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Where's My Delivery?

Investment in Fulfillment Technologies on the Rise as Consumers Demand Quicker Deliveries

Contents

Summary

Growth in e-commerce sales has significantly outpaced growth in overall retail sales and is expected to continue to do so; over the past 10 years, U.S. e-commerce sales have grown at a compound annual rate of 14%, while total retail sales have increased at 3%. And according to a recent report by Shopify, the U.S. e-commerce market is expected to grow 46% between 2018 and 2023, to over $700 billion (representing 17% of total retail sales, by our estimate). A significant enabler of this growth has been the increasing availability and ease of use of cloud e-commerce solutions, which first came about 10-plus years ago. There has also been a material increase in private capital funding of consumer companies, many of which are e-commerce and/or direct-to-consumer models.
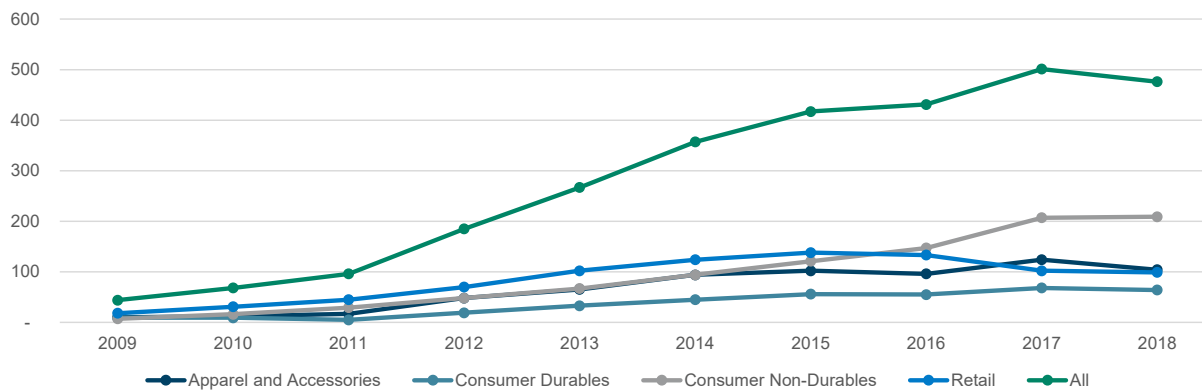
Exhibit 1
Private Capital Funding of Consumer Companies ($ in millions)
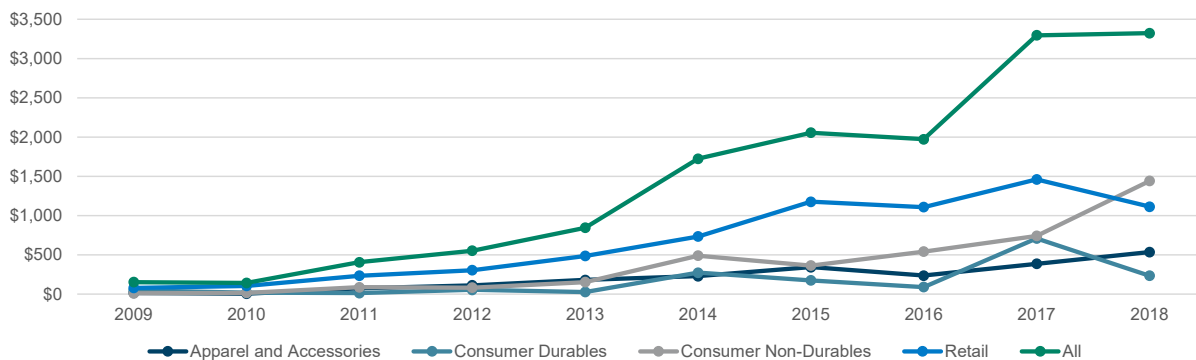
Source: Pitchbook

Exhibit 2
Number of Private E-commerce Companies Receiving Funding

Source: Pitchbook

Although the number, ease of use, and availability of e-commerce solutions have greatly increased over the past 10 years, fulfillment technology has been an overlooked area until recently (see exhibit 3), so fulfillment of e-commerce orders has remained a key pain point for many merchants. At the same time, Amazon has conditioned consumers to expect free two-day shipping and continues to push the envelope through its April announcement of one-day shipping as the standard for Prime members and its Prime Now same-day delivery. The issue for other retailers, brands, and e-commerce providers is that they have significantly fewer e-commerce fulfillment centers than Amazon and typically rely on traditional carriers for last-mile delivery. Further, a significant number of SMB

e-commerce companies have no or limited infrastructure from which to fulfill orders. Traditional 3PLs provide e-commerce fulfillment, but many of these businesses do not offer an integrated network of fulfillment centers or software to help manage the shipping process.

Exhibit 3
Timeline of E-commerce Software and Fulfillment Start-up Creation
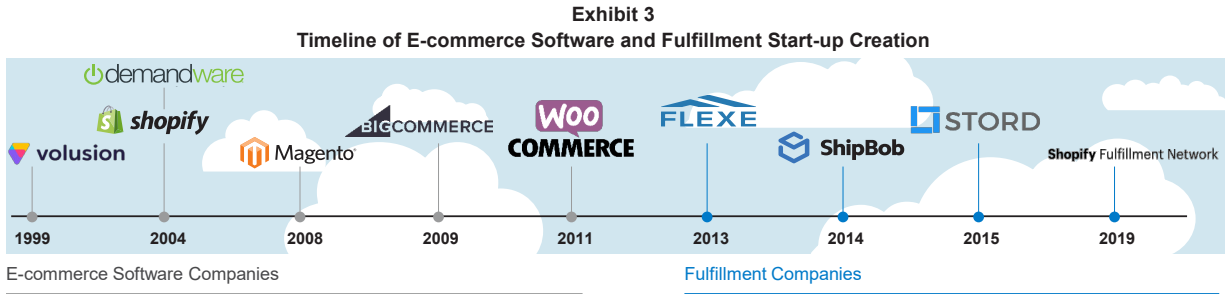
Sources: Company websites

Over the past five years, however, a number of fulfillment technology start-ups have formed, and we expect these businesses to garner more attention from private capital over the coming years (exhibit 4). There has also been a number of significant investments made by investment firms in warehouses (some of which we list in exhibit 5), including Blackstone's $18.7 billion purchase of warehouses from GLP. Public companies have also been investing in this area. In June, Shopify announced the Shopify Fulfillment Network, with the goal of providing merchants with access to cost-effective fast shipping. This was done in large part to offer an alternative to Amazon's proprietary fulfillment network, which the company started offering as a service to third-party sellers in 2006. More recently, Wayfair has recognized the importance of building out internal fulfillment capabilities to ensure quality and speed in furniture delivery, an industry beset by longer delivery times and damage, which we expect the company will be able to monetize as a service over a longer horizon.

Exhibit 4
Fulfillment and Last-Mile Companies

Sources: Company websites

Exhibit 5
Major Warehouse Transactions by Investment Funds ($ in millions)

| Announcement Date:	December 2016	December 2017	November 2017	April 2018	September 2018	October 2018	Feburary 2019	April 2019	June 2019	July 2019
Square Footage Acquired (M):	12	22	4	21	4.5	1.33	3.5	1.4	179	37.5
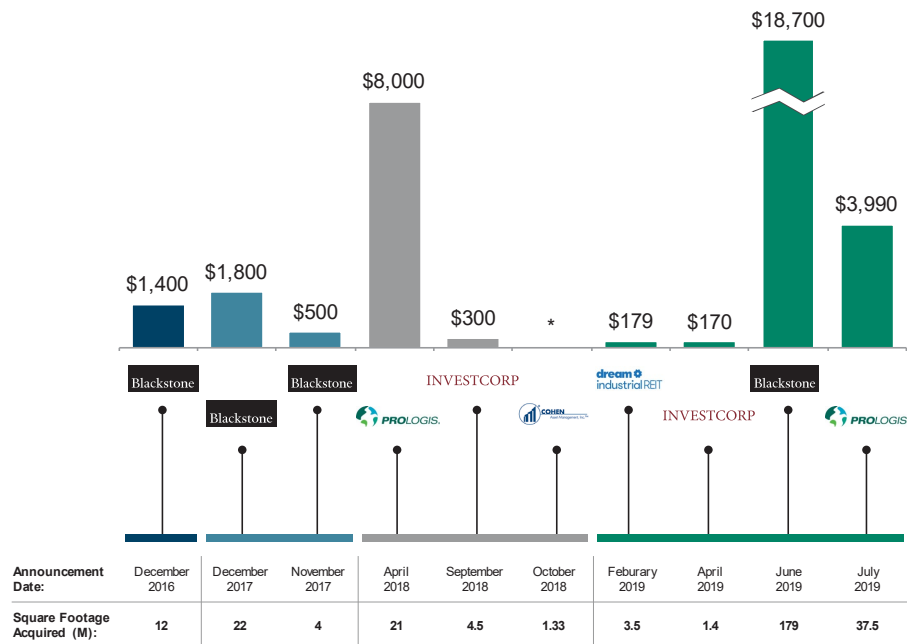
*Purchase Price Undisclosed

Sources: Company websites, Wall Street Journal, BizJournals.com

In this report, we examine some of the technologies that merchants can leverage to improve their fulfillment speed and costs to offer similar terms to those of Amazon. The three main areas we look at are on-demand warehousing, tech-enabled fulfillment providers, and store fulfillment. We believe that these technologies will be a key area of investment for e-commerce retailers and brands over the next several years as they attempt to keep up with Amazon and an ever-stretched, impatient consumer. Further, given that e-commerce sales were $528 billion in 2018 (growing at a 14% compound annual rate over the last five years) and we estimate that e-commerce companies typically spend 10%-15% of GMV on fulfillment (see exhibit 6, on the following page), the market for these technologies has the potential to be quite large.

