Digital Matching Firms: A New Definition in the "Sharing Economy" Space

Executive Summary

Increasingly, consumers and independent service providers are engaging in transactions facilitated by an Internet-based platform. The digital firms that provide the platforms are often collectively referred to as belonging to the "sharing" or "collaborative" economies, among other descriptors. However, in this paper, we narrow the focus and propose a definition of "digital matching firms" that exhibit the following characteristics:

1. *They use information technology (IT systems), typically available via web-based platforms, such as mobile "apps" on Internet-enabled devices, to facilitate peer-to-peer transactions*.

2. *They rely on user-based rating systems for quality control, ensuring a level of trust between consumers and service providers who have not previously met*.

3. *They offer the workers who provide services via digital matching platforms flexibility in deciding their typical working hours.*

4. *To the extent that tools and assets are necessary to provide a service, digital matching firms rely on the workers using their own.*

In addition to defining these "digital matching services" the report offers an initial assessment of its size and scope based on publicly available data on its largest firms, as well as an examination of its potential effect on consumers and service providers. The report closes with an overview of the benefits and challenges emerging from the growth of these firms.

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Introduction

The Internet—particularly when accessed on smartphones and other mobile devices—is enabling sellers and buyers to conduct market transactions in ways that had not been possible in the past. What began as small and informal online exchanges of goods and services via message boards and rudimentary websites has, with the widespread adoption of fast, reliable mobile smartphones and access to GPS, evolved into a collection of firms that connect millions of consumers with other private citizens who can provide goods and services quickly and efficiently.

One can now open an app and quickly arrange and pay for a car ride; book lodging for the night in a private residence; or arrange for a local provider to clean a house, cook food, or even assemble one's furniture or mount a television. Conversely, a person with free time and the right combination of skills and/or underutilized personal assets can use these same digital platforms to provide on-demand goods and services for profit, all on his or her own schedule, with low barriers of entry.

In the decade since the emergence of firms such as Uber, a transportation services company, and Airbnb, a platform for travel arrangements and reservation services, the number of people engaged in both obtaining and providing goods and services through digital matching platforms has grown considerably. A small number of digital matching firms are estimated to have valuations that rival many of the world's largest firms.[1]

In this paper, we define "digital matching firms" as entities that provide online platforms (or marketplaces) that enable the matching of service providers with customers. By identifying a set of common characteristics that define these "digital matching firms," we can explore what is new and unique about the phenomenon that is being called (among other names) "the sharing economy." We then examine the size, scope, and growth of the digital matching firms, with the caveat that there is a relative dearth of public data available on these companies. Finally, we discuss the potential benefits and detriments of the growth in digital matching firms to both the buyers and providers of the services—that is, to consumers and workers. In this final context we also discuss some of the policy challenges that have emerged as some firms using this business model have rapidly expanded and begun to compete with existing firms in established markets.

Defining Characteristics of Digital Matching Firms

The companies that have pioneered this relatively new phenomenon have been classified by a number of names including the "sharing economy," "e-lancing," the "ICT-enabled economy," among others. (See text box: A Plethora of Descriptors and Misnomers: Why We're Not Describing "Sharing" or "Collaborative" Firms). In our examination of this subset of the broader digital economy, we wish to narrow our focus and define the "digital matching firms" as consisting of firms with business models that exhibit the following characteristics:

[1] Uber is currently valued at approximately $62.5 billion (New York Times), while Airbnb has an estimated valuation of more than $25 billion. For comparison, Ford and Honda are worth approximately $60 billion, while GM has a market value of around $55 billion. The Hilton Hotel chain has a valuation of nearly $28 billion.

1. *Digital matching firms use information technology (IT systems), typically available via web-based platforms such as mobile "apps" on Internet-enabled devices, to facilitate peer-to-peer transactions.*

   Digital matching firms have introduced a variety of apps and other Internet platforms that provide a marketplace for secure, reliable, and efficient transactions between individuals. Digital matching platforms often allow individuals to access peer-to-peer services in real-time and also allow the digital matching firms to handle the financial transaction between the consumer and provider. For example, an Uber passenger pays for her ride using a credit card via the Uber app itself, with the firm paying the driver. This contrasts with a traditional taxi ride, during which the passenger pays the driver directly. In short, the worker providing the service has no role in collecting payment from the consumer.

2. *Digital matching firms rely on user-based rating systems for quality control, ensuring a level of trust between consumers and service providers who have not previously met.*[2]

   In order to facilitate peer-to-peer transactions, digital matching firms all utilize some form of rating system to ensure a level of trust between individuals that are most often strangers. In addition to requiring public disclosure of aggregate ratings, service providers are often required to maintain a consumer feedback rating above a certain threshold in order to continue providing services via their platforms. Our definition only requires that a rating system is in place to evaluate service providers, but many rating systems are bilateral, giving service providers a sense of security about the integrity of the person to whom they are, for example, renting out an asset.

3. *Individuals who provide services via digital matching platforms have flexibility in deciding their typical working hours.*

   Service providers for digital matching firms have the work flexibility of traditional freelance workers, which is why they are often referred to as "e-lancers." Individuals only offer services when they choose, assuming they meet conditions that the digital service firm may set, such as: maintaining adequate user feedback ratings; having government-required licensing, training, and insurance; and having quality assets. As such, digital matching firm service providers, who are often not legally classified as "employees" of the digital matching firm, are often *not required to be on call or work a specific amount by the digital matching firm in order to be eligible to provide services in the future.*

[2] It is worth noting that peer-to-peer financial services firms such as Lending Club or Funding Circle may or may not be considered digital matching firms, depending on how one interprets both the underlying peer-to-peer nature of the loans themselves and the necessity of a peer-to-peer rating system. Financial firms have robust rating systems, such as credit scores, that are independent from the peer-to-peer rating systems typical of a transportation, lodging, or peer-asset rental platform, but provide a mechanism for the trust necessary for consumers to use digital matching firms. In this paper, we will consider peer-to-peer lending companies as digital matching firms.

4. *To the extent that tools and assets are necessary to provide a service, digital matching firms rely on the workers using their own.*

   Unlike employees of traditional firms that use assets owned by the firm to perform services, these workers either own or have personal access to the assets that are used to provider services. Often, the assets must meet a set of criteria that the firm dictates. For example, Lyft requires that vehicles used by their service providers be from 2004 or later.[3]

Box 1. A Plethora of Descriptors and Misnomers: Why We're Not Describing "Sharing" or "Collaborative" Firms

Digital matching firms have been referred to by many names and descriptors. Among the most ubiquitous labels for the collection of these firms in both media and academic reporting are the "sharing" and "collaborative" economies. However, terms such as "sharing" and "collaborative" do not adequately characterize what makes firms like Uber, Taskrabbit, and Airbnb innovative. As discussed at length in this report, these firms provide a platform for consumers and service providers to connect and complete a transaction safely and efficiently, using the capital assets of the service providers themselves, when such assets are required to provide the service.

