016, there are several barriers that slow the transition of ad dollars out of TV and into digital video, including:

1. Uncertain ROI vs. TV
2. Poor (Uneven) Quality of Video Content
3. Lack of Audience and Campaign Measurement
4. Lack of Transparency in Buying Process
5. Complexity of Executing a Buy
6. Lack of Promotion of Video Content to Audiences
7. Video Ad Unit Lengths Are Too Short

Consumer Confusion

Content disaggregation drives slower adoption of digital video choices. The value in aggregation is that it lowers consumer confusion when they are searching for a specific title. Two to three years ago, a consumer could find most films or TV shows on Netflix. However, owing to fierce competition between Hulu, Amazon and Netflix for rights, the consumer now finds much less of what she/he wants on the first try.

This dis-aggregation problem for the consumer is exacerbated by the growing number of OTT channels, with hit content spread among them. For example:

- **CBS's** new Star Trek episodes will be available exclusively on its OTT All Access channel.
- **NBCU** launched the Seeso comedy OTT channel in January 2016. We estimate that Seeso has about 300,000 subscribers today, and is adding about 2,000 subscribers/day at a price of $4/month. At current subscriber levels, Seeso would report about $14MM of revenue in 2016.
- **The CW Network** announced that it is ending its relationship with Hulu and that, going forward, its current episodes of hit shows will be available exclusively through its own site called "CWTV.com" and its library titles will be available exclusively on Netflix.
- **Apple** is investing in videos that are strategically designed to highlight its streaming music service. For example, Apple has licensed the rights for a spinoff from CBS's hit late-night segment called "Carpool Karaoke," plus a miniseries tied to rapper Dr. Dre, plus a reality series entitled "Planet of the Apes."
- **Google/YouTube** is creating original programming for the first time.

App Proliferation

Because OTT channels are generally stand-alone services, this drives app proliferation on smartphones. Every content provider must create a different app for each device and screen size. Similarly, different TV apps are required for Apple TV, Amazon Fire, Google Chromecast, and Roku. Multiplied across smartphones, tablets, smart TVs and PCs, this confuses consumers (i.e., slows adoption) and the extra costs of creating apps for every platform and device lowers profits for content app creators.

Discovery Is Difficult

As the number of titles has grown, discovery has become a critical challenge for the online video ecosystem. The enormous volume of online video content coupled with its inconsistent quality turns new users away and shortens viewers' engagement. It takes too long to find the best videos, so viewers give up. Discovery is a core problem in the online video space.

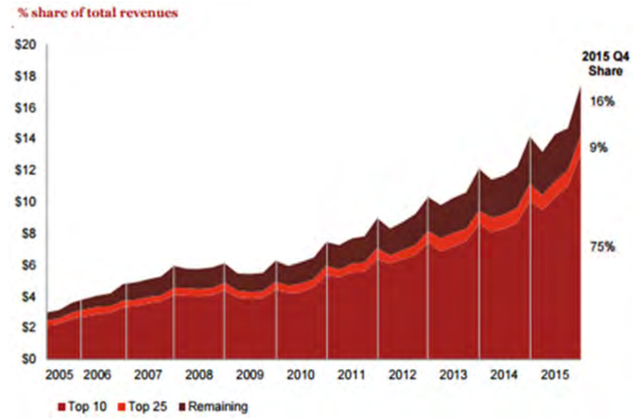
Social media is one solution to the discovery problem. Through sharing, social networks can surface the best short-form and long-form video content. When one person shares a video with 10 of his/her friends, only the best videos get pushed out to their 10 friends. A hit video can go "viral" (representing exponential growth) and reach millions of viewers within hours. A bad video does not get shared.

In addition to social media playing an important high-value-added role for the online video ecosystem, we think it also has a role to play for TV content. Twitter and Facebook can push audiences to live TV content in real time. In a world of expanding choices and growing competition for audiences, social media can direct millions of people to live linear TV content. Live viewing is the most lucrative for the TV ecosystem because it has full 14-minute ad loads.

Economics: Winner-Take-Most Markets

Digital markets are "winner-take-most" markets. For example, as shown in Figure 6, the top 10 internet companies (mostly Google and Facebook) commanded 75% of total digital advertising revenue. Interestingly, this ratio has been stable at 70% to 75% for the past 10 years.

Figure 6: Winner-Take-Most Markets



Source: IAB and PWC, 1Q16.

Video Economics. In digital video, the concentration of economics has proven similar. Digital video revenue has been growing at 35% annually, according to Magna Global, and YouTube commands about 30% of total revenue while Facebook commands the next largest slice at 10% of total.

