

Multi-layered Labor Contracting and Price Setting Process for Nonstandard Work

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Abstract

This paper examines an important but to date little understood development in the industry that dictates recruitment of nonstandard workers—the outsourcing of a management function devoted to selecting and managing of nonstandard workers to an intermediating organization, who then selects qualified workers from a group of competing suppliers in the sequential process of matching workers to firms. I make the very first scholarly attempt to examine the link between such “multi-layered labor contracting” arrangements and subsequent economic outcomes for both the hiring lead firms and the workers. I contend that an additional intermediation between the firm and the worker through outsourcing is *relationship-limiting*, a mechanism that serves to compress supplier power and its ability to control prices, while reducing worker power and its ability to negotiate prices. Using a unique proprietary data from employment records of about a million workers seeking nonstandard work at 49 large firms, I find that outsourcing of recruitment of nonstandard labor is associated with higher returns to the firms and lower returns to the workers. When workers gain bargaining power, however, through a pre-existing firm-worker relationship, the results show that the loss from an additional contracting layer is significantly reduced. The results hold even when controlling for supplier fixed effects to control for unobservable supplier characteristics, as well as when controlling for detailed measurement of skill requirements for nonstandard jobs that may instead dictate the price-setting process. Findings from this paper have potential for improving our knowledge of hiring practices in organizations and social structural inequality using the theoretical constructs of power and price-setting.

INTRODUCTION

Recruitment of nonstandard, or *contingent*, workers increasingly involve multi-layered contractual arrangements—that is, a firm-worker relationship that extends beyond a formal and dyadic exchange to those that involve multiple labor market intermediaries (Hoque et al. 2011; SIA 2017). Much of research examining the economic impacts of nonstandard employment assumes that recruitment processes and transactions enabling these new relationships are mediated by a single third-party organization, such as a staffing agency, professional employer organization (PEO), vendor, or even an online platform (for a review, see Bidwell et al. 2013; Bonet, Cappelli, and Hamori 2013). However, the recruitment of nonstandard workers today instead frequently resembles what is referred to as “multitiered contracting” (Weil 2014:101) arrangements in production supply chains, in which work that has been contracted out is further subcontracted in the form of hyper-subcontracting. In the mid-1990s, firms with immense short-term labor needs began finding ways to create a single streamlined human resource (HR) or procurement process devoted to recruiting and managing of nonstandard workers supplied through scattered relationships with staffing agencies. One important way in which this has been achieved was by creating a centralized Contingent Workforce Management (CMW) program to be managed in-house, or to *outsource* that entire CMW function to an external intermediating organization referred to as the Managed Services Provider (MSP). The resulting labor market for nonstandard workers is dictated by buyer-supplier-worker relationships that extend beyond a triadic model, as the MSP, in place of the lead firm, selects from a group of competing staffing agencies or contractors their supply of qualified candidates in the sequential process of matching workers to firms.

This paper examines specifically how recruitment outsourcing of nonstandard labor alters the price setting process for both the leading firms and the workers. While the phenomenon has become widespread, virtually no research has closely examined an employment externalization in the form described. Not only that there is a lack of available data that tracks firm variation in the hiring of nonstandard workers, extant empirical evidence on the economic impacts of nonstandard work and

outsourcing is limited at best. First, while both strands of research similarly identifies that there are variations in employment outcomes depending on the level of skills or the type of work arrangements (Barley and Kunda 2006; Dube and Kaplan 2010; Goldschmidt and Schmieder 2017; Houseman, Kalleberg, and Erickcek 2003; Kalleberg 2000, 2009; Segal and Sullivan 1997), these studies often compare workers in traditional arrangements to those exposed to a single triadic form, even when there are more than one pathway through which workers and firms find each other for the same type of nontraditional arrangement. Evans, Kunda, and Barley (2004), for example, identifies two markets for technical contractors, one in which they find work by negotiating directly with the lead firms as independent agents, the other in which they have staffing agencies find work for them. Because brokers with job-matching abilities have some discretion in the price setting process (see Fernandez-Mateo 2007), the prices agencies charge the firm and pay the workers will fundamentally differ from the prices negotiated between the firm and the workers directly; or from the prices negotiated between three or more actors in a contractual relationship.

Second, literature on outsourcing tend to focus on either the worker-side wage outcomes (Dube and Kaplan 2010; Goldschmidt and Schmieder 2017) or the firm-side performance outcomes (for a review, see Lahiri 2016) independently, without taking into an account the cost incurred to the intermediaries and how prices are distributed among all the actors involved. Similarly, studies of nonstandard workers, such as independent contractors, agency workers, or on-call workers, also frequently focus on the outcomes for workers (for example, Segal and Sullivan 1997). While some studies of staffing agencies and brokerage examine price setting process for both the lead firm and its workers (Bidwell and Fernandez-Mateo 2010; Fernandez-Mateo 2007), they are limited to a single organizational setting within the scope of a triadic firm-supplier-worker relationship. Nevertheless, organizational theories of brokerage and power-dependence employed in these studies provide important insights about how relationship-building mechanisms between actors involved affect price setting processes, in a way that is also applicable to multi-layered contractual arrangements. Building on this

literature, I contend that an additional intermediation between the firm and the worker through outsourcing is *relationship-limiting*, a mechanism that serves to compress supplier power and its ability to control prices, while reducing worker power and its ability to negotiate prices.

Given the gap in research, it begins by describing the nonstandard labor market, different roles each labor market intermediaries exhibit as well as their relationships with other actors in this market, based on my preliminary research of online archival data, online communities of nonstandard workers, industry studies, as well as interviews with staffing industry personnel. Then, I test my argument by taking advantage of a year-long negotiated access to proprietary data from the employment records of nonstandard workers in 49 large firms in the Fortune 500 companies list. The unique nature of its individual-level hiring and pricing data (for close to a million nonstandard workers) across firms that work with varying types and numbers of intermediating organizations allows me to provide, for the first time in the literature, an analysis of multi-layered contracting arrangements in nonstandard labor market, in the form of outsourced recruitment of nonstandard labor. Using this data, my main findings suggest that outsourcing the recruitment of nonstandard labor is associated with a decrease in prices charged to the firm (bill rates) and a decrease in prices paid to the worker (pay rates).

Ultimately, this research helps extend our understanding of how inter-organizational processes influence price-setting behavior of organizations involved in the job-matching process for nonstandard workers. Scholars have called for more research on outsourcing-induced changes in intra- and inter-organizational processes that influence economic outcomes: “many of the most important consequences of outsourcing on workers are mediated through the effects of outsourcing on the nature of work and organizations” (Davis-Blake and Broschak 2009:322). This paper suggests that outsourcing of recruiting and managing a particular category of the workforce alters interorganizational processes between the lead firm and the labor suppliers, in a way that influences worker outcomes as well as the firms. Further, I contribute to the literature on nonstandard work by providing evidence for the need to look beyond triadic

relationships in recruitment in order to better understand the price and the wage-setting processes in this constantly changing labor market.

MULTIPLE LAYERS OF CONTRACTING AND PRICE SETTING PROCESS

Different bodies of scholarship have conceptualized how firm profits and wage-setting processes in organizations are influenced by the nature of contractual relationships embodied in the distribution of power among those engaged. On one hand, literature on supply chains—in particular, those in hierarchical product markets with multiple actors—examines bilateral buyer-supplier relationships in the context of buyer (i.e., the lead firm) power and their impact on increased buyer profits (see e.g., Galbraith and Stiles 1983; Gosman and Kohlbeck 2009), which seems to hold even when suppliers achieve productivity gains from the relationship (Kim and Wemmerlöv 2015). Similarly, when relationships are more complex, such as those involving three or more parties along a production supply chain, the relative degree of power among different actors are found to determine firm profitability (see e.g., Cool and Henderson 1998; Lanier, Wempe, and Zacharia 2010). Extending this work to wage-setting processes, Wilmers (2018) shows, although limited to a dyadic buyer-supplier relationship in product supply chains, that wages of workers employed by the suppliers are adversely affected when their dependence on large buyers increase (i.e., greater buyer power). While research on complex relationships in supply chains and their wage effects is thin, Weil (2014) contends that in such hyper-subcontracting arrangements, the lead firm can distance itself from a set of employer-related liabilities and reduce labor costs when it maintains more bargaining power over the contractors (suppliers) and in turn, their subcontractors. The lower tier suppliers within such structure are exposed to greater competition and fluctuating demand, Weil argues, to ultimately influence worker outcomes.

In the context of recruitment supply chain, on the other hand, brokerage literature on triadic relationships frequently portrays suppliers as having considerable bargaining power *de facto* as they provide market intermediation, or brokerage, connecting two or more parties to create or capture economic value. Brokers are considered to have better access to information and an ability to provide a

match between actors that would otherwise not interact (see e.g., Autor 2008; Gould and Fernandez 1989; Marsden 1982; Osterman 2004). Research shows that staffing agencies as brokers gain bargaining power to set prices by building relationships that are long in duration (Bidwell and Fernandez-Mateo 2010) or relationships that are more valued by the firms (Fernandez-Mateo 2007). Because power advantage, according to power-dependence theory, comes from asymmetrical dependence between exchange partners in a relationship (Emerson 1962), these relationship-building mechanisms reduce the number of alternatives for other actors and increase their dependence on staffing agencies to give brokers more bargaining power (Ryall and Sorenson 2007; Simmel 1950).

In the labor market for nonstandard workers that are multi-layered (the outsourcing model), then, I illustrate below that when the relationships between staffing agencies and the lead firms are mediated by an additional intermediating organization (MSP) to increase their social proximity, staffing agencies' ability to build relationships is significantly reduced to change the ways in which they set prices for the buyers and the sellers. As a result, the recruitment supply chain starts to resemble a hierarchical product market, rather than a vertically integrated market.