Service providers using their own underutilized assets to provide a service are often characterized as "sharing" or "collaborating" with consumers, but this implies services being provided for free; the reality is that the so-called "sharing" or "collaboration" in these cases is not free. Service providers are simply using their assets to earn money. In digital matching firms, service providers bear the cost and risk of providing a service and, in many cases, use an asset they already own for another purpose, but they are not "sharing" their assets any more than a traditional taxi company is sharing its cars or a hotel is sharing its rooms. There are some true "sharing" economy platforms that help individuals provide their assets to others free of charge, such as Freecycle, which provides a place for people to give away their possessions. However, Freecycle is essentially free retail, and retail is not in the scope of our definition of digital matching services.

Similarly, a true "collaborative" economy consisting of individuals utilizing online platforms to provide services and/or produce products also exists, as in the environments that produced the UNIX operating system or R statistical software, for example. However, the types of activities conducted through the "collaborative" economy do not accurately describe the kinds of transactions conducted via digital matching platforms.

The use of a narrow set of conditions that define a digital matching firm is an intentional effort to separate firms using an innovative online business model from firms using more standard business

[3] According to Lyft's published requirements for Lyft vehicles, some states and cities require that service providers use a newer model vehicle, such as Seattle, where service providers must have 2006 or more recent vehicle models.

models that have a strong online component and from online activities that cannot be characterized as being provided by "firms." (See text box: "Sharing" Firms that Are Not Digital Matching Firms).

Many digital matching firms share certain other attributes, but we did not consider them decisive or critical for defining digital matching firms because not all digital matching firms or the services provided by these firms have these attributes. For one, service providers utilizing digital matching platforms use capital assets that they already own to provide services, if such assets are required, but there are also providers that purchase or rent assets specifically to provide services via digital matching platforms.

For example, an individual may purchase a car via Uber's partnership with a network of car dealers and lenders for the express purpose of providing transportation services through the Uber app, or lease a vehicle on a short-term basis for use with the Lyft or Uber platform; rental companies such as Breeze exist to provide vehicles for digital matching transportation firms. A provider may also purchase a condominium to rent out on Airbnb, or purchase a bicycle or tools to use for paid tasks such as delivering packages or assembling furniture via the Taskrabbit app.

While digital matching firms may set quality standards for their service providers, those standards may differ from those of their non-digital matching competitors. For instance, digital matching firm service providers may lack occupational licenses in the industries in which they provide services, and may be considered "amateurs."[4] However, digital matching firm service providers are not always amateurs, and some digital matching apps connect consumers with professionals.

Along with the wide variety of services offered are a range of pricing structures, as lodging digital matching platforms, such as Airbnb, and task platforms, such as Taskrabbit, allow service providers to set their own rates, relying on consumers and service providers to adjust prices themselves. Other firms, such as Uber and Lyft, set prices internally, and both consumers and service providers are reliant on the digital platform to determine cost of service.

[4] For example, many localities, such as New York City, require that individuals complete a certification course and/or obtain a chauffeurs license before they can legally drive a taxi.

Box 2. "Sharing" Firms that Are Not Digital Matching Firms[5]

Many companies that are commonly classified as members of the "sharing" and/or "collaborative" economy fall outside of the scope of our definition of digital matching firms. These include:

1. Firms that provide online classifieds such as Craigslist do, in fact, match consumers with goods and service providers, but lack rating systems and also do not process transactions via their own digital platform.

2. Companies that provide assets that are shared by multiple consumers on an ad-hoc basis, such as "bikesharing" and "carsharing" firms or movie rental kiosks. We exclude these firms because the assets provided are owned by the firm itself on a self-service basis. These firms operate more like rental services but without the need for a staff of retail salespeople.

3. Online retailers such as Amazon since a large portion of their sales consist of items warehoused by Amazon itself or provided via authorized, traditional third-party retailers. (In some cases, however, these large retailers have subsidiaries that provide services that fit our definition. Amazon Mechanical Turk, for example, connects consumers with freelancers who provide a service for a fee.)

4. Firms that facilitate the matching of a service without facilitating a monetary transaction. Examples of these platforms include couchsurfing, freecycle, Maine Tool Library, Neighborgoods. These firms are appropriately classified as part of the "sharing economy," as the peer-to-peer transactions that take place via these apps involve the sharing or giving away of goods and services, often for altruistic purposes.

The Size and Scope of Digital Matching Firms

The apparent dramatic emergence of digital matching firms begs a number of questions about their size and scope, including what are the total revenues of all digital matching companies and how many people are engaged in providing services within this paradigm?

As the discussion below indicates, the evidence for definitive answers to these questions is limited. Though there are many high-profile privately held startups for which there are estimated large market values, much of the market analysis that has been done to date is broad in scope and speculative — there is little systematic information on the number and characteristics of individuals acting as providers on the digital matching platforms. Information about the customer experience and consumer surplus from using digital matching platforms versus more traditional business models is often anecdotal,

[5] For a list of firms that do seem to qualify as digital matching firms, refer to the "Appendix: Examples of Digital Matching Firms" following the conclusion of this report.

although some solid economic research on specific markets—such as the price and market effects with respect to specific firms in specific cities—is beginning to emerge.

Estimates of the Size and Growth of Digital Matching Firms

Relatively little economic research on digital matching firms exists, and teasing out data about the size and value of these firms is difficult. Most digital matching companies are private and not subject to the disclosure requirements of publicly-held companies, limiting the availability of reliable data on factors such as yearly revenues. Therefore, estimates of the size and growth of digital matching firms tend to come from private-sector surveys of consumers and service providers.

PricewaterhouseCooper (PwC), consulting firm MBO Partners, investment research group PiperJaffrey, and the JPMorgan Chase Institute have each released reports that attempt to estimate the size and growth of the "sharing" and "collaborative" economies. These studies inevitably include many firms and industries that fall outside of the scope of our analysis. However, it's worth examining the few studies that do exist, as many of the companies we classify as digital matching firms are represented in their analyses. Even using a broader definition than the one we propose, all of these studies suggest that the "sharing" economy comprises a relatively small portion of the overall economy.