Falling Company Formation

One of the unintended consequences of the enormous scale economies that accrue to digital marketplace winners is that new business creation in the US fell 30% between 2006 and 2015, and 2015 was the first time company formation was higher year over year since 2010, according to the Kauffman Foundation. They find this especially troubling because the US population between the ages of 25 and 55—historically the prime years for starting a business—is growing, according to the Kauffman Foundation. This data is consistent with Labor Department statistics that show that companies less than one year old only hired about 5MM workers in 2014, down about 30% from "normalized" levels of 7MM/year during the 1990s. Finally, according to the Brookings Institute, business closures started rising in 2005 and today outpace new business formation for the first time ever (since data collected in 1970).

Stocks: We Recommend Facebook (FB)

We believe social media companies can add value to both the digital video ecosystem and to the linear TV ecosystem by driving discovery of the best content available in the cluttered online video environment. We are buyers of FB, based on our belief that digital markets are "winner-take-most" markets and that FB is particularly well positioned owing to its 92% of users and 84% of revenue coming from mobile devices. Other FB investment positives include: 1) FB has an always-registered environment with real names; 2) FB is a closed platform (non-commoditizable); 3) FB has global revenue stream upside; 4) FB has ubiquitous distribution; and 5) FB has diversification optionality from new revenue streams such as video, payments, commerce, etc. We note that, today, the vast majority of FB's revenue is from the Facebook site. We are optimistic that FB's other apps, including Instagram, WhatsApp and FB Messenger, can be important contributors to revenue and profit growth over time.

Marketplace Trends: YouTube's Poor Economics

No conversation about the future of video is complete without a discussion of YouTube. YouTube didn't exist in 2004 and today it is the most successful digital video site in the world. Consumer adoption numbers are truly impressive. According to YouTube, in July 2016:

- YouTube had over 1.3B users;
- 900MM hours of videos are watched on YouTube each month;
- 20% of YouTube views are in the US; and
- More than half of YouTube views come from mobile devices, and YouTube's mobile revenue was up 2x year over year in 1H16.

Miserable Economics

According to press reports, YouTube's revenue was about $4B in 2015 and the annual cost of running and maintaining YouTube was about $6.4B. If these numbers are accurate, this implies that YouTube loses money as a business, with profit margins of *negative 60%*. Recall that YouTube typically keeps about 45% of ad revenue and pays out the balance to content owners.

Historically, YouTube's advertising growth has been stymied by its inability to monetize much of its traffic because either its videos are too short to include ads or YouTube's content is too risky for brands because it is user-generated.

In March 2016, eMarketer published YouTube's net revenue trends for the US and offshore. Key takeaways from Figure 7 include:

- YouTube's net (45% of total) US ad revenue will reach $2.89B in 2016, suggesting that its total US ad revenue will be $6.4B.
- In 2016, US linear-TV advertising revenue will reach about $70B and total revenue (including subscription revenue) will be approximately $150B, according to PWC.
- By implication, after 10 years in the marketplace, YouTube will represent about 9% of US TV ad revenue, and 4% of total US TV revenue, in 2016.
- These anemic economics undermine YouTube's ability to disrupt the US TV ecosystem.
- YouTube's revenue growth slowed dramatically (to 21%) in 2016, about half of 2015's 41% growth rate, according to Figure 7.
- From an aggregate dollar point of view, eMarketer projects that YouTube will grow its revenue by about $1B globally to $5.18B in 2016. By contrast, Magna Global projects that national TV advertising in the US alone will increase by $2B in 2016. This implies that the economic gap between linear and YouTube will widen in 2016.

Figure 7: YouTube Ad Revenue

YouTube Net Ad Revenues Worldwide, US vs. Non-US, 2014-2016
billions and % of total

	2014	2015	2016
US			
Net ad revenues	$1.53	$2.22	$2.89
—% of total	50.4%	51.9%	55.8%
Non-US			
Net ad revenues	$1.51	$2.05	$2.29
—% of total	49.6%	48.1%	44.2%
Worldwide	**$3.04**	**$4.28**	**$5.18**

Note: net ad revenues after company pays traffic acquisition costs (TAC) and content acquisition costs (CAC) to partner sites; includes banners, rich media, search and video ads
Source: company reports; eMarketer, March 2016

Influencer Networks

Because YouTube keeps 45% of advertising revenue, a new ecosystem of influencer companies is growing. These (mostly small) companies allow YouTube's content creators to attract marketing dollars from brands. Content creators keep 100% of this revenue.

Does OTT Threaten YouTube?

According to a Stream Daily whitepaper published in June 2016, the most significant growth in OTT has been seen in people subscribing to two OTT services, which has increased from 16% in December 2015 to 19% in June 2016. Survey results concluded that this trend is hurting YouTube's viewing and economics, especially millennials (i.e., 18-34 year olds). Specifically, the report found that it is mostly millennials who are doubling up on their OTT subscriptions (i.e., "cord-nevers") and when they do, they abandon YouTube and prefer to watch premium long-form content over OTT devices like Roku and AppleTV. According to the report, the number of people who said they consume most of their online video content on YouTube dropped by 4%, compared with viewers with OTT viewing, which rose 5% between December 2015 and June 2016.