In our coverage of public technology companies, we believe that Shopify and Manhattan Associates are positioned to benefit from the aforementioned trends. Shopify's fulfillment network should aid the company in increasing merchants' sales and reducing churn. We believe that Manhattan Associates provides some of the best store fulfillment, buy-online-pick-up-in-store, and buy-online-return-to-store solutions for large retailers, and that this will be a key investment area over the next several years.

Exhibit 6
Fulfillment Costs as a % of GMV
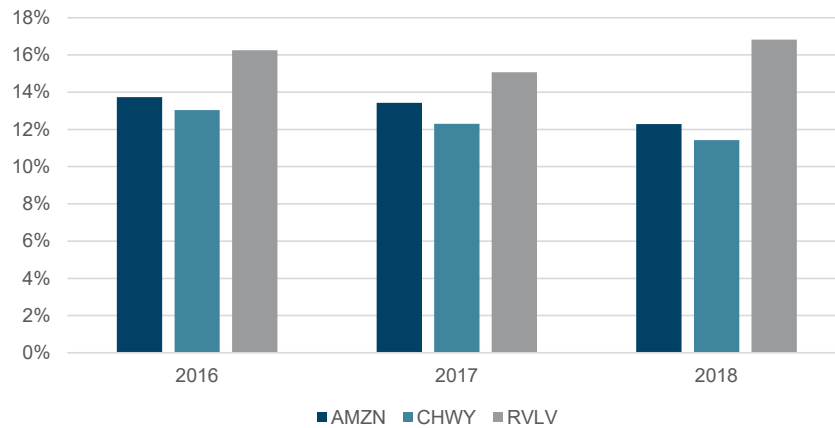
Sources: Company filings

The Problem

In February 2005, Amazon introduced Amazon Prime and free two-day shipping for all Prime members. When first introduced, two-day shipping for no additional fee (aside from the membership fee) was materially faster than the standard shipping options (typically between 5 and 10 business days) offered by other retailers—further, these standard shipping options most often incurred a fee, or required a certain basket size. Consumers' expectations have evolved, and now most individuals expect to receive their e-commerce orders within a few days of the purchase with no additional shipping fees. And the envelope continues to get pushed further. This April, Amazon revealed it would provide free one-day shipping to Prime members (down from two days). Amazon had previously offered expedited shipping optionality at a minimum basket size of $35. In May, Walmart announced free next-day shipping for its most popular products on orders with a minimum order value of $35. In the same month, Target started offering same-day delivery for 65,000 of its products for $9.99 per order or $99 per year. Still, for a large number of retailers and brands, the standard shipping time is still longer than two days (see exhibits 7 and 8).

Exhibit 7
Shipping Terms Among Retailers

	Standard Shipping Options	Expedited Shipping Options	Free Shipping Requirements
amazon	Free, 5-8 business days	N/A	Free Standard Shipping for Orders Over $25 Free 1-2 Day Shipping with Prime Membership
BED BATH & BEYOND	$5.99, 3-6 business days	- $17.99, 2-3 business days - $21.99, 1-2 business days - $9.99. same day - Prices vary for orders over $100	Free Standard Shipping for Orders Over $39
BEST BUY	$5.49, time varies by order	$5.99, same day	Free Pickup
chewy	$4.95, 1-2 business days	NA	Free Standard Shipping for Orders Over $49
DICK'S SPORTING GOODS	$6, 5-7 business days	- $12, 3-4 business days - $19, 2-3 business days	NA
FINISH LINE	$7, 3-6 business days	- $9.99, 3-5 business days - $22.99, 3 business days - $32.99, 2 business days	Free Standard Shipping for Orders Over $30
JCPenney	$8.95, 3-5 business days	- $4.95 - $9.95, 3 business days - $15 - $25, 2 business days - $25 - $35, next day	Free Standard Shipping for Orders Over $99
KOHL'S	$8.95, 3-6 business days	- $9.95 - $19.95, 2 business days - $14.95 - $29.95, next business day - $9.95 - $14.95, same day	Free Standard Shipping for Orders Over $50
macy's	$10.95, 3-6 business days	- $12 - 22.95, 2-3 business days - $22 - $32.95, 1-2 business days	Free Standard Shipping for Orders Over $75

	Standard Shipping Options	Expedited Shipping Options	Free Shipping Requirements
NORDSTROM	Free, 3-6 business days	- $12, 2 business days - $20, next business day - $35 Saturday delivery - $15 same day if in stock locally	All Orders with Standard Shipping
overstock.com	$4.95, 1-2 business days shipped	- Costs calculated at checkout based on item and size	Free Standard Shipping for Orders Over $45
Target	$5.99, 3-5 business days	- Free, 2 business days, for $35+ orders - $15.99, next business day	Free Standard and Two-Day Shipping for Orders Over $35 or REDcard Holders Expedited Shipping Available for Shipt Members
Walmart	$5.99, 3-5 business days	- Free, 2 business days	Free Next Day or Two Day Shipping on Orders over $35 Free Standard Shipping on Qualified Items
wayfair	$4.99, 1-7 business days	NA	Free Standard Shipping for Orders over $49
THE HOME DEPOT	Free, 5-10 business days	*Calculated at Checkout - 3-5 business days - 2 business days - 1 business day	Free Standard Shipping on Select Items and for Orders over $45
H&M	$3.99, 5-7 business days	- $5.99 3-5 business days - $14.99, 2-3 business days - $24.99, 1-2 business days	Free Standard Shipping for Orders over $40
UNIQLO	$5, 3-7 business days	- $7, 3-4 business days - $17, 2-3 business days - $22, 1-2 business days	Free Standard Shipping for Orders over $75
ZARA	$4.95, 2-4 business days	- $9.95, 1-2 business days	Free Standard Shipping for Orders over $50

Sources: Company websites

Exhibit 8
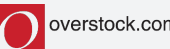**Shipping Terms Among Brands**

	Standard Shipping Options	Expedited Shipping Options	Free Shipping Requirements		Standard Shipping Options	Expedited Shipping Options	Free Shipping Requirements
allbirds	Free, 5-7 business days	- 2 business days: $10 - 1 business day: $20	All Orders with Standard Shipping	marine layer	Free, 3-7 business days	- $15, 2-3 business days - $25, 1-2 business days	All Orders with Standard Shipping
bareMinerals	$3.95-$6.95, 5-10 business days	- $2-$8.95, 4-7 business days - $15-$18.95, 3-4 business days	Free Standard Shipping for Orders over $50	monica + andy	$7.50, 5-7 business days	- $11.19, same-day - $16.53, 1 business day *Calculated at Checkout	NA
BRANDLESS	$6.95, 3-5 business days	NA	NA	Nike	$8, 2-4 business days	- $15, 2 business days - $25, next business day	Free Standard Shipping for NikePlus Members and Orders Over $150 Discounted Expedited Shipping for NikePlus Members
BOMBAS	$3.95, 4-7 business days	- $8, 3-5 business days - $25, 2 business days - Prices vary for overnight	Free Standard Shipping for Orders Over $50	Outdoor Voices	Free, 3-6 business days	- $12, 2 business days	All Orders with Standard Shipping
Calvin Klein	$9.95, 3-6 business days	- $24, 2 business days - $35, next business day	NA	patagonia	$8.50-$13.95, 7 business days	- $15 + Standard Charge, 2 business days - $20 + Standard Charge, 1 business day - $35 + Standard Charge, Saturday delivery	Free Standard Shipping for Orders over $75
Canada Goose	Free, 4-6 business days	- $40, 2-3 business days	All Orders with Standard Shipping	RALPH LAUREN	$6, 5-7 business days	- $8, 2 business days (ordered by 3 PM ET) - $20, 2 business days - $25, next business day - $35, Saturday delivery	Free 2 Business Day Shipping on Orders over $150
Casper	Free, 1-2 business days	NA	All Orders with Standard Shipping	Roots	$7, 6-10 business days	- $20, 3-6 business days	Free Standard Shipping for Orders over $75
chubbies	$7, 3 business days	- $20, 2 business days - $25, next business day	Free Standard Shipping for Orders Over $35	Supreme	$10, 10-15 business days	NA	NA
Columbia Sportswear Company	$6, 5-7 business days	- $12, 3-4 business days - $19, 2-3 business days	NA	TIFFANY & CO.	Free, 4-5 business days	- $30, next business day	All Orders with Standard Shipping
J.Crew	$5, 3-6 business days	- $15, 2-3 business days - $25, next business day - $35, Saturday delivery	Free Shipping on Qualifying J.Crew Rewards members orders	UNTUCKit	Free, 5-8 business days	- $8, 2-4 business days - $20, 2 business days - $25, next business day	All Orders with Standard Shipping
leesa	Free, 3-7 business days	N/A	All Orders with Standard Shipping	vineyard vines	$8.50-$12, 2-7 business days	- $18.50 - $24, 2 business days - $26.50 - $32, 1 business day	Free Standard Shipping for Orders over $125

Sources: Company websites

Offering two-day, next-day, and same-day shipping on a large scale at a reasonable cost requires a massive amount of infrastructure. In the 14 years since the introduction of Amazon Prime, Amazon has invested heavily in its fulfillment network, growing from seven fulfillment centers to over 300 fulfillment centers, sortation centers, and Prime Now hubs (with about 150 North America fulfillment centers). Amazon has also invested in proprietary logistics and transportation capabilities to reduce its reliance on third-party carriers. According to a company press release in June, Amazon plans to expand its aircraft portfolio to 70 airplanes in 2021, up from the 50 it currently leases. Amazon also has over 10,000 dedicated trucking trailers to manage truckload transportation, and its Delivery Service Partner Program and Amazon Flex to handle last-mile fulfillment.

