

# Connections, Referrals, and Hiring Outcomes: Evidence from an Egyptian Establishment Survey\*

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## Abstract

Network-based hiring is a common form of recruitment in businesses across the world. We administered a unique survey of Egyptian retail establishments to study the use of these hiring methods. We document important differences in establishments' use of ties to the owner ("connections") and to employees ("referrals") and their relationships with hiring outcomes. While all types of establishments use referrals at similar rates, use of owner connections varies widely and is most common among small informal establishments. We develop a model of hiring which predicts that connections and referrals should have heterogeneous effects on hiring outcomes depending on establishment type. Our empirical results are consistent with the model's predictions. When high-productivity establishments use connections, the practice is associated with lower-quality hires (nepotism), yet when low-productivity establishments use connections, they find more productive workers. By contrast, referrals benefit high-productivity establishments more due to network homophily. These findings indicate that policies designed to either limit or expand network-based hiring could benefit one type of organization while having negative effects on others.

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# 1 Introduction

Network-based hiring is widespread in developing countries. But due to a lack of data, knowledge about specific hiring processes, their prevalence, and the outcomes associated with them remains limited. The literature has documented that firms can use employee referrals to find more productive workers (Burks et al., 2015; Pallais and Sands, 2016), find better matches (Brown et al., 2016; Dustmann et al., 2016), and give their existing workers the right incentives (Heath, 2018). But referrals can also disadvantage those with less social capital (Beaman et al., 2018; Chandrasekhar et al., 2020; Furstenberg and Kaplan, 2004).

Owner connections - hiring workers who have some tie to the firm owner - are far less studied. Typically this type of hiring is assumed to be a form of inefficient nepotism (Bertrand and Schoar, 2006). However, many of the theoretical reasons that employee referrals can help a firm apply to owner connections as well. Firm owners may know good workers and be able to convince them to work for the firm, increasing the firm's profits and reducing frictions in the labor market. Hiring practices that appear inefficient at first glance can actually have important advantages in some contexts (Assaad, 1993).

Using a unique survey of establishments in the Egyptian retail sector, we study the use of owner connections and employee referrals in hiring. We look at the hiring methods used by establishments, their relationship with formal and informal labor arrangements and firm structure, and the outcomes associated with use of these methods. In addition to showing novel descriptive evidence on these questions, we develop a model which clarifies the differences between connections and referrals and how each can be used by different types of firms. Our regression results are strongly consistent with the model's predictions.

We first document a number of new facts from our survey. Owner connections and employee referrals are very different phenomena: while referrals are used at similar rates (about 15% of hires) by all different types of establishments, use of owner connections varies widely. Establishments that use formal labor make only 7% of their hires using owner connections, while informal establishments and those that are independent

(single-site) make about 40% of their hires this way.<sup>1</sup>

Armed with these facts, we construct a model of owner connections and employee referrals. The model explains how the two methods are different and predicts that use of connections and referrals will have heterogeneous effects on outcomes by establishment type. In the model, establishments differ in their available applicant pools and their objective functions. Existing research shows that referred workers often exhibit higher productivity than other new hires (Pallais and Sands, 2016; Topa, 2019). However, to the extent that network homophily contributes to this productivity differential (Galebianos, 2014; Hensvik and Skans, 2016; Montgomery, 1991), not all establishments will have equal access to high-quality employee referral networks. High-productivity establishments will be able to access more productive workers via employee referrals, but low-productivity employers will not. The latter’s use of referrals will thus be associated only with benefits such as reduced turnover.

The dynamics of the model are reversed for owner connections. High-productivity establishments – which are characterized by higher wages, better working conditions, and high-quality employee networks – already have access to high-productivity job applicants both through arms-length hiring and employee referrals. Given the productivity limitations associated with connections-based hiring, high-productivity establishments use connections infrequently, and when they do, the hires made via this method exhibit lower productivity that is indicative of nepotism. By contrast, low-productivity establishments do not have access to high-quality employee referral networks. Their use of owner connections is actually associated with higher-productivity hires than those made through general applications.