Outsourced Nonstandard Recruitment of Nonstandard Labor: A Background

The modern labor market for nonstandard work arrangements is no longer confined to a triadic exchange relationship where one staffing agency (i.e., broker) mediates relationships between the worker (i.e. seller) and the lead firm (i.e. buyer). A triadic exchange relationship has been studied as the one dominant model in the staffing industry, where a staffing agency or a vendor supplies temporary labor for the “lead” firm (i.e., firms with temporary labor demand) to provide, at times, better information about the pool of candidates they source and to identify qualified candidates. The competitive advantage of the staffing agencies is that because they work with both the buyer and the seller of labor for multiple assignments through repeated exchanges, they are often considered to provide better quality or more efficient matching (Bidwell and Fernandez-Mateo 2010; King, Burke, and Pemberton 2005), with some incentives to provide quality candidates to firms as they generate profits by guaranteeing staffing

expertise (Cepin 2012; Khurana 2002). Such externalization of work represented a movement towards an employment system dependent on an market-based firm-firm relationships rather than firm-employee relations within the firms' internal labor markets (Bidwell et al. 2013; Osterman 2011).

Starting in the mid-1990s, however, the HR and procurement professionals in many large firms started to recognize the need for centralized management of nonstandard labor. Traditionally, individual business unit hiring managers made decentralized decisions to hire short-term workers, often based on personal relationships with a small number of suppliers, thereby making it difficult to track all individuals who were on- and off-boarded for short-term assignments (Figure 1a). Firms however became increasingly unconvinced that staffing firms were serving their best interests, with the absence of transparency in pricing and the growth in regulatory concerns related to co-employment and employee misclassification lawsuits. The popular sentiment in the industry was, "We don't feel that the staffing firms are policing themselves, therefore we will need to do something."¹

In addressing this challenge, large firms began adopting strategies referred to as the Contingent Workforce Management (CWM) that diverged in one of two ways: (1) creation of CWM in-house; and (2) outsourcing of CWM to a third-party management agency referred to as the Managed Service Provider (MSP). In the first case, firms create a specialized HR/procurement function to centralize the management of alternative work arrangements (Firm A in Figure 1b). This model fundamentally differs from a traditional, personalized triadic relationship (Figure 1a) since it reflects a deliberate attempt by large firms to organize and centralize the HR system for nontraditional workers in-house, typically referred to as the Internally Managed Program (IMP). Alternatively, firms outsource that entire Contingent Workforce Management to a third-party Managed Service Provider (MSP) (Firm B in Figure 1b). In 2017, 63 percent of 145 large firms surveyed in an industry study used an MSP, up from about 42 percent in 2009 (Staffing Industry Analysts 2017). The MSP adds an additional layer to labor contracting

¹ As quoted in "Vendor Accountability for Contingent Workforce Management." 2016 *SAP Fieldglass Whitepaper*.

as it brokers relationships between the lead firm and hundreds, or even thousands, of staffing agencies and vendors who supply temporary labor.² While some MSPs provide its own staffing services, most subcontract out staffing services to smaller staffing agencies, and instead focus on management functions, such as supplier selection, on- or off- boarding, contract negotiation, time keeping, and compliance oversight. When such management functions are outsourced, the MSP becomes the primary contact for all the suppliers, which reduces both administrative and regulatory burdens on the lead firm.

[Figure 1 about Here]

Enabling such a large-scale management of alternative work arrangements, both the lead firms (Firm A) and MSPs (working with Firm B) contract with technology vendors that provide a cloud-based platform (or Vendor Management System, VMS)³ to compare and select workers from a large number of suppliers in the system. An employer survey has reported that about 73 percent of firms surveyed had used a VMS in 2017, a rapid growth from just about 16 percent in 2006 (Staffing Industry Analysts 2017). The platform has enabled an important feature in this nonstandard labor market that was previously non-existent: a *competitive bidding* system, where staffing agencies bid prices for their available workers for a given job requisition. The lead firms (in the case of Firm A) or the MSPs (in the case of Firm B) then select, from a number of comparable options, candidates for further hiring processes. In fact, the widespread adoption of this practice is considered by industry professionals to provide the MSPs or the lead firms a way to minimize “bias” in selecting favorable suppliers, which allows suppliers to compete for a contract on a level playing field.⁴

² They first emerged through an organized effort by smaller staffing firms that saw the need to leverage their resources better to their advantage. See: OnContracting. 2014. “What is MSP or VMS in Staffing?” August 11. Retrieved March 1, 2017 (<https://www.oncontracting.com/article/what-is-msp-vms-in-temp-staffing.html>).

³ Commonly referred to as “Vendor Management System” (VMS), this technology platform is often an internet-enabled, cloud-based application software marketed and sold by vendors that specialize in technology solutions specifically for nontraditional work arrangements. Some of the most popular VMS providers include SAP Fieldglass, Beeline, IQNavigator, Peoplefluent, PRO Unlimited.

⁴ In a purely competitive bidding model, the MSP does not have an affiliation with any particular staffing agency nor supply labor on its own. Most MSPs that use this technology as well as independent technology vendors frequently use words such as “vendor neutrality” or “vendor accountability” to describe their products: “Our clients

Buyer Power, Profitability, and Wage Determination

In the multi-layered contractual relationship intermediated by an MSP (Firm B in Figure 1b) using the MSP/VMS integrated model, staffing agencies have limited bargaining power for two main reasons. First, the use of a cloud-based technological platform as described earlier intensifies competition among suppliers through its competitive bidding process. When suppliers compete on a level playing field within the cloud, they are unable to extract and capture value that typically arise through the relationship building mechanisms. While competitive bidding is new in the nonstandard labor market, procurement managers have long made use of competitive bidding in product markets. Studies have commonly characterized competitive bidding as adversarial in product supply chains (Hahn, Kim, and Kim 1986) as well as in online marketplaces (Wise and Morrison 2000), since it encourages suppliers to focus on short-term costs instead of long-term capabilities. Further, even a positive aspect of competitive bidding like simplification in the supplier selection process can be to be associated with inefficient outcomes. In industries such as lean construction, contracts awarded based on a plan with complete specifications at the time of competitive bidding are found to create inefficiencies since it is common for project designs and methodologies to change in the long-run (Elfving, Tommelein, and Ballard 2005).

Second, the suppliers of labor (staffing agencies or vendors) are one-step away from the buyer (lead firm), as they are tied to the MSP that acts as a focal broker between the buyer and the suppliers. This limits a supplier's ability to build direct exchange relationships with the buyer. Many contractual arrangements between an MSP and a lead firm in fact forbid a direct communication between the firm and the suppliers. For example, in the health care industry where hospitals hire temporary travel nurses through the MSP/VMS model, hospitals are not allowed to contact the agency directly to avoid unnecessary calls from the staffing firms.⁵ This seems to be a standard practice: even in the case of local

will tell you that the vendor-neutral approach consistently delivers the highest quality talent at market-driven competitive rates" (Andrew Popler, quoted in Andrew Karpie and Nick Heinzmann, "Linking a Combined MSP and VMS with Pure Vendor Neutrality: Advantages and Lessons Learned" Spend Matters, April 5, 2017).

⁵ Schmidt, Kyle, "9 Points of Debate Between Travel Nursing Companies over the MSP Model" *BluePipes Blog*, 2013.

government social services in the United Kingdom that made use of this MSP/VMS model, Hoque et al. (2011) found that managers of the lead firms were instructed to not contact staffing agencies which was considered to have “undermined valuable personal relationships” with suppliers that they have previously worked with. Not only that suppliers are limited from building relationships with the MSPs within the space of competitive VMS, suppliers are one step removed from any potential to build relationships with the buyer for gaining bargaining power.

In this setting, the buyer has many available options, which reduces dependence on other actors and increases its power, according to Emerson (1962). The buyer can either use other MSPs to find equivalently well-qualified suppliers or easily bring the service back in-house with the help of technology.⁶ Instead of depending on an MSP, firms can adopt the same technological platform in-house (Firm A in Figure 1b), which opens the door to an equivalently broad selection of suppliers and their workers.⁷ The MSP therefore has both an incentive and a tool to find suppliers that can charge lower bill rates to the buyer than when the buyer manages nonstandard workers in-house. In sum, contrary to the assumption in the literature that a broker gains power advantage by building personal relationships with the buyer, I establish that the buyer gains bargaining power to set prices for the rest of the supply chain members when an MSP brokers relationship between the buyer and the supplier in this nonstandard labor market. In other words, *outsourcing of recruitment of nonstandard of labor would be associated with higher returns to the buyer (i.e., the lead firm)*, as the buyer gains bargaining power over the others in the supply chain.

⁶ In fact, despite the widespread externalization of nonstandard workforce management, the more recent debate has focused on the potential benefits of bringing the management back in-house, accompanied by the same technological platform (as in Firm B in Figure 1b). See, for example, recent industry articles on this topic: Guest Contributor. “Why Are Clients Moving Away from MSPs to Internally Managed Programs (IMPs) to Optimize Contingent Labor?” *SpendMatters*, March 3, 2017; Reagan, Peter. “Going Internal? Consider all costs” *Staffing Industry Analysts*, November 18, 2015.

⁷ This internalization would similarly influence supplier competition with competitive bidding, but the mere fact that the buyer directly oversees, manages, and chooses suppliers in the system gives an opportunity for relationships and preferences to form in ways that can give suppliers some bargaining power less available in the MSP-mediated relationships.

