

THE FUTURE IMPACT OF E-COMMERCE ON THE ECONOMY

New economy, same old returns?

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IN BRIEF

We use three novel data sources to document the intensity and proliferation of e-commerce in the U.S. economy, its effect on corporations and its investibility through public and private markets. We find that:

- The extent of e-commerce adoption is substantially higher than official statistics suggest.
- E-commerce intensity tends to be positively correlated with corporate performance.
- There are regional and sectoral pockets in public markets that are e-commerce intensive.
- Private companies account for a nontrivial share of e-commerce activity.

For our long-term economic and market projections, these findings give us a higher level of confidence that technology adoption will raise productivity growth from current low levels, with greater benefits to firms levered to this trend. We also see private markets as an important channel by which investors can access technology-related growth.

Technology is a perennial theme in our long-term economic and market outlook. Relatively low rates of productivity growth over the past decade appear to imply either that the technological frontier is expanding at a less rapid clip or that firms have been slower to adopt tech innovations in their business practices. It has also led to speculation of a return to the productivity paradox of the 1970s and '80s - often linked to Robert Solow's quip "You can see the computer age everywhere but in the productivity statistics." We lean toward a more optimistic interpretation: Our economic projections implicitly assume that any fallow period in innovation and adoption, whether real or a figment of measurement, will prove transient. Moreover, we keep an open mind about upside risk to the outlook as productivity accelerates from its post-crisis lows.¹

Given the difficulty of forecasting productivity, how confident can we be in this sanguine view? And what are its implications for corporate performance and global asset classes? In this paper, we assess recent trends in technology proliferation from the perspective of the economy, firms and investors, using e-commerce as a case study. E-commerce, defined here as the absence of the consumer's physical presence in the negotiation of terms, placement of orders or payment for purchases, is by no means a comprehensive measure of technology innovation or adoption in the modern economy. However, it is a fairly broad aspect of the "new" economy and, crucially, it is something we are able to measure. We present three empirical proxies for e-commerce and use them to measure the extent and rate of e-commerce proliferation in the U.S. economy, gauge the effects it has on firms and describe how investors can access e-commerce in global markets.

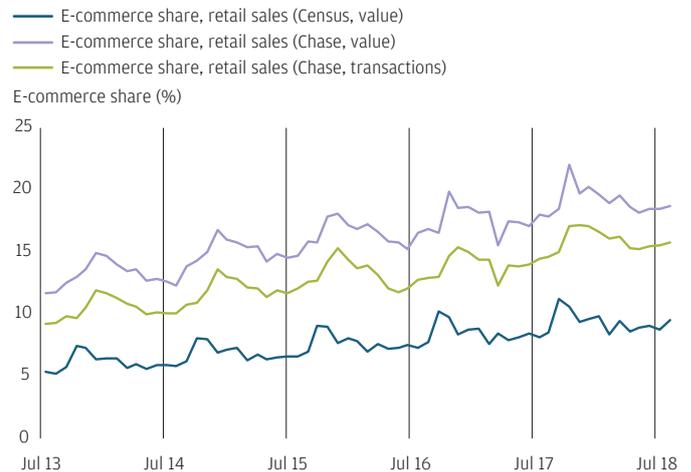
E-COMMERCE IN CONSUMPTION: MORE PREVALENT THAN OFFICIAL STATISTICS SHOW

The first piece of supporting evidence for our view that e-commerce proliferation has been rapid and broad comes from a proprietary measure using Chase consumer card transactions data² (see "Three measures of e-commerce"). We compute e-commerce transaction and expenditure shares at the national and industry level over the past five years (**Exhibit 1**) by adding up the Chase card transactions flagged as "card not present." For the subset of consumption classified as retail sales, e-commerce activities account for 16% of expenditure value and 13% of transactions. The disparity between these shares reflects the fact that e-commerce

transaction size tends to be larger than average. These series have been rising rapidly over the course of the past five years, with each increasing roughly 7 percentage points.

E-commerce spending shares are much higher using card data vs. official measures

EXHIBIT 1: E-COMMERCE TRENDS FOR RETAIL TRADE INDUSTRIES



Source: U.S. Census Bureau, J.P. Morgan Asset Management Multi-Asset Solutions, JPMorgan Chase Bank; data through September 2018.

