IS TECHNOLOGY EATING THE TEMPORARY STAFFING INDUSTRY?
AN ANALYSIS OF UPWORK

BY

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THESIS

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Abstract

The rise of web-based work platforms such as Uber has sparked speculation about the potential of these platforms to revolutionize the labor market. This speculation has rarely been accompanied by a data-based explanation of the competitive advantages of web-based work platforms or the mechanisms by which they may impact the labor market. We sought to provide such an explanation by comparing a web-based work platform, Upwork, to the traditional labor market intermediary it best resembles, a temporary staffing agency. We hypothesized that the two would be different and chose to compare them based on three characteristics: composition, wages and revenue, and efficiency. Using data collected from Upwork's website and the Bureau of Labor Statistics, we found significant differences in all three characteristics. We analyzed the differences we found for evidence that they provided Upwork with a competitive advantage over traditional temporary staffing agencies. We also asked whether the differences we found indicated how web-based work platforms might impact the labor market as a whole. We concluded that Upwork in its current form is more of an expansion of the temporary staffing industry than a revolutionary force because it allows workers and clients to make contracts that cannot efficiently be made elsewhere. We also suggested avenues for further research.

Table of Contents

1. Introduction

Advances in technology, including mobility and faster internet speeds, have yielded a crop of web-based labor market intermediaries. Claims abound of the markets for certain types of labor being "eaten" by new platforms that meet new needs while also doing a more efficient job of meeting the old needs. One such new platform is Upwork, which in many ways resembles a fully online temporary staffing agency with a global reach. The central question of this paper is whether Upwork is simply a web-first version of a temporary staffing industry or something entirely different with the potential to revolutionize the temporary staffing industry. We argue that Upwork is significantly different from traditional temporary staffing agencies. In this paper, we will analyze the differences between Upwork and temporary staffing agencies in three areas: composition, wages and revenue, and efficiency.

1.1 About Upwork

Upwork is a global online platform that connects workers--mainly freelancers-- with those seeking to hire workers. The organization, originally called Elance-Odesk, was created in 2013 when two separate companies, Elance and Odesk, merged. Upwork reports that they currently have over 12 million freelancers and 5 million clients. Over one billion USD in work is done annually, with nearly half in technology. Both clients and workers hail from all over the world (Upwork, 2016).

Upwork serves both those looking to hire workers and those who are looking for or performing work. The hiring party is referred to as the Client. Clients can be

individuals or organizations and can choose from three different account types (one free and two with fees) based on desired features and services. The working party is referred to as a "Freelancer" irrespective of the actual legal status of the worker.

Freelancers can be designated as Individuals or Agencies. The latter refers to multiple individuals working together under one account. In the US, most Upwork freelancers work as independent contractors; they are legally not employees of Upwork or the client. Recently, Upwork has created a payroll company that can act as the employer of record for US-based freelancers who must be classified as employees for legal compliance reasons. For our purposes, we will refer to any individual performing work on Upwork or through a temporary staffing agency as a "worker". Upwork's revenue comes from the fees charged to clients and workers as a percentage of worker earnings, as well as fees charged to clients for premium services. We will discuss Upwork's fee structure in greater detail later in this paper.

1.2 Upwork in the labor landscape

Industry and news publications often make unfounded predictions about the potential of online labor platforms to revolutionize the labor market. Too often, vaguely defined phrases like "gig economy" and "uberization of work" are used to describe a scenario where the mass adoption of many different labor platforms results in a revolutionized labor market. Such predictions are rarely based on a sober analysis of the platforms in question or the mechanisms by which these platforms could change the labor market.

We think that the failure to conduct such an analysis is the result of a failure to properly describe and categorize online labor platforms. All platforms are not created equal. All are labor market intermediaries (LMIs) defined by Benner, Leete, & Pastor (2007) as third-party organizations that help match people looking for work with employers looking for employees. All are also members of a class of LMIs that use web- or app-based platforms to connect those selling goods, services, or labor with those buying. This was dubbed the Online Platform Economy (OPE) by Farrell and Greig (2016). Specifically, most are what Farrell and Greig call labor platforms, as opposed to capital platforms like AirBnB.

That is where the similarities end. The labor OPE encompasses a diverse array of platforms. Anyone researching Upwork, Uber, and Amazon Turk would find pronounced variations on such elements as degree of contact and negotiation between buyer and seller, variety of services, duration of contract, rates, and amount of information provided by both parties. A report by Staffing Industry Analysts accounts for these differences by breaking the labor OPE--which they refer to as the "Human Cloud" --into three groups: online staffing platforms, online work services, and crowdsourcing. Online work services platforms organize a group of freelancers to provide a certain product or service, like a ride or a delivery. Crowdsourcing platforms like Amazon Turk or Crowdflower either break tasks into "microtasks" performed by many individual workers, or open the task to bidding from the crowd. Online Staffing platforms include Upwork, UpCounsel, MBA&Co, and others. Online staffing is defined as staffing with a web-based platform in place of an agency and its employees, or "recruiter-less" staffing (Francis, 2016). Only by first carefully describing labor

platforms can we begin to analyze them and compare them to other intermediaries in the labor market.

Upwork, the subject of this paper, is an online staffing platform within the labor OPE or "human cloud". On its surface, it is similar enough to the analog version of a temporary staffing agency to warrant the comparison we will conduct in this paper. Temporary staffing agencies allow client organizations to hire workers, usually for a specific job and for a short amount of time, without directly employing them. Upwork lets its client organizations do the same thing. Delving into the specifics of each intermediary will help us answer our core question—are they different? —and suggest answers to larger questions surrounding the OPE. Specifically, we will analyze our findings for competitive advantages that could enable online platforms to disrupt their industries (in our case, the temp industry). Also, we will ask if any differences we find provide evidence that the OPE is changing the labor market.

1.3 Sizing the temporary staffing industry

Exploring potential disruptions of the status quo in temporary staffing is especially important today because employment in the temporary staffing industry--and in all alternative work arrangements--is growing. The temporary staffing industry accounted for 13% of net employment gains since end of the recession in 2009 and from 2007 to 2011, has comprised 11-14% of new hires (Houseman & Heinrich, 2015). Even though temp work is responsible for only about 4% of total employment at any one time, a greater percentage of employees are employed by the temp industry over the course of the year (Houseman, 2001). Growth in employees working in alternative work

4

arrangements (AWA's), a group that includes temps as well as independent contractors, has also been substantial. In 2005, 10.1% of workers reported being engaged in AWAs; in 2015, it was 15.8%, an increase of over 50% (Katz & Krueger, 2016).

The OPE employs nowhere near the number of workers that the temporary staffing industry does, but it is growing. An estimate of OPE payments to JP Morgan-Chase customers found that in June 2016, 0.9% of adults earned income in the OPE, with 0.5% earning income through labor platforms (as opposed to capital platforms like Airbnb) (Farrell & Greig, 2016a). Katz & Krueger (2016) landed on a similar number of workers employed through an online intermediary (also .05%) through a 2015 survey; Harris & Krueger (2015) estimated that 0.4% of workers work through an online intermediary in 2015 through an analysis of google searches. A report by Staffing Industry Analysts found that 80% of the revenue generated in the Human Cloud/labor OPE comes not from Online Staffing sites like Upwork, but rather online work services like Uber and Lyft (Francis, 2016). Thus, we can assume that Upwork is employing less than a tenth of a percent of the overall population of Human Cloud/labor OPE workers, which in turn employs less than one percent of workers overall.

Whatever evidence we find of Upwork's potential as a revolutionary force, research on the growth of the OPE indicates that rapid growth is not a present reality for most organizations in the OPE. Participation in OPE labor platforms has continued to grow in 2016, albeit at a slower rate than in previous years. At the same time, monthly earnings on OPE labor platforms, which grew by 51% between the end of 2012 and June 2014, decreased by 6% between June 2014 and June 2016 (Farrell & Greig, 2016). The modest size and growth rate of the OPE provides important perspective throughout our analysis.

The importance of studying the OPE doesn't stem from its current size, which is small, or its growth rate, which falls well short of explosive. Rather, studying the OPE is important because of the proliferation of online work platforms combined with the rise in alternative work arrangements. It's difficult to argue that technology won't touch alternative work in some way, particularly with a "digital native" generation poised to enter the workforce. Comparing a new intermediary for alternative work arrangements (Upwork) with a similar legacy intermediary (temporary staffing agencies) may tell us how work platforms are likely to impact the growing number of workers and organizations participating in alternative work arrangements.