In 2014, a study by PwC[6] presented an estimate that five key sharing sectors—travel, car sharing, finance, staffing, and music and video streaming—had global revenues of about $15 billion in 2014 with the potential to increase to around $335 billion by 2025. In addition, PwC surveyed 1000 consumers in order "to comprehend consumer attitudes toward the sharing economy." According to the PwC data, 8 percent of all adults have participated in some form of automotive sharing, and 1 percent have served as providers under this new model, "chauffeuring passengers around or loaning out their car by the hour, day or week". The PwC study also suggests that service providers in the "sharing economy," which they estimate to comprise 7 percent of the U.S. population, are made up of a wide variety of age and income groups though their estimates include firms that we would not consider digital matching firms.

The consulting firm MBO Partners produces an annual report titled the "State of Independence in America"[7] that examines the U.S.'s "independent workforce, or those who work 15+ hours a week as an independent contractor." In a proprietary supplement to this report titled "Independent Workers and the On-Demand Economy," MBO estimates that 2.7 million Americans, or 9 percent of independent workers provide services through "on-demand economy platforms," and that roughly 500,000 of the estimated 2.7 million U.S. on-demand independent workers are estimated to provide services for Uber, Lyft, and Airbnb, suggesting that service providers in the digital matching economy are concentrated in a small number of firms. Further the report found that, of those surveyed, independent workers in the on-demand economy reported lower earnings than independents not using these platforms and marketplaces. The data shows that 36 percent of independent workers using on-demand platforms reported earnings of $25,000 or less compared to 22 percent of independent workers not using such platforms. At the other end of the spectrum, only 17 percent of those providing services through on-demand platforms reported earning $75,000 or more; that compares to 28 percent of independent

[6] PricewaterhouseCooper. "The Sharing Economy." *Consumer Intelligence Series*. April 2015.
[7] MBO Partners. "MBO Partners State of Independence in America 2015."

workers that do not use on-demand platforms. However, like the PwC survey, MBO Partners included many companies in their report, such as Amazon and Ebay, which do not fit our criteria for digital matching firms.

The JPMorgan Chase & Co. Institute released a report titled "Paychecks, Paydays, and the Online Platform Economy: Big Data on Income Volatility,"[8] that attempted to estimate the effect of what they call the "online platform economy" on income volatility. The authors used an anonymized sample of 1 million people who were customers of JPMorgan between October 2012 and September 2015, and a dataset of more than 260,000 individuals who have offered goods or services on an online platform. They estimate that more than 4 percent of adults, or approximately 10.3 million people, participated in the "online platform economy" over the three-year period of their study, and that 1 percent of adults earned income from an online platform in a given month. Moreover, the Institute estimated a 47-fold increase in the number of adults that earned income from online platforms over the course of the three-year period.

Investment research group PiperJaffray produced a report titled "Sharing Economy: An In-Depth Look At Its Evolution & Trajectory Across Industries"[9] that estimated total "sharing" revenues from short-term person-to-person (P2P) home rentals, such as Airbnb, at 2 percent of the U.S. accommodations market, which includes hotels, hostels, bed and breakfasts, cruises and other short-term and P2P rentals. However, this report predicts that by 2025, P2P home rentals could represent as much as 10 percent of accommodation bookings, with revenue of $107 billion. In addition, Uber and other "ridesharing" companies are estimated to make up more than 5 percent of the $90 billion global taxi marketplace.

As noted earlier, the information available about the collective size of digital matching firms is sparse, the reports consist of small survey samples, and every study includes firms that that are outside the scope of our definition. For that reason, these estimates are not entirely applicable for our purposes. However, despite the inclusion of firms and industries that do not reflect the digital matching economy, these studies suggest that digital matching firms are quickly growing in size, yet remain a relatively small part of the greater U.S. economy.

The Largest Digital Matching Firms

Current estimates of the size and growth of the "sharing" economy may not be appropriate for our purposes given the inclusion of firms that fall outside of our defined digital matching firm parameters. However, publicly released estimates of the size and growth of the largest individual digital matching firms are available and provide an insightful, if imperfect, glimpse into the rapid growth of the most successful firms.

[8] JPMorgan Chase & Co. Institute. "Paychecks, Paydays, and the Online Platform Economy: Big Data on Income Volatility." February 2016.
[9] Olson, Michael J., Samuel J. Kemp. "Sharing Economy: An In-Depth Look At Its Evolution and Trajectory Across Industries." PiperJaffray Investment Research. March 2015.

Market intelligence group VB Profiles[10] estimated that, worldwide, there are now 17 companies in the sharing or collaborative economies each worth more than $1 billion, with 60,000 employees and $15 billion in funding. As with the other studies discussed above, we would not consider many of these companies part of our more narrow definition of digital matching firms, but the list does include digital matching companies such as Uber, Lyft, and Airbnb, as well as other digital matching companies such as Chegg, which specializes in online textbook rentals.

- Uber—a privately held company—is the largest digital matching firm based on market valuation. The Wall Street Journal reported that its market value was estimated to be $62.5 billion in December 2015, up from $60 million in 2011.[11] If this is accurate, its current valuation is higher than 80 percent of all S&P 500 companies. Reuters forecasts that Uber, from the 20 percent cut it takes from every ride, will generate approximately $2 billion in revenue worldwide in 2015.[12]

- Airbnb—also a privately held firm—is the second largest digital matching firm based on market valuation and the largest lodging accommodations provider among digital platform firms. The Wall Street Journal reported Airbnb's estimated value at more than $25 billion, which is more than that of the Marriott hotel chain.[13] The valuation increased from approximately $10 billion in April, 2014.

[10] Koetsier, John. "The sharing economy has created 17 billion-dollar companies (and 10 unicorns)." *VentureBeat.* June 4 2015.
[11] Isaac, Mike, Leslie Picker. "Uber Valuation Put at $62.5 Billion After a New Investment Round." *The New York Times*. December 3, 2015.
[12] Zhang, Shu, & Gerry Shih. "Uber seen reaching $10.8 billion in bookings in 2015: fundraising presentation." *Reuters*. August 21, 2015.
[13] Alba, Davey. "Airbnb Confirms $1.5 Billion Funding Round, Now Valued at $25.5 Billion." *Wired*. December 7. 2015.

Box 4. Disruption and Convergence

As with the introduction of e-commerce in the 1990s, Internet-based technologies in the form of digital matching apps have the potential to disrupt existing markets. The growth of the digital matching firms appears to have begun to cause some disruption in traditional industries such as transportation services and lodging, with the potential to do so in a variety of other industries.