We have three key takeaways from this work:

- YouTube is the standard bearer for digital video. It is the largest, most well-known, and economically strongest (revenue of over $4B in 2015) potential digital disruptor in the marketplace. If YouTube (after 10 years) loses money on a global basis, what chance does it, or any other digital video company, have of disrupting the lucrative US TV ecosystem? The lack of monetization on digital platforms makes digital entrants weak competitors to the linear TV ecosystem in the US.
- Our work calculates that content companies are paid an average of approximately $0.30/hour/person for their content when it is viewed on linear TV. This is about 10x higher than the economics at $0.03/hour/viewer of content viewed on YouTube. Until the economics of YouTube improve, we think the traditional media conglomerates are likely to use YouTube primarily as a marketing platform to push viewers back to their dual revenue stream linear TV bundle.
- By implication, if TV economics are disrupted, it is more likely to come from TV and film companies putting identical content on lower value platforms, thereby retraining consumers to pay lower rates (through lower subscription fees and/or lower ad loads) for premium long-form content.

Marketplace Trends: OTT Ecosystem Update

Skinny Bundles

There are a growing number of skinny bundles (also called "virtual MVPDs") in the marketplace, although growth is slower than anticipated owing to suboptimal economics:

- **Dish Network's Sling TV** skinny bundle was launched on February 5, 2015 at $20/month. It had 700,000 subscribers at June 30, 2016, implying $168MM/year ($20/month x 700,000 subs x 12 months/year) of revenue from this product. Dish recently introduced a second skinny bundle package choice, anchored by Fox channels.
- **Sony Corp.'s PlayStation Vue** is priced at $30/month (or $40/month including live local stations). It had 100,000 subscribers at June 30, 2016, implying $36MM/year ($30/month x 100,000 subs x 12 months/year) of revenue from this product.
- **Hulu TV** (owned by FOXA, DIS, CMCSA) has announced it will launch a skinny TV bundle in 2017 for about $40/month. It has no subs today for this product.
- **AAPL.** Noticeable for its absence is Apple, which has been trying to get a TV bundle launched for years. We estimate Apple generates $1 billion in annual sales from Apple TV, but this is far below AAPL's ambition.

A La Carte OTT Channels

A few channels from the US linear TV bundle have launched OTT services. Generally, we believe that marketing costs are higher and consumer adoption is slower than expected. Data for a selection of the largest OTT channels, where we have good subscriber numbers, include:

- **CBS All Access** (launched in October 2014 and priced at $6/month) plus **Showtime OTT** (launched in July 2015 and priced at $11/month) had approximately 2MM subscribers in June 2016, split about evenly, according to CBS. This implies total annual revenue of about $200MM.

- **HBO Now** was launched on April 7, 2015 and as of March 30, 2016, management stated that it was "nearing" 1MM subscribers at $15/month, implying total annual revenue of about $200MM.
- **WWE Network** was launched in February 2014 and in 2Q16 averaged about 1.5MM paying subscribers globally, each paying about $10/month. This implies total annual revenue of about $200MM. Despite a passionate fan base and 5-7 hours of programming on linear TV each week with Raw and SmackDown (which gives WWE free promotion time to millions of wrestling fans every week), marketing costs have been well above budget and it has proven expensive to find the 2-3MM folks in the world that might want to pay $120/year for the WWE OTT channel.

MVPDs Coming to OTT

MVPDs have a better idea of who to market to inside their own footprint, we believe. This should lower their marketing costs in the US compared to any content company's OTT service while retaining upside optionality from global revenue streams. Several examples of US MVPDs introducing OTT services include:

- **Cox's Glosi.** Cox has announced that it will launch an ad-free SVOD service named Glosi, which targets the Latina market, with "thousands of hours of classic shows and exclusive content." Glosi price point is $9.99/month. Over time, Cox could use it as an incentive to upsell faster internet speeds in Cox's core high-speed-data business. Anyone with an internet connection can subscribe for Glosi.
- **Comcast's Stream TV** is positioned as a Netflix killer with live TV, 20 hours of network DVR storage, plus on-demand content at $15/month inside the Comcast footprint. Stream TV is not an Internet service because only existing Xfinity broadband customers have the option to buy it. Another important limitation is that, though Stream TV can be watched on any device (smartphone, tablet, laptop, etc.), it can only be accessed while inside the home.
- **DirecTV** has announced that it will launch three new Internet services by December 31, 2016.