Both measures are substantially higher than the corresponding estimates from the Census Bureau's Monthly Retail Trade Survey (MRTS). For the industries classified as retail trade, the average e-commerce value share was 8% over that five-year period. What is striking, beyond the fact that the Chase measures are almost twice as large, is that the two sets of estimates are actually quite similar in both trend and seasonal fluctuation (i.e., to a first approximation, they are off by a constant). We do not believe that the difference in level is a simple artifact of the Chase banking population being different from the overall U.S. population. One piece of evidence that suggests deeper underlying differences between the Census and Chase card measures is the distribution of their shares across industries. High Chase estimates of e-commerce are more or less ubiquitous across the industries shown (**Exhibit 2**).³ For retail trade industries, the e-commerce value share is above 10% for all industries except two - Food and Beverage Stores and Gasoline Stations - and hence there is no significant skew across industries. In contrast, for the Census measures all industries have a value share of 3% or less, with the exception of Nonstore Retailers at 60%. The fact that virtually all of the Census Bureau's overall e-commerce share in retail trade industries is driven by Nonstore Retailers suggests that aggregate differences in e-commerce share are not a

¹ For instance, see "Technology, productivity and the labor force: The impact of technology on long-term potential economic growth," in *2018 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management.

² The Chase dataset excludes some co-branded cards.

³ Industries are as defined by the North American Industry Classification System (NAICS).

simple function of Chase customers being generically more intensive e-commerce users.

The discrepancy between Chase and official measures is starker for services industries, as illustrated relative to the Census Bureau’s Service Annual Survey (SAS) in Exhibit 2. The sheer magnitude of the differences, even for sectors where revenues consist primarily of final demand by households (which are most comparable to our perspective in the Chase data), appears to indicate considerable underlying disparities.⁴

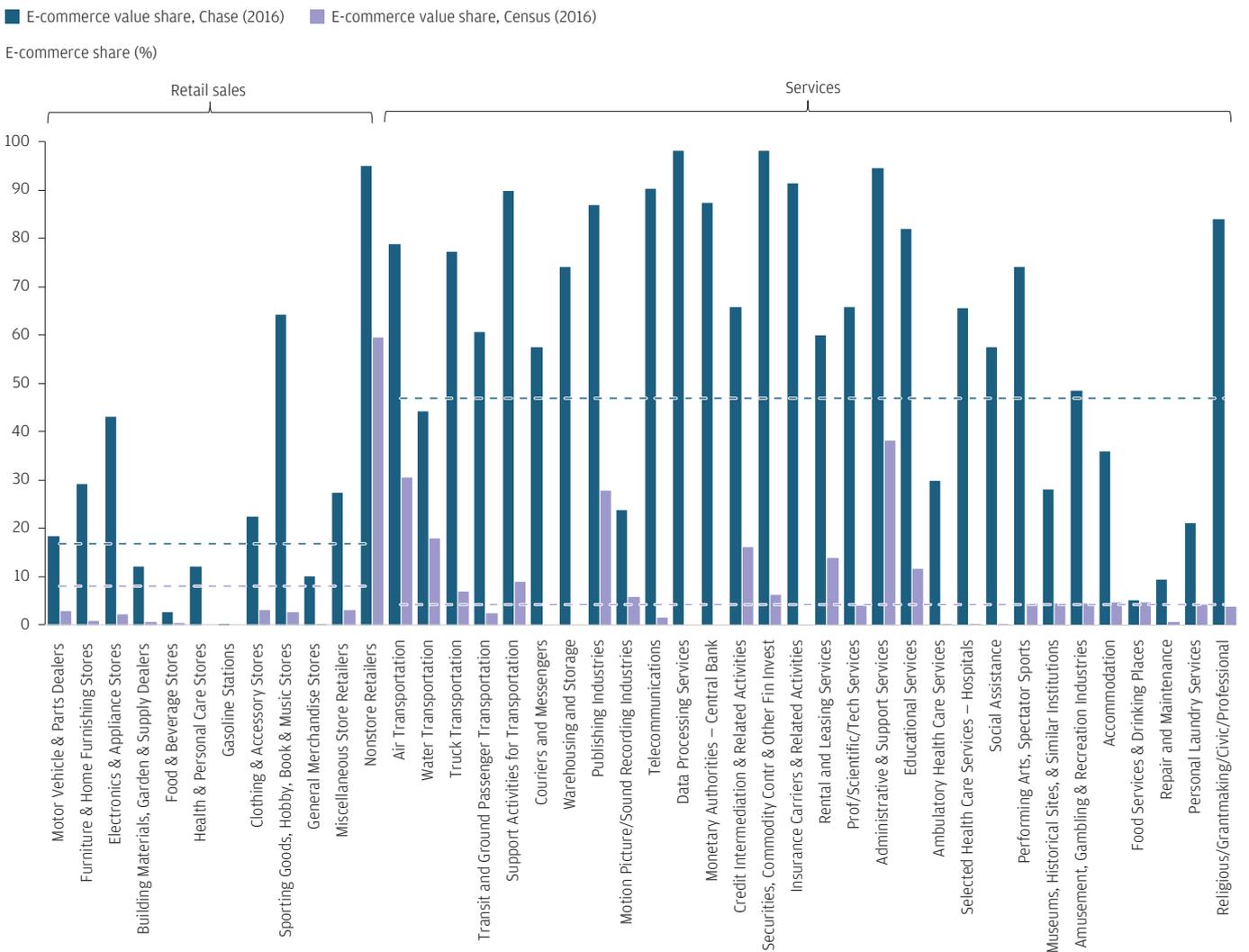
Personal and Laundry Services, for example, an industry that caters primarily to individuals and households rather than businesses, has a 21% e-commerce share in the Chase data vs. 4% in the SAS.