All of this investment has resulted in Amazon having a fulfillment and delivery network that is multiple the size of other retailers. In exhibit 9, we show the number of Amazon's fulfillment and distribution centers compared with other retailers and e-commerce companies. It should also be noted that the totals for some brick-and-mortar retailers include distribution centers geared toward shipping large quantities of product to stores rather than e-commerce fulfillment. For example, of Walmart's 156 total U.S. distribution and fulfillment centers, only 33 are dedicated e-commerce fulfillment centers. However, as stores are increasingly being enabled to fulfill online orders, this distinction becomes less relevant, in our view.

Exhibit 9
Total U.S. Distribution and Fulfillment Centers

*Includes fulfillment centers, airport hubs, cross docks, sortation centers, delivery stations, and Prime Now hubs
Sources: Company filings, William Blair estimates
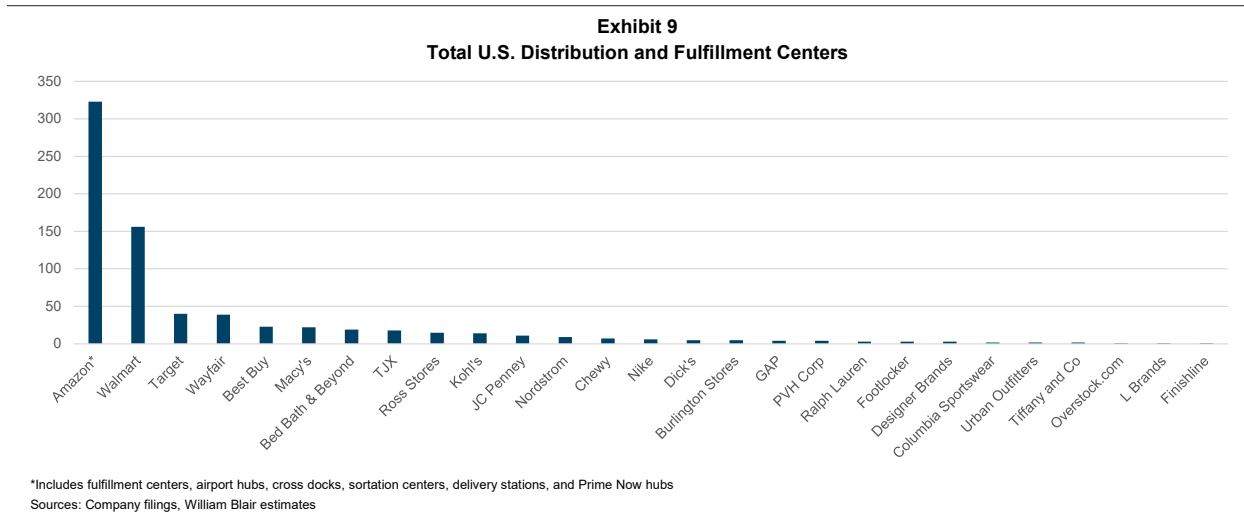
Amazon not only has a significant lead on the competition, but also is massively outspending other e-commerce companies in further building its fulfillment and distribution operations. In exhibit 10, on the following page, we show Amazon's capital expenditures compared with other e-commerce companies. It should be noted that Amazon's capital expenditures include multiple areas of operations, such as Amazon Web Services (AWS), and international investments; however, even after adjusting for these items, we still believe the company is outspending its competitors.

Exhibit 10
Capital Expenditure by Online Retailers

	Amazon*	Walmart.com	Chewy.com	Wayfair	StitchFix	Revolve	Etsy
2016	$2,948	$4,162	$24	$97	$15	$3	$36
2017	$5,299	$4,521	$40	$100	$17	$2	$4
2018	$5,757	$5,218	$44	$159	$17	$3	$1
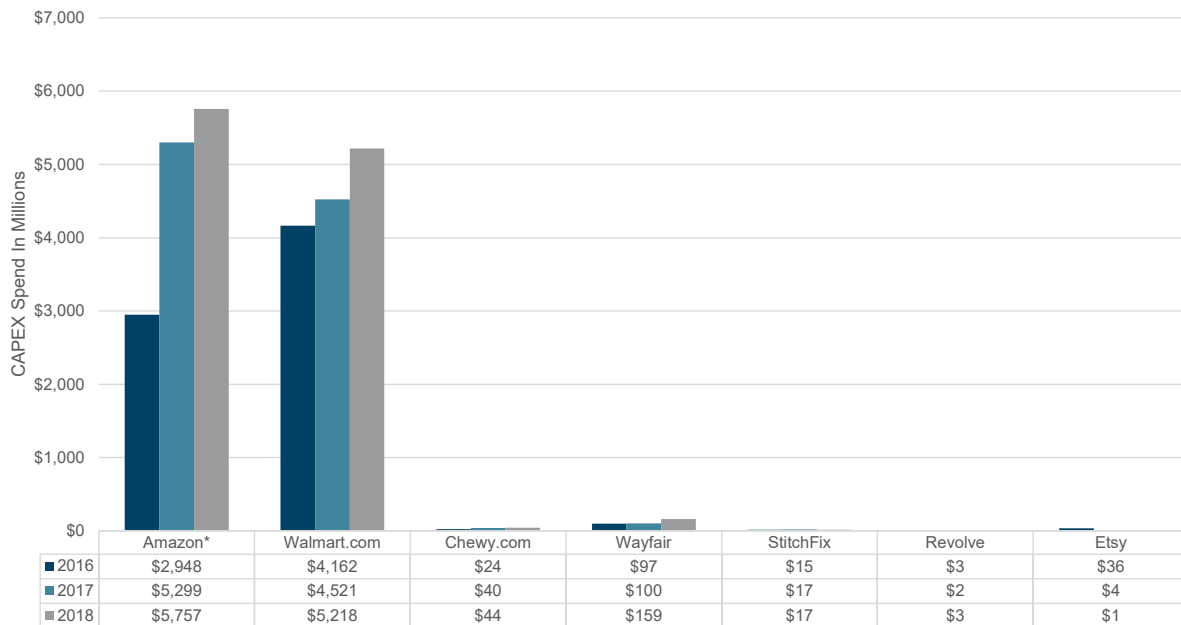
*Only includes estimated U.S. capex excluding AWS
Sources: Company filings, William Blair estimates

All of the aforementioned investment and infrastructure is needed to build a network of fulfillment centers and distribution operations to support two-day, next-day, and same-day shipping. One of the most expensive parts of the shipping process is the last mile, especially if the parcel shipment is completed over a long distance. It is much more cost effective to ship a product as far as possible as part of a truckload shipment, and then use parcel shipping to move the product within a relatively close radius. This is primarily because guaranteed delivery date rates increase when going outside the local zone (zone 1). For example, UPS 2Day could cost 25% more when shipping from zone 1 to zone 2 versus staying within zone 1 (exhibit 11). And when going from zone 1 to zone 4, the shipping cost could double depending on the item's weight. In exhibit 12, we show the potential impact to a merchant's profits from paying for two-day shipping across multiple zones. Note that fulfillment costs will vary by scale and product profile (weight, dimensions), while the relative cost is largely dependent on average order value. Consider that a $3 three pack of Chapstick will cost the same to ship as an $88 three pack of Tom Ford lipstick. This is why many retailers have had dollar thresholds for free shipping, or have adjusted the online offering to account for shipping costs (a customer would be hard-pressed to find a single Chapstick tube on sale on Amazon, historically one of the most price-insensitive platforms). But as free shipping becomes more expected and shipping times continue to collapse, such profitability initiatives become less effective, shifting the onus to efficiency within a company's broader fulfillment network.