Airbnb and other lodging-centric digital matching firms may have already had an effect on hotel revenues in some areas. According to a Boston University study titled "The Rise of the Sharing Economy: Estimating the Impact of Airbnb on the Hotel Industry," each additional 10 percent increase in the size of Airbnb listings in Texas resulted in a 0.37 percent decrease in monthly hotel revenues. There is also some evidence that digital matching firms may have had an effect on the supply of long-term rentals in some areas, as some landlords in major cities, such as New York City, have chosen to operate homes as short-term rentals via Airbnb rather than lease them in a more traditional manner, decreasing the supply and potentially raising the price of rental properties within that market. To combat what they consider ad-hoc hotels, regulators in New York City have since proposed heavy penalties for property owners who violate the city's ban on short-term rentals.[14]

In the transportation industry, the rise of firms such as Lyft and Uber likely have negatively affected the value of taxi medallions in New York City, as the price fell to roughly $805,000 in early 2015, down 23 percent from 2013's peak of $1.05 million; corporate medallions, which may be owned in fleets, were down 28 percent from their peak.[15] Taxi industry revenue has fallen considerably in a number of cities as well; in Seattle, taxi revenues dipped 28 percent in two years.[16]

At the same time, in an effort to compete with digital matching firms, traditional industries are beginning to incorporate digital matching technology into their services, in a process known as convergence, lowering their own costs and improving the consumer experience. For example, the Curb app for taxi services works much like Uber, connecting consumers with taxi drivers representing 90 taxi companies in 60 cities and allowing consumers to pay for rides via the app.

Along with incorporating technologies from digital matching firms into their business models, some regulatory hurdles are being modified to help make traditional firms more competitive with digital matching firms. For example, the New York City Taxi Commission has removed geography questions from the taxi license test in response to a decline in the number of driver applicants, while also acknowledging that reliable GPS technology has made rote knowledge of the New York City area less important for driver success and customer satisfaction.[17]

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[14] Gonzalez, Juan. "NYC Council to propose tough penalties for landlords who use sites like Airbnb, in effort to keep affordable housing." *New York Daily News*, June 10, 2015.
[15] Barro, Josh. "New York City Taxi Medallion Prices Keep Falling, Now Down About 25 Percent." *The New York Times*, Jan. 7, 2015.
[16] Samuelson, Rob. "Seattle taxi revenue dropping precipitously due to Uber and Lyft." *Seattle Sun Times*. June 13, 2015.
[17] Worland, Justin. "Cab Drivers No Longer Required to Learn N.Y.C.'s Streets." *Time.* March 9, 2015

Benefits and Challenges Introduced by Digital Matching Firms

Benefits of Digital Matching Platforms

With the potentially rapid growth of digital matching firms, an important question is whether or not they benefit consumers, workers, and the overall economy. Given the developing nature of the sector, there is insufficient data to make any definitive judgments. However, given its inherent characteristics, digital matching firm technology has the potential to provide a number of benefits. This section explores the benefits often associated with the digital matching platforms.

1. **Provides Lower Prices for Consumers Due to Reduced Transaction and Overhead Costs for the Service Provider**: Transaction costs are the time, money, skill, and effort needed to facilitate a market transaction. Every day, consumers demand goods and services that could be provided by professionals and non-professionals in their communities. These market exchanges are often facilitated through firms, brokers, and sometimes government agencies. Digital matching platforms potentially reduce the costs of coordinating these transactions by connecting consumers with service providers directly and often in real-time, ostensibly cutting out the traditional firm and middlemen that would otherwise be needed to link them.

   There is some evidence that these lower costs for the service provider has resulted in lower prices for consumers. For example, a Business Insider article reported that in 2014, an Uber ride was less expensive than a taxi in all but two of the 21 large cities studied, *so long as surge pricing wasn't activated*.[18] In addition, the previously discussed PwC survey found that, of those polled, 56 percent cited "better pricing" as the reason for their preference for "automotive sharing economy models." The PiperJaffray report, which was also previously discussed, found that private accommodations available through digital platforms, such as Airbnb, are generally less expensive than hotels in cities throughout the world (see table).

[18] The price of Uber services will rise during "peak" periods, when consumer demand for rides is highest. According to Uber's FAQ, "At times of high demand, the number of drivers [Uber] can connect you with becomes limited. As a result, prices increase to encourage more drivers to become available." These often include periods of inclement weather, holidays, and near areas in which special events are taking place. Given that Uber surge pricing is variable and that rates can climb by many multipliers of the base fare, it's possible that consumers, on the whole, pay more for Uber.

Table 1:

Hotel vs. Private Rental Costs Throughout the World

City	Private Rental Index ($)	Hotel Index ($)	Difference (%)
Singapore	68	202	67
Seoul	48	142	66
Rio de Janerio	102	257	60
Hong Kong	73	174	59
Barcelona	65	149	56
Zunich	87	199	56
New York	114	255	55
London	75	165	55
Istanbul	69	151	55
Budapest	45	99	54
Cannes	108	231	53
Palma de Mallorca	73	150	52
Sydney	94	195	52
Frankfurt	76	159	52
Melbourne	75	155	52
Los Angeles	94	192	51
Florence	76	152	50
Nice	89	174	49
Paris	98	183	47
Munich	87	159	46
Miami	115	214	46
Rome	87	155	44
Lisbon	63	113	44
Madrid	65	115	44
Milan	84	152	44
Seville	64	113	43
Prague	64	112	42
Berlin	65	112	41
Vienna	77	130	40
Venice	119	183	35
Brussels	93	136	32

Source: Study commissioned by Wimdu and converted from EUR to USD by Piper Jaffray

2. **Provides Flexible Employment Schedules and Additional Income for Workers**: People who need extra income and/or can't work traditional hours are often able to provide services via digital matching firms. Low barriers of entry and the utilization of ubiquitous, common capital assets, such as cars, bicycles, and extra bedrooms allow individuals to work during their "off" hours or while they're otherwise unemployed[19]. For example, in a survey commissioned by Uber, 80 percent of their "driver-partners" were working full or part-time jobs just before they started driving on the Uber platform, and two-thirds of that group reported having a full-time job. In addition, of those

[19] Evidence indicates that firms have encouraged individuals to purchase capital assets such as cars for use with the digital matching app. For example, Uber has a vehicle financing service that connects borrowers, including those with poor credit, with auto dealers. Individuals who purchase an asset to use specifically with a digital matching app in-fact may be losing the flexibility benefits that are ostensibly one of the draws of being a service provider for a digital matching firm, as they are now responsible for the payments and maintenance of that asset, and thus must work.

surveyed, more than half had never previously worked as a driver, whether it be for a taxi, limo, or other for-hire transportation company, suggesting that the Uber platform provided an introduction into a new line of full or part-time work for the majority of its service providers.[20]

Further, the previously discussed JPMorgan Chase Institute study found that earnings from labor platforms helped to offset low or zero-income periods for workers with high levels of income volatility, notably when they were between jobs and when their income dipped. Although the number of people participating in what they call the "online platform economy" increased tremendously during the three-year period of their study, individuals mostly utilized online platforms as a secondary source of income, and their reliance on platforms for income remained stable over time in both the fraction of months that participants were active and the fraction of total income earned on platforms in active months.