We suggest two possible explanations for what is driving the higher e-commerce intensity in Chase’s measure. First, we employ a broader definition, including payments, as opposed to the Census definition, which focuses on orders. To the extent that e-commerce circumscribes the set of payment technologies for things like automatic recurring payments - paying utility bills by direct debit, for instance - we would argue that our measure is actually a better reflection of e-commerce in consumption than the Census measure, in which those transactions would not count as e-commerce.

⁴ While the MRTS measures sales to final consumers exclusively, the SAS sales figures include transactions with other businesses and, as such, capture some activity that is not strictly comparable to the Chase measures.

Large differences exist between Chase and official measures of e-commerce intensity, particularly for services industries

EXHIBIT 2: COMPARISON OF CHASE VS. OFFICIAL MEASURES, BY NAICS INDUSTRY

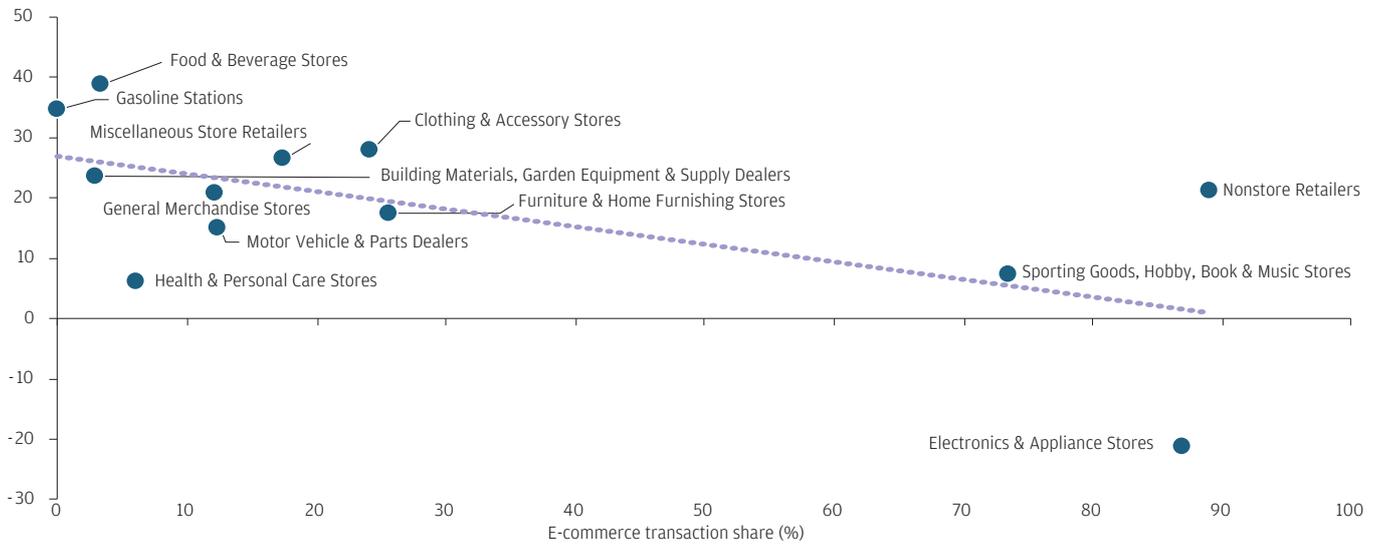


Source: U.S. Census Bureau, J.P. Morgan Asset Management Multi-Asset Solutions, JPMorgan Chase Bank; data through September 2018.

Industries that are more e-commerce intensive tend to have lower output price inflation

EXHIBIT 3: E-COMMERCE VS. OUTPUT PRICE INFLATION BY NAICS INDUSTRY

Cumulative producer price index (PPI) change, 2010-18 (%)



Source: U.S. Bureau of Labor Statistics, J.P. Morgan Asset Management Multi-Asset Solutions, JPMorgan Chase Bank; data through September 2018.

The second possibility is that there are inherent measurement biases between estimates based on surveys of firms vs. data collected directly from consumers. So whereas the e-commerce measure of retail trade based on the MRTS is designed to be representative of the universe of 2 million U.S. retail firms, one sampled from the Chase data might be more closely aligned with overall consumer spending. Since these two perspectives are just opposite sides of the same transactions, in principle they should not be that different. But we have more confidence in the direct measures from consumers.