While we cannot establish causal relationships between hiring methods and outcomes, we find strong evidence from our survey in favor of these predictions. High-productivity establishments (multi-site stores using formal labor) use owner connections sparingly, but when they do, their hires are of far lower quality. Low-productivity establishments, meanwhile, get more productive workers when using owner connec-

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<sup>1</sup>In our survey, we define formal labor as those who work with a contract, and we define informal labor as those who do not. This is similar to the definition used in the Egyptian Labor Market Panel Survey (Assaad and Krafft, 2013). Although there are other important dimensions of labor relations, such as whether the worker has social insurance or other benefits, we follow the practice of using the presence of a contract as a proxy for some of these other factors (International Labour Organization, 2013).

tions. On the other hand, employee referrals bring more productive workers to high-productivity establishments, but only lower turnover and reduced hiring costs to other establishments. We control for establishment size in our analysis, and the results are practically unchanged when we restrict our sample to smaller establishments.

Our results have important policy implications. Efforts to reduce corruption by limiting the use of owner connections in hiring must take into account the fact that the practice may improve productivity for some types of establishments. Similarly, policymakers interested in facilitating employee referral networks to be more inclusive and reduce hiring frictions should recognize that the productivity benefits from such networks will be concentrated among establishments that are already highly productive. It is critical to think through the types and characteristics of target organizations when analyzing recruitment practices or designing labor market interventions.

This paper makes several key contributions to the literature on network-based hiring. First, we distinguish between owner connections and employee referrals, both theoretically and empirically. There is a substantial literature focused on the use of employee referrals. Referrals can be of use to both individual job-seekers (Beaman et al., 2018; Furstenberg and Kaplan, 2004; Ioannides and Loury, 2004) and firms (Beaman and Magruder, 2012; Brown et al., 2016; Burks et al., 2015; Pallais and Sands, 2016; Topa, 2011, 2019). While there are models of firms' use of referrals (Dustmann et al., 2016; Heath, 2018), we are not aware of a previous model or empirical exploration that differentiates between owner connections and employee referrals (see Chuang and Schechter (2015) for an overview). Typically hiring through owner connections is equated with "nepotism" or "cronyism" (Barnett et al., 2013; Bertrand and Schoar, 2006), although Assaad (1993) argues that use of connections is driven by a lack of good information between workers and firms. We show that connections and referrals are used to solve different problems for different types of firms.

Second, we show that both owner connections and employee referrals have heterogeneous associations with hiring outcomes depending on how they are used. Earlier work has shown that referrals often generate positive effects for the firm, but those benefits vary and could lead to changes in optimal firm structure (Burks et al., 2015; Chandrasekhar et al., 2020; Heath, 2018). We provide additional insights into these differences by showing that referrals generate productivity benefits for some firms and

lower turnover for others based on the firm’s characteristics. Connections also generate productivity benefits for firms without access to high-quality job applicants but are an inefficient practice for more productive firms.

Finally, our descriptive analysis, based on a unique survey of businesses designed by the authors, empirically documents the prevalence, and heterogeneous use of, connections and referrals. A 2013 World Bank report argued that social networks are key to finding a good job “usually and most of the time” in the Middle East/North Africa region (Gatti et al., 2014). A small literature discusses the potential importance of connections in different contexts, e.g. *wasta* in the Arab world (Assaad and Krafft, 2021; Ramady, 2016; Wehr, 1979) and *guanxi* in China (Bian and Ang, 1997; Wang, 2013). We provide quantitative evidence about how important these practices are from the hiring side, building on newer work that shows that labor constraints can limit firm growth (Bassi and Nansamba, 2019; Hardy and McCasland, 2015). On average, about half of hires made in the retail sector are done through networks, but this varies considerably across establishments. Jobs that are likely more desirable to workers – jobs at formal, multi-site establishments – are the least likely to be filled using networks (20%).

The paper proceeds as follows. Section 2 discusses the local context of our study and our survey of establishments. Section 3 shows descriptive evidence on connections, referrals, and other establishment practices and characteristics. Section 4 provides a model of connections and referrals, which we evaluate using our survey data in Section 5. Section 6 concludes.

## 2 Local Context and Our Survey

Our study takes place in Egypt, a middle-income country with a PPP-adjusted GDP per-capita of about \$12,000. It is commonly believed in Egypt that many jobs are obtained through ties to someone in the firm. The Arabic term for this is *wasta*, which roughly translates as “who you know.” The 2014 Survey of Young People in Egypt reported that 55% of young adults thought that jobs were obtained by *wasta* “to a large extent,” and a further 30% said “sometimes.” Assaad and Krafft (2021) also show that Egyptian youth believe that family connections are necessary for many high-

quality jobs, and majorities of private sector employees in other Middle East/North Africa countries report having found their jobs through friends or relatives (Gatti et al., 2014). This view was echoed in conversations with our Egyptian partners.