Exhibit 11
Shipping Costs by Zone Example
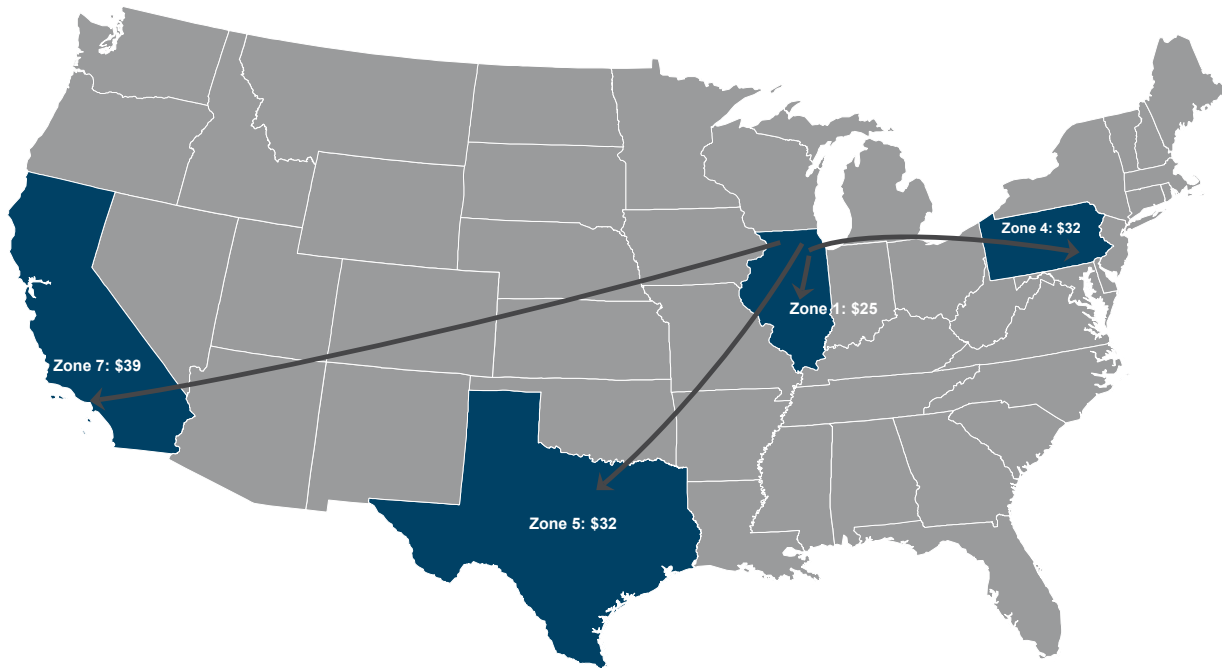
Sources: UPS, FedEx

Exhibit 12
Impact on Profits From Shipping Costs

MSRP	**$150**	**$150**	**$150**
Gross Profit	**$30**	**$45**	**$60**
Gross Profit Margin	*20%*	*30%*	*40%*
Zone 1			
Standard Shipping	**$9**	**$9**	**$9**
% of Gross Profit	*30%*	*20%*	*15%*
2-Day Shipping	**$25**	**$25**	**$25**
% of Gross Profit	*84%*	*56%*	*42%*
Zone 4			
Standard Shipping	**$11**	**$11**	**$11**
% of Gross Profit	*35%*	*23%*	*18%*
2-Day Shipping	**$32**	**$32**	**$32**
% of Gross Profit	*106%*	*71%*	*53%*
Zone 7			
Standard Shipping	**$12**	**$12**	**$12**
% of Gross Profit	*38%*	*26%*	*19%*
2-Day Shipping	**$39**	**$39**	**$39**
% of Gross Profit	*129%*	*86%*	*64%*

Sources: UPS, FedEx, Biz Journals Portland, Nike

A network of fulfillment centers that are strategically located close to urban centers is required to minimize last-mile fulfillment costs. According to industry sources and our estimates, about two fulfillment centers are needed to cost effectively provide two-day shipping to 70% of the U.S. population, four fulfillment centers are needed to provide two-day shipping to 90% of the U.S. population, and 11 fulfillment centers are needed to provide one-day shipping to 90% of the population. For example, a shipment from zone 1 to zone 5 (i.e., Chicago to Dallas) using standard shipping could typically be delivered in two business days.

Exhibit 13
Potential Fulfillment Centers Needed by Shipping Time

Shipping Time	50% of U.S. Pop.	70% of U.S. Pop.	90% of U.S. Pop.	98% of U.S. Pop.
3-day	1	1	1	1
2-day	1	2	4	8
1-day	5	8	11	16

Sources: Flexe, Shippo, William Blair estimates

The Solution

The obvious solution to providing faster, cost-effective shipping is for merchants to expand their fulfillment networks. But this is expensive, and the vast majority of merchants is not at a size that makes owning and operating multiple warehouses logical. If we assume fulfillment centers range from 200,000 to 1,500,000 square feet and that the average annual lease cost is $7 per square foot, it would cost a business roughly $22 million to $170 million per year just in leasing costs for 16 fulfillment centers. The overall costs including operations and working capital would likely be multiples of this. According to a survey by Logistics Management, warehouse square footage averaged 220,800 in 2018 and number of employees was 182 (or 0.82 per 1,000 square feet). And according to Energy Star, a warehouse typically has 0.59 workers per 1,000 square feet. These estimates are likely conservative given Amazon's MDW7 fulfillment center is 850,000 square feet and has 4,000 employees (or 5 per 1,000 square feet), which are supplemented by 5,200 robots. Considering that the median hourly wage for warehouse workers was $18.58 in 2018, labor costs would likely be in the hundreds of millions per year for operating 16 fulfillment centers (see exhibit 14).

Exhibit 14
Annual Fulfillment Center Operating Costs

Square Footage:	200,000	1,500,000
Lease Cost Per Square Foot	$7.00	$7.00
Annual Lease Cost Per Fulfillment Center	$1,400,000	$10,500,000
Annual Lease Cost for 16 Fulfillment Centers	$22,400,000	$168,000,000
Employees Per 1,000 Square Feet	1.0	1.0
Average Hourly Wage	$19	$19
Average Hours Per Week	25	25
Annual Labor Costs Per Fulfillment Center*	$4,830,800	$36,231,000
Annual Labor Cost for 16 Fulfillment Centers*	$77,292,800	$579,696,000

*Does not include benefit costs, which could add another 20% plus
Sources: CBRE, Bureau of Labor Statistics, Logistics Management, Energy Star, The Boyd Company, William Blair

Instead of building multiple fulfillment centers, merchants can outsource all or some of their fulfillment to 3PLs. But many 3PLs do not have an extensive enough fulfillment network to solve the problem, so multiple ones may be needed. And managing multiple 3PLs along with owned fulfillment centers can be cumbersome considering that many 3PLs do not have technology platforms to seamlessly integrate and manage inventory across multiple warehouse operators. Further compounding the issue, many merchants do not have the proper data or tools to make efficient decisions about where to store inventory or how much inventory to store.

We believe three key technologies that merchants can leverage to compete better are on-demand warehousing, tech-enabled fulfillment providers, and store fulfillment (for those with an existing physical store base). In the following sections, we highlight each of these areas and list some additional fulfillment/last-mile technology providers.

On-Demand Warehousing
On-demand warehousing, a relatively new concept, essentially gives merchants the ability to scale up and scale down their distribution operations, much like AWS does for compute power. This model is particularly good for businesses with some uncertainty, whether that be seasonal, high growth, or new product introduction, among others. But merchants can also use on-demand warehousing to increase their fulfilment capabilities to provide faster, more-efficient shipping, without the capital investment of building additional fulfillment centers.

How it works? On-demand warehousing leverages a marketplace model, where warehouse operators list excess capacity and businesses needing warehouse space can contract with the listed providers. The contracts can be short- or long-term, and many of the on-demand warehouse marketplaces provide assistance in matching the right warehouse provider with the right businesses based on various requirements. Further, many on-demand warehouse platforms provide software that integrates with other supply chain systems (e.g., warehouse management, order management, and inventory management) to help manage inventory, orders, shipments, and billing. This software is used by both the warehouse operator and the consumer of warehouse capacity.

The biggest benefit of the on-demand warehouse model is flexibility; merchants are better able to match fulfillment capacity with their needs with minimal fixed costs. We believe that merchants are mainly using on-demand warehousing as a supplement for owned fulfillment centers. As the model evolves, however, we could see large businesses using on-demand for their entire fulfillment. In exhibit 15, we show the on-demand warehouse providers; in exhibit 16, we provide some examples of how companies are using on-demand warehousing.