E-COMMERCE AND FIRMS: A POSITIVE PRODUCTIVITY SHOCK, BUT NOT FOR EVERYONE

What does the proliferation of e-commerce mean for corporate performance? Is it a positive innovation for firms' productivity and cost structures or, rather, an inherent challenge to a subset of firms and sectors now facing greater competition? To some extent, it is both. Our first pass at addressing these questions is to link our Chase card e-commerce measures to economic statistics at the industry level. One striking relationship is that retail trade industries that are more intensive in e-commerce tend to have flatter trends in output price inflation (**Exhibit 3**). This finding could be consistent with e-commerce as an opportunity or a threat to firms, by lowering marginal costs and prices or putting downward pressure on their margins, respectively.

While the Chase measures are useful for comparison to national statistics and industry macro phenomena, they ultimately fall short of creating tight links with measures of corporate performance. For one, they are not specific to firms, where more detailed information on corporate health is available. We also need a more holistic view of firms' use of e-commerce. Whereas the card data captures the specific interface between retailers and consumers, it would also be desirable to capture the e-commerce activity of firms providing technology and ancillary services to those retailers. Our solution is to use ThemeBot, a natural language processing algorithm that sifts through hundreds of millions of news articles, regulatory filings, company profiles and research publications to find key phrases associated with e-commerce, and then to score publicly listed firms' e-commerce intensity (see "Three measures of e-commerce").

Using this definition, we find that sectors with higher e-commerce scores tend to have had faster revenue growth and greater margin expansion since 2010 (**Exhibits 4A and 4B**). They also have come to account for a larger share of MSCI All-Country World Index (ACWI) earnings over that period and have had a higher return on equity. This business cycle has highlighted that in periods characterized by sluggish economic growth, markets afford a premium to companies able to generate solid revenue and earnings growth. Interestingly, it is those companies that also tend to have embraced e-commerce. The Information Technology, Consumer Discretionary and Communication Services sectors - some of the best-performing sectors over the course of this cycle - fall into this camp.

It may appear intuitive that higher e-commerce scores are associated with service-oriented businesses and more robust profitability, but are these trends informative about the underlying business model that these companies employ? Drilling down to the industry level yields some interesting insights. One thing to note is that there is far more differentiation at the industry level, and hence a more diffuse relationship, between e-commerce intensity and corporate performance. On average, industries with higher e-commerce

scores tend to have higher asset turnover, less leverage and lower capital expenditures as a share of sales (Exhibit 5). This suggests that industries with higher e-commerce scores are employing a more efficient, capital-lite business model. Beneath the averages, we note the possibility that e-commerce's influence on firms has been highly differentiated. For example, Retailing, which has the highest e-commerce score, includes firms that have arguably been hit the hardest by the growth in e-commerce.

Businesses with higher e-commerce activity levels have had higher rates of revenue growth and profit margin improvement

EXHIBIT 4A: E-COMMERCE INTENSITY AND REVENUE GROWTH

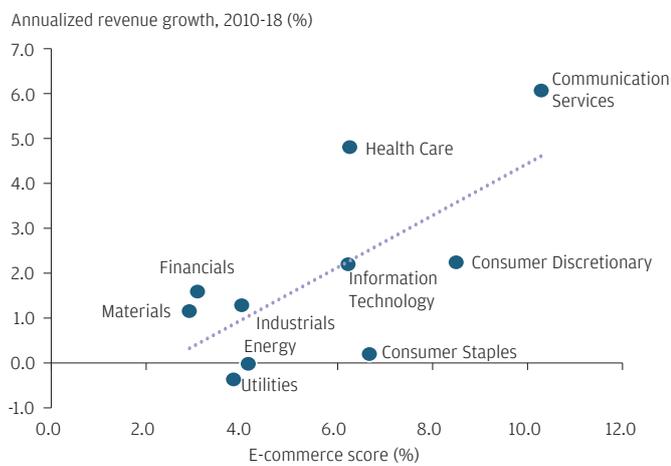
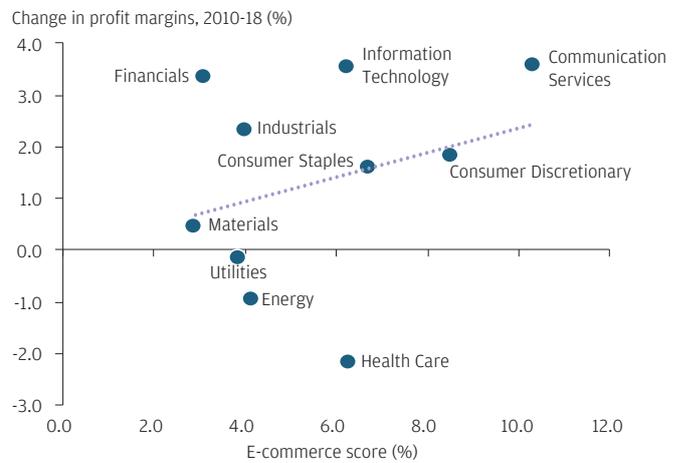