1.4 Framework for comparison

Our framework for comparing Upwork and temporary staffing agencies (TSAs) examines three characteristics of each intermediary: composition, wages and revenue, and efficiency. Differences in these areas not only indicate important differences between the temporary staffing industry and Upwork, but they might also point to differences in overall costs between the two. Cost difference is important because it indicates Upwork's potential to revolutionize the traditional temporary staffing industry model or the labor market as a whole. Uber has thrived because if its ability to lower transaction costs (Wallsten, 2015). Uber created a technology that allows individuals to quickly and easily summon a ride without any of the inconveniences or unknown variables of ordering a cab. In doing so, Uber filled certain existing needs of the cab-riding market more efficiently. It also pulled drivers into the marketplace who were demographically different than traditional cab drivers and potentially wouldn't have

worked as cab drivers otherwise, effectively expanding the pool of cab drivers (Hall &

Krueger, 2016). If Upwork provided a similar way to lower transaction costs for

temping, it might also attract workers with skill sets and economic needs that aren't met

elsewhere as well as clients who cannot find the skill sets or low costs they'd need to

make a contract in the temp industry. For each section of our analysis, we will ask

whether any differences we find could contribute to or be a symptom of a decrease in

overall cost of making a contract. As research into OPE work is relatively new, we will

also suggest many avenues for future research along the way.

2. Occupational and worker composition

We hypothesize that both the type of work and types of workers most commonly found on Upwork are different from those most commonly found in the temp industry. Such a difference might in turn signal that Upwork is filling worker or client needs that are different from the needs being filled by the temporary staffing industry (temp industry). In this section, we compare the two LMIs in two different ways. First, we look at the breakdown in occupations between the temp industry and Upwork. Then, we examine Upwork worker hours and schedule compared to those of temporary workers.

2.1 Occupational breakdown

When Dey, Houseman, & Polivka (2012) traced the growth and evolution of the temp industry, they noted that clerical positions, which were originally a greater percentage of temporary jobs, took a backseat to blue collar professions around the dawn of the new millennium and expansion into technical professions has begun more recently. Their findings align with a 2015 report by the United States Department of Commerce, which found that the two largest occupations within the temp industry were blue collar: transportation and material moving (24%) and production (24%). Office and administrative follow closely (20.7%) and, in a distant fourth, computer and mathematical occupations (3.4%) (Nicholson, 2015).

We expect Upwork's composition to be significantly different. Our expectation primarily relies on the fact that Upwork is an intermediary that is used seemingly without exception for remote work. The two largest temporary staffing occupations, meanwhile, almost certainly require the worker to be present in the workplace.

Upwork's remote nature may limit the kinds of work that can be done on Upwork and create an emphasis on work that requires computer skills.

We obtained data on the percentage of workers in different occupations in the temporary help industry data from the Bureau of Labor Statistics 2015 data for occupations within the temporary help industry. Getting comparable data from Upwork was more difficult. We did not have access to data showing the total number of active contracts in each occupation, which would have been the most accurate comparison. Upwork officially reports the size of an occupation by client spend rather than by number of workers, meaning that occupations with larger average hourly rates would likely be overrepresented. Therefore, we decided to collect data from Upwork by hand. We took two different approaches to collecting occupational data from Upwork.

Our first approach was to report the number of "active" US worker profiles in each occupational category listed on Upwork. Our criteria for active US worker is as follows:

- US based
- "Active" in the past two weeks
- Worked a minimum 100 hours in the past six months

An important caveat to this method of collection is that workers may appear in multiple filter categories. As a result, our comparison is valid in terms of showing where

9

workers cluster in different occupations, but likely not valid in terms of absolute number of worker profiles. Another element we tried to control for is that workers can list a category on their profile even if they have never worked in that category and possess no relevant skills. Thus, someone who works mainly as an administrative assistant can also list himself as a data scientist, but that does not mean he has ever worked in that capacity or is even capable of doing so.

Our second approach tries to adjust for inaccurately labeled or unused/dormant profiles by capturing the demand side by simply reporting number of posted jobs for each occupation at a single point in time. Demand completes the picture by suggesting which workers are most likely to be finding work on Upwork, rather than just which workers are drawn to creating profiles on the platform. Twenty-thousand data scientist profiles would paint a misleading picture of Upwork if there are only twenty data scientist jobs. To meet our activity level criteria, those twenty thousand data scientists would likely be working in another field, further muddying the picture. Taken together, the number of active workers in each occupation and the number of open jobs in each occupation give an approximate picture of the composition of Upwork.

An important note is that unlike the BLS occupational data, Upwork job postings are not specific to the US—a US worker can accept a job posted by an Australian company, for example. For this reason, we did not place restrictions on the location of the job poster.

When comparing BLS and Upwork data, we discovered that many Upwork positions did not have BLS equivalents or had BLS equivalents that made up such a small proportion of the temp industry that no data was reported. As a result, we had to roll many Upwork categories into one and compare it to the closest BLS match. For

example, all Upwork occupations in IT, Development, and Data Science were combined

and compared to the broad BLS category "Computer and Mathematical Occupations."

Also, in the case of the BLS category "Office and Administrative Support," the

proportion of workers in the detailed occupation "Customer Service" had to be identified

separately so that it could be compared to Upwork's customer service occupation.

To calculate the occupational breakdown of foreign workers, we used the same

criteria for "active workers" and applied it to three of the other largest Upwork-worker

providing countries, including two Asian countries (India, Philippines), and one eastern

European country (Ukraine).

2.1.2 Analysis

The results of the comparison between BLS temporary staffing occupations and

Upwork worker profiles and job listings are shown in Figure 2.1

Figure 2.1: Composition of Upwork vs. temp industry by occupational category (active workers)

Category	Upwork (job postings) %	Upwork (US worker profiles) %	Temp Industry overall (BLS data) %	Adjusted temp industry (BLS data excluding non-Upwork occupations) %
Non Upwork	0.00%	0.00%	68.28%	0.00%
Computers and Math	37.27%	18.87%	3.60%	11.35%
Engineering	3.07%	1.85%	1.59%	5.01%
Design	17.82%	9.61%	0.40%	1.26%
Writing	13.00%	17.82%	0.16%	0.50%
Translation	3.40%	2.63%	0.01%	0.03%
Legal	0.99%	1.20%	0.37%	1.17%
Admin Support	8.12%	17.88%	16.46%	51.89%
Customer Service	1.38%	9.47%	4.14%	13.05%
Sales	12.68%	13.78%	2.69%	8.48%
Accounting	2.26%	6.89%	2.30%	7.25%
TOTAL	99.99%	100.00%	100.00%	100.00%
Total #	137,643	12,607	2,930,820	929,656

There is a notable difference in both the size and the composition of the temp industry vs. the composition of Upwork. Upwork has a much smaller number of US workers than the temporary industry. There are over 200 times more temporary workers than Upwork workers; when we eliminate those who work in occupations not found on Upwork (see the farthest right column in the table above), the temp industry still has more than 70 times as many workers as Upwork. Computers and Math, Upwork's largest category in job postings and US worker profiles, has 2,379 US worker profiles compared to 105,509 workers in the temp industry. The size difference is smaller and in some cases, disappears when job postings are used as the point of comparison instead of Upwork worker profiles. Upwork has 51,300 job postings in

computers and math globally—enough to employ roughly half of the 105,509 workers in that occupation in the US temp industry. Job postings aren't the most direct source of comparison because an Upwork job may not equate to a temp job in terms of hours, however they show that there is substantial demand on Upwork for certain types of workers.

Upwork is composed differently than the temp industry. The difference remains considerable whether Upwork job postings or worker profiles are used as the comparison data. Upwork is weighted heavily toward computer and creative occupations, while the temp industry still relies heavily on occupations that aren't typically found on Upwork. We estimate that 68.28% of temp industry workers work in jobs that cannot be found on Upwork. Upwork also has a notably higher percentage of sales workers than the temp industry.