To study these issues, we designed and conducted a survey of Egyptian retail businesses in 2017-18. We first conducted a short qualitative survey on a small group of firms to identify key occupations and skill needs in each industry. We then conducted a longer quantitative survey of 539 retail establishments. The survey provides us with unique data on the hiring practices, hiring outcomes, turnover, skill demands, and firm structure of the establishments. As far as we are aware, these are the first data of their kind from a developing country context.

We focus on the retail sector because of its prevalence in Egypt and the ability to define a common job (salesperson) across establishments. The 2018 Egyptian enterprise census showed that retail accounts for 28.1% of all employment, making it by far the largest sector of the labor market. Our pilot survey identified salesperson as the most common entry-level position. Despite a wide variety of types of retail firms in our survey, all have this common job, allowing us to compare skill requirements, wages, and more across firms.

To recruit the sample, we first consulted Egypt's 2018 enterprise census as a guide to ensure that the distribution of firm size by industry was nationally representative. The survey firm then identified locations that include well-known clusters of retail establishments and aimed to survey the universe of establishments in that area. This strategy was implemented because we did not have access to a detailed list of all establishments in the country and so could not implement a random sampling methodology. We then produced sample weights that ensure that our sample lines up with the distribution of retail enterprises in Egypt using the census based employee sized groupings (5-9 employees, 10-24, 25-49, 50-99, 100-249 and 250+). The current sampling method likely leads us to sample somewhat more capable and productive establishments as these operations have been able to survive in competitive clusters.<sup>2</sup>

The surveys were conducted via interviews with human resources or hiring managers at each establishment. Upon arrival, the interviewer asked to speak with a manager

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<sup>2</sup>Note that we cannot link establishments in our survey to the enterprise census, so we do not have information on these establishments beyond what we collect ourselves.

who has authority over personnel and hiring matters. In 18% of cases that individual was also the owner of the establishment. Each survey took approximately one hour and contained about 80 questions. About 92% of the establishments that were approached completed the survey, giving us a total of 539 retail establishments, but we eliminate the 103 of them that have fewer than 5 employees because we do not have information on this size class from the Census. This group makes up only 2% of employment and 4% of hiring in our survey. Our final sample is made up of 436 establishments.

The sample is spread out geographically over Egypt. The greater Cairo area represents the largest population center in Egypt, and establishments there account for about 45% of our sample. Establishments in the greater Alexandria region, the second largest city in Egypt, account for 33% of our sample. The remaining 22% come from the southern population centers of Al-Minya and Assuit.

The survey focused on three topics that are important for this study. The first is hiring methods and difficulties in hiring. We separately asked what share of workers are hired with no tie to anyone at the firm, with a connection to the owner, an employee, or a customer.<sup>3</sup> We then asked about vacancies, long-term vacancies, average time to hire, the average time a worker takes to reach acceptable productivity, and how often workers leave (turnover).

Second was information about employment, labor arrangements, and firm structure. This section included questions about the number of employees, change in size over time, the age and educational distributions of employees, and whether workers are “formal” (working with an official contract) or “informal” (no contract). We also asked if the establishment is independent or “part of a larger organization” (i.e., one site of a multi-site firm).

Third, we asked a variety of questions to distinguish establishments by complexity or sophistication. These include things like the types of technology they use, whether customers are wealthy, whether the firm pays higher wages than its competitors, and whether and how the firm provides training for its workers, etc. We also asked about the skill requirements for a salesperson; establishments answered yes or no to whether

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<sup>3</sup>The term we used in our survey referred specifically to the owner of the firm, not a manager. We acknowledge that establishments with different management structures may have interpreted our question differently. Still, the information about owner connections and employee referrals should capture two fundamentally different ways of finding workers.

the job required a long list of skills, such as speaking English, doing mental math, and remembering customer orders. We will use these as control variables in our analysis, as they may be correlated with firms' ability to hire workers and the methods they use.

### 3 Descriptive Analysis

In this section, we analyze the descriptive results from the survey, which we use to inform our model of network-based hiring in the next section. In most cases, we use establishment weights so that our descriptive analysis matches the size composition of establishments in Egypt.