Exhibit 15
On-Demand Warehouse Providers

Company	Founded	Funding ($ in millions)	Logistics Partners
FLEXE	2013	$64.00	1,000-plus
FLOWSPACE	2017	$15.50	Hundreds
STORD	2015	$15	248
WAREHOUSE EXCHANGE	2017	ND	ND

Sources: Crunchbase, company websites

Exhibit 16
On-Demand Warehouse Provider Examples and Use-Cases

Use-Case	Customer Examples and Possible Use-Cases
Seasonal Demand	Walmart used Flexe to supplement peak seasonal demand for 90 to 120 days, primarily for e-commerce. Because the warehousing was needed for only a short period and across three different U.S. regions, Flexe was chosen because it could quickly identify facilities to do the work for the company in accordance with Walmart's performance expectations.
Contract Flexibility	According to Datex, a supply chain software provider, average warehouse leases last five years. As a result, warehouse space is fixed for the duration of the lease. On-demand warehousing allows retailers to increase or decrease their necessary space based on near-term forecasts and treat storage costs as variable.
Network Expansion	Casper mattress became a Flexe customer four years ago, and since then has used Flexe to open more warehouses and change locations of warehouses over time as the business grew. Since Casper's business is constantly changing (expanding to brick-and-mortar, reducing delivery costs, etc.), Flexe provides an opportunity for Casper's distribution network to grow with the demand faced by the business.
Ease-of-Use	For small and midsize enterprises, coordinating warehouse space, leases, and fulfillment processes at multiple warehouses can be a time-consuming process. Some on-demand warehousing companies act as a single point of contact for the retailer and handle the legwork of researching locations, pricing, etc. As a result, dealing with an on-demand warehouse provider could be more efficient for a small or midsize enterprise.
Excess Warehouse Capacity	A Flowspace warehouse provider planned to expand the business in the future so it moved into a larger warehouse. The provider did not need the excess capacity for the current year, so it used Flowspace to generate income from its empty space until the company expanded to fill that capacity.

Sources: Company websites

What are the benefits? Again, the biggest benefit of on-demand warehousing is flexibility. Almost every business has some level of uncertainty, and it is difficult to plan long-term investments and sign long-term leases that will efficiently accommodate variations in a merchant's fulfillment or warehouse needs. Second, on-demand warehousing can be used to cost-effectively expand a merchant's fulfillment network to be able to offer improved shipping terms/times to a larger portion of the population. It is also possible that pricing could be favorable for on-demand warehousing (versus traditional outsourcing) because warehouse operations are monetizing unused space that previously was not generating any revenue.

For warehouse operators, on-demand warehousing provides the opportunity to generate extra revenue from a fixed investment. Flexe estimates that 20% to 30% of a warehouse on average is empty. Leveraging this empty space through on-demand warehousing has some incremental variable operational costs, but no incremental impact on the fixed investment.

What are the challenges? The two biggest challenges that we see for on-demand warehousing are matching the right merchant with the right warehouses and providing tools to help manage inventory, orders, and quality. To the first point, many warehouses are heavily customized for that operator's specific needs. For example, one might be set up to handle bulk items (e.g., mattresses), while another is set up to handle small CPG products. This is where the on-demand warehouse marketplaces need to be able to account for different requirements and capabilities and help make the proper match.

Aside from variations in types of fulfillment centers, the WMSs of these warehouses are typically heavily customized for that warehouse operator's needs, and in a number of cases are not equipped to handle multiple merchants out of a single fulfillment center. Therefore, on-demand warehouse marketplaces need to provide software that integrates with a warehouse provider's WMS to help manage fulfillment of multiple merchants' products. And the merchant needs inventory visibility across the on-demand warehouses it is using, which the on-demand marketplace must facilitate through software integration.

Having additional warehouses also increases the inventory carrying costs for a merchant. We estimate that going from one warehouse to two could increase the amount of inventory by 30% to 40% as a result of safety stocks. Therefore, a merchant needs to balance the lower shipping costs from additional warehouses with the additional inventory carrying costs and working capital requirements.

Lastly, with leveraging on-demand warehouses, the quality and service levels are out of the hands of the merchant. Marketplaces can add value here by providing tools to monitor warehouse operator performance, create a rating system, and eliminate poor-performing providers from the marketplace.

Who are the on-demand warehouse providers?

FLEXE. Launched in 2013 and based in Seattle, Flexe provides an on-demand warehouse marketplace. The solution enables both first-party (e.g., retailers) and third-party (e.g., 3PLs) warehouse operators to offer excess capacity to businesses for e-commerce fulfillment, retail distribution, and inventory overflow. In addition to offering a marketplace, Flexe provides a technology platform that integrates with other supply chain systems (e.g., warehouse management, order management, and inventory management) to help manage inventory, orders, shipments, and billing. The platform also has a real-time dashboard and detailed reporting, creating a unified view across on-demand and owned warehouses. Flexe has over 1,000 warehouses in its network and its customers include Casper, Ace Hardware, BJ's Wholesale Club, Staples, and Church & Dwight. Flexe has raised $64 million in total funding from Activate Capital, Tiger Global Management, Madrona Venture Group, Redpoint Ventures, and Prologis Ventures. See our [Private Company Spotlight](#).

Flowspace. Flowspace provides an on-demand warehousing and fulfillment network, enabling one- and two-day shipping for businesses. The solution consolidates excess capacity from 3PLs that businesses can leverage for warehousing, e-commerce fulfillment, and retail fulfillment. Flowspace also integrates with Amazon and Shopify to help automate the order fulfillment process. Flowspace has over 500 warehouse locations, and customers do not need to sign long-term contracts. Flowspace, founded in 2017 and based in Los Angeles, has raised $15.5 million in funding and its investors include Canvas Ventures, Moment Ventures, 1984 Ventures, and Y Combinator.

STORD. Stord, founded in 2015 and based in Atlanta, consolidates excess warehouse capacity from 3PLs that is then resold to businesses looking for warehouse space. The company also provides tools for inventory and order management, which integrate with ERP systems. The company's solution can be used as a sole source of fulfillment or supplement a merchant's existing distribution network. Stord has raised $15 million and its investors include Kleiner Perkins, Susa Ventures, and Dynamo.

Warehouse Exchange. Warehouse Exchange, founded in 2017, provides a marketplace that enables warehouse operators to post available space and businesses to book space. The platform uses a matching algorithm to find results based on a business's needs.

Tech-Enabled Fulfillment Networks
In this section, we highlight several providers of tech-enabled fulfillment networks. These companies provide merchants access to a network of fulfillment centers and a software platform to manage the fulfillment processes. The platforms typically integrate with various e-commerce software (e.g., Shopify and BigCommerce) and marketplaces (e.g., Amazon and eBay), and automate the order management and fulfillment processes. Through leveraging these fulfillment networks, businesses of any size can cost-effectively provide fast shipping to customers. For SMBs, we see very little downside to leveraging these fulfillment networks. The main negatives are higher inventory levels (because of maintaining inventory in multiple warehouses) and potential quality issues given the reliance on a third party to complete the fulfillment process. However, for SMBs there are really no other cost-effective options for offering fast fulfillment, especially when merchants start shipping meaningful volume (e.g., more than 50 orders per day).

Although some of these services may seem similar to on-demand warehouse marketplaces, there are a few key differences, in our view. First, in an on-demand warehouse marketplace, the merchant chooses specific warehouse operators to work with. With tech-enabled fulfillment networks, merchants choose to use the service (not specific warehouses) and the fulfillment provider tells merchants which warehouses to send their goods to. Second, on-demand warehousing is great for supplementing in-house fulfillment capabilities for uncertainty, seasonal, or new product demand, while tech-enabled fulfillment networks are typically used as a merchant's primary source of fulfillment (although on-demand could also be used as a primary source of fulfillment). Lastly, tech-enabled fulfillment networks are typically used more heavily by SMBs, while on-demand warehousing is geared more toward enterprises. In our view, this is because on-demand warehousing is more flexible, while tech-enabled fulfillment networks are typically meant to be a simple, all-encompassing fulfillment offering.

The difference between tech-enabled fulfillment networks and traditional 3PLs is that 1) they have a network of fulfillment centers across the United States that can be used holistically and 2) they provide software, analytics, and data to help manage the distribution process. However, traditional 3PLs can partner with these fulfillment networks and provide the physical fulfillment service.

Who are the tech-enabled fulfillment networks?

Fulfillment by Amazon. Fulfillment by Amazon (FBA) was launched in 2006, giving third-party sellers access to Amazon's growing world-class fulfillment network. Sellers on Amazon's marketplace have four different fulfillment options:

1. *Fulfilled by Amazon (FBA):* Seller ships inventory to Amazon, and Amazon fulfills orders on the seller's behalf.

2. *Fulfilled by Merchant (FBM):* Seller ships its own products directly to the customer after receiving orders from Amazon.

3. *Seller-Fulfilled Prime (SFP):* Seller ships its own products directly to the consumer according to Amazon Prime's strict shipping standard, allowing it to display the Prime badge on listings it fulfills from its own facilities.

4. *Multichannel Fulfillment (MCF):* Seller ships inventory to Amazon, and Amazon fulfills order on the seller's behalf for non-Amazon sales channels.

FBA fees are dynamic, fluctuating based on seasonality, type, and size of item stored and shipped, and several other factors. FBA charges two primary fees: fulfillment and inventory storage. The fulfillment fee covers the entire picking, packing, and shipping process for each order. To calculate shipping costs, Amazon uses dimensional weight, taking a shipment's density into account. The fulfillment fee also covers return processing for certain categories. Sellers pay an additional fee for FBA returns if products are eligible for free returns through Amazon Prime. The monthly inventory storage fee includes storage of products in Amazon fulfillment centers. Inventory storage fees are based on the space occupied in Amazon's warehouses, measured in cubic feet. During the holiday season, storage fees can more than triple. For example, in 2019 monthly inventory storage fees will increase from $0.69 to $2.40 per cubic foot from October through December. This seasonal fee hike dissuades sellers from clogging up Amazon's warehouses with slow-moving inventory ahead of the holiday rush.