The farthest right column recalculates the proportion of temp workers in occupations as a proportion of workers in Upwork occupations only as opposed to the entire temp industry. This attempt to control for occupations that potentially cannot be done via remote work makes some of the differences between Upwork and the temp industry less dramatic, with the notable exception of administrative and creative occupations. Among occupations that the two share, the temp industry is heavily weighted toward administrative occupations and contains very few workers in sales or creative occupations (like writing and design) compared to Upwork.

An important consideration regarding the temp industry data is that there are many factors that impact the spread of temp work across different industries. The proportion of temp workers in computers and math is quite small compared to the manufacturing sector, but this doesn't mean that computers and math are necessarily

less of a focus for the temp industry; clearly there is a substantial number of temporary workers in computers and math. Rather, there may be industry factors that led manufacturing's sheer numbers to rise, and thus represent a greater percentage of the industry.

No analysis of Upwork's composition would be complete without considering the large population of workers from outside of the US. The composition of occupations by country is shown below.

Figure 2.2: Occupational composition of Upwork by country (active workers)

	Philippines	India	Ukraine	USA
Category	%	%	%	%
Non-Upwork	0.00%	0.00%	0.00%	0.00%
Computers and Math	12.02%	45.61%	59.53%	18.87%
Engineering	1.17%	1.17%	3.49%	1.85%
Design	7.20%	12.38%	12.58%	9.61%
Writing	9.75%	6.16%	3.56%	17.82%
Translation	2.50%	0.67%	3.58%	2.63%
Legal	0.29%	0.20%	0.11%	1.20%
Admin Support	28.10%	11.86%	7.96%	17.88%
Customer service	17.29%	3.96%	2.68%	9.47%
Sales	15.85%	15.44%	5.00%	13.78%
Accounting	5.84%	2.56%	1.50%	6.89%
TOTAL	100.00%	100.00%	100.00%	100.00%
TOTAL # Profiles	28,960	19,021	4,522	7,610

The occupational composition varies somewhat by country. The US stands out with a larger proportion of writers than the other countries but otherwise falls in the middle of the pack on most occupations. The Philippines has a large proportion of administrative support and customer service workers while Ukraine and India have notably large proportions of workers in Computer and Mathematical occupations.

Ukraine stands out because it has much lower proportions of Administrative workers than any of the other three countries along with the highest proportion of computer and mathematical workers. Across the board, workers tend to cluster in computers and math, design, sales, and administrative support. Many different factors may influence this distribution, including average educational attainment and English language abilities (Upwork is a primarily English-language site).

In both the US and international analyses, it's important to remember that there is pollution between categories--workers can accept any job they'd like regardless of whether it's completely outside of their stated skill set. Therefore, the results of our international analysis are most useful for showing the occupations in which workers tend to cluster and how this clustering varies by country.

2.2 Worker schedule and hours

An important question surrounding OPE-work is whether it is replacing full-time work or simply acting as a supplement for other income. Some studies have shown that workers are using the OPE to supplement other work are meeting needs that aren't being met in other labor markets. Farrell & Greig (2016) completed a study on JP Morgan customers earning income from the "gig" economy. They found that in their sample, labor platform earnings offset a 14% dip in non-platform income for users of labor platforms. This also indicates that these users use OPE work as a supplement to their non-platform earning, not as their primary source of income. In a study of Uber, 80% were employed full or part-time prior to partnering with Uber, indicating that Uber was not their only source of income (Hall & Krueger, 2016). In this section, we analyze

whether Upwork's workers, like other workers in the OPE, work a non-full time schedules. We also compare Upwork contract length to contract length in the temp industry.

2.2.1 Full Time vs. Part time work

Full-time hours seem to be much more common in the temp industry than in the OPE. Hall & Krueger (2016) found that 83% of Uber drivers—the largest cloud platform--work fewer than 35 hours per week. In contrast, a report by the American Staffing Association found that 76% of temporary workers work full time compared with 82% of all employees (American Staffing Association, 2017). This aligns with the 2005 Contingent Worker Supplement (CWS) data showing that 80.4% of workers with temporary work arrangements reported working full-time hours. We decided to examine Upwork's US and foreign workers to see if they tended toward full-time work, like workers in the temp industry, or part-time work, like their OPE peers.

For our analysis of full-time hours, we decided to analyze US workers and non-US workers separately, theorizing that the ability or inclination to depend on Upwork as a primary source of income might vary across different countries. Our criteria for being a full-time worker was simply having worked 1,000 hours in the past six months, which is as close to a forty-hour workweek as Upwork filters would allow us to get. We calculated full time workers as a percentage of both total profiles and workers who were minimally active or better. Minimally active workers are workers who had earned at least one dollar or billed at least one hour and had been active within the past two

months. This ensured that any spam or never-active profiles wouldn't be counted among actual Upwork workers.

Figure 2.3 shows the results of our analysis of hours. First, it's clear that there are many profiles on Upwork that are not even minimally active. Across all regions countries, the number of profiles sinks considerably when the least stringent criterion ("minimally active") is applied.

Figure 2.3: Worker activity levels by country

	Total number of workers	Workers who meet minimally active criteria	Workers working who meet full time criteria	% of total workers who meet full time criteria	% of minimally active workers who meet full time criteria
REGIONS					
Asia	714,932.00	68,773	4,408	0.62%	6.41%
Europe	384,138.00	32,805	665	0.17%	2.03%
Americas	556,881.00	30,927	419	0.08%	1.35%
Oceania	32,611.00	1,691	9	0.03%	0.53%
Africa	82,851.00	4,157	110	0.13%	2.65%
COUNTRIES					
United States	627,828.00	22,173	152	0.02%	0.69%
Canada	11,236.00	2,869	18	0.16%	0.63%
India	415,849.00	27,597	979	0.24%	3.55%
Philippines	323,346.00	18,645	2,589	0.80%	13.89%
Pakistan	118,118.00	7,093	306	0.26%	4.31%
Bangladesh	110,342.00	7,314	362	0.33%	4.95%
Russia	56,095.00	4,173	110	0.20%	2.64%
Ukraine	69,583.00	7,717	228	0.33%	2.95%

Working full-time on Upwork is uncommon and limited to an extremely small pool of individuals. Full-time work is most common in Asia (6.41% of minimally active workers) and least common in the two western countries on our list-- the US (0.69% of minimally active workers) and Canada (0.63% of minimally active workers). Of the

countries we analyzed, full time work on Upwork is far and away most common in the Philippines, with 2,589 workers or 13.89% of minimally active workers working full time.

2.2.2 Contract duration

The nature of contracts in the temp industry vs. on Upwork adds important details to the full vs. part time picture. For example, a worker who works full-time on a two-week contract is very different from a worker who works full-time on a two-year contract, but both may report working full time. The crux of what we seek to understand is whether Upwork workers are working fewer hours overall than their temp industry counterparts and how those hours are broken up across contracts. To answer this question, we compared the duration and hours worked per contract for Upwork and temporary staffing contracts.

Temporary workers seem to make fewer contracts per year than Upwork workers. In the temp industry, the average number of contracts held by IT workers over a three-year period was 4.3, with a median of one (Houseman & Heinrich, 2015). Across the data we collected on web developers in the US and India for the wage section of this paper, the average number of contracts over a worker's entire Upwork tenure was 31.5 (median: 17). We did not collect data on join date so we cannot calculate an average number of contracts per year to compare to available data on temporary workers. We do know that Upwork's predecessors, Elance and Odesk, were founded in 1999 and 2005 respectively. Even if all workers had been at it since 1999—and observation tells us that such long tenure is rare—Upwork workers would still have held far more than the temp

industry median of one contract every three years. We are confident concluding that Upwork workers on average hold more contracts than temp workers in the same span of time.

Comparing the quality of these contracts in terms of absolute hours and length of time is an important next step. Among temporary industry contracts, the length varies by occupation. Overall, three quarters last less than three months and over half last less than one month. For professional and technology workers, 9% of contracts lasted over one year, compared with 4% overall. (Houseman & Heinrich, 2015). We do not have contract length data for Upwork, but we were able to calculate the hours worked per hourly job for our US web developer sample (all of whom had worked at least 100 hours in the last six months) to compare to IT workers in the temp industry. US web developers on Upwork worked an average of 148.9 hours per contract (median 83.5).