Aside from providing employment opportunities for the unemployed and workers who require supplemental incomes, digital matching platforms also offer opportunities for non-traditional working populations, such as retired people and individuals with disabilities or health issues. Some companies are actively recruiting senior citizens; Uber, for example, announced a partnership with AARP's Life Reimagined, which would give members who sign up to be new drivers a bonus after they provide 10 rides through the service.

3. **Leverages Excess Capacity**: Digital matching firms provide a platform for service providers to take advantage of underutilized assets. Turo, for example, capitalizes on the existence of idle private vehicles by allowing users to rent out their cars to others when they're not using them. Transportation services provided by Uber and Lyft capitalize on both underutilized cars that are theoretically sitting unused and drivers with both the time and desire to work. Rooms listed for rent on Airbnb or HomeAway are often guest rooms or in houses that are currently vacant due to vacation, travel, or other life events.

4. **Potentially Stimulates New Consumption**: By providing consumers access to services that were previously either unavailable or less convenient, digital matching firms may be able to access untapped markets and increase overall consumption. However, it's possible that total consumption in the economy could actually decrease as consumers shift away from the more traditional economy. For example, if urban consumers begin using digital matching apps for their transportation needs to a large enough degree, they may hold off on purchasing a car, which could potentially decrease overall consumption in the economy. Reliable data examining the stimulative effect of digital matching firms is currently sparse.

5. **Improves the Consumer Experience**: The innovations introduced by digital matching firms could considerably lessen the inconvenient aspects of service transactions, increasing consumer welfare. For example, both Lyft and Uber allow consumers to pay for their services via their respective apps, removing the post-ride in-person transaction that is often required when they use traditional taxi

[20] Hall, Jonathan V, & Alan Krueger. "An Analysis of the Labor Market for Uber's Driver-Partners in the United States."

services. The apps also utilize GPS technology to allow consumers to track their driver so that they know in real-time when he or she will arrive.

6. **Provides a Mechanism for Trust between Consumers and Individual Service Providers:** Digital matching firms, via rating systems within their platforms, have provided the consumer an efficient mechanism through which they are willing to trust complete strangers to provide goods and services. Relying on crowdsourced information to establish trust between a consumer and a company is not new, as people have long used relatives, friends, co-workers, and neighbors to choose a company or specific service provider. However, robust public ratings systems may be a more efficient guidepost when deciding whether or not, for example, they will stay in a spare bedroom or have a stranger clean their house, mount their TV, or cook their food. Further, many digital matching firms are able and willing to ban service providers who fall below ratings thresholds, acting as an incentive for better service.

Challenges Introduced by the Digital Matching Platforms

Digital matching firms and their technologies have the potential to provide a number of benefits, but there are possible downsides to the emergence of these firms, most notably to service providers themselves. Partly because service providers are typically not classified as employees of the firm, risks are often shifted from the digital matching firm (that provides the platform) to the service provider (often an individual). There are also potential concerns about customer privacy and access to these services that need to be considered when evaluating the overall costs and benefits of these new services.

1. **Potential Income Instability:** Service providers in the digital matching economy are fully reliant on the digital matching platform's ability to connect them with consumers, and they are not guaranteed to be matched. Thus, service providers in the digital matching economy are often unsure at any given time whether or not their services will be in demand. Also, in the case of digital matching firms that set rates themselves, service providers are unsure of the price until they begin providing those services, and the prices may change at any time.

2. **Fewer Benefits and Protections for Service Providers:** Since many digital matching firm service providers are classified as independent contractors, they are not eligible to receive many benefits, such as a minimum wage, overtime pay, health and life insurance benefits, collective bargaining rights, retirement and savings plans, protections from discrimination, and sick leave. Workers who sign up for their own benefits must additionally devote their own unpaid time to what is normally provided by human resource departments. In addition, service providers are often not compensated if, for instance, a client is running late or reneges on a service request.

3. **Service Providers are Responsible for their Own Training:** A digital matching company lacks the incentive to train its service providers lest they be classified as employees. For that reason, service providers either must already possess the knowledge and experience to provide a service or are forced to train themselves. Thus, for example, laborers providing handyman services via platforms such as Taskrabbit, must either already know how reliably to mount a TV, or teach themselves to do so.

4. **Capital Investment and Maintenance Costs are the Responsibility of the Service Provider**: Digital matching firms rely on service providers to use and maintain their own capital assets. If, for

example, a service provider's car breaks down or their tool malfunctions, he or she must cover replacement and repair costs. Further, when providing services through car transportation platforms such as Uber, service providers are responsible for fuel costs, depreciation, and insurance coverage.[21]

5. **Consumer Privacy and Security:** Digital matching firms by their very nature collect and have access to a substantial amount of consumer and service provider information, whether it be a consumer's credit card information, home address, location, or travel history. As with all firms that conduct business via the digital economy, the safe handling and legal usage of such data by digital matching firms must be considered.

6. **Access:** In order to utilize digital matching platforms as either a consumer or a service provider, one must at least have access to the Internet, and also, in many cases, a smartphone. According to the Pew Research Center[22], about two-thirds of American adults now own a smartphone, up from 35 percent in 2011. Although smartphone access has grown considerably, one-third of U.S. adults are effectively unable to utilize many digital matching applications without assistance, and many of those without smartphones are those with lower levels of educational attainment and those on the lower end of the socioeconomic spectrum. For instance, only 50 percent of Americans making less than $30,000/year own a smartphone, compared with 84 percent smartphone ownership among those making $75,000/year or more. Only 52 percent of Americans with a high school degree or less own a smartphone compared with 78 percent ownership among those with college degrees.