We document several key facts. First, network-based hiring is common, but not universal; about half of hires in the Egyptian retail sector are made using networks. Second, owner connections and employee referrals are distinct phenomena. While both are common hiring methods, referrals are used at similar rates by all types of establishments, while use of connections varies widely and is strongly related to other establishment characteristics. Connections are used mostly by independent establishments that use informal labor. Third, almost all establishments use either all formal or all informal labor, and multi-site establishments are more likely to be formal.

#### 3.1 Connections, Referrals, and Informality

We look primarily at two types of network-based hiring: owner connections (hires with a tie to the owner) and employee referrals (hires with a tie to an employee). Hiring someone with ties to the establishment's customers is very uncommon in our data (only 2.4% of hires), so we focus on the other two types.

Network-based hiring is common, though far from universal (see Table 1 below, where we compare establishment types). On average, establishments report that 52.8% of hires are made not using any type of tie, 15.6% are made using employee referrals, and 29.7% are made using owner connections.<sup>4</sup>

Figure 1 shows the distributions of hiring methods by establishment. There is considerable variation in use of owner connections: 20% of establishments report using

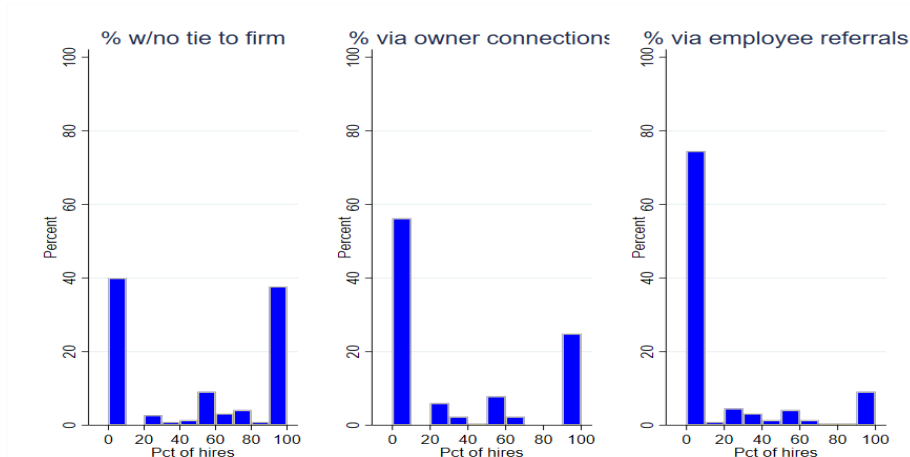
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<sup>4</sup>Here we weight our sample to match the employment size distribution of the Egyptian retail sector, so that the figures represent the share of hires (not establishments) that use each method.



connections for all of their hiring, while 58% never use them. It is rare to exclusively use employee referrals (6% of establishments), while 66% of establishments say they never use them.

Figure 1: Percentage of Hires Using Each Method



Note: The figure shows the distribution of answers to three questions about hiring. The first shows the percentage of current workers who were hired with no tie to anyone in the firm. The second shows the percentage of hires with a connection to the firm owner. The third shows the percentage of hires with a connection to another employee.

To start thinking about who uses network-based hiring and why, we look at a couple of other important dimensions on which Egyptian establishments differ. The first is whether the establishment uses formal or informal labor. Informal work is common in developing countries (Loayza, 2018), and the same is true in our data. We find that 98% of establishments report using either all formal or all informal labor. Most (68.6%) are all informal, while 29.5% are all formal. For the rest of this section, we will split establishments into those that are “all informal” and those that are not, calling the latter “formal”.

We also ask establishments if they are “part of a larger organization” – i.e., if they are part of a multi-site firm. Here there is a fairly even split. 54% of establishments are independent, while 46% are multi-site. This is a useful piece of information, as multi-site stores likely have more guidance and regulations regarding their hiring practices.