Bundling Economics Are Powerful

Our work shows that about $100B of market capitalization is potentially at risk if the US TV ecosystem unbundles. The value loss is even higher for consumers. (Please see our report entitled "Valuing Consumer TV Choices" for calculation details.) Consumers lose more than companies because every US home watches 18 channels every month (stable for nearly a decade), according to Nielsen. Our work calculates that only 50 channels would survive in an unbundled world and every home watches 8-12 channels below the top 50 largest channels, so although each home may save money, there will be no more niche (i.e., passion) channels such as Golf, Fly Fishing, Military, History and most foreign language channels. Also, consumer option value is maximized because consumers today can simply change the channel to watch new hit shows. Unbundling destroys consumer option value faster than companies' profits decline, we believe.

Why are bundling economics so powerful? Quoting from a new book (August 2016) we recommend from MIT Press entitled *Streaming, Sharing, Stealing* by Michael Smith and Rahul Telang, "When media products are sold individually, specific consumers assign radically different values to each. Bundling multiple products allows a seller to set the price at the average value. Not everyone assigns the same values to the same titles but in a large bundle the individual values average out." Bundles drive MORE long-tail content in an effort to attract the next viewer to the bundle.

What's Next? Consumer Confusion Suggests Inertia

Although consumers are demanding a broader array of choices, we expect a la carte and skinny bundle channel offerings to account for less than 20% of US subscription revenue, and less than 10% of total revenue (including advertising), at maturity. Why? Because part of the success of Netflix and Hulu and Amazon Prime are that they are large bundles of media. As the aggregators become unbundled into dozens of a la carte channels, choosing among hundreds of total channel choices is hard work for consumers. It creates a "Tyranny of Choice."

Academic research indicates that too many choices lowers consumer value:

- In 2004, Barry Schwartz wrote a book entitled *The Paradox of Choice: Why More Is Less,* in which he concluded that having too many options to choose from often leaves consumers bewildered and less satisfied if they do actually make a purchase decision.
    a. One of his key insights is that too many choices often produces paralysis. Consumers simply don't decide at all. They chose nothing, because they fear making the wrong choice.
    b. If they actually reach a decision, too many choices often make them second-guess whether they made the right decision after all, thereby lowering satisfaction of any purchase decision made.
- Professor Sheena Iyengar of Columbia Business School has spent her academic career studying the value created by choice. In her 2010 book entitled *The Art of Choosing,* she includes a now famous experiment where she alternated offering tastings of a large assortment of jams (24 of the 28 total flavors made by Wilkin & Sons), followed by a small selection of only six jams, and found that when consumers went to the jam aisle to purchase jam after the tasting, "People who had sampled the large assortment were puzzled. They kept examining different jars, and if they were with other people, they discussed the relative merits of the flavors. This went on for up to ten minutes, at which point many of them left empty-handed. By contrast, those who had sampled up to six jams seemed to know exactly which one was right for them. They strode down the aisle, grabbed a jar in a quick minute and continued with the rest of their shopping." In all, 30% of people who had sampled the small assortment decided to buy jam, but only 3% (1/10th) bought a jar after sampling the large assortment. In this case study, too many choices lowered revenue by 90%.

Many of the best marketers in America offer consumers three choices, such as small, medium, large, or tall, vente, grande, or bronze, silver, gold. Three choices is a recurring theme in marketing because it allows consumers to default to the middle choice. In TV, the middle choice has been called the "expanded basic" TV bundle, which more than 65% of US multichannel households subscribe to.

Conclusions: The notion that consumers will perceive they are better off (i.e., higher value) when their choices go from 3-5 TV bundle options to 300 a la carte channels is flawed, according to the academic literature. Too many choices overwhelm consumers and often leads to inertia and can lower economics by up to 90%.

Marketplace Trends: US Linear TV Advertising Robust

Downward pressure on US TV economics over the past 3 years has been caused, at least in part, by consumers watching TV content on a broader array of digital devices, both in and out of the home. These audience shifts were largely not measured by Nielsen until 2016. Now that Nielsen's Total Audience and Total Content ratings products are in the marketplace and comScore has initiated modem and mobile measurement products, we expect TV content viewing totals (and monetization) to rise by 10-15%.

Including incremental Olympics and political spending, national TV advertising revenue in the US is projected to grow by 5% in 2016 (to $44.8 billion), according to Magna Global. The outlook for 2017 is equally robust, based on "upfront" data points.