To compare, if the workers in our Upwork sample were working full 40 hour workweeks—as around 80% of people in the temp industry do—50% of their contracts would last about two weeks or less. By contrast, only 28% of IT contracts last less than one month (Houseman & Heinrich, 2015). As discussed earlier, Upwork workers do not tend to work full-time hours, so their contracts probably last longer than two weeks but require fewer hours of work per week and overall.

2.3 Interpretation

We can conclude that Upwork is different from the temp industry in terms of the breakdown of occupations and the characteristics of contracts. First, the composition of occupations on Upwork is different than that of the temp industry. As expected, there is

a number of occupations that cannot be found on Upwork due largely to its remote nature. But beyond the differences between Upwork and the temp industry that we would expect given Upwork's remote nature, Upwork features a stronger proportion of workers in computers and math, sales, design, and writing occupations than the temp industry in the US. In absolute terms, it's unlikely that Upwork's large proportion of computer and design workers indicates that the temp industry is losing out to Upwork. The temp industry is still significantly larger than Upwork, so even occupations that are less common in the temp industry and more common on Upwork have a larger number of workers. Members of our sample also work far fewer hours per week at their Upwork occupation than the average temp worker works at his. Including full-time workers only might have yielded a different occupational composition.

Still, it's important to ask why, outside of Upwork's remote nature, certain occupations cluster on Upwork but not in the temp industry. One possibility is that Upwork's supply of workers is different than that of temp agencies. Many of the more popular Upwork professions like web development or graphic design require a high degree of computer literacy. Naturally, these workers turn to the internet and sites like Upwork when looking for work. Upwork's platform may also enable it to better accommodate demand for specific technical skills. Upwork's interface allows clients to drill down on their specific skills needs, like knowledge of certain programming languages or data science techniques. This may extend beyond cutting edge computer and math-related work and into the digital incarnations of traditionally analog professions. We did not do an in-depth analysis of the specific types of jobs offered by Upwork, but if we did, we might find that some fields that aren't inherently tech-centric, like writing, may be dense with jobs that require tech savvy. Search Engine Optimization

(SEO) writing, for example, is a service commonly sought by blogs and websites that is native to the online environment and requires specialized knowledge of how search engines like google rank webpages based on content. It's unsurprising that workers and clients would bypass traditional temporary staffing industries or the job market and go straight online marketplace for such an inherently web-based service.

Our findings suggest that Upwork may be attracting different workers and clients than the temp industry. It's clear that Upwork workers are overwhelmingly part-time workers, unlike most workers in the temp industry. Irrespective of the duration of Upwork contracts vs. temporary staffing contracts, Upwork contracts probably provide fewer hours of work per contract, although Upwork workers probably make more contracts than temporary workers over the same span of time. Clients may be drawn to Upwork to make short (in terms of hours) contracts that would be too costly to make via a TSA but are costly enough to the client that they'd prefer to outsource them. If this was the case, Upwork would be expanding the client side of the market for temporary workers. Likewise, Upwork might be expanding the pool of temp workers in the same way that Uber attracted workers to the temp industry who were demographically different from cab drivers. Upwork, like Uber, might be catering to a set of workers who desire flexibility in location and hours—two needs that may have not been met by markets for temporary labor. Only by learning more about workers' backgrounds and reasons for becoming a part of the Upwork labor force can we conclude whether they represent an expansion of the temporary labor market.

Given the location-agnostic and remote nature of online work, it might be advisable to consider an assessment of "outsource-ability" when analyzing prevalence of certain occupations in online vs. offline work. For instance, a report by the Bureau of

Labor Statistics outlines four criteria that make occupations easier to outsource. These include: inputs/outputs that can be transmitted electronically or transported cheaply; low levels of interaction with others; low levels of local or idiosyncratic cultural knowledge required; and high rationalizability and scriptability (Moncarz, Wolf, & Wright, 2008). Further research is needed to determine if Upwork and intermediaries like it represent a middle ground between temporary staffing and outsourcing, and if this positioning might also help explain its occupational composition domestically and internationally.

3. Wages and Revenue

We anticipate that Upwork and TSAs differ significantly in what they offer to clients and workers as well as in their own approaches to earning revenue. To test this, we analyze wages and revenue for TSAs and Upwork from the following three perspectives: the intermediary, the client, and the worker. We will examine the differences between temporary agencies and Upwork from all three.

3.1 Intermediaries

Intermediaries, including TSAs and Upwork, earn revenue from the service they provide matching workers with client jobs. Most TSAs make money by charging clients a markup on top of each worker's hourly wage. Agencies provide workers to clients for a flat hourly rate, of which the worker receives only part. Autor, Levy, and Murnane (1999) found this markup was around 51% on average, with slight variation by profession. The tradeoff is that the TSA must act as the employer of record for the worker. This means that they must pay of social security taxes, unemployment insurance, workmen's compensation, and any other benefits owed to the worker, like health insurance. TSAs also have overhead including facilities and salaries of their own workers, and they bear legal responsibility for the workers for whom they are the employer of record (Houseman & Heinrich, 2015). Autor, Levy, & Murnane (1999) point out that net profits are likely to be "substantially below the markup" because of these expenses.

On its face, Upwork's method of earning revenue is different. First, both the worker and the client pay. The worker must pay a portion of what they bill based on the total amount they bill. Their fee schedule is[1]:

- 20% for the first $500 billed with the client
- 10% for lifetime billings with the client between $500.01 and $10,000
- 5% for lifetime billings with the client that exceed $10,000
- If you are a Freelancer performing services for an Enterprise Client, the Service Fee rate is 10% of the Freelancer Fees, unless otherwise provided in the Enterprise Client contract

This scale recently replaced a flat percentage fee regardless of amount billed. According to Upwork, the purpose of this change was to align fees with costs. Upwork's stated reason for this shift is that a worker who tends to have fewer, longer-term contracts will find themselves in fewer disputes than workers who frequently make short term contracts with new clients. Upwork devotes more man hours to settling disputes for the latter type of worker. The higher fee for short term contracts adjusts for the corresponding costs.

Clients pay an additional 2.75% fee on every payment made. Those who spend over $910/month are eligible to pay a $25 flat monthly fee instead of a per-payment fee. Clients can also choose to pay Upwork for access to a higher level of service through Upwork Pro or Upwork Enterprise. Upwork Pro charges $500 per job search plus 10% of the worker's invoice and offers access to an elite pool of freelancers and a dedicated

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[1] All data on Upwork's fee structure is pulled from the Upwork website

24

talent specialist to help with sourcing. If a client wishes to hire their worker full-time, Upwork charges the Pro members the greater of $10,000 or 20% of the freelancer's annual earnings as a sourcing fee. For non-pro, there is a complex circumvention clause in the contract. Fees and service levels for Upwork Enterprise are negotiated on a case-by-case basis, but Upwork claims that staffing through Upwork Enterprise is more affordable than "traditional means" like staffing agencies.

To test the claim that hiring a temp worker through Upwork is cheaper than through a temporary agency, we devised a simple scenario based on hiring a worker whose "take-home" pre-tax earnings are $30/hr. The table below shows the results. The number for the contract "buy out" or "conversion" fee for hiring a temporary worker away from the agency is based on an estimate we collected by calling our local branch of Adecco, one of the nation's largest staffing firms. Their conversion fee for hiring away an employee is "about 20%" of the worker's yearly salary if it happens within 90 days of the start of the contract, but only $200 if they are hired after 90 days of temping. For Upwork, we assume the client is a Pro member and thus must pay the additional 10% fee on a 100-hour contract, plus the $500 sourcing fee. We also base yearly salary for Upwork's conversion fee on the worker's Upwork rate, per the agreement. The results of our comparison are below:

Figure 3.1: Comparison of temporary staffing and Upwork fees and revenue

	Upwork	Temporary Agency
Worker take home (/hr)	$30.00	$30.00
Worker rate/hr	$36.00*	$45.30**
Initial fee	$500.00	$0.00
Total for 100-hour contract	$4,485.00***	$4,530.00
Total captured by intermediary	$1,485.00	$1,530.00
Conversion fee(<90 days)	$14,976.00	$12,480.00
Conversion fee (>90 days)	$14,976.00	$200

*Assuming worker takes 20% markup suggested by the calculator on the worker view of Upwork's contracting interface
**Assumes average 51% markup
***Includes $25 flat fee paid by clients+10% of total contract billings per Upwork pro agreement

In this case, Upwork captures only slightly less revenue per hour than the TSA and charges slightly less. Despite the difference in markup, the additional fees for Upwork Pro—which offers services like those of a TSA and is thus comparable—raises the cost to the client. For a longer contract, the gap in cost and revenue grows. Assuming 90, eight-hour work days, Upwork's total billing would come to $29,087 while a TSA's is $32,616. It's worth noting that despite this difference, Upwork is still likely taking home much more of this in profit because they are not paying the employer's share of benefits or payroll. Upwork captures less revenue overall for non-pro contracts, which do not have initial fees or additional service fees.