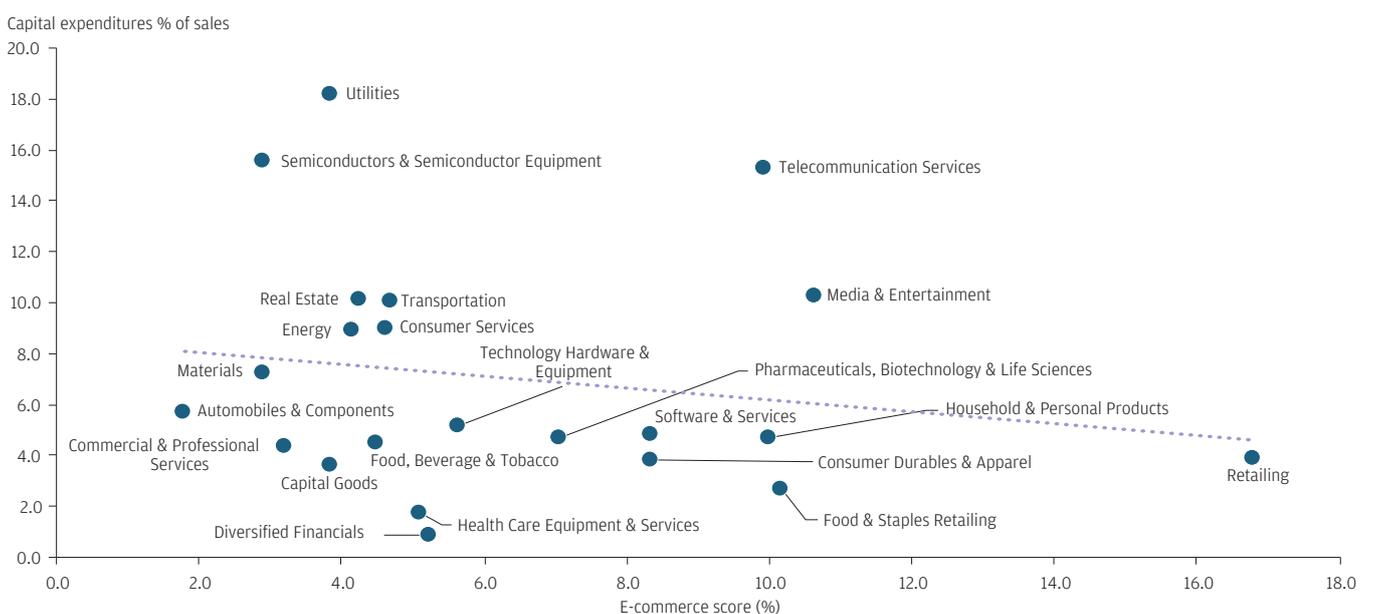
EXHIBIT 4B: E-COMMERCE INTENSITY AND MARGIN GROWTH



Source: FactSet, Standard & Poor's, J.P. Morgan Asset Management Quantitative Beta Strategies, J.P. Morgan Intelligent Digital Solutions; data as of July 2019.

While not a tight relationship, companies with higher e-commerce intensity have lower capital expenditures-to-sales ratios

EXHIBIT 5: E-COMMERCE INTENSITY AND CAPITAL EXPENDITURES



Source: FactSet, Standard & Poor's, J.P. Morgan Asset Management Beta Strategies, J.P. Morgan Intelligent Digital Solutions; data as of July 2019.

Public market e-commerce opportunities are concentrated in a few economies and sectors, with smaller pockets elsewhere