Upfronts

Each summer, 50-80% of total primetime advertising inventory is sold to advertisers "upfront" under contractual obligation for the next TV season (historically September-June). According to Media Dynamics, the 2016-17 US television upfront, which finished in July 2016, totaled $18.6B, up 4.5% year over year, representing an $840MM increase committed to TV channels that participate in the traditional linear TV ecosystem. Of this:

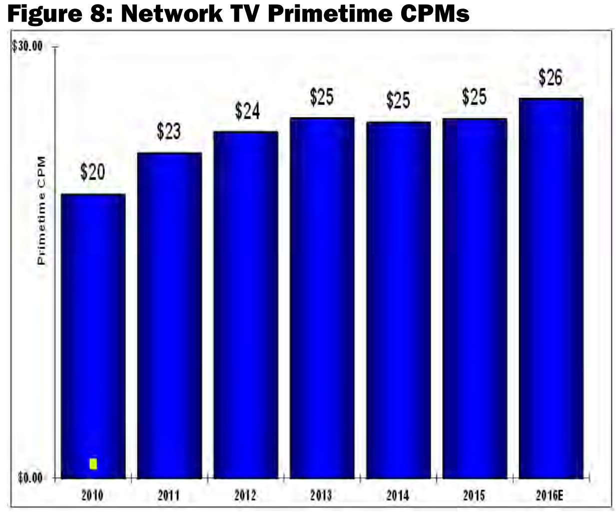
- The 5 Broadcast Networks (ABC, CBS, Fox, NBC & CW) totaled $8.75B, up $390MM (+4.5%) compared with last year's $8.36B.
- The Cable Channel upfront totaled $9.86B, up $410MM, (+4.2%) compared with last year's $9.45B.

After being down 2-4% last year, this year's upfront pricing was up double digits (10-12%) for many channels, and most networks sold more ad inventory, implying a tighter scatter market owing to less available ad inventory beginning this September. According to the Video Advertising Bureau, about 75% of upfront deals guaranteed viewers using live viewing + 7 days of DVR viewing (C7) as opposed to C3. Figure 8 includes the trajectory of Network TV Primetime pricing trends.

We believe that 2016's strong TV upfront is indicative of:

- The ability of TV to drive business results (i.e., higher sales);
- Advertisers putting a higher value on the broad reach of linear television;
- Nielsen's measurement currency across all TV channels and growing digital devices;
- Consistent, high-quality, long-form content;
- Full screen take-over for 30 seconds (i.e., no viewability or fraud issues);
- The effective emotional connection with customers on the big TV screen; and
- Economically, locking in pricing during the upfront represents protection against higher prices in the scatter market.

Figure 8: Network TV Primetime CPMs



Source: Nielsen: 2010-14. Needham & Company, LLC 2015 & 2016.

Stocks: CBS (CBS) and Scripps Networks Interactive (SNI)

Both CBS and SNI CEOs have outstanding records (based on one-year and five-year market capitalization growth), excellent programming teams, upward ratings momentum, a handful of "must have" channels that we expect to be included in every skinny bundle, and ownership of deep libraries of content that they can sell globally over all digital platforms, including smartphones. Both also have event upside potential.

- **CBS.** Premium content plus content libraries become more valuable as global markets add TV channels and digital distribution platforms proliferate, in our view. Downside protection, in the wake of Brexit, is provided by less than 15% of CBS's revenue coming from outside the US. In addition, CBS has been using its enormous FCF to pay dividends and to buy back its shares, which shrinks future claims on its earnings and creates a floor under CBS's share price. Event upside could come from CBS's spin-off of radio, a corporate reunion with Viacom, and/or a change of control at National Amusements (owner of CBS and Viacom).
- **SNI's** upside potential comes primarily from strong operating execution, in our opinion. For example, SNI has reached record high viewer ratings year over year at every one of its six US TV channels in each of the past two quarters. In addition, SNI's upfront for the 2016-17 season was very strong (up double digits), its advertising revenues rose 9% year over year in 2Q16 and 14% year over year in 1Q16. Millennial audiences rose 6% year over year in 2Q16 at Home & Garden, driven by strong growth in social media metrics on SnapChat and Facebook, and viewing time at Travel Channel rose 10 minutes year over year in 2Q16, suggesting SNI's immersive content strategy is paying off. Event upside is suggested because SNI is the smallest public conglomerate amid a rapidly consolidating US distribution ecosystem. SNI would have more negotiating power if it was part of a larger organization.

What's Next? Convergence of TV with Gaming

One of the things that makes the US TV ecosystem robust (our view) is that the number of participants is large and therefore experimentation is varied and diverse, well organized and well-funded. For example, in reaction to millennials leaving linear TV, Turner Broadcasting is fighting back by bringing successful digital video learnings to the linear TV ecosystem.