From the perspectives of the suppliers, the reduction of their bargaining power over the lead firm due to the MSP-tie amplifies the need to effectively control prices in ways that can still generate profit. A supplier typically profits by charging a bill rate to the firm for workers it supplies, minus the pay rate that goes to the workers as an hourly compensation ($supplier_profit_A = bill_rate_A - pay_rate_A$). For work assignments that an MSP manages for the buyer, the supplier profit gets reduced by the fee paid to the MSP for its services per transaction ($supplier_profit_B = bill_rate_B - pay_rate_B - MSP_fee$).⁸ However, since suppliers tied to an MSP are unable to charge higher bill rates to the buyer to offset the additional cost incurred, standard economics would predict that suppliers under perfect competition should be willing to take lower profits holding constant the pay distributed to workers of same quality and skills. It may be the case that there are unobservable benefits (e.g., large volume of job openings, sharing of risks) of working with the MSPs to compensate for the lower profits. Alternatively, the suppliers will break out of the subcontracting arrangement and instead resort to working directly with the lead firms to generate profit, *unless* they can “transfer” the additional price burden from the MSP to the workers (Fernandez-Mateo 2007) as a broker that has bargaining power over workers. Fernandez-Mateo (2007) has suggested that such transferring of burden is in fact possible when there is some stickiness to the relationship between suppliers and workers; that is, when workers are uncertain about the quality of other suppliers. Within an institutional structure that involves MSPs, workers likewise have little or no understanding of how their work assignments are sourced and priced—a lack of contract transparency, especially in a context where there is no direct contact with the lead firms during the process of job search. For example, an online community of temporary travel nurses discussed the issue when a problem surfaced; and a more experienced nurse said the following:

“It is not unethical for the recruiter not to tell you upfront about vendor managers [MSPs or technology vendors]. ...It is complicated to explain, and there is no decision you would have to make with [the vendor managers]. They don’t tell you what the bill rate is, or how much they pay for liability insurance, or what a recruiter makes. On the other hand, most any good agency will

⁸ This pricing model is commonly referred to as the “supplier-funded model” where buyers of staffing services, that is, the lead firms, do not pay any upfront fees to use the MSP. Instead, the MSP fee (typically ranges from about 2% to 5% of bill rate) is incorporated in the bill rate per transaction.

tell you if you ask (and the recruiter knows), but unless you are an advanced [temporary nurse], you will not know what you can do with that information so there is not much point to it.”⁹

While this set of temporary workers has a community online where they can at least get some information on the pricing complexities, most workers in alternative work arrangements have little insight into such information. Most publicly available information on staffing agencies (through easily accessible outlets such as staffing agency or association websites, blogs, or news articles) do not state clearly how staffing agencies source their labor, i.e. their connections to specific MSPs or the usage of technology platform. In the absence of transparent information, therefore, workers are not only prevented from communicating directly with the lead firm, they also do not have a strong motives to seek out alternatives even when they are paid at a rate that could otherwise be negotiated higher by a staffing agency that works with a lead firm directly. In sum, *outsourcing of recruitment of nonstandard of labor would be associated with lower returns to the seller (i.e. the worker)*, as the buyer gains bargaining power over the others in the supply chain.

Worker Power and Wage Determination

So far, I have argued that outsourcing would benefit the lead firm while reducing worker pay, primarily because multiple-layers of labor contracting limits both the firm-supplier relationship as well as the firm-worker relationship. As a result, the intensified market-based competition within a hierarchical supply chain encourages suppliers, who have more bargaining power over workers, to transfer the price burden to workers. Put differently, this should mean that *absent* the suppliers’ negotiating power to control prices to their advantage over workers, they would have less financial gain in exchange for higher worker pay and take even lower profits when the distance from the firm increases. Since brokers gain power to negotiate prices when they become less replaceable with the value gained from access to private information (Marsden 1982), their negotiating power would likewise be reduced if their capacity to provide value to the given party is limited by design. For suppliers of labor, their primary role as brokers

⁹ Anonymous contributor in allnurses.com, Feb 18, 2012.

is to provide a matching function between two parties, where their access to information about the matching parties, or their repeated success or failure in providing quality matches, would dictate the extent to which they can negotiate prices to their advantage. Then, in an institutional context where suppliers mediating do not provide a match between firms and workers, they would no longer have the discretion to lower worker wages in return for higher profits.

In my setting where firms actively decide to centralize the management of nontraditional workers, firms may also find workers using their own internal resources independent of the suppliers, and manage these workers through the centralized system. In other words, firms sometimes contract with suppliers solely for the purposes of “payrolling” workers that are “pre-identified”, rather than to find a suitable match. Often used interchangeably with payrolled or directly sourced workers, pre-identified workers are typically workers that have already been identified by a hiring manager at the lead firm: i.e., previously hired nontraditional workers, interns, alumni, retirees, and referred workers by current employees at the firm. For this set of workers, while suppliers still mediate the relationship between the buyer and the workers, their role is significantly reduced, and so is their power to negotiate prices, as they are not engaged in selecting and recruiting workers for the buyer. These suppliers instead provide a plainly administrative function, such as the W-2 payroll processing, timekeeping, and tax administration, to become the legal employer of record in place of the lead firm.

In comparison to competitively bid workers whose suppliers match them to firms, the pre-identified workers are therefore relatively free from the influence of suppliers as they have direct, pre-existing relationships with the buyer. Further, by design, because suppliers managing pre-identified workers do not provide matching services, the supplier fee charged solely for their payroll services should be lower than traditional supplier markup rates.¹⁰ In other words, suppliers should be able to pay these workers higher wages or charge buyers lower bill rates, compared to when the same suppliers compete in

¹⁰ Carre, Margaret, “Are Pre-identified Workers Costing You More Than Assumed?” *Allegis Global Solutions Whitepaper*.

the bidding system. Previous studies suggest that these pre-identified workers, that is, both previously hired workers and referred workers, may benefit from working directly with the firm. This type of pre-existing firm-worker relationship is an example of what Uzzi (1997) referred to as the “third-party referral networks and previous personal relationships” that make up an embedded tie, often considered to be more efficient than an arm’s length tie (e.g., firm relationship with competitively bid workers) (see e.g., Ingram and Roberts 2000; Uzzi 1997). Research shows that compared to nonreferrals, employee-referred candidates had more appropriate applications (Fernandez, Castilla, and Moore 2000; Fernandez and Weinberg 1997), were more likely to be hired (Fernandez and Weinberg 1997), and had higher initial wages at the point of hire (Brown, Setren, and Topa 2016; Galenianos 2013; Montgomery 1991). Even when brokers provide the matching function, longer firm-worker relationships developed through a broker’s repeat placement of its workers with the same firm are found to reduce the share of broker’s gains from the transaction (Bidwell and Fernandez-Mateo 2010).

Pre-identified workers then have considerable bargaining power over the buyer unlike typical workers who build relationships with the lead firms, because they are “named requests” which is indicative of their value for the lead firm. Although the savings from a direct match may equally benefit both the buyer and the workers, the buyers should be willing to spend more to hire these workers. In fact, industry experts have discovered that:

“Although, in theory, the final cost of a payrolled pre-identified worker should be lower than those sourced through the supply base, without proper oversight in place, this is almost never the case. Hiring managers have limited insight into market pricing for contingent labor and tend to be poor negotiators of wages for these workers.”¹¹

As a result, such a pre-existing buyer-seller relationship, when it resembles a direct relationship without contracting layers, should be associated with lower returns to the buyer (i.e. the lead firm) and higher returns to the seller (i.e. the worker) than when the relationship is competitively determined.

¹¹ Ibid., p.3.

Moreover, a lead firm that outsources nonstandard workforce management to an MSP hires pre-identified workers through suppliers that the MSP selects for purposes of payrolling or have selected for a previous assignment. While the role of suppliers is still limited to payrolling function, the MSP continues to engage in the management function by selecting suppliers and helping to negotiate contracts. In other words, for the buyer, outsourcing will help them negotiate lower prices for pre-identified workers than when the buyer negotiates directly with the payroll suppliers. On the other hand, outsourcing that forces suppliers to transfer price burden to workers in competitive bidding should not influence wages of the pre-identified workers the same way. The payroll suppliers do not have bargaining power over the pre-identified workers as they are unable to extract value from matching. Therefore, the outsourcing effect should be moderated by a pre-existing buyer-seller relationship, to support the claim that the relationship limiting aspects of outsourcing influences price determination.

DATA AND METHOD

I use unique and proprietary data of employment records for nonstandard workers provided by a North American company (hereafter, “ContingentCo”), a labor market analytics company specializing in a segment of workers that they classify as “contingent”. To my knowledge, this is the first available data that provides detailed information on how nonstandard workers are hired (or onboarded¹²) to work assignments across multiple large firms in the United States: specifically, a detailed list of suppliers and their types, information on the lead firms that workers get assigned to, assignment characteristics, and their prices. The data consists of hiring information of nonstandard workers from 49 large firms in the U.S. in the Fortune 500 companies list that have designated resources specifically for a Contingent Workforce Management (CWM) program in their human resources or procurement departments.¹³ In the

¹² The term “onboarding” is used by industry practitioners to refer to the “process of bringing a worker into a position with a goal of providing all necessary tools to be productive as soon as possible” (Staffing Industry Analysts 2017: p.27). For purposes of this paper, I will be using the term “hire” consistent with literature.

¹³ It is important to note that the ContingentCo has been able to collect such information since all 49 firms make use of a technology platform referred to as the Vendor Management System (VMS) for an efficient processing and documenting of their contingent workforce. Even though I expect that the use of the VMS should lead to

past, one major challenge in understanding alternative work arrangements has been that there is a lack of publicly or privately available data that captures in detail both the multiple pathways that workers go through to get matched to a firm, as well as the precise rates at which the workers are paid and billed by suppliers of labor. Data on the establishment- or the firm-level use of nonstandard workforce is unable to capture individual-specific hiring information (see e.g., Cappelli and Keller 2013; Houseman 2001; Kalleberg, Reynolds, and Marsden 2003), while surveys at the individual-level are unable to capture both the modes of entry into work and how much the lead firms benefit from hiring these workers. The ContingentCo data is able to capture the entirety of the labor market in which these nonstandard workers as well as buyers and suppliers of labor operate along the supply chain and across different industries, occupations, and skill-levels.

Importantly, the data has information on whether these large firms have outsourced their CWM programs to a third-party agency, a Managed Service Provider (MSP). Previous studies on outsourcing has relied on approximate and indirect measures of outsourcing, either through staffing or service firm industry classifications (Dube and Kaplan 2010) or input-output data from the U.S. Bureau of Economic Analysis (BEA) that uses intermediate inputs of the outsourcing industry as a measure of outsourcing (Yuskavage, Strassner, and Medeiros 2008). Firm-specific data on whether a particular service frequently done in-house, in this case, managing of a nonstandard segment of workforce, is outsourced, is an important measure of outsourcing that has not been available in previous studies. Finally, in studies of nonstandard and contingent work, it has often been difficult to tease out the supply-side selection bias, as workers can choose to work in alternative work arrangements or outsourced agencies for reasons not causally determined. It may be the case that staffing agency workers in manual jobs, for example, sort into these jobs with greater preferences for flexibility and autonomy in exchange for lower wages to reflect compensating differentials. To understand *de facto* the role of inter-organizational processes

differential outcomes for firms compared to those that do not use the same system (which is still common for smaller firms or firms that use small number of nontraditional workers), it is beyond the scope of this paper.

independent of supply-side preferences, one must hold constant the type of workers and their choice of their own legal employers (suppliers). I exploit the fact that the ContingentCo data has information on individual job candidates, all of whom have *already* sorted into working with a brokering organization to find work.