EXHIBIT 6: E-COMMERCE INTENSITY SCORES FOR ECONOMY/SECTOR PAIRS, %

	Energy	Utilities	Real Estate	Materials	Financials	Consumer Staples	Health Care	Communication Services	Industrials	Information Technology	Consumer Discretionary	Grand Total
Israel	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3
Italy	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.6
Indonesia	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.2	0.0	0.0	0.0	0.7
Ireland	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.2	0.0	0.8
Spain	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.8
Mexico	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.2	0.1	0.0	0.1	1.0
Russian Federation	0.4	0.1	0.0	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	1.0
Thailand	0.3	0.0	0.0	0.0	0.1	0.2	0.0	0.6	0.0	0.0	0.2	1.6
Germany	0.0	0.2	0.0	0.2	0.1	0.2	0.2	0.4	0.4	0.4	0.5	2.6
Brazil	0.3	0.1	0.1	0.2	0.2	0.8	0.1	0.0	0.1	0.1	1.3	3.4
Canada	0.3	0.2	0.2	0.2	0.4	0.5	0.2	0.3	0.2	0.4	0.5	3.4
United Kingdom	0.0	0.1	0.2	0.2	0.4	0.5	0.2	0.5	0.3	0.1	0.8	3.5
India	0.4	0.2	0.0	0.4	0.1	0.7	0.8	0.3	0.2	0.4	0.5	3.9
France	0.1	0.3	0.2	0.1	0.2	0.8	0.3	0.2	0.5	0.5	1.0	4.1
Hong Kong	0.1	0.2	0.4	0.0	0.4	0.5	1.0	0.6	0.6	0.0	0.6	4.3
South Korea	0.0	0.0	0.0	0.3	0.4	0.4	0.6	0.7	1.1	0.3	1.0	4.9
Japan	0.0	0.1	0.5	0.8	1.0	1.8	1.4	1.7	3.1	2.2	2.3	15.0
China	0.3	0.6	0.6	1.2	2.9	0.9	2.8	2.9	2.7	2.8	4.9	22.5
United States	0.9	1.0	1.6	0.7	3.0	1.9	1.7	2.1	2.3	4.9	5.6	25.7
Grand Total	3.4	3.5	3.9	4.7	9.7	9.8	9.9	11.2	12.1	12.3	19.5	100.0

Source: J.P. Morgan Asset Management Beta Strategies, J.P. Morgan Intelligent Digital Solutions; data as of July 2019.

E-COMMERCE AND INVESTORS: POCKETS OF CONCENTRATION IN PUBLIC AND PRIVATE MARKETS

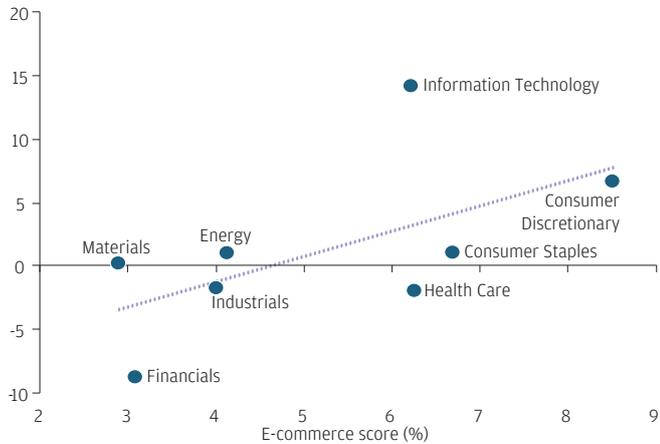
Having identified the macro trends and some of the relationships between e-commerce intensity and corporate performance, the final question for investors is how to gain exposure to e-commerce as a theme. Within public markets, there are important geographic and sectoral concentrations of e-commerce exposure that investors should keep in mind. For example, roughly 60% of the e-commerce intensity in the ACWI universe is in the U.S., China and Japan, and skews toward Information Technology, Consumer Discretionary and Industrials (**Exhibit 6**). Looking at this cross section, the nine combinations of these top economies and sectors account for roughly 31% of e-commerce intensity within the MSCI ACWI universe.

An important alternative access point for building exposure to e-commerce trends is through private markets, as the sector mix of these markets suggests. Information Technology and Consumer Discretionary are relatively large shares of the U.S. private equity benchmark, whereas sectors with lower e-commerce scores, like Financials, tend to skew toward public markets (**Exhibit 7**). Deal trends in the private equity world are consistent with these sectoral patterns. Software transactions as a share of total private equity deals have trended higher as companies have embraced capital-lite business models and spent less on traditional property, plant and equipment. Additionally, the technology sector remains a key focus across both buyout and add-on strategies, a trend showing little sign of abating imminently. In sum, with return expectations in public markets depressed relative to history, investors seeking growth have been migrating toward private markets and, directly or indirectly, the pockets of technology exposure therein.

Private equity markets can be a gateway to sectors with high e-commerce intensity

EXHIBIT 7: SECTOR WEIGHTS - PRIVATE VS. PUBLIC MARKETS

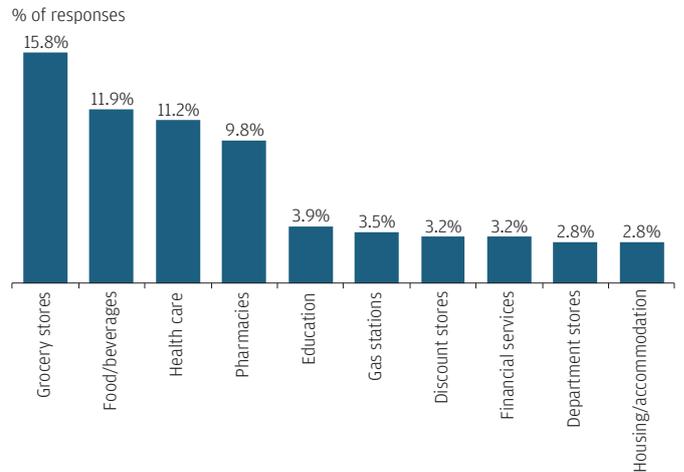
Difference between U.S. private equity and Russell 2000 sector weights (%)



Source: Cambridge Associates, FTSE Russell, J.P. Morgan Asset Management Beta Strategies, J.P. Morgan Intelligent Digital Solutions; data as of July 2019.