Exhibit 17
Fulfilled by Amazon
Fees Table

Fee type	Price
Monthly inventory storage (per cubic foot)	$0.69 to $2.40 depending on season and size of item (oversize discounted)
Long-term storage - Over 365 days	$6.90 per cubic foot
FBA fulfillment fees (per unit) - Standard size	$2.41 to $5.26+ (cost depends on weight)
FBA fulfillment fees (per unit) - Oversize	$8.26 to $137.32+ (cost depends on size and weight)
Inventory removal (per unit) - Return	$0.50 to $0.60 depending on item size
Inventory removal (per unit) - Disposal	$0.15 to $0.30 depending on item size
Return processing fee (per unit)	$3.19 (after Amazon provides free shipping to customer return)
Unplanned service fee (per unit)	$0.20 to $2.40 depending on problem

Sources: Amazon Seller Central, William Blair

FBA is the preferred option for most Amazon sellers because it is simple and cost effective. Using Amazon's fulfillment network allows merchants to instantly scale their business and reach more customers. Other positives include Prime eligibility, increased success winning the buy box, access to Amazon customer service (i.e., returns management), ease of managing seasonal spikes without additional resources, and using FBA to fulfill orders placed on some third-party websites.

However, FBA has several drawbacks. First, Amazon is known for tracking seller product listings and customer shipping addresses. This is intellectual property that sellers may prefer to keep private, fearing Amazon may decide to disintermediate them. Second, the overall cost to sell on Amazon, including FBA, can be higher than other channels because of the 10%-15% marketplace fees and advertising costs (e.g., sponsored products get placed ahead of relevant search results). Third, using FBA eliminates the opportunity for branded shipping materials or product personalization. Fourth,

sellers can lose control of their inventory if they choose to commingle products with other sellers. Amazon could ship a damaged item that is not part of the seller's inventory, prompting a return and negative review. Fifth, sellers cannot use FBA to deliver goods sold on Walmart's Marketplace. Sixth, if merchants decide to no longer use FBA, it can be costly to remove inventory from Amazon fulfillments centers.

MCF is for merchants that sell on channels other than Amazon. For example, merchants that sell on eBay (but do not sell on Amazon) can use MCF to fill those orders. This allows sellers that operate on multiple platforms to manage inventory and orders from a central source, adding significant scale to their business. The inventory storage fees for MCF are the same as FBA. However, MCF fulfillment fees are higher by roughly 25% (depends on weight and size). One downside to MCF is lack of integration into certain marketplaces' expedited shipping programs (e.g., Walmart Marketplace), which can potentially lead to slower shipping times.

Exhibit 18
Fulfilled by Amazon (FBA) vs. Multichannel Fulfillment (MCF) Fees

Product Example	$25.00, standard-size item, weight 2 lbs.	
Fulfillment & Other Fees	**Sold on Amazon & Fulfilled via FBA**	**Sold on Own Website & Fulfilled via MCF**
FBA / MCF Fulfillment Fee	$4.71	$5.95
Inventory Storage Fee (1 month)	$0.64	$0.64
Inbound Shipping to FBA	$1.60	$1.60
Amazon Seller Fee (15%)	$3.75	-
Total Fees	**$10.70**	**$8.19**

Sources: Amazon Seller Central, Fitsmallbusiness.com, William Blair

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More recently, Amazon seems to be shifting its attention to controlling the entire fulfillment chain, including freight and air, with 50 owned and leased aircraft and 20,000 owned and leased vehicles across its fleet. While a fraction of UPS and FedEx (note that the latter cut ties with Amazon earlier this year), Amazon is already close to fulfilling half of all orders on its platform, while USPS deliveries have gone from 60% to 30% in the last three years. We expect Amazon will continue to take share of its own delivery network.

Darkstore. Darkstore was launched in 2016 and has raised $30.2 million. Darkstore provides a technology platform that enables brands to offer same-day shipping. The company does this by using excess space in storage facilities, malls, and stores for fulfillment, creating a network of local fulfillment centers. The facility owners can use Darkstore's mobile application to manage the fulfillment process.

Deliverr. Deliverr, founded in 2017, provides a fulfillment solution for e-commerce businesses of any size. The company leases warehouse space from over 10 facilities, which are located across the continental United States. Deliverr provides customers with a software platform that helps manage the fulfillment process and, through machine learning, predicts when and where items will need to be shipped. The fulfillment solution can be used for Walmart, Amazon, and eBay, and supports integrations with ChannelAdvisor, Sellbrite, Zentail, GeekSeller, SellerCloud, SellerActive, Shopify, Skubana, Listing Mirror, eComdash, and SellerCloud. Deliverr has raised $7 million in funding.

eBay Managed Delivery. In July, eBay announced that it would launch Managed Delivery, an end-to-end fulfillment service. EBay will create a technology platform to manage inventory and orders, and will partner with warehouse operators across the United States. The solution will provide sellers with cost-competitive one-day, two-day, and three-day shipping options. Managed Delivery is targeted toward high-volume sellers and will be available in the United States in 2020.

ShipBob. Launched in 2014 and based in Chicago, ShipBob is a tech-enabled fulfillment and logistics solution for SMB e-commerce companies. ShipBob enables these long-tail e-commerce businesses to offer two-day, next-day, and same-day shipping to better compete with the larger e-commerce players. ShipBob's offering is a mix of software and services. ShipBob houses its customers' inventory across its many warehouses and handles the entire fulfillment process. The company's software integrates with leading e-commerce platforms like Shopify. When a purchase is made on one of ShipBob's customers' website, the order information is sent to one of ShipBob's fulfillment centers, where it is picked, packed, and shipped. The SMB uses ShipBob's software as its inventory management system to help manage daily operations. ShipBob's warehouse management system is proprietary and built to handle thousands of customers in a fulfillment center, and manage all of the company's fulfillment centers as one network. ShipBob has a network of fulfillment centers that are strategically located close to urban centers.

ShipBob differentiates itself from traditional 3PLs with its software, both internal (proprietary WMS and TMS) and customer facing (essentially provides a mini ERP system for SMBs). The company's network of fulfillment centers and ability to manage them in an integrated fashion are also points of differentiation. The advantage of ShipBob versus FBA is its neutrality. Unlike FBA, ShipBob does not care which channel the sale comes from and does not charge different rates. Leveraging FBA and providing Amazon with data could also be dangerous from a competitive perspective, whereas ShipBob is not a potential competitor for merchants. FBA also limits a merchant's ability to brand its shipping materials. ShipBob has raised $62.5 million, and its investors include Menlo Ventures, BainCapital Ventures, Hyde Park Venture Partners, Y Combinator, FundersClub, and SVAngel. See our [Private Company Spotlight](#).

Shopify Fulfillment. At its Unite conference in June, Shopify announced the Shopify Fulfillment Network. This offering will give U.S. merchants access to a network of fulfillment centers enabling fast, cost-effective shipping. The fulfillment centers will initially be operated by 3PL partners, but Shopify may build its own warehouses depending on demand and supply. The fulfillment network will be integrated with Shopify's e-commerce platform and provide customers with inventory management tools. The solution is initially targeted to U.S. businesses with 10 to 10,000 orders per day; by the end of the year, Shopify expects the network to be able to handle merchants with 3 to 30,000 orders per day and ship to 99% of the continental U.S. within two days or less. In September, Shopify announced its intention to acquire 6 River Systems for $450 million, which will enable the company to improve its fulfillment network capabilities through autonomous warehouse robots and the associated fulfillment software. This could make the fulfillment network more attractive for partners and help lower fulfillment costs.

In our view, the main goal of Shopify's fulfillment offering is providing an alternative to FBA and ensuring that fulfillment and shipping does not inhibit the success of merchants. Since Shopify effectively monetizes its customers' growth (through payments, customers moving to higher tiers, and Plus pricing), the company is heavily incentivized to help its merchants be successful. Further, more-successful merchants are less likely to churn, as a big source of churn for Shopify is business failure.

Conceptually, Shopify's fulfillment network makes a lot of sense to us; however, we see some challenges that need to be worked through for the service to be successful. First, many 3PLs are not equipped to handle hundreds or thousands of customers in a single fulfillment center. Therefore, their WM systems and warehouses are not configured to handle this type of diversity in the customer

base. To solve this issue, Shopify will likely have to provide software that integrates with 3PLs' WM systems to handle numerous small customers operating out of a single fulfillment center. Further, Shopify will need to consolidate inventory and order information across its 3PL partner base to provide a holistic view to merchants and have accurate inventory and shipping information on its customers' e-commerce sites. There is also likely to be a great deal of customer turnover within 3PLs' warehouses, partly because of business failure, which could create some complexities. Lastly, balancing supply with demand is likely to be a challenge, but Shopify has already stated that it is open to building its own warehouses to help alleviate this.