My main empirical strategy is to estimate the prices that suppliers charge the lead firm and wages that workers receive for each assignment, depending on the types of buyer-seller or buyer-supplier relationships that alter bargaining power between stakeholders, controlling for firm, state, and occupation variations.

Description of Variables

The final dataset contains information on a sample of 955,169 nonstandard workers, 395,879 of whom have successfully been hired into a job assignment (either completed or currently onboarded to an assignment; 41.5% of all candidates in the data) across 49 large firms in the United States, mostly between years 2009 to 2017. As can be seen in Table 1, these workers are successfully hired into 158,652 job assignments across 23 industries.

[Table 1 about Here]

Dependent Variables. The main dependent variables of this study are the logged hourly bill rates that suppliers charge the buyers per worker matched to an assignment; and the logged hourly pay rates that workers receive per assignment from a supplier (their legal employer of record). The average bill rate and the pay rate for workers successfully hired are \$46.3 and \$29.9 per hour in constant 2017 dollars, respectively. I use information on the year in which the job vacancies were filled and adjust the prices to constant 2017 dollars using the CPI-U-RS from the Bureau of Labor Statistics. I exclude observations that had incorrect specification of years (0.02% of observations, which gives 395,803 out of 395,879 successfully hired workers with adjusted bill rates). Since all suppliers have to bill the lead firm for every candidate they submit to the system, bill rates are available for every candidate-level observation.

However, not all suppliers are obliged to report to the lead firm how much they pay the workers: in ContingentCo data, only about 48.3% of the successfully hired workers had pay rates reported to the lead firms by the suppliers (191,340 workers). Studies have found that disclosure of wage information resulted in higher wages for workers in Britain (Rosenfeld and Denice 2015) and compressed wages among top managers in California (after a 2010 mandate to post salaries online; Mas 2017).

By using ContingentCo data to attain wage information for nonstandard workers for those that disclose them, I may therefore be selecting suppliers who provide higher than average nonstandard worker wages. To supplement the analyses, I also use the logged hourly markup rates that suppliers receive from having successfully matched a worker to a lead firm. The profit for a supplier from this transaction should reflect the difference between the bill rate and the pay rate, minus fees paid to the MSP (if the supplier works with one); however, the dataset does not specify the share of bill rate that gets paid to the MSP. Thus the markup rates in this data are the percentage difference between the bill rate and the pay rate, simply reflecting the share of price that flows to the labor market intermediaries as a whole.¹⁴ The average markup rate for workers successfully hired are 34.2%.

Measure of Labor Contracting Layer (Outsourcing). A firm is coded as having outsourced its Contingent Workforce Management (CWM) if it works with a Managed Service Provider (MSP) to source its nonstandard labor. Otherwise, a firm is coded as having an in-house system if they use an internal program management office to manage nontraditional workforce. In the sample, 40 firms have outsourced its management of nonstandard labor and 9 firms manage nonstandard labor in-house. I operationalize labor contracting layer as the distance between the worker and the lead firm; that is, the total number of labor market intermediaries involved in hiring a worker for an assignment. If an individual works for a lead firm that is coded as having outsourced its nonstandard worker management to

¹⁴ The markup rates for suppliers providing workers for Firm A and Firm B are the following, subsequently:
 $markup_rate_A(\%) = \frac{bill_rate_A - pay_rate_A}{bill_rate_A} * 100$; $markup_rate_B(\%) = \frac{bill_rate_B - pay_rate_B}{bil_rate_B} * 100 + MSP_fee$

an MSP, the labor contracting between the worker and the firm is considered to have one additional layer than when the MSP is not involved.

Firm characteristics. Besides the status of outsourcing CWM, I use one additional firm-level variable as a control. The lead firms report their financial spending on the CWM program, which can be used as a measure of their program size. 14.3 percent of the firms spend less than \$5 million and 14.3 percent of the firms spend more than \$250 million on managing nonstandard workforce (others distributed between \$5-25 million (28.6%); \$26-50 million (20.4%); \$51-100 million (14.3%); and \$101-250 million (8.2%) in spending).

Job characteristics. ContingentCo categorizes nonstandard jobs as belonging to 23 “classes of jobs” which reflect industries the jobs belong to: Administrative/Clerical, Business Professional, Change/Implementation, Clinical/Scientific, Compliance, Risk and Audit, Customer Service, Education, Engineering/Design, Finance/Accounting, Food and Beverage, Healthcare, Hospitality, Human Resources, Industrial, Information Technology, Legal, Manufacturing, Marketing/Creative, Operations, Procurement, Retail, Sales, and Other. Some of the largest industries include: Information Technology (20.4%), Industrial (14.1%), and Healthcare (11.7%). ContingentCo also categorizes nonstandard jobs into 342 “job titles,” which I use as an occupation classification. The top 10 occupations in the sample are composed of: Nurse (8.9%), Engineer (6.4%), General Laborer – Light (5.1%), Software Developer (3.1), Administrative Assistant (3.0%), Technical Support Analyst (2.8%), QA Associate (2.6%), Technician (2.5%), Assembler (2.4%), and General Laborer – Heavy (2.44%). In addition, there is a variable that ContingentCo has coded to reflect the level of a job position: Entry (18.9), Intermediate (22.4%), Senior (11.6%) and Expert (4.7%). However, because 42.5 percent of the jobs do not have this information, this variable is used for robustness check. As can be seen, jobs in the sample represent different levels of skills, occupations, and industries.

Exposure to competition. I operationalize the exposure to competition using the different types of candidate sourcing models that vary by suppliers. In the sample, there are three major types of candidate

sourcing models that suppliers adopt the most and are most relevant for the purposes of this paper. First, workers may be in the “competitive bidding” system where all candidates submitted by different suppliers are exposed to open competition and are theoretically given an equal chance, regardless of any pre-existing relationships between the exchange partners. It is the most common model in the industry today that has been facilitated by the adoption of a cloud-based technology platform (80.5% of successfully hired workers). Competitive bidding has actively been promoted to help minimize precisely the kinds of economic value capture as described by the brokerage scholars and to provide a level playing field for all the suppliers in the system. Second, workers may also be sourced as a “pre-identified” worker (13.5% of successfully hired workers). Pre-identified workers are those that have been identified by the lead firm without competition, which is indicative of a pre-existing relationship between the lead firm and the worker. Finally, workers may work with a “master supplier” where a supplier becomes the primary supplier of staffing for a certain type of workers—e.g., light industrial and clerical—before the requisitions are distributed to secondary suppliers in case they fail to find qualifying candidates.¹⁵ I use master supplier status (3.4% of successfully hired workers) to conduct further test of exposure to competition.

Worker Characteristics. For most of the main analyses, I use an assignment status variable to limit the sample to workers who are currently on a job assignment or have completed an assignment (41.5% of the full sample). This is so that my dependent variables (the bill rates and the pay rates) reflect the final negotiated price for a given assignment. Other candidates in my sample are either in the selection or interview stages, or are rejected by the firm or the candidate after a bid has been made (58.6% of the full sample). Most workers in the sample are agency workers (96.7%); that is, nonstandard workers who have staffing agencies as formal employers on record, regardless of the specific terms of their contract. While I do not have demographic data on these individuals to control for their skills, I use the “worker quality” variable as an approximate measurement of their skills or quality. Out of those who are

¹⁵ Based on an anonymous conversation with the ContingentCo employee on June 2017

currently on a job assignment or have completed an assignment, 33.9% of workers have successfully completed an assignment, 3.0% of workers were hired full time, 1.2% of workers did not start the assignment as client needs had changed, and 7.2% of workers were terminated from the assignment or left early (54.7% workers unknown).

RESULTS

Basic descriptive statistics in Table 1 (Panel A) show that the lead firms using internal CWM program are billed on average \$51.44 per hour per nonstandard worker they hire, whereas the lead firms outsourcing its CWM program to an MSP are billed on average \$44.30 per hour per nonstandard worker they hire. There is also a wage gap between nonstandard workers hired through an internal CWM program and those hired through the MSP. The wage penalty for going through an additional layer of contracting is around \$9.11 on average (\$36.74 and \$27.63, respectively) and the difference is significant ($p < 0.001$). Table 1 (Panels B and C) shows that the share of the bill rate the workers receive for their pay varies depending on the type of suppliers workers contract with, as well as the types of jobs they apply for. The raw numbers show that the workers hired into competitively bid jobs received 61.9 percent of the bill as their wages, while the pre-identified workers received 76.6 percent of the bill as their wages. Workers hired into jobs with high skills, such as engineer, quality assurance (QA) associate, and technical support analyst positions, received higher share of the bill (between about 92% to 98%), whereas workers hired into jobs with low skills, such as general laborer and administrative assistant positions, received lower share of the bill (about 71%). Similarly, workers hired for expert-level jobs received the highest share of bill as wages (88.5%) while workers hired for entry-level jobs received the lowest share of bill as wages (72.3%).

Prior to presenting the main results, I begin by testing the core assumption of my argument that when the buyer outsources the contingent workforce management to the MSP, the buyer has bargaining power to drive down bill rates and further, wages. To test this, I need to show that the MSP compresses share of the bill that goes to the workers by finding suppliers that can charge lower bill rates to the buyer

than when the buyer finds suppliers using the in-house management system. Table 2 presents logits models in which the dependent variable is whether the candidate has been hired by the buyer. Model 1 first shows that the hiring probability is greater if the bill rates are lower and if the candidate goes through an MSP, controlling for the type of work arrangements, worker quality, exposure to competition, firm-specific program size, state, job industry, and occupation. Model 3 then examines whether the hiring probability given the bill rates varies with the MSP-tie by adding the interaction term, *outsourced (to MSP) x bill rate (logged)*. This term is negative and statistically significant, which indicates that candidates going through MSPs are more likely to be hired for projects that have lower bill rates and less likely to be hired for projects that have higher bill rates, in comparison to candidates going through an internal system at the lead firm. Even when controlling for the level of jobs (entry, intermediate, senior, or expert), the results hold (Models 2 and 4). The bill rate coefficient turns positive in Model 4, but interaction term is still negative and significant, indicating that the likelihood of hiring is not determined solely by the decreasing bill rate but is influenced by the MSP-tie that increases the likelihood of hiring with decreasing bill rates.