Integrating Digital Matching Firms into the Regulatory Framework

When startups with innovative business models emerge, it may take time to figure out how they fit into the regulatory framework. For example, the rise of what are now considered traditional online retailers such as Amazon and Ebay brought with them a multitude of complicated policy issues that are still being debated, such as how, where, and when to tax purchases.[23] If regulations are inequitable, this may lead to market distortions. The purpose of this section is to provide an overview of several of the issues that have emerged to-date as some of the prominent digital matching firms have increased their market share over the past few years. Although not a comprehensive list, these issues include:

1. **Worker Classification:** Currently, many digital matching firm service providers are classified as independent contractors, and not employees. As discussed earlier, in the United States this distinction carries with it differences in rules and regulations related to areas such as unemployment insurance, workers' compensation, training, and health insurance coverage. The IRS has a list of 20 factors that "may be examined in determining whether an employer-employee relationship exists." These factors include worker training and set hours of work. Government regulators are examining

[21] https://www.uber.com/driver-jobs. Viewed on 3/24/2016.
[22] Pew Research Center, "U.S. Smartphone Use in 2015." April 1, 2015.
[23] For example, Amazon currently only collects sales taxes for transactions that take place in just over half of U.S. States.

whether or not these service providers should be classified as employees, and some are ruling that they should be. California's Labor Commission, for example recently ruled that Uber drivers should be classified as employees. The U.S. Department of Labor also recently reemphasized concern over companies claiming their workers as independent contractors when they should be employees, although the guidance did not specifically reference the "sharing" economy or any of the other commonly used designations.[24] However, in anticipation of similar rulings, some companies, such as Shyp, have begun converting their independent contractors into employees.

Further, companies are required to withhold income taxes, pay unemployment taxes, and pay and withhold Social Security and Medicare taxes for workers classified as employees. As mentioned above, California regulators recently ruled[25] that Uber drivers should be classified as employees, not independent contractors. If that ruling stands, Uber will be required to incur the administrative costs necessary to collect these employment-related taxes, as well as pay the Federal Unemployment tax (FUTA) and cover half of their employees' social security and Medicare taxes[26].

The sharp disparity between the way contractors and employees are regulated has led some[27] to question whether a third worker classification should be enacted that covers workers who fall somewhere between independent contractors treated as self-employed businesspeople and traditional employees that are generally entitled to certain benefits and worker protections.

Our understanding of the extent of the worker classification issue is challenged because of the limited availability of data on this segment of the workforce, although the federal government is currently conducting several efforts to collect better data on the subject. (Box 5. Expanding the Collection and Availability of 'Sharing' Firm Data).

2. **Taxation and Compliance:** The applicability of hotel taxes to room and residence rentals via Airbnb and other lodging-specific digital matching firms have been raised in a number of localities. Initially, digital matching firms did not require that service providers pay lodging taxes that are typically required of hotels and other lodging establishments, potentially reducing government revenue and creating a competitive advantage for lodging-specific digital matching firms. Many localities, such as Santa Monica, California have banned the use of Airbnb-like services for short-term lodging unless the service provider obtains a business license and pays a hotel tax.[28] In response, Airbnb has agreed to collect taxes in several cities, including the District of Columbia and Portland, Oregon in order to meet local tax collection responsibilities while not burdening potential service providers with the need to apply for licenses or collect taxes themselves.

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[24] https://www.dol.gov/whd/workers/misclassification/ai-2015_1.htm
[25] http://www.reuters.com/article/us-uber-tech-drivers-lawsuit-idUSKCN0Y02E8
[26] https://www.irs.gov/businesses/small-businesses-self-employed/understanding-employment-taxes
[27] For example, The Hamilton Project at the Brookings Institute released a report titled "A Proposal for Modernizing Labor Laws for Twenty-First-Century Work: The "Independent Worker" that examined alternative employee classifications for gig economy workers.
[28] Sam Sanders, "Santa Monica Cracks Down On Airbnb, Bans 'Vacation Rentals' Under A Month," NPR, May 13, 2015, http://www.npr.org/sections/thetwo-way/2015/05/13/406587575/santa-monica-cracks-down-on-airbnb-bans-vacation-rentals-under-a-month

Box 5. Expanding the Collection and Availability of 'Sharing' Firm Data

Given the relative infancy of digital matching firms and the broader "sharing economy," limited federal data is available about the size, scope, and growth of these firms or about the makeup of their employees and contractors. The lack of data makes it difficult for researchers and policymakers to study trends in this area. However, efforts are underway to expand the availability of data on these firms and the workers that provide services through them.

For example, the Department of Labor and the U.S. Census Bureau will reintroduce the Contingent Worker Supplement (CWS) as part of the Current Population Survey in 2017[29]. The CWS was conducted 5 times from 1995 to 2005 in an attempt to measure more accurately the size of the contingent workforce[30]. With adjustments to reflect questions relevant to digital matching firms or to the 'sharing economy,' the CWS could be an important source of data on workers, both within the government and in the private sector, who participate in these parts of the economy but are not traditional employees.

Further, expanding the ability of federal statistical agencies to use limited Federal tax information holds promise for improving data on digital matching firms or the broader "sharing economy." Such data access potentially would enable the statistical agencies to measure income from sources such as payments made to a person who is not an employee, sources which are particularly relevant to these parts of the economy. Allowing statistical agencies access to this type of data would require a change in the tax code to expand the use of tax information for statistical purposes; for example, under current law, the Bureau of Economic Analysis only has access to Federal tax information of corporations (FTI) and the Bureau of Labor Statistics has no access to FTI for use in the statistics it produces. This barrier to accessing business tax information is a roadblock preventing measurement of the sharing economy's financial size and employment scope.

3. **Equal Access to Services for Individuals with Disabilities:** A large number of businesses in the United States are included in the 12 categories that are considered "public accommodations" and are therefore covered by the American with Disabilities Act (ADA), including restaurants, hotels, movie theaters, schools, day care facilities, recreation facilities, taxi services and doctors' offices. For instance, taxis services are required to ensure that a certain percentage of their fleets are equipped to transport passengers with disabilities; in the District of Columbia, each taxi and sedan company

[29] Secretary Tom Perez, "Innovation and the Contingent Workforce," U.S. Department of Labor blog, January 25, 2016.