Upwork has a higher conversion fee because they charge the client for a salary based on a worker's Upwork rate. If workers agree to an employment arrangement for a higher hourly rate than they charge via Upwork, as is the case above, the temporary

agency conversion fee would be greater. Upwork may derive additional revenue from conversions because it doesn't give clients a break on hiring workers, even after a long relationship, though they do offer the option to convert any worker to Upwork Payroll without a sourcing fee. This may also imply that Upwork does not regularly engage in the practice of converting temporary workers to employees or does not wish to promote it.

An important difference between TSAs and Upwork is their total number of full-time employees. The offices of large TSAs are staffed by employees who screen workers and manage client relations, among other tasks. Upwork's technology-centric business means that it doesn't have to employ as many workers as a TSA. The table below compares the revenue Upwork generates per employee with that of two top TSAs— Adecco and Robert Half. Upwork's revenue per employee is significantly greater than that of either agency.

Figure 3.2: Revenue per employee for Upwork and staffing firms

	Upwork	Adecco*	Robert Half***
Revenue	$1.2 billion**	$24 billion	$5.09 billion
Full-time employees	500****	32,000	16,100
Revenue/employee	$2,400,000	$750,000	$316,149

* Adecco 2015 annual report
**Upwork revenue from SIA 2015 report
***Robert Half 2015 annual report
****Upwork has between 201-500 employees according to glassdoor.com

Overhead cost is the next factor in comparing the business models of a TSA vs. Upwork. It's difficult to determine whether Upwork's total overhead rivals that of a comparable TSA. The table above shows that staffing agencies employ more full-time employees, and we've already covered that TSAs act as the employer of record for all their temp workers. This creates administrative costs for temp agencies and exposes them to potential legal issues. Upwork does not act as the employer of record for any of the workers on its site except for those enrolled in Upwork's affiliate, Upwork payroll, which was created recently to help clients comply with labor regulations for US-based workers who met the definition of "employee." It's not a stretch to assume that the clear majority of Upwork workers are still freelance contractors, and thus are not the beneficiaries of any protections or benefits provided to Upwork employees. Thus, it's likely that Upwork's total human capital overhead is much lower than that of the TSAs.

Upwork bears some overhead costs that TSAs do not. Large TSAs like Adecco and Robert Half have costly brick and mortar outposts around the country (and world). Instead of dozens of outposts, Upwork has a robust online infrastructure, something

that most staffing agencies do not have. Continued maintenance of the site to ensure it stays secure and functional as software and hardware continue to evolve is a significant expense, but one that cannot be sacrificed without sacrificing the core of Upwork's business. While some traditional TSAs have a significant web presence, they do not depend on their online infrastructure for revenue to the same degree that Upwork does. Upwork bears the costs of arbitrating disputed contracts and resolving any fraudulent or illegal activity that occurs on the site but is probably less exposed to employment-related litigation than a TSA because they employ far fewer people. Finally, Upwork's marketing spend may be significant compared to that of more established TSAs. Upwork is new to the industry and lacks the established client relationships and brand recognition of some TSAs. Upwork must devote sales and marketing resources to building a reputation and a brand from scratch in a noisy online marketplace. Ultimately, the lack of available financial information on Upwork makes it difficult to say whether Upwork's greater revenue per employee leads to greater profits.

3.2 Clients

Client needs dictate whether Upwork or a TSA is truly costlier. Clients most often cite non-financial reasons, like business fluctuations and sick or absent employees, for hiring temporary workers (Houseman, 2001)**.** Still, it has been pointed out that there are several financial benefits to hiring temporary workers, including avoiding litigation, keeping organizations leaner, and avoiding having to pay nonwage labor costs (Kruger 1991; Freedman 1996, Houseman & Heinrich, 2015). It seems clear that firms view certain financial benefits to hiring temporary workers and, thus, if Upwork offered

clients the same outcomes as TSAs for a lower cost, Upwork would have an advantage over TSAs.

A difference between Upwork and traditional TSAs is that, as established the previous section, most fees on Upwork are paid by the worker as a percentage of their billing, whereas TSAs charge fees to the client on top of a worker's wage. Economically speaking, this may be the same thing—it may be both the client and the worker who "pay" the TSA, just like Upwork workers may charge clients higher rates to offset Upwork fees. However, from the point of view of the client, Upwork is taking nothing but the 2.75% credit card fee from them. The built-in calculator in Upwork's contracting interface encourages workers to mark their contract price upward to clients by showing the percentage of the total client payment that the worker will capture (5-20%). If this calculator encourages workers to mark up their desired wage by only 5-20%, we can assume that the markup on Upwork workers is significantly less than the average 51% for temporary agency workers (Autor, Levy, & Murnane, 1999). Figure 3.1, specifically the "worker revenue/hr" number, presents a scenario where Upwork offers a lower price to clients for the same worker.

In addition to the actual rate paid by the client to the intermediary, it's important to consider nonfinancial costs to the client, namely the amount of work that must be expended by the client in the service of finding and contracting a worker. TSAs pick from their own pool of presumably pre-vetted workers; the client generally has no hand in the process other than delivering specifications. Part of the fee paid to the agency by the client covers this service. At its most basic tier, which is fee-free to clients, Upwork shifts the role of searching for, interviewing, and hiring mostly to the client. Upwork's design, features, and tools facilitate this process through categorization and the

conveyance of detailed information, but access to human assistance with searching and vetting is only given to clients willing to pay for it. Upwork claims that even after paying for access to its premium levels of service, clients still get a better deal than through a TSA, but our exercise above shows that Upwork Pro charges substantial fees and that converting a worker to full-time via Upwork is costly. We can conclude that for some types of hires, clients will likely pay lower fees through Upwork than they would through a TSA, but this may not always be true at Upwork's upper tiers of service, which are not free and feature human-supported services like those of a traditional temporary agency.

3.3 Worker

It's difficult to predict whether the wages of Upwork workers will differ significantly from those of TSA workers because wages are influenced by a number of factors that are difficult to accurately control for, like skill. We focus on hourly wages in this section, which for temporary workers have been shown to be like those of direct hire workers (Autor & Houseman, 2010). Though it isn't our focus, it's important to acknowledge that Upwork workers are at a disadvantage compared to temporary staffing workers and direct hire workers when it comes to the full value of the compensation they receive. Until recently, Upwork workers had no other option than to be classified as independent contractors. In the US, this means that they do not receive the benefits or legal protections that some temporary agency employees are entitled to. Upwork workers must contribute the employer portion of FICA, which is an extra 7.65% of their income. Upwork workers must make between 7-10% more in wages to take home as much as a temporary agency worker.

It is beyond the scope of this paper to discuss the reasons why a worker might decide to work via Upwork. A more comprehensive study should factor in possible drivers when comparing wages because it's possible that some workers take part of their wage in non-financial benefits, like flexibility, enjoyment, or educational benefit. For example, Upwork workers are remote and thus have more flexibility regarding where to work than their TSA counterparts, who traditionally (though not always) work on-site and on a schedule dictated by the client. For some workers, these "benefits" might be worth more than any difference in wages and benefits. With that said, we focus only on nominal wage in this section.

3.3.1 Method

To conduct our comparison, we chose one skilled occupation, Web Developer, and one lower skilled occupation, Administrative Support Worker, which are present on both Upwork and in BLS data on temporary staffing workers. It's important to note that a full-time schedule is not a requirement to be included in our sample, so it contains a dramatically lower percentage of full-time workers than BLS data.