[Table 2 about Here]

Main Analysis

Table 3 provides the results from my main set of analysis. I use ordinary least-squares regressions to estimate the magnitude of which the outsourcing of nonstandard worker management to an MSP influences firm profitability (bill rates) and worker wages (pay rates). All regression models control for the type of work arrangements (agency worker, independent contractor, or sub-vendor), worker quality (successfully completed an assignment, hired full time, assignment incomplete as client needs changed, or terminated), and the lead firm spending on CWM. While there is a lack of worker-specific human capital information typically used to control for their fit for the job, I use a direct measure of their quality attained post-assignment to control for how they actually performed at the job. Controlling for the lead firm spending on CMW is also important, as the use of a third-party agency to manage a program can

simply be attributed to the firm or overall size of nonstandard workforce at the firm. The wage regressions also include fixed effects for the state (54 dummies including District of Columbia, Puerto Rico, Virtual, and Unrecorded), job industry (23 dummies), and occupation (342 dummies), as it might be the case that some states or occupations are more susceptible to multiple layers of labor contracting. For example, there might be more workers in occupations with low-skills contracting with suppliers with an MSP-tie.

Consistent with my main argument, Model 1 in the baseline specification shows that outsourcing of nonstandard worker management to an MSP, that is, an additional contracting layer between the buyer and the seller of labor, is associated with the buyer's ability to receive lower bill rates from the suppliers ($\beta = -0.023$; $p < 0.001$). This means that outsourcing allows the lead firm to lower the bill rate by 2.3%, a reduction of about \$1.06 per hour for an assignment billed on average \$46.3 per hour in constant 2017 dollars. Model 2 controls for the level of jobs to account for some of the skills required for the job with a reduced sample, since not all jobs specify a level or are coded as having one. For example, a job posting for an "administrative assistant" or a "computer programmer" position does not typically specify whether the job is for an entry- or an expert- level. The results stay consistent with about a 4.2% reduction in the bill rate, which means that the lead firm benefits financially from outsourcing its management to an MSP. Models 5 and 6 are used to test that outsourcing of nonstandard worker management to an MSP may be associated with lower wages for the seller, as buyers gain bargaining power to set prices over suppliers. The negative and significant coefficients ($\beta = -0.081$ and -0.045 , subsequently; $p < 0.001$) show that an additional contracting layer between the buyer and the seller of labor decreases worker pay by 8.4% (Model 5), and by 4.6% (Model 6) when controlling for the level of jobs. Specifically, it refers to a reduction of about \$2.51 per hour (and \$1.38 per hour from Model 6) for an assignment paid on average \$29.9 per hour.

[Table 3 about Here]

Table 3 also provides a test of shifting power dynamics between stakeholders by looking at when the suppliers' negotiating power is absent, that is, when workers are pre-identified by the lead firm (to resemble a direct relationship). The coefficients for pre-identified workers in Model 5 show that compared to workers who are sourced through suppliers in the competitive bidding system, the pre-identified workers are likely to see their wages go up ($\beta=0.237$; $p<0.001$). In the reduced sample, controlling for the level of jobs (Model 6), workers that have pre-existing relationships with the lead firm (buyer) in the form of having been pre-identified is likely to see their wages go up about 8% compared to those that enter competitive bidding. In Models 7-8, I add the interaction term, *CWM outsourced x pre-identified worker*, to first find that the baseline coefficients for both outsourcing and pre-identified worker conditions remain similar to those in Models 5-6 (5.2% wage reduction in the outsourcing condition and 5.6% wage gain in the pre-identified worker condition, when controlling for job-level in Model 8). The positive interaction term in Model 8 shows that the reduction of worker wages associated with additional labor contracting layer ($\beta=-0.051$; $p<0.001$) *decreases* by 70.6% for pre-identified workers compared to those sourced through competitive bidding.

The lead firms, on the other hand, are likely to see their bill rates go up when hiring workers that are pre-identified as compared to those that are competitively bid ($\beta=0.119$; $p<0.001$; Model 1). While the significance goes away when controlling for job-level dummies, Models 3-4 continue to find support for declining buyer profits per pre-identified worker hired. However, the negative and significant interaction term in Model 4 ($\beta=-0.021$; $p<0.001$) shows that controlling for job-level dummies, an increase in bill rates associated with hiring pre-identified workers disappears when CWM is outsourced as compared to when in-house (declines by 105.2%). The interaction term also means that a reduction in bill rates associated with additional labor contracting layer ($\beta=-0.038$; $p<0.001$) is further amplified when hiring workers that are pre-identified as compared to those that are competitively bid (a further reduction by 55.3%). I therefore find that a pre-existing buyer-seller relationship, in the form of buyer identifying a known seller of labor, benefits the workers by moderating the negative effect of outsourcing CWM. Such

relationship is found to benefit the lead firms, however, only when they outsource CWM for an MSP to manage the selection of payroll suppliers.

Supplier Selection

Unlike workers, suppliers have transparent information about how they relate to different actors in the system; hence, the relationship between suppliers and buyers are less sticky. Suppliers that work with an MSP (Firm B in Figure 1b) as opposed to the lead firm directly (Firm A in Figure 1b) may then select into such an arrangement due to some unobservable supplier characteristics that drive down the prices for workers rather than the power-reducing distancing. For example, the MSP-tied suppliers may simply be low-road employers that pursue savings on labor costs (for a review of literature on high- and low-road employment practices, see Osterman 2018); or, they may be smaller and newer staffing agencies that lag behind in resources or information transfer, thereby affecting the rate and volume at which workers are matched to firms. I therefore must show that for the *same supplier* that submits candidates to both the MSP and the lead firm directly, its ability to set bill rates for the buyer and pay rates for the seller should vary depending on their adding of an additional contracting layer with an MSP.

Table 4 presents results from bill rate and pay rate regressions that replicate results from Table 3, but this time with supplier fixed effects, in order to control for unobservable supplier characteristics that may influence its ability to charge prices. Models 1-2 in Table 4 replicate results from Models 2 and 4 in Table 3 and Models 3-4 in Table 4 replicate results from Models 6 and 8 in Table 3. As can be seen, the results stay consistent throughout with supplier fixed effects. Outsourcing of recruitment of nonstandard labor is associated with 6.1% reduction in the bill rate and 7.5% reduction in the pay rate when controlling for both suppliers and job-level in Models 1 and 3. Specifically, it means that for an average bill rate of \$46.3 per hour (in constant 2017 dollars), a lead firm pays the supplier \$2.82 less per worker hired when sourced through an MSP as opposed to an internal system. For an average pay rate of \$29.9 per hour (in constant 2017 dollars), a worker gets paid \$2.23 less when sourced through a supplier tied to an MSP. In addition, pre-identified workers are more likely than competitively bid workers to make

higher wages per hour (3.8%), and their working with multiple intermediaries have less negative effect than competitively bid workers (the interaction term in Model 4 refers a reduction in the negative CWM outsourcing coefficient by 69.6%). The lead firms hiring pre-identified workers are more likely to see their bill rates go up even when controlling for suppliers, but such a rise is moderated by the CWM outsourcing (the interaction term in Model 2 refers to a reduction in the positive pre-identified coefficient by almost 50%).

[Table 4 about Here]

As an additional analysis, I look at the “master supplier sourced” condition where workers have little bargaining power in the supply chain: in such a case, the supplier acts as a primary supplier of labor for a particular type of worker that are often lower skilled (e.g. light industrial and clerical). This arrangement naturally creates a buyer-supplier relationship that suppresses, similar to outsourcing worker wages while benefiting the buyer. In Tables 3 and 4, I find that workers sourced through master suppliers are billed at a reduced rate of about 1.5% (Model 1 of Table 4) and make about 2.4% less (Model 3 of Table 4) compared to when they are competitively bid, controlling for both job-level and supplier dummies. When an MSP is involved in selecting a master supplier for the lead firm, the interaction term *CWM outsourced x master supplier sourced worker* in Tables 3 (Model 4) shows that a reduction in bill rates associated with the buyer-supplier tie almost disappears. I find similar results using supplier fixed effects in Table 4 (Model 2), yet with small significance ($\beta=0.130$; $p<0.1$). For workers, the negative interaction term in Table 3 (Model 8) shows that the reduction in wages with additional contracting layer is found to further intensify when workers are sourced through a master supplier than when they are competitively bid. However, significance of interaction term disappears when using supplier fixed effects in Table 4 (Model 4). It can be seen that type of direct buyer-supplier relationship, even in the multi-layered arrangement, allow for suppliers to gain some discretion back in setting prices, as seen in the triadic arrangements.

Heterogeneity in Skills Demanded

In previous sections, I have used job-level dummies to account for variations in skills required for the job. Unlike the occupation classification used in the U.S. Census Bureau, real jobs differ in their required tasks at work depending on the level of the job. However, not all jobs have such a clearly defined description of a skill level at which tasks need to be performed; and, even within the same level of the job, the actual content of the job may require different types of skills. For example, an entry-level accountant position at one firm may require more cognitive skills such as mathematical and analytical skills, while the same position at a different firm may require social skills such as an ability to communicate with clients. It may be the case that the effect of additional contracting layer found in previous sections on prices is driven by heterogeneity in skills demanded when the lead firm hires workers through an MSP as opposed to internally. Some lead firms may work with an MSP to fill temporary vacancies that require low skills for peripheral tasks; and others may create an internalized system to fill vacancies that require high and complex skills necessitating a direct assessment of candidates.