[30] According to the Department of Labor, contingent workers are "persons who do not expect their jobs to last or who reported that their jobs are temporary. They do not have an implicit or explicit contract for ongoing employment. Alternative employment arrangements include persons employed as independent contractors, on-call workers, temporary help agency workers, and workers provided by contract firms."

with 20 or more vehicles must dedicate a portion of its fleet to wheelchair accessible vehicles.[31] Hotels and even bed and breakfast facilities must comply with ADA regulations regarding architectural barriers. Digital matching firms that provide transportation services may not be equipped to provide service to the disabled, and it is unclear whether or not they are required to do so under the ADA or related statutes and regulations. Also not clear is whether authorities require most rooms and houses listed on websites of lodging-specific digital matching firms to be ADA compliant.

4. **Consumer Safety and Service Provider Certification:** Traditional firms must often pass rigorous regulatory checks, such as health and safety inspections in hotels and in restaurants, to ensure that their services are safe for consumers. Service providers in certain traditional industries are also often subject to additional screening and certification requirements, such as ensuring the contractors they employ are licensed to conduct handyman services or have taxi licenses for their cabs. Digital matching firms may not meet these same consumer safety requirements. Airbnb and other lodging-specific digital matching firm service providers, for instance, are not subject to the health and sanitation inspections common among hotels and bed and breakfast facilities. Providers of handyman services through digital matching platforms may not have the required contractors' licenses to do specific requested tasks. Firms such as Taskrabbit hedge against such issues by providing insurance coverage in the event of an accident, but their service providers potentially remain unlicensed.

   Traditional service providers must also comply with federal, state and local environmental regulations to which digital matching service providers may not be subject. Hotels, for example, must adhere to a number of basic federal requirements under the Clean Air Act, Clean Water Act, and the Resource Conservation & Recovery Act and Toxic Substances Control Act, among others.

Conclusion

In this paper, we proposed a definition for "digital matching firms" as firms that use Internet and smartphone-enabled apps to match service providers with consumers, help ensure trust and quality assurance via peer-rating services, and rely on flexible service providers who, when necessary, use their own assets. Notwithstanding the challenges of defining and measuring digital matching firms in the context of the greater economy, their rapid growth suggests that these firms are providing a unique and valuable platform to connect consumers and service providers. We found that many digital matching firms have grown considerably during the past five years, and although reliable public data about the size and scope of the digital matching economy as a whole is scarce, there are a number of digital matching firms that are reportedly valued in the billions of dollars, with Uber and Airbnb leading the pack at $62.5 billion and more than $25 billion, respectively. However, these firms remain a small part of the greater economy.

[31] According to the DC Taxicab Commission Disability Advisory Committee, the portion of its fleet dedicated to wheelchair accessible vehicles must be at least 6 percent by December 31, 2014; at least 12 percent by December 31, 2016; and at least 20 percent by December 31, 2018.

We discussed a number of potential benefits and challenges introduced by digital matching firms, with benefits including potentially lower transaction costs for services, flexible employment opportunities for service providers, the leveraging of excess capacity, improved customer experience, and the potential for stimulating new consumption in the economy. However, the introduction of digital matching firms is not without potential downsides. These detriments include potential income instability for service providers, the need for service providers to take care of their own asset maintenance costs, responsibility for obtaining the assets (such as a car or room) that they use to provide services, fewer worker benefits, and access issues for individuals who don't have a readily available Internet source and/or smartphone.

Finally, we discussed some of the challenges that are emerging with the growth of this particular innovative business model. Like ecommerce firms in the 1990s, digital matching firms are promoting debate about how to capture the benefits of technology driven change without abandoning important aspects of the current industrial organization, such as workers' rights, consumer safety, equal access, environmental protection, and privacy. .

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Appendix: Examples of Digital Matching Firms

This list was compiled for the purpose of testing whether it was possible to develop a firm-based definition that captures the uses of a "new technology," where the new technology is the on-demand or digital matching platform business model. The majority of this research was done in the latter half of 2015 using the methods described below the table. An effort has been made to ensure the firms in the list are still in operation and continue to meet the definition. However, given the dynamism of entrepreneurially activity in this area, the list should not be viewed as authoritative or as a comprehensive list of companies using the digital matching platform model.

Category	Company Name	Company Website
Art Rental	Art.sy	artsy.net
Art Rental	TurningArt	turningart.com
Art Rental	Artsicle	artsicle.com
Bike Sharing	Spinlister, Inc. (formerly Liquid)	https://www.spinlister.com/
Car Sharing	Turo, Inc.	http://www.Turo.com/
Car Sharing	Getaround, Inc.	https://www.getaround.com/
Car Sharing	SnappCar	http://www.snappcar.com/
Car Sharing	BMW Car Sharing, LLC (DriveNow)	https://us.drive-now.com/
Care	Dog Vacay, Inc.	http://dogvacay.com/
Care	A Place for Rover, Inc.	http://www.Rover.com/
Care	UrbanSitter, Inc.	https://www.urbansitter.com/
Care	Care.com, Inc.	https://www.care.com/
Care	Swifto	https://swifto.com/
Care	The Good Bear, Inc. (Doggybnb)	http://doggybnb.com/
Care	Zingy	http://www.zingypet.com/
Clothing Swaps	Dig N'Swap	http://www.dignswap.com/
Delivery	Postmates, Inc.	https://postmates.com/
Delivery	Food Lovers United Co.	https://www.fluc.com/
Delivery	Square, Inc. (Caviar)	https://www.trycaviar.com/
Delivery	DoorDash, Inc.	https://www.doordash.com/
Dining	Feastly, Inc.	https://eatfeastly.com/
Dining	EatWith Media Ltd.	http://www.eatwith.com/
Dining	Greased Watermelon LLC (LeftoverSwap)	http://leftoverswap.com/
Dining	SpoonRocket, Inc.	https://www.spoonrocket.com/
Dining	Munchery, Inc.	https://munchery.com/
Dining	Sprig, Inc.	http://sprig.com/
Dining	Gobble	
Errands	TaskRabbit, Inc. (formerly RunMyErrand, Inc.)	https://www.taskrabbit.com/
Errands	JobRunners, LLC	https://www.job-runners.com/
Errands	Zaarly, Inc.	https://www.zaarly.com/
Errands	Dolly, Inc.	https://getdolly.com/
Errands	RedBeacon	http://www.redbeacon.com/
Errands	Expert Bids	https://www.expertbids.com/
Errands	Fancy Hands, Inc.	https://www.fancyhands.com/
Errands	Gorilly, Inc.	http://www.gorilly.com/
Errands	Alfred Club, Inc.	https://www.helloalfred.com/
Errands	NeighborFavor, Inc.	https://favordelivery.com/
Errands	Campus Bellhops, LLC	https://getbellhops.com/