Bringing gaming to linear TV may prove to be an effective lure to entice young men back to the TV bundle. An interesting case study of how TV is learning from digital platforms follows:

- **PewDiePie.** The highest paid YouTube star is PewDiePie (real name Felix Arvid Ulf Kjellberg, age 26), who made $7MM in 2014 and $12MM in 2015. As of April 13, 2016, he had over 42MM subscribers, and he has held the top slot on YouTube since December 2013. His engagement (i.e., watch time) is also the longest on YouTube because he banters as he plays video games. Authenticity is paramount but his core competence is doing 50 things well that allow him to maintain a global fan base (i.e., a loyal audience).
- **Turner Broadcasting (TBS).** Faced with falling ratings and abandonment by the young men that Turner targets, on September 24, 2015, TBS announced a partnership with talent agency WME/IMG for a new eSports league. The league has 24 teams globally that compete in two 10-week seasons to win $1.4MM each season. Matches are broadcast live on TBS on Friday nights and simultaneously stream online on Twitch. Matches are physically played at Turner headquarters in Atlanta, and tickets are sold to the live event. On July 30, the Russian eSports organization Virtus.pro won the inaugural season of eLeague. Viewing stats were impressive with 19MM viewers on TBS's linear network, including 3.4MM first-time viewers of TBS, where Friday night ratings rose 97% year over year among men 18-34, because most eLeague viewers are millennial males (very valuable to advertisers). Social metrics were also impressive at 60MM interactions on Facebook and Twitter.

What's Next? Big Data in Video

One of the competitive advantages of digital platforms is the data they collect. This data can be used for targeting ads and products directly to specific consumers. Targeted ads should have pricing power and should annoy users less. Because we believe that personalization and targeting are key to maximizing the economics of digital video, we would highlight the following datapoints:

- In 1Q16, Hulu stated that it collects four petabytes of user data a day on what consumers are doing on Hulu. This represents 1B pieces of data each day.
- Adobe's 2016 Digital Trends survey (based on 7,000 marketing, digital and ecommerce professionals) concluded that data organization and usage is nascent, even at a time when most companies say they are building their ability to gather more data. Many companies are investing in systems that allow them to gather more data, but are not spending money on their ability to process or use the data they collect. We think this will change over the next 5 years.

Biggest Threats to Digital Video Economics

Not all revenue is equally valuable. Why? Because at identical industry maturity levels, Wall Street values multiple revenue stream business models above single revenue sources owing to diversification of risk. That is, because the future is uncertain, we note multiple revenue stream business models nearly always get a premium valuation multiple. We calculate that two revenue streams add about 30% to valuation multiples structurally.

Ad Blockers

A good example of why investors worry about the long-term viability of single-source revenue stream business models is ad blocking. That is, many internet companies rely exclusively on advertising revenue. According to a July 2016 IAB report, 26% of desktop users plus 15% of mobile consumers use ad blockers to remove ads from publishers' websites. An additional 17% of non-ad blockers were "at risk to start doing so" (i.e., using ad blockers). What surprised us most was that only one-third of ad blockers were "young" consumers (defined as ages 18-34), implying that ad blocking spans age groups. The IAB found that only 32% of the folks that used ad blockers were young men aged 18-34, and 22% were young women 18-34. As ad blockers become more widely adopted, 100% of many internet companies' revenue is at risk. If video ads are going to be blocked by consumers, this should slow the move of advertising from television to online.

Investment Implications. Ad blocking makes it less likely that the online video ecosystem will be a successful disruptor of the TV ecosystem, and increases the odds that the demise of TV (if it occurs) will come from TV incumbents by shifting viewing from their high-value linear TV viewing hours toward lower revenue digital platforms.

Password Sharing

According to our estimates, from its peak in 2012, when cable/satellite/telco operators had about 100MM subscribers, total US subs to the bundled linear TV ecosystem are down about 3MM to 97MM in 2016. As more channels go "over the top" (OTT), passwords can be shared.

In no case is password sharing a positive economically. Password sharing lowers the TAM (total addressable market) economics for any company. There have been many studies about how economically destructive password sharing might be.

- A Parks Associates study quantifies the risk at $500MM+ of revenue lost for Netflix and HBO from password sharing.
- A July 2016 study of 1,007 adults by IBM Cloud Video's Clearleap division found that 42% say they share their SVOD (like Netflix, Hulu, Amazon Prime, etc.) passwords with family members plus an additional 4% of subscribers share their password outside their family circle. 50% of millennials said they

have used someone else's password to watch SVOD services, and 6% of respondents admit to using someone else's password (which is technically against the law).

- That is, Netflix subscribers can create up to five profiles for each paying account. Netflix limit is based on folks using Netflix simultaneously. Netflix's $11.99/month choice allows for four devices to stream at the same time, whereas the $9.99/month choice only allows two users of Netflix simultaneously.