I develop a measure of skill requirements for nonstandard work, by coding specific skills demanded for each of about 200,000 job descriptions. Despite that numerous research have used job descriptions to extract job-specific information such as the skills (Deming and Kahn 2018) or words that are discriminatory (Kuhn and Shen 2013) or stereotypical (Castilla and Rho 2019; Gorman 2005), and that job descriptions are often accessible on-line, reliable job descriptions for nonstandard work are rare. This is because job advertisements online for nonstandard work are usually vague exemplary descriptions of jobs for which recruiters claim to help find job seekers eventually; hence, these job ads typically exclude job- or firm- specific information. On the other hand, job descriptions for alternative work arrangements from ContingentCo are *real-world* job descriptions that lead firms post on their cloud-based platform for suppliers to view and submit applicants. These descriptions can therefore serve as a reliable source of skills demanded at the lead firm when coded.

Using coded data on skill requirements demanded by the lead firms, I first test to see whether my main proposition on the effect of additional contracting layer on bill rates and pay rates still holds controlling for required skills. Then, I examine whether skills have any predictive power on setting bill rates and pay rates, independent of additional contracting layer through the use of an MSP. In fact, growing evidence points to the predictive power of detailed measurement of skills on wages in both economics and sociology literature. Deming and Kahn (2018) look at firms' differential demands for both cognitive and social skills for standard workers as an explanation for wage inequality—they find that firm variability in skill demand accounts for substantial variation in pay across firms, controlling for worker quality and occupations. Looking at long-term trend, Liu and Grusky (2013) study rising returns to even more detailed measurement of skills and find that rising wage payoffs to analytic skills were the most substantial. I follow a set of studies that use a detailed measurement of skills to come up with ten detailed skill categories nested in four broader skill categories: cognitive (analytical, quantitative, reading and writing), social (interpersonal, managerial, service), manual (physical, routine), and technical skills (see e.g., Deming and Kahn 2018; Handel 2016; Liu and Grusky 2013; Weaver and Osterman 2017 for related schemes).¹⁶

I also code a set of *complex (or “hybrid”) skills* to better understand the increasing complementarity between different categories of skills. While earlier studies on skills have focused on

¹⁶ Appendix Table 1 shows specific skill categories that I coded using a content analysis software, Linguistic Inquiry and Word Count (LIWC; see, e.g., Pennebaker, Booth, and Francis 2007) after having identified words that belong to each of the ten skill categories. These words draw on descriptions and task requirements of each skill in the Occupational Information Network (O*NET) (U.S. Department of Labor) data that are conventionally used in studies of skills and tasks (e.g. Autor, Levy and Murnane 2003; Acemoglu and Autor 2011; Liu and Grusky 2013). I use a bag-of-words approach to code a job description as having a particular skill requirement if it has at least one of the words listed for each skill, a binary value assignment following Deming and Kahn (2018). Similar to the Burning Glass Data for standard worker job vacancies that they use, ContingentCo also has unique keywords and phrases they have developed for each job—I also use their keywords for robustness check and for some of the skills where they had better coded information (technical skills and minimum level of education). As can be seen in Appendix Table 2, cognitive, social, and manual skills were required by 64%, 79.2%, and 18.8% of jobs, subsequently. Interpersonal skills were required the most in these jobs when looking at a fine-grained skills measurement, followed by service and analytical skills. A hybrid of cognitive and social skills were required by 56.1% of jobs, while much smaller share of jobs required technical and social skills (3.5%) or manual and social skills (14.1%).

cognitive skills that were found to have generated increasing returns with growing complexity of jobs (Autor, Katz, and Kearney 2008; Autor, Levy, and Murnane 2003), recent work suggests that there is rising complementarity between cognitive and social skills (Borghans, Ter Weel, and Weinberg 2014; Deming 2017; Deming and Kahn 2018; Weinberger 2014). The social skill premium is considered to have risen partly due to the growing demand for difficult-to-computerize skills in the midst of technological change (Autor 2014; Borghans et al. 2014) and also due to organizational changes such as the rise in team-based and multitasking-demanded work design (Bloom and Van Reenen 2007; Caroli and Van Reenen 2001; Ichniowski and Shaw 2003). For nonstandard jobs, numerous studies have illuminated the importance of social skills and social capital when navigating the labor market, in particular for high-skilled contractors. They have to develop relationships with hiring managers in staffing agencies for better information and negotiation (Barley and Kunda 2006), while managing reputation for a constant flow of jobs (Evans et al. 2004).¹⁷ I therefore examine returns from both cognitive and social skill demands for nonstandard workers, as well as a mix of social skills with cognitive, technical, and manual skills. Importantly, I examine how much the firm is willing to spend on hiring workers with these skills, which is different from the actual share of the pay that workers receive in the labor market for nonstandard work.

Table 5 presents results from several bill rate and pay rate regression estimates controlling for four broad skill categories (cognitive, social, manual, and technical), as well as creativity, language skills, personal traits, and minimum level of education required, not presented in the table for space limitations. Across all estimates, I include full set of controls used in Table 3, except for the job-level dummies. I find that even when controlling for broad skill requirements (Models 1 and 4), outsourcing of nonstandard worker management to an MSP continues to be associated with lower bill rates for the lead firms (2.6%) as well as lower pay rates for the workers (8%). The magnitude of the effect increases significantly when

¹⁷ Barley and Kunda (2006), studying a group of contractors with technical skills, have observed, “even the most valued expertise was useless, unless the contractor could repeatedly rise above the clamor of the market, often on short notice, to attract the attention of hiring managers [with social skills]” (Barley and Kunda 2006: 50).

I run the same analyses using supplier fixed effects in Models 2 and 5 (12.5% decline in bill rates; 18.3% decline in pay rates). The coefficients indicating a buyer-seller relationship --hiring of workers pre-identified-- also continues to be positive and significant for both the bill and the pay rates; and the coefficients indicating a buyer-supplier relationship --hiring of workers using a master supplier-- continues to be negative and significant for both the bill and the pay rates.

[Table 5 about Here]

Independent of the outsourcing condition, the coefficients for skill requirement controls show results that are consistent with studies that find higher wage premium for high skills required for standard employment. Models 1-2 show that jobs with cognitive, social *or* technical skill requirements are associated with higher bill rates, which indicates that firms are willing to spend more money to hire workers for nonstandard jobs requiring high skills. Models 4-5 show that jobs with equivalent skill requirements are associated with higher pay rates (social skill coefficient is only significant with supplier fixed effects). On the other hand, job requirement for manual skill, which is typically considered a lower skill, are associated with a decline in the bill rate by 6.1% and in the pay rate by 3% (Models 1 and 4). I then evaluate returns to complex skills and find complementarity between cognitive and social skills even for nonstandard jobs. The pay rate coefficients for complex skill requirements, that is, cognitive *and* social skill, technical *and* social skill, or manual *and* social skill requirements in Models 6 are all positive and significant, controlling for supplier fixed effects ($\beta=0.089$ and $\beta=0.074$, subsequently; $p<0.001$). For bill rates, the amount the firm is willing to pay to hire nonstandard workers with complex skills, the coefficient is positive and significant only for cognitive *and* social skills ($\beta=0.089$; $p<0.001$). However, the coefficient for technical *and* social skill requirement is not significant; and, the manual *and* social

requirement is associated with negative bill rates, though the magnitude of the effect is small ($\beta=-0.008$; $p<0.05$).¹⁸

CONCLUSION AND DISCUSSION

The last several decades have seen a rise in the outsourcing of nonstandard workforce management to a third-party organization, the MSP, who further contracts out hiring of workers to staffing agencies or contractors. In this paper, I make the first scholarly attempt to examine the link between such multi-layered contracting arrangements governing employment for nonstandard jobs and subsequent economic outcomes for both the hiring lead firms and the workers. Using organizational theories of price setting, I argue that the lead firm decisions to outsource the recruitment of nonstandard work supplier power due to its relationship-limiting characteristics, to eventually incentivize suppliers to transfer the competitive burden to workers. I find that an additional contracting layer between the lead firm and the worker is associated with higher returns to the buyer, a reduction of bill rate of about 2 to 6 percent, depending on model specification. Outsourcing to the MSP is also associated with lower returns to the workers, a reduction of pay rate of about 4 to 8 percent, depending on model specification.

To strengthen my argument about how relationships may change in such a way to influence the distribution of bargaining power among stakeholders, I further analyze a pre-existing buyer-seller relationship where workers gain more power over both the suppliers and the lead firms. I find that the “pre-identified” workers were associated with higher wages than those who were competitively bid, and their loss from an additional contracting layer was less. For the lead firms, while their hiring of pre-identified workers were associated with lower returns per transaction than when they hire competitively bid workers, the higher returns from an additional contracting layer were amplified when they hired pre-identified workers instead of competitively bid workers.

¹⁸ In a separate analysis, I run regression models predicting markup rates, the profit retained by suppliers. I find positive and significant markup rates associated with matching workers for jobs with all three types of complex skills.

One important puzzle from these results is that it is unclear as to why suppliers connected to the lead firms through the firm's internal VMS technology pay workers above the reservation wage, where, in the world of competitive bidding, they are equally likely to pay low wages to workers as the suppliers that contract with the MSPs. One explanation may be due to the lack of transparency. While suppliers in the competitive bidding system are bidding based on the bill rates offered by comparable suppliers, they lack information about how other suppliers pay their workers. In the ContingetCo data, only about half the candidates (49.5%) had pay rates recorded by the suppliers in the system. Considering that some of the information are hand coded by suppliers post hoc, it is most likely the case that less than half the suppliers revealed the actual pay rate in the system to the lead firms and other suppliers. Without knowing how much others pay their workers, suppliers hoping to attract qualified candidates will continue to pay their workers above the reservation wage (or as much as they can). While suppliers are most likely to find out about the competitiveness of their pricing as they continue to interact with their candidates through different assignments, because the candidates themselves also lack transparency about the channels through which they get assigned to jobs (as elaborated above), suppliers will often have a distorted picture of how much nonstandard workers typically get paid. One logical step in my future research is to build on this explanation and test against other potential explanations using more qualitative data.

In addition, I conduct several robustness checks to tease out alternative explanations. During the wage-setting process, there may be some unobservable supplier characteristics that influence their decisions to set wages. It could also be the case that firms using different hiring arrangements for nonstandard workers may systematically demand different types of skills. I control for both alternatives, first by using supplier fixed effects, and second by coding and controlling for a detailed measurement of skill demands. Even with these specifications, I still find consistent and significant results.