Errands	Shyp, Inc.	http://www.shyp.com/
Errands	Crowdflower	http://www.crowdflower.com/
Fashion	Tradesy, Inc.	https://www.tradesy.com/
Fashion	Le Tote, Inc.	https://www.letote.com
Fashion	RocksBox, Inc.	https://www.rocksbox.com/
Fashion	Rent the Runway, Inc.	https://www.renttherunway.com/
Fashion	Bag Borrow or Steal	bagborroworsteal.com
Fashion	Shopittome	shopittome.com
Fashion	The Outnet	theoutnet.com
Funding	Kickstarter, Inc.	http://www.kickstarter.com
Funding	RocketHub, Inc.	http://www.rockethub.com/
Funding	IndieGoGo Inc.	https://www.indiegogo.com/
Funding	Prosper	prosper.com
Funding	LendingTree, LLC (formerly Tree.com, Inc.)	https://www.lendingtree.com/
Funding	LendingClub Corporation	https://www.lendingclub.com/
Funding	Enterprise Den	enterpriseden.com
Funding	Startsomegood	startsomegood.com
Funding	Pozible	pozible.com
Gardens	Servicevines	
General Online Rental	AnyHire	anyhire.com
Goods Sharing	Sugar Packet, Inc. (doing business as NeighborGoods)	http://neighborgoods.net/
Goods Sharing	HeyNeighbor, LLC	http://www.heyneighborapp.com/
Goods Sharing	1000 Tools, Inc.	https://www.1000tools.com/
Goods Sharing	Boatbound, Inc.	https://boatbound.co/
Goods Sharing	Streetbank	streetbank.com
Goods Sharing	Zi Group SA (Zilok)	http://us.zilok.com/
Goods Sharing	Sparkplug Marketplace, Inc.	http://www.sparkplug.it/
Goods Sharing	Friends With Things	friendswiththings
Goods Sharing	Toolzdo	toolzdo.com
Goods Sharing	RentStuff	rentstuff.com
Homesharing	Couchsurfing International, Inc.	https://www.couchsurfing.com/
Homesharing	Airbnb, Inc.	https://www.airbnb.com/
Homesharing	FlipKey, Inc.	https://www.flipkey.com/
Homesharing	HomeAway, Inc. (formerly CEH Holdings)	http://www.homeaway.com/
Homesharing	Roomorama	https://www.roomorama.com/
Homesharing	Lifealike Limited (doing business as onefinestay)	http://www.onefinestay.com/
Media and Entertainment	Fon Wireless, Ltd.	https://corp.fon.com/
Media and Entertainment	SoundCloud Ltd.	http://soundcloud.com/
Media and Entertainment	Earbits, Inc.	http://www.earbits.com/
Misc Services	Wello	wello.com
Misc Services	Nanny in the Clouds	nannyintheclouds.com
Parking	Parkcirca	www.parkcirca.com
Parking	Parking Panda Corp. (Parking Panda)	https://www.parkingpanda.com/
Personal Services	Rent a Friend	rentafriend.com
Personal Services	Hire a Boston Wingwoman	hireawingwoman.com
Professional and Freelance	Amazon.com, Inc. (Amazon Mechanical Turk)	https://www.mturk.com
Professional and Freelance	Upwork Global, Inc. (formerly Elance-oDesk, Inc.)	https://www.upwork.com/
Professional and Freelance	Fiverr International Ltd.	https://www.fiverr.com/
Professional and Freelance	Thumbtack, Inc.	https://www.thumbtack.com/
Professional and Freelance	SpareHire, Inc.	https://www.sparehire.com/
Professional and Freelance	Websoft, Inc. (doing business as Guru.com)	http://www.guru.com/
Professional and Freelance	Wonolo, Inc.	http://wonolo.com/
Professional and Freelance	Gig Bureau, LLC (doing business as GigSalad)	https://www.gigsalad.com/
Professional and Freelance	Peers Benefit Corporation	http://www.peers.org/
Professional and Freelance	Turuly, Inc. (doing business as BlogMutt)	https://www.blogmutt.com/
Professional and Freelance	Gigwalk, Inc.	http://www.gigwalk.com/
Professional and Freelance	Creative Circle, LLC	https://www.creativecircle.com/
Ridesharing	Uber Technologies, Inc.	http://www.uber.com
Ridesharing	Lyft, Inc.	https://www.lyft.com/

Ridesharing	Sidecar Technologies, Inc.	https://www.side.cr/
Ridesharing	Tripda, Inc.	https://www.tripda.com/
Ridesharing	GoCarShare	http://gocarshare.com/
Ridesharing	Shuddle, Inc.	https://shuddle.us/
Ridesharing	AtoB LLC (Coride)	https://www.coride.com/
Ridesharing	Zimride	https://zimride.com/
Ridesharing	carma	https://carmacarpool.com/
Ridesharing	wingz	https://wingz.me/
Ridesharing	Nuride	http://www.nuride.com/
Ridesharing	Jayride	http://us.jayride.com/
Taxi Sharing	Taxi2	
Taxi Sharing	Weeels	http://www.bandwagon.io/about#main
Teaching	CoachUp, Inc.	https://www.coachup.com/
Teaching	Chegg, Inc. (Chegg Tutors)	https://www.chegg.com/tutors/
Teaching	Skillshare, Inc.	http://www.skillshare.com/
Teaching	Udemy, Inc.	https://www.udemy.com/
Teaching	Service Scout, Inc. (doing business as TakeLessons)	https://takelessons.com/
Teaching	Myngle	http://www.myngle.com/
Teaching	Glovico	http://www.glovico.org/
Teaching	RiffRaff Community, Inc.	http://www.riffraff.me/
Teaching	Livemocha	
Textbook Rental	Chegg	
Textbook Rental	CampusBookRentals	
Textbook Rental	BookRenter	
Toy Rental	BabyPlays	babyplays.com
Unique Experiences	Vayable, Inc.	http://www.vayable.com/

As digital matching firms are a relatively new phenomenon and the companies have been commonly referred to as part of the "sharing" or "collaborative" economy, research into existing digital matching firms was conducted via basic online searches. The majority of these firms were found using Google search of the words "sharing economy," or "collaborative economy," which directed us to several news and journal articles written on the topic. We then researched the companies and compiled a list of those that have the characteristics of digital matching firms.

The articles used to identify these firms are cited below the table along with the names of companies mentioned..

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Any errors in the report are solely the authors' responsibility. The author also wishes to express that the inclusion and/or discussion of any company is not to be characterized as an endorsement of neither the firm itself nor the services it provides.