As discussed in the previous section, Upwork has many worker profiles that are not particularly active and virtually anyone can create a "web developer" profile for themselves regardless of skill. To create an Upwork group that would be comparable to the non-Upwork group in the same profession, we decided to collect data only from active, US Upwork workers. To meet our definition of an active web developer in the U.S, a user must:

- List themselves in the Upwork category of Web Developer

- Be based in the US

- Have worked at least 100 hours in the past six months

- Have been active in the past two weeks

- Have scored in the top 30% of at least one of the web development-related tests that Upwork offers.

Our choice to limit the sample to workers who scored reasonably well on at least one web-development related test stems from the different barriers to entry into the Upwork market vs. the temporary staffing market. Dramatically different skill levels could confound our wage comparison, especially in a skilled profession like web development. We suspected that the skill level of Upwork workers may be much lower on average because any person can create a profile on Upwork and pitch himself as a web developer, regardless of actual skill. He can take jobs outside of web development and wind up a part of our sample despite lacking the skills to be called a web developer. It's safe to assume that a worker who is placed in a web development job by a TSA has gone through a vetting or interview process. Our skill criterion, while imperfect, was the best filter option available to ensure our Upwork group has skills comparable to those of temporary workers.

For our sample of Administrative Support Workers, we used identical criteria to web developers except for the test, as there is no commonly-taken Administrative Support skills test. The population of Administrative Support Workers in the US is quite large so we analyzed a random sample of worker profiles; we did not have to take a

random sample of web developers as our criteria left a manageable number of data points.

Additional screening steps included omitting workers who made a significant amount of money from non-web development tasks and workers whose actual total hours did not match up with the hours reported on their profile interface. Any of these could indicate an error with the Upwork system or some editing of a worker's profile that would compromise our calculation of their hourly rates.

Calculating hourly rate was a multi-step process. Upwork workers can take on both hourly and fixed-price projects, so we first subtracted fixed project earnings (as calculated off each worker's profile) from Upwork's measure of each worker's total revenue. Total revenue is equal to the total amount a worker has taken home *after* paying fees to Upwork. The difference was divided by the total hours worked by a worker to get the worker's hourly rate (calculated hourly rate). To verify that the calculated hourly rate was accurate, we compared each calculated hourly rate to the associated worker's Upwork history. Those with extreme discrepancies were recalculated and, if still problematic were thrown out of our data on the assumption that the profile in question or its hours had been altered or affected by a technical issue.

3.3.2 Analysis

The results show that wages for active, US Upwork web developers (n=130) are somewhat lower than those of web developers across all industries and web developers in the temp industry, with web developers in the temp industry having the highest hourly wage of all.

Figure 3.3: Hourly wages of web developers

	Hourly Mean	Hourly Median	10%	25%	75%	90%
BLS Overall	$33.97	$31.23	$16.71	$22.40	$43.00	$56.07
BLS Temp Industry	$34.73	$32.22	$16.74	$22.44	$44.85	$58.02
Upwork	$33.47	$28.74	$13.56	$20.88	$42.71	$53.59

The average wages for US Upwork web developers ($33.47), web developers across all industries ($33.97), and web developers in the temp industry ($34.73) are not that different, however deeper analysis indicates that Upwork web developer wages tend to be lower at each percentile compared to either group, as is evident in Figure 3.1.

Figure 3.4 Hourly wages of administrative support workers

	Mean	Median	10%	25%	75%	90%
BLS Overall	$17.47	$15.96	$9.54	$12.08	$21.35	$27.86
BLS Temp Industry	$15.50	$14.07	$9.39	$11.15	$18.18	$26.31
Upwork	$11.97	$11.34	$6.72	$8.75	$14.77	$17.04

Wages for administrative support workers look quite different. Wages of US Upwork administrative support workers (n=132) are significantly lower on average ($11.97) than those of administrative workers working in the temp industry ($15.50), which are lower than wages for administrative support workers across all industries ($17.47). As is evident in Figure 3.2, this difference holds at all percentiles.

There are many reasons why Upwork's wages may be lower. In discussing our web developer criteria, we mentioned that the barriers to entering the Upwork labor pool are virtually nonexistent because anyone can create a profile. It's therefore possible that Upwork workers are on average less skilled than temp workers, who are often subject to screening before they are employed. The effect of asymmetrical information about which workers are skilled and unskilled may result in skilled workers having to lower their wages to match their less-skilled competition, lowering the overall wage (Akerlof, 1970). Upwork workers may also be willing to take a lower wage in exchange for the flexibility offered by Upwork. For example, Upwork workers may value the ability to work from any location or choose their desired hours and volume of work.

3.4 International wages

As we mentioned in our section on occupations, no analysis of Upwork can truly be complete without placing it in an international context. A key feature of Upwork is the presence of workers from a variety of low- and high-wage countries. As shown in section 2.1, this is true of both high-skilled and low-skilled occupations. Any client can hire a worker from another country just as easily as they'd hire a domestic worker. Unless clients specify a preferred country of origin, workers from all countries appear in the same list of search results. The contracting process for a foreign worker vs. a domestic worker is identical, with major drawbacks being issues of language and time zone. We suspect that workers from lower-wage countries also earn lower-wages on Upwork, and could feasibly be used as substitutes by workers in higher-wage countries

for local temporary workers, who charge higher wages. This means that Upwork lowers the cost of making a temporary (Upwork) contract for clients in higher wage countries.

To test this, we collected data on Indian web developers. We chose India for a couple of reasons. First, we found in our research on occupational breakdown (section 2.1) that India has a large proportion of active workers in computer and mathematical occupations. Second, India is already popular destination for United States IT outsourcing (The Economist, 2013). Thus, we assumed Indian workers might be an instinctive choice for US clients seeking lower-cost web development than they could obtain from US workers. Two findings that would potentially point to Upwork facilitating the use of low-cost Indian workers as alternatives to US temporary staffing and direct hire workers are:

1. Indian web developers on Upwork are making lower wages than their US-based counterparts
2. A significant percentage of Indian web developers' work is coming from US clients

In addition to these two points, we decided to also compare our wage finding to the average wage of Indian web developers overall from an external data source. We did not hypothesize one way or the other whether Upwork web developers would make a higher or lower wage than the overall average because of work coming from higher-wage countries; it just seemed an appropriate additional point of comparison given that we'd compared US Upwork/non Upwork wages. We collected Indian wage data from Payscale.IN.

We used the same criteria for selecting our Indian web developer sample as we did for our US sample, with the one difference being that we had to take a random sample due to the large number of web developers who met our criteria. Our measurement of hourly income for Indian web developers was also the same as for US web developers. We also tracked the number of each worker's jobs that came from the US An important note about our data collection in this section is that while not all a worker's jobs are included in our measures of hourly earnings (due to their fixed rather than hourly contract), all a worker's jobs are included in the job origin count (both fixed and hourly jobs).

3.4.1 Results

We found evidence that Indian web developers earn lower wages than US developers and that they get a significant amount of work from US clients. Indian web developers made a lower hourly wage (mean: $9.37; median: $8.52) than their American counterparts (mean: $33.89; median: $29.52). The level of Upwork wages for Indian web developers is comparable to the monthly salary for a web developer with five years of experience on Payscale.IN, which comes out to INR 9,2107 or USD $8.62/hr (assuming a 40-hour workweek). Thus, we can conclude that the wage earned by our sample of Indian Upwork developers is comparable to the wage they'd earn in a non-Upwork environment with five years of experience.

Our entire sample received 25.65% of their business from US-based clients. Additionally, we are confident that this is lower than the true percentage because many employers keep their personal details private and thus are not counted toward the US

total. While we did not specifically track workers' non-US clients, including developed countries like Australia, the UK, and Canada, it is readily observable that a much larger proportion of Indian web developers' business is coming from clients in these higher-wage countries than from Indian clients.

Our findings suggest that web developers in India earn less than their American counterparts and thus may be used as an alternative to higher-cost local labor by clients from higher-wage countries, from which Indian web developer receive a substantial proportion of their business. This is by no means a confirmation that there is competition between lower cost foreign workers and higher cost domestic workers for the same contracts. It also doesn't suggest that competition causes Upwork workers from higher-cost countries to lower their wages. Other factors like the types of contracts made between clients and workers, the types of tasks completed by workers, and skill levels of workers may also impact wage. More research into the rationale behind hiring decisions and the types of work offered to workers from different countries is needed to draw further conclusions.