There is room for more traditional retailers to evolve their operating models

EXHIBIT 8: TOP 10 CATEGORIES WHERE RESPONDENTS WANT MORE E-COMMERCE ACCESS (RANKED BY % OF RESPONSES)



Source: J.P. Morgan Multi-Asset Solutions, "J.P. Morgan global e-commerce survey of analysts and interns," June-July 2019; data as of July 2019.

Focusing on millennial/post-millennial consumers

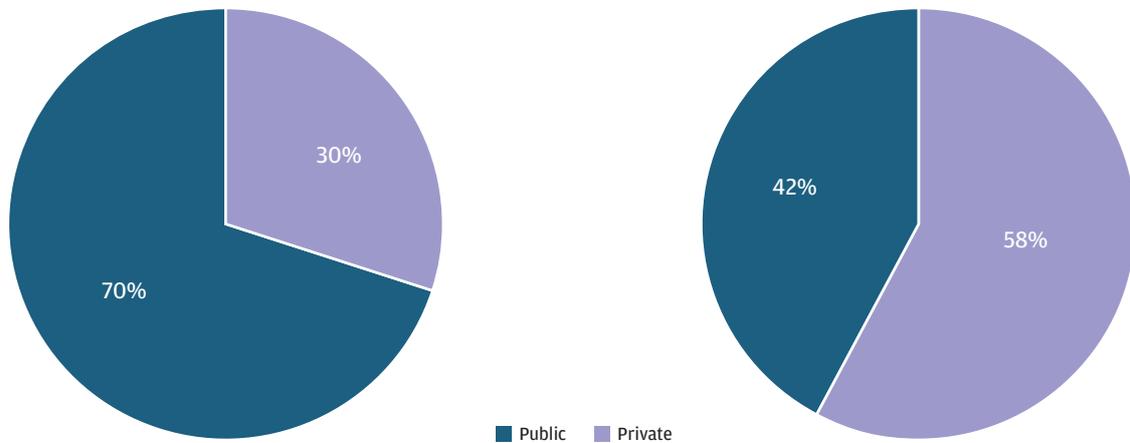
We bring one more piece of evidence to bear on the question of where e-commerce exposure resides in global markets: a proprietary survey of 183 analysts and interns at J.P. Morgan Asset and Wealth Management (see "Three measures of e-commerce"). The survey results corroborate several findings from the Chase data. Namely, e-commerce accounts for a material amount of consumer spending across a wide swath of sectors, goods and services; for more than 80% of the sample, online expenditures represent over 20% of total consumption. Unsurprisingly, the majority of respondents reference nonstore retailers and air travel as significant beneficiaries of the trend, with more than 60% of the wallet-share as e-commerce in their respective categories. However, traditional retailers also seem to be making significant inroads with their e-commerce presence, muddying the common perception that there are few winners in that space. Respondents are also looking for more from traditional staples-oriented retailers. For example, the top responses to the question "Where would you like to see more of an e-commerce presence?" were grocery stores, food/beverages, health care, drugstores and pharmacies (Exhibit 8). This suggests additional opportunities or potentially fewer threats for businesses willing to evolve their operating models.

Interestingly, when our interns and analysts were asked what individual firms they spend the most with online, relatively new firms focused on e-commerce with direct-to-consumer business models (e.g., personal shopping apps, monthly subscription services and travel companies) were prominent among their responses. This suggests to us that they are comfortable with trying newer brands. The relative frequency of their interaction with these (generally) capital-lite business models lends additional support to our findings on the relationship between e-commerce intensity and operating fundamentals. Separately, a significant amount of money is spent on housing, utilities and financial services, further illustrating the breadth of e-commerce. We also found that the e-commerce share of total consumption is greater and encompasses a broader range of industries among older, fully employed analysts vs. younger summer interns. This suggests that e-commerce spending and its breadth may vary positively with income.

One potential headwind for the e-commerce trend is the perception around data security and privacy. When asked about concerns related to e-commerce, 60% took issue with cybersecurity, although their concern was not reason enough to dissuade them from relying on e-commerce on a regular basis.