Ware2Go. Ware2Go, based in Atlanta, provides a platform that matches available warehouse space and fulfillment services with merchants looking for online order fulfillment. The service is targeted to SMBs and is used mostly by business-to-business companies. The company is majority owned by UPS, which also provides the shipping for guaranteed two-day delivery.

Wayfair. Taking a cue from Amazon, Wayfair opened its own proprietary fulfillment network to third-party suppliers in 2014 under the moniker CastleGate. Similar to FBA, CastleGate allows for supplier inventory to be positioned in Wayfair fulfillment centers, with Wayfair then handling shipping and customer service functions when orders come in. By front-loading inventory in CastleGate facilities, Wayfair can ship small-parcel items (average 30 pounds) in two days and larger-parcel items (average 80 pounds) within seven days. The big get here for both suppliers and Wayfair is to be able to speed delivery, with furniture delivery time more typically measured in months, not days. As of 2018, some 26% of small-parcel deliveries were running through CastleGate, while more recently the company has indicated that 14% of large-parcel items are fulfilled through CastleGate. In total, we estimate close to a quarter of all items are running through Wayfair's proprietary fulfillment network. Over time, we would look for leverage on fixed-cost investment here as penetration approaches 50% (more in line with Amazon). It is important to appreciate that Wayfair is building this fulfillment network from the ground up (including middle mile and last mile) as more traditional forwarding paths in the United States were not set up to account for large items. This is in part why delivery times for furniture suppliers are elongated, often they have to negotiate a tangled and disparate network of third-party delivery companies. By controlling the entire system, Wayfair cuts down lag time, alleviating a key pain point in the industry. With a fully developed network, Wayfair has an opportunity to monetize its fulfillment capabilities beyond what it can offer its own supplier network, opening distribution for more traditional furniture retailers that Wayfair will increasingly make compete on delivery time (much like Amazon has across the broader retail landscape), but that will have limited, if any, opportunity to do so without using what Wayfair is creating.

Bricks-and-Mortar Stores as Fulfillment Centers

Many brick-and-mortar retailers already have a significant geographic presence through their retail locations. Historically, these physical stores have been run separately from the e-commerce side of the business; however, more retailers are starting to leverage their physical stores as mini fulfillment centers. Further, stores can be used to expand convenience and delivery optionality to customers through buy-online-pick-up-in-store and buy-online-return-to-store options. Although these concepts have been discussed for years, we believe market adoption of technology solutions to handle these processes is still relatively early, having gained momentum more recently with the growing penetration of online sales (see exhibit 19). According to the Omnichannel Leadership Report from NewStore, of the 150 brands evaluated, only 26% offered buy-online-pick-up-in-store and only 29% offered buy-online-return-to-store. In exhibit 20, we evaluated 45 brands and retailers, and roughly 67% offered buy-online-pick-up-in-store and 87% offered buy-online-return-to-store. A few retailers leverage stores as their primary fulfillment centers. For example, in first quarter 2019 Target stores handled 80% of the retailer's digital volume.

Exhibit 19
Online Penetration by Category

Penetration rates	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Consumer electronics	13%	13%	15%	17%	18%	22%	23%	27%	29%	30%	33%	34%	37%	39%	44%
Apparel and footwear	2%	3%	3%	4%	5%	6%	6%	7%	8%	10%	12%	14%	16%	19%	22%
Pet care	1%	1%	1%	2%	2%	2%	2%	2%	3%	3%	4%	6%	8%	12%	16%
Health	2%	2%	2%	3%	4%	5%	6%	7%	8%	9%	9%	9%	10%	11%	12%
Beauty and personal care	2%	2%	3%	3%	4%	4%	4%	5%	5%	6%	7%	8%	9%	10%	11%
Home furnishings, improvement, gardening	1%	1%	2%	2%	3%	3%	4%	4%	5%	6%	6%	7%	9%	10%	11%
Consumer appliances	2%	2%	2%	3%	3%	4%	5%	6%	8%	9%	9%	10%	10%	11%	11%
Toys and games	2%	2%	3%	3%	3%	3%	3%	3%	4%	4%	5%	6%	6%	7%	8%
Video games	1%	1%	2%	2%	2%	2%	3%	3%	3%	3%	4%	4%	4%	5%	6%

Sources: Euromonitor, William Blair estimates

Exhibit 20
Retailer In-Store Pickup and Return Availability

	Pick up	Returns		Pick up	Returns		Pick up	Returns
Abercrombie & Fitch	✓	✓	DULUTH TRADING	✓	✓	patagonia	✓	✓
amazon	✓	✓	FINISH LINE	✓	✓	RALPH LAUREN		✓
Apple	✓	✓	Foot Locker	✓	✓	The RealReal		
ARITZIA		✓	GAP	✓	✓	Roots	✓	✓
bareMinerals		✓	H&M	✓	✓	Target	✓	✓
BED BATH & BEYOND	✓	✓	THE HOME DEPOT	✓	✓	TJX		✓
BEST BUY	✓	✓	J.Crew	✓	✓	Supreme		
BOOT BARN		✓	JCPenney	✓	✓	TIFFANY & CO.	✓	✓
BRANDLESS			KOHL'S	✓	✓	UNIQLO	✓	✓
Calvin Klein		✓	macy's	✓	✓	URBAN OUTFITTERS	✓	✓
(Canada Goose)			marine layer	✓	✓	UNTUCKit		✓
Casper			monica + andy		✓	vineyard vines	✓	✓
Columbia Sportswear Company		✓	Nike	✓	✓	Walmart	✓	✓
DSW DESIGNER SHOE WAREHOUSE	✓	✓	NORDSTROM	✓	✓	ZALES THE DIAMOND STORE	✓	✓
DICK'S SPORTING GOODS	✓	✓	Outdoor Voices			ZARA		✓

Sources: Company websites

Some digitally native brands have opened physical locations. Even Amazon has expanded its physical presence and offers pickup from over 2,800 Amazon lockers in more than 900 cities and returns through 1,159 Kohl's stores. Further, the company has 520 North American physical locations, which includes about 475 Whole Foods stores in the United States.

What are the benefits? For retailers or brands that already have physical stores, using them as fulfillment centers is a way to get additional leverage on existing fixed costs—according to Target, using stores as fulfillment centers is about 40% less expensive than upstream warehouses, since the company already has the fixed cost of the store. Typically, physical stores are located close to urban centers, so this provides a means for faster shipping to the surrounding areas. This can be more efficient for supplementing fulfillment capacity versus building additional fulfillment centers. Further, leveraging buy-online-pick-up-in-store offers an efficient way for consumers to purchase products that they need immediately. And providing in-store returns can be more cost-effective for retailers and

brands and convenient for consumers. According to the National Retail Federation in 2018, about 10% of a retailer's annual sales will be returned, a number that skews much higher for online sales (up to 30% for some categories). There is also the opportunity to sell customers additional products when they buy online and pick up or return to store. In 2016, UPS and comScore, Inc. surveyed 5,330 online shoppers in their Pulse of the Online Shopper report. The report stated that of the 50% of shoppers surveyed that have shipped to store for pickup, 46% made additional purchases in store. In addition, when shoppers returned product in store, 70% made an additional purchase. Comparatively, when shoppers processed their return on a website, 45% made an additional purchase.

What are the challenges? The biggest challenges associated with using stores as fulfillment centers are that stores typically carry significantly fewer SKUs than fulfillment centers and are significantly smaller. According to a 2018 issue of Supply Chain Quarterly, a brick-and-mortar store typically holds 50,000 SKUs, whereas a fulfillment center may hold 15 times that amount. Brick-and-mortar stores typically range from 1,000 to 50,000 square feet, and according to EMarketer, excluding anchor tenants such as Macy's or Target, most physical retail averaged 11,000 square feet; fulfillment centers can range from 200,000 to 1.5 million square feet. Compounding the size differential, stores are typically not set up to maximize inventory storage. And the costs to fulfill out of a retail store can be much higher than a fulfillment center. A store is typically not set up to be as efficient as possible from a fulfillment perspective, most notably on the labor side. Also, since retail stores can be located close to urban centers, square footage and labor costs can be higher.

Another major issue is that store-level inventory is typically not very accurate. According to a presentation by Manhattan Associates, store inventory accuracy can range from 60% to 70%, whereas warehouse inventory accuracy is typically above 90%. Therefore, an important part of fulfilling from a store is ensuring that inventory accuracy is high enough. Further, additional software is needed to handle the fulfillment and return processes, and employees need to be trained on how to fulfill orders.

Who are the software providers?

IBM. IBM is one of the leading order management system providers. Along with Manhattan Associates, IBM's distributed order management system is typically ranked at or near the top of industry analyst reports. In addition to handling order management for e-commerce, the solution has add-ons that can be used for in-store fulfillment. Although IBM has a good order management system, the company does not provide a WMS and needs to integrate with another vendor. This is where we believe Manhattan Associates has an advantage over IBM; Manhattan can provide a system to manage the entire fulfillment process, but IBM must integrate with a third-party WMS.