3.5 Interpretation

A significant difference exists between Upwork and TSAs in the areas of business model, costs, and wages. For clients who value the matching services provided by TSAs, Upwork's pro and enterprise services, which closely resemble the services of a TSA, may be an acceptable but not necessarily lower-cost alternative. Presumably, due to the wealth of information included in Upwork worker profiles, clients utilizing the pro or enterprise services have more information on workers than they would through a TSA.

Coupled with lower costs and fees, it's easy to see how Upwork might attract clients who had cost or information-related reservations about using a TSA. On the other hand, clients may view Upwork as a costlier alternative if they place a high value the placement services of TSAs, don't wish to incur search costs themselves, require a shorter contract or the ability to convert a worker for a lower fee, have reservations about Upwork workers' reputation, or lack the technical literacy to use the Upwork interface.

Wages on Upwork appear to be lower for US workers, though the degree varies by occupation. The presence of lower-wage domestic and foreign workers on Upwork offers new opportunities for cost savings to clients. Our findings suggest that more research is needed on whether the skill level of tasks and occupations influences differences between temporary staffing and Upwork wages.

Another interesting avenue for further research is the impact of workers from countries with lower-wages on the wages of workers from higher-wage countries on Upwork. We found that Indian web developers receive a large percentage of their work from the US, and casual observation suggests that most of their work comes from Western and Oceanic countries with higher wages rather than from India. Our analysis did not delve into hourly wages paid to Indian web developers by US clients specifically; however, the lower average wage of Indian web developers and high percentage of work from the US suggests that US clients could be paying Indian web developers on average less than their US counterparts. Future research should analyze payments made by clients in higher wage countries to workers in higher-wage and lower-wage countries across different occupations and degrees of task complexity.

Finally, we think that the breakdown of not just occupations but discrete tasks on Upwork warrants further research. For instance, a pattern in outsourcing is that "back office" menial tasks are "offshored" to lower-wage countries while higher value work is kept onshore (The Economist, 2013). It would be beneficial to examine whether this trend is repeating itself not only on Upwork but on platforms across the online work landscape. Such differences in tasks may indicate that online platforms alter what clients will or will not outsource to a worker outside the boundaries of the firm.

4. Efficiency

We propose that Upwork increases the efficiency of the labor market in two areas. First, we speculate that Upwork's detailed user profiles and ease of contracting make for more efficient matching of workers to jobs. Second, we think that Upwork's location-agnostic nature allows workers to overcome local labor market conditions to work and earn more optimal wages.

4.1 Matching and Contracting

Upwork's online worker profiles and messaging system allow clients insight into the reputation, skills, and suitability of workers that far surpasses the minimal amount of information offered by TSAs. Katz and Krueger (1999) suggested that the temp industry increases the efficiency of the labor market through lowering hiring costs, improving matches, and reducing bottlenecks. According to data published by Upwork, their average time to hire is faster than that of traditional agencies.

To test this proposition, we posted a job for a data entry assistant on Upwork. After spending <10 minutes setting up an account and posting our job, we could look through a list of profiles that matched our post, which was given to us automatically by the Upwork system. Additionally, we were inundated by "proposals" from workers all over the world--over a dozen in the span of one hour. Upwork automatically put together a list of "suggested" applicants, effectively separating out the best candidates (good ratings, price, relevant work experience). We could message any candidate we wished. After exchanging messages with three promising candidates, we made an "offer," which was accepted by the worker—an administrative worker from the

Philippines--within minutes. The offer was for her advertised wage ($6.00 per hour) and we set a limit of three hours for the task. The entire process took less than ninety minutes. We ended the contract once the three hours of work were up and provided feedback to the worker. Should we choose to re-hire her, we could complete the process in one click.

To compare, we called a local Adecco branch and asked about the timeline to bring on an Administrative Assistant temp. We were told that the absolute fastest would be around one day, given that they needed time to find the appropriate candidate to meet our specifications and give the candidate notice. Having a worker start within two hours, as we did on Upwork, was not feasible.

From our experience hiring a worker and our familiarity with Upwork, it is clear to us that the experience the worker has matching and contracting through Upwork is very different to that of temporary staffing workers. On Upwork, workers create their own profiles, apply to jobs themselves, and negotiate their own contracts with clients. TSA workers typically do nothing more than submit a resume to and interview with the agency. Temp workers typically do not negotiate with the client on wages or hours or any other contract-related matters. For workers who wish to control their hours, projects, or rates, Upwork may be one of the few options to wield such control. Upwork may seem less efficient to workers who find searching and contracting activities extremely costly.

We cannot speak for the worker, but from the client point of view, the contracting process was quick and painless. We did not run a large-scale test so we cannot say for certain that the conventional agency process would always be longer or more difficult. However, it seems unlikely that most TSAs could fill a position and start a worker in less

than the two hours it took us through Upwork. This would be especially unlikely given the date and time (a Friday evening at 8PM US Central Time) that we decided to hire the worker.

Admittedly, the speed we experienced had a lot to do with the risk-free simplicity of our task and the fact that it could be done remotely; hiring for more complex tasks via Upwork instead of through a TSA might prove more difficult.

4.2 Information

The amount of worker information available to clients on Upwork may enhance its efficiency. Autor (2001) concluded that TSAs partly function as information brokers, selling information about worker quality to their clients. But while workers and agencies in Autor's data used proxies like training to signal true ability, such roundabout means of signaling is not necessary on Upwork. Worker profiles contain information about past jobs, including work samples, ratings, feedback, and payment amounts. Any tests passed by the worker are also visible to potential clients, as are accolades awarded by Upwork, notably the "top rated' badge bestowed on freelancers with a particularly good track record. Even a worker's advertised hourly rate may act as a signal of sorts to clients regarding the worker's level of expertise and experience. In addition to the extensive profile information to which clients have access, they can also message, call, or video chat with workers through the site. These tools allow a client to quickly size up a worker's basic communication skills and comprehension of the subject and tasks.

TSAs, by contrast, may not offer clients much information about their workers or even a chance to speak with them before placing them in a job. Employees of the TSA

are typically the only ones vetting workers resumes and/or interviewing them in person, so clients must rely on the agency's reputation for thorough vetting and appropriate matchmaking. The upside of course is that many clients lack the time or inclination to analyze a worker's information or communicate with them and are willing to pay the agency to complete these tasks.

Ultimately, we lack hard data comparing the efficiency of Upwork's matching and contracting to that of traditional TSAs. Controlled experiments comparing the matching and contracting process for similar tasks via the two different intermediaries are needed for a better understanding of which is more efficient.

4.3 Wages

We theorize that Upwork may contribute to more efficient wages than TSAs in two ways: by helping workers and clients derive more benefit from each dollar and by removing location-related barriers that prevent workers from earning an optimal hourly wage or working an optimal number of hours.

Workers may derive more benefit from Upwork due to its remote nature. One of the great promises of remote work is that it unshackles workers from the burdens of commuting to and working from an office every day. A study of Chinese workers at Ctrip, a travel agency, found a myriad of benefits to remote work, including increased job satisfaction and an increase in worker productivity that amounted to almost an extra week's worth of work (Bloom, Liang, Roberts, & Zhichun, 2015). No studies as extensive as Bloom's have been completed on Upwork, but Upwork's remote nature suggests that its workers and clients could enjoy some of the same benefits as Ctrip's workers. Thus,

each dollar paid to Upwork workers may earn clients a "better" worker while also contributing to a decrease in facilities costs. Each dollar earned by an Upwork worker may also pay the worker in terms of both satisfaction and time and money not spent commuting. On the other hand, the shorter contracts common to Upwork may not be as reliable of an income source as a TSA's longer contracts. Upwork workers may also be at a disadvantage from a tax and benefits point of view because of their 1099 status.

Many labor market ills are blamed on the immobility of workers. Marston (1985) showed that labor market shocks that generate unemployment in metro areas can be ameliorated by mobility. In theory, Upwork and similar platforms are delivering on economist's perfect-world scenario of instantly bringing workers to jobs and jobs to workers, at least for certain remote-friendly occupations.

We theorized that the outcomes of such mobility would be visible in two ways. First, an Upwork worker's wage would not be impacted by a worker's local labor market factors. Second, workers residing areas where jobs in their field are less common or paid poorly would work a greater number of hours on Upwork to overcome such scarcity.