Both public and private markets offer opportunities to access e-commerce trends

EXHIBIT 9: PUBLIC-PRIVATE BREAKDOWN OF COMPANIES MENTIONED AS PART OF RESPONDENTS' E-COMMERCE SPENDS IN THE PAST 12 MONTHS ...
... AMONG 70 MOST FREQUENTLY MENTIONED COMPANIES **... AMONG ALL 186 COMPANIES MENTIONED**



Source: J.P. Morgan Multi-Asset Solutions, "J.P. Morgan global e-commerce survey of analysts and interns," June-July 2019; data as of July 2019.

Finally, the firms reported as receiving top shares of respondents' e-commerce spend included a mix of both public and private entities. While the total spend is currently skewed toward public companies, the tail of the opportunity set skews private, suggesting diversity in how investors may access the opportunities leveraging these powerful trends (**Exhibit 9**).

CONCLUDING THOUGHTS

Our findings for e-commerce have broad implications. For our long-term economic and market projections, these findings give us a higher level of confidence that technology adoption will raise productivity growth from current low levels and provide support for potential GDP growth and equilibrium rates of interest. As such, it would be a mistake to extrapolate the low growth post-crisis experience ad infinitum. These benefits of e-commerce are not for free, though, and there is a voluminous academic literature linking rising wage inequality to, among other factors, the "skill bias" embedded in new technologies.⁵ From an investment perspective, the benefits to corporate performance for firms levered to this trend hint at the value associated with identifying and accessing e-commerce, as well as other themes having to do with the digital consumer. Our analysis suggests that portfolio allocations related to e-commerce will straddle both public and private markets.

⁵ For an early survey, see Daron Acemoglu, "Technical change, inequality, and the labor market," *Journal of Economic Literature* 40, no. 1 (2002): 7-72.

THREE MEASURES OF E-COMMERCE

- 1 Chase credit and debit card data:** Our first measure of e-commerce is computed using a confidential administrative dataset of credit and debit card spending from the Consumer & Community Banking division of JPMorgan Chase & Co.* The dataset contains monthly card purchase information for 39 million anonymized households that have a banking relationship with Chase, segmented by the roughly 1,000 merchant classification codes (MCC) for the period July 2013–September 2018. The 43.5 billion underlying transactions aggregate to USD 1.8 trillion in spending over that period, representing 3% of total personal consumption expenditures. Spending transactions where the card was not physically present are designated e-commerce. The defining characteristic of e-commerce is thus a lack of physical presence at the point of sale or, to be more precise, the point of payment. This is a broad definition insofar as it includes a much wider set of expenditures than just online purchases of merchandise, but it is similar to definitions used in related research.**
- 2 ThemeBot:** ThemeBot is a J.P. Morgan proprietary portfolio construction engine developed by our Quantitative Beta Strategies group in collaboration with our Intelligent Digital Solutions data science team. It utilizes machine learning techniques to facilitate the building of thematic portfolios. Data is accessed by ThemeBot from a variety of sources, including both primary sources (such as broker reports, company filings, etc.) and secondary sources such as news articles. ThemeBot generates an e-commerce score for each constituent of the MSCI All-Country World Index (ACWI). This e-commerce score has two parts: a textual relevance score, which quantifies how frequently a company is covered in documents that mention theme-related concepts, and a revenue score, a probabilistic metric indicating the likelihood of a company having exposure to business segments related to a theme. Averaging these metrics together produces the e-commerce score, which we use to create market capitalization-weighted aggregates by sector, industry and economy.
- 3 J.P. Morgan Global E-Commerce Survey of Analysts and Interns:†** For a third lens into e-commerce trends, we leveraged insights from a “captive” population of consumers, consisting of over 180 university and graduate-level members of our Global Analyst and Summer Intern classes at J.P. Morgan Asset and Wealth Management, representing a specific cohort of spenders that have internet-based commerce as a staple of their consumption opportunity set. They also provide some relevant, global context as to how the next generation is likely to spend. What we heard was consistent with the insights gleaned from conversations with leading venture capital firms that use similar methods to discern purchasing habits and brand insights as part of their due diligence for potential investments. Our survey focused on identifying the amount of total consumption via e-commerce, the breakdown of e-commerce spending by industry group and the specific companies that the respondents patronize.

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**See, for example, Paul Dolfen, Liran Einav, Peter J. Klenow, Benjamin Klopach, Jonathan D. Levin, Laurence Levin and Wayne Best, “Assessing the gains from e-commerce,” (February 2019), NBER Working Paper No. w25610. Available at SSRN: <https://ssrn.com/abstract=3346257>. The authors use Visa card data to measure e-commerce activity.

† A total of 183 first- through third-year part-time and full-time analysts from J.P. Morgan Asset and Wealth Management’s Global Analyst and Summer Intern classes participated in this survey in June and July 2019. We are grateful to Gabriel Castro and Neil Desai, who designed and administered the survey.

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