Manhattan Associates. Based in Atlanta, Manhattan Associates was founded in 1990 and has become a leader in the enterprise supply chain management market for retail, consumer packaged goods (CPG), and 3PL companies with complex distribution operations. Manhattan initially focused on warehouse management—where the company is the market leader and has been consistently ranked in the leaders quadrant in Gartner's Magic Quadrant reports. It has since significantly expanded its product set, including solutions for merchants to have in-store fulfillment and returns. Through its warehouse management, order management, and point of sale, Manhattan is able to manage a merchant's entire inventory and distribution process, creating one unified view of inventory—this is a point of differentiation versus competitors. For example, when an online order is processed, Manhattan's OMS knows where all of the inventory for the purchased product is and can determine the right location to fulfill said order based on the retailer's goals (e.g., speed, cost). The order is then sent to the store or fulfillment center, where Manhattan's WMS or store fulfillment software handles the pick and pack process. Manhattan also has functionality that integrates with RFID devices within a store to improve inventory accuracy and make fulfillment more efficient; associates can follow a map of the store as they fulfill an order. We believe Manhattan is well positioned with large retailers and brands with a brick-and-mortar presence.

NewStore. NewStore, started in 2015 by Stephan Schambach, who previously founded Demand-ware, is based in Boston with offices in New York and Berlin. NewStore provides an omnichannel platform that has an integrated cloud order management system and mobile POS. The solution was built entirely from a mobile perspective, enabling retailers and brands to provide an end-to-end shopping experience for customers. Some of the features of the platform include distributed order management, one transaction (process combination of store and endless aisle purchases in a single transaction) store fulfillment, enterprise inventory (i.e., managing inventory across all stores and fulfillment centers), omnichannel customer data and service (e.g., one view of the customer across all channels), and omnichannel sales reporting. The solution integrates with existing e-commerce platforms, warehouse management systems, and order management systems. NewStore's custom-ers include UNTUCKit, Adidas, and Steven Alan. According to Crunchbase, the company has raised $110 million in funding and its investors include General Catalyst, Activant Capital, and Mr. Scham-bach. The company's board of directors includes Sharen Jester Turney (former Victoria's Secret president and CEO) and Carol Meyrowitz (executive chairman of the board for TJX and former CEO). See our [Private Company Spotlight](#).

Shopgate. Shopgate, founded in 2009, provides a SaaS platform for mobile applications for retailers. The applications include a mobile shopping app, in-store fulfillment, and clienteling. Shopgate inte-grates with multiple e-commerce platforms, including BigCommerce and Magento. The company's solutions are used by over 12,000 merchants.

Curbside Pickup
Related to the store-as-fulfillment model is the emerging convenience of curbside pickup, i.e., a retailer having a product available to be brought to a customer's vehicle at a designated location, typically outside the store. Curbside pickup is already a focus area for a handful of larger big-box retailers and grocers, most notably Walmart, which rolled out the program to 2,100 of its 5,000-plus U.S. centers in 2018 and has noted strong engagement with both new and existing customers. More recently, Target expanded its own curbside program nationwide in September. Another interest-ing concept still in the development stages is OLAM (which stands for online, at-mall), which is looking to solve for the lack of efficiency many mall-based retailers face simply using retail space for fulfillment. While still in the early stages signing up clients, the company hopes to be able to take smaller, 2,000-square-foot outward-facing parcels in malls to allow for curbside pickup and returns for online orders for retailers in that mall. The company plans to test its first location at the Willowbrook mall in suburban Chicago, Illinois. A study conducted on OLAM's behalf in late 2014 by the NPD Group suggests high potential adoption rates, particularly among women (45% of respondents citing interest in the concept).

Last-Mile Fulfillment Technologies

Matternet. Matternet, based in Menlo Park, California, performs on-demand drone deliveries in urban environments. Matternet produces its own drones; its current drone, the Matternet M2, can carry payloads up to 4.4 pounds for distances up to 12.5 miles. The drones are unmanned and pro-vide the option for same-day delivery at lower costs for short trips. The company has performed delivery flights since 2017, and conducted the first revenue-generating drone delivery in the United States during 2019. The drones perform healthcare, e-commerce, and humanitarian delivery. In March 2019, UPS announced a partnership with Matternet to deliver medical samples in the Raleigh, North Carolina, metropolitan area with oversight from the FAA. Matternet has raised $25.5 million in funding, and its investors include Boeing HorizonX Ventures, Swiss Post, Sony Innovation Fund, and Levitate Capital.

Nuro. Nuro, founded in 2016, produces self-driving electric vehicles to handle short neighborhood deliveries for products such as groceries, prescription drugs, or dry cleaning. The vehicle is smaller than a passenger car and uses multiple high-definition cameras, LIDAR, radar, and ultrasonic and audio sensors for its self-driving capabilities. The company previously completed a pilot in Scottsdale,

Arizona, delivering groceries in partnership with Fry's Foods. The company is partnering with Kroger in select zip codes in Houston to deliver groceries. Nuro has raised $1 billion in funding, and its investors include SoftBank, Greylock Partners, and Gaorong Capital.

Starship Technologies. Starship Technologies, launched in 2014, creates electric self-driving delivery robots to perform food and package deliveries. Starship has tested its delivery robots in more than 100 cities around the world and completed over 100,000 deliveries. Over the next two years, Starship plans to expand to 100 university campuses based on the strength of its pilot started at George Mason University in June 2018. The company, based in the San Francisco Bay Area, has raised $85 million in funding to date. Starship Technologies' investors include Morpheus Ventures, Shasta Ventures, Matrix Partners, MetaPlanet Holdings, TDK Ventures, and Qu Ventures.

Warehouse Automation Technologies

Fetch Robotics. Fetch Robotics, based in San Jose, California, was founded in 2014 by Melonee Wise (CEO). The company's Fetch Cloud Robotics Platform provides autonomous robots for material handling and data collection in warehouses, factories, and distribution centers. Specifically, customers can use the robots for automated material transport (moving boxes throughout a fulfillment center) or automated data collection (perform inventory counting by automatically scanning RFID tags). The company also produces a robotics platform for researchers to collaborate and develop more mobile robotic technologies. In July, the company raised $46 million as part of its series C round, led by Fort Ross Ventures. The company has raised $94 million in funding to date.

Locus Robotics. Locus Robotics, based in Wilmington, Massachusetts, was founded in 2014. The company produces autonomous robots (LocusBots) for e-commerce fulfillment to assist workers in the picking process. The LocusBots communicate with the LocusServer, which integrates with a customer's WMS system through APIs and custom integrations. The company also developed a management platform to gain insight into performance and activity and manage operations and workflow. In April, the company raised $26 million as part of its series C round, led by Scale Venture Partners and Zebra Ventures. The company has raised $59 million in funding to date.

Other Interesting Fulfillment Technologies

Bringg. Bringg provides a delivery logistics platform for restaurants, retailers, brands, and grocery stores, among others. The platform can help companies manage deliveries made by any combination of private fleets, employees, crowd-sourced platforms (e.g., Postmates), or 3PLs. Based on preferences, Bringg determines which drivers should take which deliveries and the route. The platform gives retailers visibility into the delivery and flags orders, which may have exceptions. During the delivery, Bringg keeps the customer informed and manages the delivery process for the driver. Bringg can also be used to analyze driver performance and other items. Bringg has raised $54.5 million in funding, and its investors include Next47, Salesforce Ventures, Aleph VC, OG Tech Ventures, Cambridge Capital, Coca-Cola, Ituran, and Pereg Ventures.

SHIPSI. Shipsi's software integrates with existing e-commerce websites to provide same-day delivery. During the checkout process, Shipsi's software will determine if an item is in stock locally and if there is an available driver. If the inventory and driver are available, Shipsi will provide the consumer with the option for same-day delivery. The deliveries are performed by partners such as Uber and Postmates. We believe the software is targeted to midsize to large retailers with a physical presence. Shipsi has raised $2.8 million in funding, and its investors include Initial Capital, Halogen Ventures, Precursor Ventures, and Stage Venture Partners.

The prices of the common stock of other public companies mentioned in this report follow:

Amazon.com, Inc. (Outperform)	$1,785.30
The Blackstone Group L.P. (Outperform)	$53.30
eBay Inc.	$40.24
ChannelAdvisor Corporation (Market Perform)	$9.31
FedEx Corporation	$145.67
Manhattan Associates, Inc. (Market Perform)	$84.05
Shopify Inc. (Market Perform)	$313.26
Target Corporation	$108.78
UPS, Inc.	$119.05
Wayfair Inc. (Market Perform)	$118.29
Walmart Inc.	$117.62

IMPORTANT DISCLOSURES

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DOW JONES: 26807.80
S&P 500: 2966.60
NASDAQ: 7993.62

Additional information is available upon request.

Current Rating Distribution (as of September 25, 2019):

Coverage Universe	Percent	Inv. Banking Relationships *	Percent
Outperform (Buy)	67	Outperform (Buy)	19
Market Perform (Hold)	31	Market Perform (Hold)	7
Underperform (Sell)	1	Underperform (Sell)	0

*Percentage of companies in each rating category that are investment banking clients, defined as companies for which William Blair has received compensation for investment banking services within the past 12 months.

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