4.3.1 Method

We tested this theory on our sample of US web developers. We collected the city and state data for each of our US web developers from Upwork. We matched each worker with the appropriate metro or non-metro area in BLS data, along with each area's location quotient (LQ) and average local hourly wage (LocWage) for web developers. Note that this was not for temporary web developers but rather for web developers across all industries.

Out of our 130 web developers, nine hailed from non-metro areas for which there was no data about web developers, presumably because there are so few web developers in the area. An additional 43 workers in our sample lived in areas with below-average density of web developers (LQ<1) for which there was data. Our regression equation is listed below (Equation 4.1).

Equation 4.1: US web developers and wage

$$Y\ln_{(wage)} = \beta_0 + \beta_1 hours + \beta_2 LQ + \beta_3 \ln_{(locWage)} + \beta_4 Dummy_{rated} + \varepsilon_i$$

This equation examines whether local labor market conditions impact Upwork wage by considering the impact of location quotient, local BLS wage, and experience in the form of total lifetime hours worked, as well as their status as a "top rated" worker. If worker's Upwork wages were impacted by local conditions--for example, people in lower-wage areas also make lower wages online--we would expect to see BLS wage and/or location quotient to have a significant impact on Upwork wage. We also control for workers having a "top rated" rating with a dummy variable.

Our second equation (equation 4.2) examines the impact of location-related variables on hours worked.

Equation 4.2: US web developers and hours

$$Y_{hours} = \beta_0 + \beta_1 \ln_{(wage)} + \beta_2 LQ + \beta_3 \ln_{(LocWage)} + \beta_4 Dummy_{rated} + \varepsilon_i$$

47

We hypothesize that if a worker's local area has a low density of web development jobs or pays a sub-par wage, workers might rely more heavily on Upwork to earn supplemental income. This equation controls for any effects that a worker's Upwork wage or rating might have on hours worked. Additionally, the results of this equation should also hint at any relationship between some of the variables of our first equation (e.g. "top rated" status and hours worked).

4.3.2 Analysis

The results of our equation are listed below. The effects of the different variables on hourly wage are mixed. It does not appear that any location-related factors have an impact on hourly wage. Hourly wage also isn't impacted by the number of hours worked by a worker, indicating that experience doesn't necessarily impact wages.

Figure 4.1: Equation 4.1 Results

	Coefficients	Standard Error	t Stat	P-value
Intercept	3.2979	1.0381	3.1767	0.0019
LocWage	-0.0453	0.3119	-0.1454	0.8847
LQ	0.1155	0.0795	1.4530	0.1489
Top Rated	0.2413	0.0946	2.5496	0.0121
Hours	0.0000	0.0000	-0.6120	0.5417

One factor that shows a significant relationship is "top rated" status, which is associated with workers making a higher wage. There are a lot of relevant factors that go into a "top rated" badge. A worker must have received relatively positive reviews, and thus worked enough jobs to receive those reviews; therefore, even if experience in isolation doesn't impact wage, we can assume that there may be an indirect effect through the "top rated" badge. It might also be that highly-rated workers are more

skilled and feel more confident charging more or only apply to higher-skilled, higher-paying contracts.

Our second equation indicates that location-related factors may have an impact on hours worked. It shows the same positive relation between "top rated" status and hours worked, in that "top rated" workers work more hours--an unsurprising finding.

Figure 4.2: Equation 4.2 Results

	Coefficients	Standard Error	t Stat	P-value
Intercept	11974.3589	3788.9771	3.1603	0.0020
Upwork wage	-206.9782	338.1893	-0.6120	0.5417
Loc wage	-3033.6429	1102.4916	-2.7516	0.0069
LQ	89.5731	292.6094	0.3061	0.7601
Top Rated	1044.4331	341.2940	3.0602	0.0027

What is interesting is that local wage and hours worked are negatively related--that is, lower average local pay for web developers was associated with a greater number of hours worked on Upwork. One explanation for this finding is that workers are putting in time on Upwork to compensate for lower wages earned in a "regular" job outside of Upwork. Individuals in higher-wage areas may view the wages they could earn on Upwork as unnecessary given the amount they earn at a higher-paying "regular" job or view Upwork as inferior to other non-Upwork alternatives for additional income in their area.

4.4 Interpretation

Our findings suggest that Upwork may more efficient than traditional temporary agencies. It was clear to us that the process of finding a suitable worker for a simple task

and hiring that worker was faster and easier than it likely would be through a TSA due to the amount of information and tools available to us and the streamlined contracting process. Future studies should compare the ease and success of hiring for complex tasks through Upwork (or similar) vs. through a TSA. Our findings suggest that Upwork's platform increases the speed of contracting and the amount of information available to both parties. We think it's worth exploring whether increased availability of information and efficiency combined with potentially lower costs are lowering the bar on what tasks clients are willing to outsource.

Among US web developers, we find no evidence that hourly earnings on Upwork are impacted by a worker's local average wage or location quotient for their occupation, but we do find that a lower local wage was associated with a greater number of hours worked on Upwork. There is a wide variety of potential reasons for this relationship, including lower-income workers using Upwork as a supplement or substitute for non-Upwork work. These findings are in line with previous studies showing OPE work as a supplement for "regular" income shortfalls, a line of inquiry that deserves much more study. An analysis that includes greater number of data points across a variety of occupations and locations is needed to see whether wages and hours in OPE environments vary by local conditions and occupation.

Finally, it seems that Upwork workers' wages are more a product of a worker's reputation in the market --Upwork's "top rated" designation--than any of a worker's local factors. Deeper analysis is needed regarding the characteristics of workers who are most successful in OPE platforms and methods used by platforms to both signal and influence this success.

5. Conclusion

Today's media often label any tech-savvy take on an existing business model as an Uber-esque game changer. The purpose of this paper was to examine whether Upwork is just a TSA with a robust website or something significantly different. Our findings show that Upwork is significantly different from a TSA and that its differences may point to an evolution or expansion of the temporary staffing market.

Upwork is a small global market of mostly part-time workers concentrated in a relatively small number of remote occupations. The contracts made on Upwork are generally shorter (in terms of total hours worked) than those made in the temp industry, indicating that some clients and workers may be making contracts on Upwork that cannot efficiently be made elsewhere. For workers, Upwork offers autonomy, the freedom to make their own terms, and the tools to possibly overcome local labor market conditions or supplement income. For clients, Upwork is a streamlined way to hire workers that fit their skill and cost criteria, usually on a short-term basis. At the non-premium levels, the tradeoff clients make for a much lower markup is assuming responsibility for searching for and choosing the right worker for the job based on an ample amount of information.

Should Upwork grow the premium and pro services of their businesses--those that most resemble the services of TSAs--they could become a threat to staffing agencies for certain occupations. It's not a stretch to imagine that clients in the US would see benefit in easily hiring lower-wage foreign workers, especially if information about their abilities and reputations is known. Clients of all sizes may see value in the ability to farm out tasks like cleaning spreadsheets or putting together slide decks that have always represented inefficient uses of employee time but previously fell short of warranting the

expense of a dedicated temporary worker or new hire. Upwork's main opportunity may be in enabling clients of all sizes to shift a larger subset of tasks to lower-wage workers outside the boundaries of the firm, thus expanding the amount of temporary work available to workers and lowering workers' barriers to capturing that work.

A great deal of additional research must be done to understand the future of Upwork and platforms like it. First, a broader understanding of wages, benefits, and protections for OPE workers is overdue given the popularity of platforms like Uber. Certainly, as a younger, more tech-savvy workforce rises we will need to understand if and how these new LMIs impact worker outcomes. The differences we discovered between Upwork and the temp industry suggest that researchers should proceed with caution when comparing OPE workers to other groups of workers. OPE workers' current tendency to use OPE work as an income supplement, as supported by our research, indicates that they may fit into multiple worker categories and may even be their own new category. An analysis of workers and jobs that delves into details like skill set, tasks, and contracts across occupations is essential for understanding the true nature of the work being done on Upwork and the OPE and predicting future patterns of work distribution. Finally, it's imperative that we develop a better understanding of the motivations and values of workers on Upwork and other intermediaries in the OPE. Future research should delve into workers' economic rationale for participating in the OPE, especially any tradeoffs they are making regarding wages, work availability, and flexibility. Such research could uncover factors that will ultimately accelerate or hinder the growth of the OPE in the future.

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