Valuation of TV vs. Video Revenue Streams

We calculate that content creators are paid an average of $0.30/hour/person of content viewed on linear TV. This falls to $0.11/hour/person viewed on Netflix and $0.03/hour/person viewed on YouTube. (Please see our "Future of TV: Follow the Money" report dated December 10, 2015 for this calculation.) In addition to inferior revenue per hour economics, the valuation multiple applied to digital revenue streams is lower than TV's. Why? Because the $0.30/hour/person paid to content owners from linear TV is from a dual revenue stream business model with both advertising plus subscription revenue, whereas digital revenue streams are typically *either* advertising or subscription revenue. When a content company that has the power of two revenue streams behind its content puts that identical content on a platform with a single revenue stream, it destroys value in three ways:

- It pushes viewing toward lower revenue per hour for that piece of content, which acts as a headwind to future revenue growth, and retrains consumers to demand a lower cost per hour of premium content viewed via lower ad loads or lower subscription prices.
- It lowers the value of the enterprise because it shifts consumption from a dual revenue stream business model toward a single revenue stream. We calculate that dual revenue stream businesses trade at a 30% premium to single revenue stream assets.
- It moves public content companies away from their enormous competitive advantage of having two revenue streams toward their digital competitors, who generally have only a single revenue stream (generally advertising or subscription), and self-destructs a key valuation advantage.

Appendix A

We are intrigued by innovation occurring in digital video. We recommend investors pay special attention to the following private companies.

	Alloy Digital is a multi-platform, next-generation video company targeting the highly coveted, early adopter 12-34-year-old demographic. It offers a top-10 video network, which delivers several hundred million monthly streams and includes award-winning Smosh, the #1 YouTube channel, as well as Shut Up! Cartoons.
	Big Frame is a leading media company in the YouTube video entertainment space, connecting advertisers with their highly engaged audiences. The biggest advertisers in the most competitive industries work with Big Frame to reach active, engaged and demographically focused audiences.
	BrightLine is the leading provider of rich media interactive advertising over televisions. It creates interactive TV experiences for advertisers, and gives advertisers the tools to design interactive video experiences over the TV screen, and in-App-based Smart TV environments. BrightLine uses proprietary data-driven design tools backed by 10 years and over 500 campaign executions.
	BuzzFeed is a social news and entertainment site, covering global media and technology topics, such as politics, DIY, animals and business. The site includes text and video, serious journalism, and fun and entertainment-oriented content. In video, BuzzFeed has created "The Creepiest Series" and "Fun Facts."
	Carbon Media Group connects advertisers with the largest digital audience of outdoor enthusiasts, in text and video. Carbon builds innovative production and creative services that help strengthen brands to ensure their online marketing campaigns are successful.
	Delivery Agent adds commerce to TV for the world's largest brands and media companies. Its proprietary technology allows viewers to transact directly from advertisements in television shows from both advanced television and mobile applications. It maintains long-term partnerships with NBC, FOX, CBS, HBO, Showtime, Pepsi, Visa, Comcast, Cablevision, AT&T, Verizon, Samsung, LG, etc.
	Extreme Reach is the leading provider of video ad management, delivery and measurement solutions across TV and digital media. Its cloud-based platform streamlines the execution and measurement of cross-media video campaigns from pre-production through campaign analytics, and is the only platform that integrates video delivery with talent payment and rights management.

eyeview	Eyeview is a video advertising technology company and the market leader in providing brands with ROI on their video advertising spending online.
grapevine	Grapevine is a YouTube influencer network that allows brands to find and pay YouTube content creators to create marketing content that reaches their fan base. Grapevine makes it simple and easy to find and manage the wide array of YouTube sponsorship opportunities. Grapevine is not a multi-channel network (MCN) and therefore is used as a compliment to MCNs.
interlude	Interlude makes interactive music videos. Viewers lean forward and engage, making choices that reflect their preferences and replaying the video multiple times to explore alternate paths. By combining the reach of digital video with the engagement of gaming, Interlude has created a new form of entertainment.
IZEA	IZEA connects brands with influential content creators and publishers. Its platform enables content marketing and influencer marketing at scale.
Kaltura open source video	Kaltura allows enterprises to upload videos to a centralized location and distribute them to multiple destinations, such as YouTube, Hulu and DailyMotion, at the click of a button. All public videos are automatically indexed by leading search engines, including Google and Bing. Kaltura has a leading in-player recommendation gallery and deep integration with discovery tools.
LittleThings	LittleThings is the only digitally native media property that scales uplifting content while influencing women across generations. Headquartered in New York City, LittleThings is the leading lifestyle destination for inspiring, uplifting, and engaging content.
MACHINIMA	Machinima is the world's most powerful and enthusiastic gamer network, providing gaming-focused programming to the 18-34-year-old male demographic. It reaches 190 million-plus unique gamers each month, with over 2 billion videos viewed. Its video content is distributed on YouTube, Facebook, Twitter, iOS, Android, and the Xbox 360. It produces high-quality editorial content and offers a suite of applications, tools and technologies that motivate and engage its audience.
MOAT	Moat develops technologies and products for brand advertisers and premium publishers. Products include Moat Intelligence and Moat Analytics. Moat measures viewability of the video ad units, so publishers can charge advertisers only for ads deemed "viewable" by Moat's measurement technology.