In running models using the skill requirements for nonstandard workers, I also show that, consistent with the literature on skills, the requirements for higher skills such as cognitive, social or technical skills were associated with a higher wage premium, while the requirements for lower skills such

as manual skills were associated with a lower wage premium. Further, complex skill requirements (cognitive and social, technical and social, or manual and social skill requirements) also produced greater returns to workers. Due to the rare availability of data on skill requirements for nonstandard jobs, there has been no attempt to date to make a detailed assessment of how skill requirements for nonstandard jobs may contribute to wages. While numerous studies have examined how labor market outcomes for nonstandard workers tend to be polarized by the skill level (Houseman et al. 2003), such work has been limited to single- firm or occupational analysis and they do not measure the firm demand in skills.

Future research should extend this work on skill requirements for nonstandard workers to see whether they differ from requirements in standard work, in order to gain a better understanding of how firm employment strategies may vary depending on the types of skills they demand. For example, the MSP is often promoted for its ability to address the “skills gap”, an idea that employers have difficulties finding workers with the right set of skills (Carnevale, Smith, and Strohl 2013; Manyika et al. 2011). Firms may decide to use nonstandard workers for skills that are more “expensive” to fill using a permanent labor force, and further, use an MSP to facilitate the process.

Findings from this paper make contributions to the literatures of organizational theory and social structural inequality using the theoretical constructs of power and price-setting. I address how inter-organizational processes, through multiple layers of contracting arrangements in recruiting nonstandard workers, shift distribution of power among stakeholders to influence both firm profits and worker wages per assignment. While I am unable to identify whether the same individual working with varying numbers of intermediaries produce different outcomes (the key limitation of this paper), I speak to how workers hired to similar jobs with the same skill requirements may end up with unequal labor market outcomes depending on the layers of employment contracts. Importantly, I make an advancement in our understanding of how nonstandard workers are hired in today’s labor market by opening the “black box” of institutional processes which are much more complicated than previously examined.

There are important implications for both human resource management and public policies from this work. The findings highlight that the recruitment for nonstandard workers increasingly resembles hierarchical production supply chains with the use of multiple layers of contracting and competitive bidding practices. While this may lead to lowering of bill rates per transaction, the resulting economic consequences for workers should not be undermined. Recently, in fact, industry professionals have actively been discussing whether managing of nonstandard work in-house might be a better way to move forward, especially with the new technological availability to self-manage a large number of workers at once.¹⁹ Whether there are overall savings to firm profits from adopting different strategies is beyond the scope of this paper but should be an important area of future research. It is also important to note that many large firms have moved to centralizing nonstandard worker management and contracting out this function for the benefit of managing regulatory risks. The increase in lawsuits and DOL (Department of Labor) investigations related to misclassification and co-employment of nonstandard workers have incentivized firms to keep better track of external workers to minimize regulatory risks. An understanding of this new development, therefore, is crucial in advancing policy agenda for nonstandard workers.

¹⁹ Guest Contributor, “Integrated Workforce Solutions: A New Alternative in the MSP-IMP Debate” *SpendMatters*. June 22, 2017; Marsh, Leslie, “IMP vs Third Party Programs” *Hiretalent*. February 2016.

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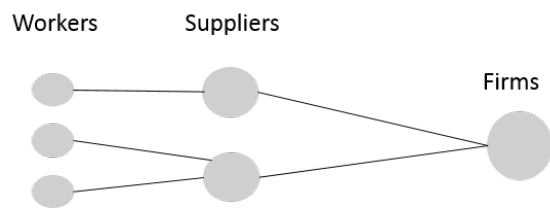
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Figure 1. Changes in nonstandard workforce management

(a) Traditional triadic model



(b) Two types of new employment model

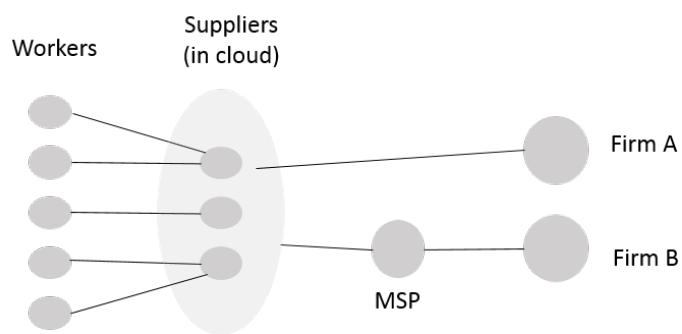


Table 1. Summary of Descriptive Statistics

PANEL A: Firm Characteristics (49 firms)			
	Contingent Workforce Management (CWM) program		
	In-House (n=9)	Outsourced (to MSP) (n=40)	Difference
Bill rate	\$51.44 (0.129)	\$44.30 (0.067)	\$7.13 (0.134)***
Pay rate	\$36.74 (0.119)	\$27.63 (0.072)	\$9.11 (0.142)***
Markup rate (share)	0.282 (0.0005)	0.363 (0.0004)	-0.081 (0.0007)***

PANEL B: Worker Characteristics (955,169 candidates)				
	(%)	Bill rate (\$)	Pay rate	
			(\$)	Share bill rate
Hired (on Assignment or completed)	41.5	46.3	29.9	0.646
Otherwise (interview stage, rejected, etc)	58.6	52.7	36.1	0.685
If Hired==1 (395,879 candidates)				
Exposure to Competition				
Competitive Bidding	80.5	45.9	28.4	0.619
Pre-identified	13.5	57.0	43.7	0.766
Master Supplier	3.4	16.4	11.9	0.730
Other	2.7	41.1	15.8	0.386
Type of Work Arrangements				
Agency Worker	96.7	44.6	29.5	0.661
Independent Contractor	0.7	92.6	89.0	0.962
Sub Vendor	1.1	110.2	81.1	0.736
Employee	1.6	66.4	n.a.	n.a.
Worker Quality				
Completed successfully	33.9	53.1	25.3	0.477
Hired full time	3.0	42.1	27.6	0.656
Canceled (client)	1.2	58.1	29.9	0.515
Terminated or left early (candidate)	7.2	39.4	25.3	0.641
Other	54.8	43.0	32.1	0.747
	Mean	SD	Min	Max
Bill rate (\$)	46.3	37.9	8.0	804.3
Pay rate (\$)	29.9	27.1	5.7	685.1
Markup rate (share)	0.34	0.13	0.0	2.1

Notes. All in constant 2017 dollars calculated using CPI-U-RS and the year the lead firm released assignment request to suppliers. Standard errors in parenthesis. ***Statistically significant at the 0.001 level (two-tailed tests).

PANEL C: Job Characteristics (207,170 jobs)				
	(%)	Bill rate (\$)	Pay rate	
			(\$)	Share bill rate
If Hired==1 (158,652 jobs)	76.6			
<i>Job Level</i>				
Entry	18.9	23.5	17.0	0.723
Intermediate	22.4	48.0	35.2	0.735
Senior	11.6	70.3	53.2	0.756
Expert	4.7	100.9	89.2	0.885
n.a.	42.5	47.2	26.3	0.557
<i>State (Top 5)</i>				
California	21.0	61.3	36.6	0.596
Minnesota	18.4	52.5	27.5	0.523
Washington	7.1	61.9	48.4	0.782
Texas	5.0	31.6	24.7	0.782
New Jersey	5.0	55.3	47.7	0.863
<i>Job Industry (Top 5)</i>				
Information Technology	20.4	68.7	58.6	0.853
Industrial	14.1	20.5	15.6	0.761
Healthcare	11.7	73.6	49.1	0.667
Engineering/Design	10.5	58.2	54.8	0.942
Manufacturing	7.4	26.7	17.8	0.669
<i>Occupation (Top 10)</i>				
Nurse	8.9	78.1	38.5	0.493
Engineer	6.4	52.7	51.4	0.976
General Laborer - Light	5.1	21.3	17.2	0.810
Software Developer	3.1	80.9	70.4	0.870
Administrative Assistant	3.0	29.5	21.1	0.715
Technical Support Analyst	2.8	31.2	28.6	0.919
QA Associate	2.6	31.9	29.6	0.928
Technician	2.5	38.2	22.2	0.581
Assembler	2.4	21.9	17.4	0.796
General Laborer - Heavy	2.3	15.0	10.7	0.714
	Mean	SD	Min	Max
Unique candidates per job	4.6	11.9	1	1,135
Unique suppliers per job	2.0	2.7	1	38
(Suppliers in total: 2,222)				

Notes. All in constant 2017 dollars calculated using CPI-U-RS and the year the lead firm released assignment request to suppliers

Table 2. Logit Regression Models Predicting Whether the Candidate is Hired by the Lead Firm

	Bill Rate interacted with Outsourcing			
	Model 1	Model 2	Model 3	Model 4
Ln(Bill Rate)	-0.439*** (59.572)	-0.049*** (4.483)	-0.139*** (13.327)	0.450*** (29.880)
Outsourced (to MSP)	-0.963*** (96.330)	-0.537*** (45.169)	0.690*** (16.432)	2.074*** (37.006)
Outsourced x Ln(Bill Rate)			-0.442*** (40.476)	-0.689*** (47.727)
Job-level dummies		Yes		Yes
Constant	2.826*** (11.039)	1.152*** (4.321)	1.812*** (6.928)	-0.503+ (1.813)
N candidates	951,001	644,803	951,001	644,803

Notes. All regressions include dummies for type of work arrangements, worker quality (reason for closing of an assignment), exposure to competition, firm-specific program size (spending on CWM), state, job industry, and occupation. Standard errors are in parenthesis.

+p<0.10, *** p<0.001 (two-tailed).