reelio	Reelio's mission is to make it easier for talented creators to support themselves on digital platforms through the video content they create. Reelio achieves this by connecting brands with YouTube creators who are interested in sponsorship opportunities. Brands can also post campaign opportunities to Reelio's Influencer Marketplace, where YouTube creators can review and apply to opportunities that interest them.
Roku	Roku is the market leader in streaming entertainment devices for TV, with 8 million units sold. It believes that consumers should be able to watch, listen and enjoy content on their TV, whenever they want it. Roku streaming players are renowned for their simplicity, variety of entertainment choices, and exceptional value.
SHAZAM	Shazam connects more than 350 million people, in more than 200 countries and 33 languages to music, TV shows and ads they love. Every month another 10 million people embrace Shazam, making it the world's leading media engagement company. Founded in 2002, Shazam is one of the world's most recognized mobile consumer brands and one of the Top Ten most downloaded apps on iTunes App Store.
Tastemade	Tastemade is a video network built for the mobile generation. It creates video content for all screens, from smartphones to connected TVs, and reaches a global community of 88 million people each month. Using Tastemade's platform, Tastemakers come together to discover and share their passion for great food and travel.
vevo	VEVO is the world's leading all-premium music, video and entertainment platform, available in the U.S., Australia, Brazil, Canada, France, Ireland, Italy, New Zealand, Spain and the U.K. through VEVO.com, the mobile web, mobile and tablet apps, Connected Television (Xbox, Roku) and user embeddable video players. VEVO is a joint venture between Universal Music Group and Sony Music.
videology	Videology simplifies big data to empower marketers and media companies to make smarter advertising decisions to fully harness the value of their audience across screens. Its math/science-based technology enables customers to manage, measure and optimize digital video and TV advertising to achieve the best results in the converging media landscape.

VUBIQUITY	Vubiquity is the leading global provider of multiplatform video services, helping to bring the most innovative, advanced video services into consumers' homes and onto their connected devices. Vubiquity offers the industry's most complete portfolio of multiplatform video services, including TV Everywhere, VOD, linear television delivery, advanced advertising and data analytics. Vubiquity gets its customers to market faster, at a lower cost, and with greater flexibility than they could on their own.
WIDEORBIT	WideOrbit is the leading provider of advertising management software for media companies. It provides innovative, proven solutions for managing the business of broadcast and cable operations, from proposal to order, scheduling to automation, billing and AR/aging. More than 2,700 television stations, radio stations and media networks around the globe use WideOrbit Traffic software and another 3,200-plus stations operate on WideOrbit Radio Automation platforms. WideOrbit software manages more than $30 billion in advertising revenue annually.

Disclosures

ANALYST CERTIFICATION
I, Laura A. Martin, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject company (ies) and its (their) securities. I also certify that I have not been, am not, and will not be receiving direct or indirect compensation in exchange for expressing the specific recommendation(s) in this report.

ANALYST CERTIFICATION
I, Dan Medina, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject company (ies) and its (their) securities. I also certify that I have not been, am not, and will not be receiving direct or indirect compensation in exchange for expressing the specific recommendation(s) in this report.

Companies mentioned in this report under coverage by Needham & Company, LLC:

Company	Symbol	Closing Prices 9/6/16	Rating	Disclosures
21st Century Fox – Cl A	FOXA	$24.42	Hold	B, G
Alphabet	GOOG	780.08	Buy	B, G
Amazon.com	AMZN	788.87	Hold	B, G
Apple	AAPL	107.68	Strong Buy	B, G
CBS	CBS	51.75	Buy	B
Cisco Systems	CSCO	31.87	Hold	B, G
comScore	SCOR	30.49	Suspended	B, G
Facebook	FB	129.73	Buy	B, G
Netflix	NFLX	100.09	Hold	B, G
Nielsen Holdings	NLSN	53.04	Buy	B
Scripps Networks Interactive	SNI	63.18	Buy	B, G
Time Warner Inc.	TWX	78.39	Hold	B
Viacom	VIAB	44.21	Hold	B, G
Walt Disney	DIS	93.80	Hold	B
World Wrestling Entertainment	WWE	20.96	Buy	B
Yahoo!	YHOO	44.71	Buy	B, G

	% of companies under coverage with this rating	% for which investment banking services have been provided for in the past 12 months
Strong Buy	5	12
Buy	62	17
Hold	30	0
Underperform	<1	0
Rating Suspended	<1	33
Restricted	<1	0

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Strong Buy: A security, which at the time the rating is instituted, we expect to outperform the average total return of the broader market as well as the securities in the analyst's coverage universe over the next 12 months.
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Hold: A security, which at the time the rating is instituted, we expect to perform approximately in line with the average total return of the broader market over the next 12 months.
Underperform: A security, which at the time the rating is instituted, we expect to underperform the average total return of the broader market over the next 12 months.
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