Table 3. Bill Rate and Pay Rate Regressions for Nonstandard Workers Hired

	Ln (Bill Rate)				Ln (Pay Rate)			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
<i>CWM</i> : Outsourced (In-house as reference)	-0.023*** (0.003)	-0.041*** (0.002)	-0.024*** (0.003)	-0.038*** (0.003)	-0.081*** (0.003)	-0.045*** (0.003)	-0.136*** (0.004)	-0.051*** (0.004)
<i>Worker</i> : Pre-identified (Competitively bid as reference)	0.119*** (0.002)	0.003 (0.002)	0.091*** (0.004)	0.019*** (0.004)	0.237*** (0.003)	0.077*** (0.003)	0.069*** (0.005)	0.055*** (0.004)
<i>Worker</i> : Master Supplier Sourced (Competitively bid as reference)	-0.118*** (0.004)	-0.036*** (0.005)	-0.183*** (0.013)	-0.128*** (0.012)	-0.104*** (0.004)	-0.028*** (0.006)	-0.086*** (0.021)	0.145*** (0.019)
Outsourced x Pre-identified			0.039*** (0.005)	-0.021*** (0.004)			0.238*** (0.005)	0.036*** (0.005)
Outsourced x Master Supplier Sourced			0.071*** (0.014)	0.111*** (0.013)			-0.014 (0.022)	-0.190*** (0.020)
Job-level (Entry as reference)								
Intermediate		0.194*** (0.002)		0.193*** (0.002)		0.219*** (0.003)		0.221*** (0.003)
Senior		0.399*** (0.002)		0.398*** (0.002)		0.431*** (0.003)		0.433*** (0.003)
Expert		0.635*** (0.003)		0.633*** (0.003)		0.765*** (0.005)		0.769*** (0.005)
Constant	3.094*** (0.056)	3.137*** (0.045)	3.111*** (0.056)	3.167*** (0.045)	2.666*** (0.072)	2.668*** (0.062)	2.723*** (0.071)	2.647*** (0.062)
<i>N</i> Hired Workers	395,803	238,852	395,803	238,852	191,340	118,444	191,340	118,444
Adjusted R-squared	0.715	0.822	0.715	0.822	0.751	0.833	0.753	0.833

Notes. All regressions include dummies for type of work arrangements, worker quality (reason for closing of an assignment), firm-specific program size (spending on CWM), state, job industry, and occupation. Standard errors are in parenthesis.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed)

Table 4. Bill Rate and Pay Rate Regressions for Nonstandard Workers Hired, with Supplier Fixed Effects

	Ln (Bill Rate)		Ln (Pay Rate)	
	Model 1	Model 2	Model 3	Model 4
<i>CWM</i> : Outsourced (In-house as reference)	-0.059*** (0.004)	-0.056*** (0.004)	-0.072*** (0.006)	-0.079*** (0.006)
<i>Worker</i> : Pre-identified (Competitively bid as reference)	0.036*** (0.002)	0.055*** (0.005)	0.070*** (0.003)	0.037*** (0.005)
<i>Worker</i> : Master Supplier Sourced (Competitively bid as reference)	-0.015* (0.006)	-0.144* (0.071)	-0.024*** (0.006)	-0.062 (0.072)
Outsourced x Pre-identified		-0.027*** (0.005)		0.055*** (0.006)
Outsourced x Master Supplier Sourced		0.130+ (0.071)		0.040 (0.072)
Supplier FE	Yes	Yes	Yes	Yes
Job-level Control	Yes	Yes	Yes	Yes
Constant	3.298*** (0.273)	3.295*** (0.273)	2.361*** (0.275)	2.367*** (0.275)
<i>N</i> Hired Workers	238,852	238,852	118,444	118,444
Adjusted R-squared	0.858	0.858	0.865	0.865

Notes. All regressions include dummies for type of work arrangements, worker quality (reason for closing of an assignment), firm-specific program size (spending on CWM), state, job industry, occupation, job-level, and supplier. Standard errors are in parenthesis.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10 (two-tailed)

Table 5. Bill Rate and Pay Rate Regressions for Nonstandard Workers Hired, with Supplier Fixed Effects and Skill Requirements

	Ln (Bill Rate)			Ln (Pay Rate)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>CWM</i> : Outsourced (In-house as reference)	-0.026*** (0.003)	-0.116*** (0.004)	-0.118*** (0.004)	-0.077*** (0.003)	-0.170*** (0.005)	-0.168*** (0.005)
<i>Worker</i> : Pre-identified (Competitively bid as reference)	0.125*** (0.002)	0.055*** (0.003)	0.054*** (0.002)	0.240*** (0.003)	0.094*** (0.003)	0.093*** (0.003)
<i>Worker</i> : Master Supplier Sourced (Competitively bid as reference)	-0.110*** (0.004)	-0.055*** (0.004)	-0.054*** (0.004)	-0.106*** (0.004)	-0.062*** (0.004)	-0.062*** (0.004)
Skill Requirements						
Cognitive	0.082*** (0.002)	0.052*** (0.002)	-0.007** (0.003)	0.060*** (0.002)	0.058*** (0.002)	0.014*** (0.003)
Social	0.018*** (0.002)	0.022*** (0.002)	-0.012*** (0.002)	0.004 (0.002)	0.012*** (0.002)	-0.021*** (0.003)
Manual	-0.059*** (0.002)	-0.058*** (0.002)	-0.052*** (0.003)	-0.030*** (0.003)	-0.048*** (0.003)	-0.054*** (0.004)
Technical	0.020*** (0.003)	0.016*** (0.003)	0.025*** (0.007)	0.039*** (0.005)	0.028*** (0.004)	0.010 (0.008)
<i>(Complex skills)</i>						
Cognitive and Social			0.089*** (0.003)			0.074*** (0.004)
Technical and Social			-0.011 (0.008)			0.026** (0.010)
Manual and Social			-0.008* (0.004)			0.012** (0.005)
Supplier FE	No	Yes	Yes	No	Yes	Yes
Constant	3.077*** (0.055)	3.623*** (0.320)	3.635*** (0.319)	2.689*** (0.071)	2.787*** (0.130)	2.792*** (0.130)
<i>N</i> Hired Workers	395,803	395,803	395,803	191,340	191,340	191,340
Adjusted R-squared	0.723	0.804	0.805	0.757	0.817	0.818

Notes. All regressions include dummies for type of work arrangements, worker quality (reason for closing of an assignment), firm-specific program size (spending on CWM), state, job industry, and occupation. Standard errors are in parenthesis.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed)

Appendix Table 1. Skill Categorization of Job Descriptions

Skill and task requirements		Coded words
Cognitive skills		
	Analytical	cognitive (cognitive skill*); analytical (analytic*); critical thinking (critical thinking, think* critical*, deductive, inductive, reasoning); problem solving (problem solving, problem-solving, solution*, cost-effective, cost effective, propos* option*, prepar* proposal*, complex problem*, identif* problem*); decision making (decision making, decision-making); research (research, analys*, analyz*, interpret*, organiz* information, gather* information, information gathering)
	Quantitative	basic (math* ability to add, subtract*, multiply, multiplication, arithmetic); advanced (advanced math* stati*, algebra*, geometry, trigonometry, calculus, quantitative, modeling, data model)
	Reading and Writing	basic (basic read*, basic writ*); other (reading, to read, writ*)
Soft skills		
	Social/interpersonal	social (social skill*); interpersonal (interpersonal); communication (communicat*, oratory, oral, oral skill*, speak* contact* interact* facilitat*, conversat*); ability to work in teams (team* collaborat* build trust, conflict, group, help other, ability to relate, relationship, diplomatic); negotiation (negotiat*); presentation skill*, to present (presentation)
	Managerial	lead*, motivate, project management, manage project*
	Service	care work (customer*, patient*, care for, caring); other service work (sales, complaint*, client*)
Manual skills		
	Physical	manual labor, lift*, move, unload*, climb*, bend*, kneel*, long period, long hour*
	Routine	routine*
Technical skills		
		(ContingentCo keywords)
	Basic and advanced computer	e.g. word, excel, python, stata, java, and many more
Other skills		
	Creative	original, originality, ingenuity, inventive, creativ*, innovat*, initiate, initiation, self-start*, self start*
	Personal Traits	conscientiousness (conscientious*, organized, organiz* skill*, organizational and, competen*, ambitio*, attitude*, inspir*, work ethic, professionalism, attentive, persiste*, self-motivated, self motivated, self driven, self-driven, motivated, hardworking, hard-working, hard working, dependable, proactive*, pro-active*, detail*, accura*, meticulous*, diligent*, thorough*); extraversion (outgoing, sociable, friendly, enthusiastic, energetic, assertiv*, self-confiden*, self confiden*, confident, confidence, adventurous); agreeableness (trustworthy, trusted); multi-task (multi task*, multitask*, multi-task*); time-management (time management, on time, on-time, meet deadline, meeting deadline, priorit*, set goal)
	Language	language bilingual arabic cantonese chinese creole dutch english french german gujarati hindi italian japanese korean latin mandarin polish portuguese russian spanish vietnamese (ContingentCo keywords)
	Education, minimum level required	high school, associate, bachelors, masters, doctor
Organization- and job-specific aspects of work		
	Autonomy	no oversight, minimal oversight, little oversight, no supervision, minimal supervision, little supervision, no guidance, minimal guidance, little guidance, independen*, take charge, ownership, self-discipline*, self discipline*
	Unionization	collective bargaining agreement*, union contract* union agreement*
	Irregular shift	flexible hour*, flexible shift*, irregular hour*, irregular shift*

Appendix Table 2. Share of Job Advertisements for Nontraditional Jobs with Each Skill Requirement

	Mean	SD
<i>Share of Job Ads with Following Skill Requirements</i>	(n=168,014; Min=0; Max=1)	
Cognitive	0.640	0.480
Analytical	0.396	0.489
Quantitative	0.096	0.294
Reading and Writing	0.385	0.487
Social	0.792	0.406
Interpersonal	0.612	0.487
Managerial	0.229	0.420
Service	0.422	0.494
Manual	0.188	0.391
Physical	0.142	0.349
Routine	0.057	0.233
Technical	0.043	0.203
Hybrid		
Cognitive and Social	0.561	0.496
Technical and Social	0.035	0.184
Manual and Social	0.141	0.348
Other Skills		
Creative	0.085	0.279
Language	0.166	0.372
Personal Traits	0.415	0.493
	(n=35,307; Min=0; Max=30)	
Work Experience (avg. year)	4.8	3.1
Education (min. required)	(%)	
High School	23.0	
Associate	2.7	
Bachelors	10.9	
Masters	0.9	
Doctor	0.2	
Not specified	62.3	