To look at heterogeneity in use of connections and referrals, we categorize establishments in a 2x2 matrix using the formal/informal and multi-site/independent variables. Table 1 shows the distribution of establishments across these four cells, in addition to the average use of each hiring method in each cell. The top panel shows a strong rela-

tionship between formality and multi-site status. About 80% of formal establishments are multi-site, while only 31% of informal establishments are. The formal-multi-site establishments are about twice as large on average than the other types and pay the highest monthly salary. These correlations are consistent with evidence from other settings (Assaad and Krafft, 2015; Busso et al., 2012; Cardiff-Hicks et al., 2015).<sup>5</sup>

Table 1: Use of Network-Based Hiring by Establishment Type

	Percent of Establishments		Average Establishment Size		Average Monthly Salary	
	Multi-Site	Independent	Multi-Site	Independent	Multi-Site	Independent
Formal	25.1	6.3	14.5	7.8	1,819*	1,418
Informal	21.4	47.2	8.6	6.5	1,382	1,348
			Overall avg: 11.0		Overall avg: 1493	
	Avg. % "no ties"		Avg. % owner connections		Avg. % employee referrals	
	Multi-Site	Independent	Multi-Site	Independent	Multi-Site	Independent
Formal	79.9*	53.5	3.3*	22.5	15.1	17.8
Informal	45.5	41.6	30.9	44.4*	20.1	12.6
	Overall avg: 52.8		Overall avg: 29.7		Overall avg: 15.6	

NOTE: Informal means an establishment uses exclusively informal labor, while formal means they use at least some formal labor. 98% of establishments are all informal or all formal. Multi-site means the establishment is part of a larger organization. Monthly salary is in Egyptian pounds. The bottom panel shows the percentage of hires made using each method by establishment type. We exclude one formal/multi-site establishment that is an extreme outlier on establishment size. We run t-tests of each mean against the three other means in that sub-table; a \* indicates a figure significantly different at the 5% level from all of the other three figures in that sub-table.

Use of network-based hiring is common, comprising almost half of all hires, but varies widely by type of organization. Formal/multi-site establishments only make 20% of their hires using networks, while that figure is almost 60% for the informal-independent establishments.

There is wide and significant heterogeneity in the use of owner connections. The formal/multi-site establishments almost never use connections (3.3% of their hires), while the few formal-independent establishments use them substantially more (22.5%). All informal establishments make liberal use of connections, especially those that are independent (44.4%); this figure is significantly larger at the 5% level than all of the

<sup>5</sup>The monthly salary variable is missing for about one-sixth of establishments, so it should be interpreted with caution. These establishments typically reported hourly wage but not hours worked. Note also that it does not include any non-wage benefits, so it likely understates compensation for the larger formal establishments.

other establishment types in use of connections.<sup>6</sup>

The formal/multi-site establishments' low use of owner connections is not just due to their larger size (i.e., more employees relative to one owner). Even when we restrict the sample to only those establishments with under 25 employees in Table A1, these establishments still stand out for their rare use of connections and tendency to hire people with no ties to the organization.

Referrals vary much less across establishment types, ranging only from 12.6% to 20.1% and averaging 15.6%. The informal independent establishments, which use connections most, actually use referrals the least, though none of the differences by establishment type in use of referrals is significant at the 5% level. Clearly, connections and referrals are very different practices, used by different types of establishments.

### 3.2 Hiring, Turnover, and Productivity

We now look at some outcomes of hiring: turnover, weeks to hire, and weeks to acceptable productivity. We asked establishments how many of their salespersons had quit or retired in the past year (“voluntary turnover”) and how many had been fired (“involuntary turnover”). We calculate turnover rates as a share of employment by dividing each of these by the total employment of salespersons at the establishment. Table 2 shows these turnover rates by establishment type. Both involuntary and voluntary turnover are highest at informal multi-site establishments, with the former being significant. This could be for different reasons; informal jobs are less desirable, whereas jobs at multi-site establishments may provide more opportunities to step to other jobs.

We also ask establishments how long it takes them to usually find a candidate and make a job offer. This does not vary significantly across types of establishment. Lastly, we ask how long it takes a newly hired worker to reach “acceptable productivity”. We take this as a measure of the quality of hires. Given that all of the jobs we are asking about are salespersons, a longer time to productivity suggests the worker is less qualified

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<sup>6</sup>It is possible that the formal/multi-site establishments are simply less likely to admit their true use of owner connections due to a social stigma. However, in an ongoing project, we show via list randomization that these establishments are just as likely as smaller ones to admit to another potentially stigmatized practice, gender discrimination in hiring. While respondent reticence may exist, we think it is unlikely to explain the large differences in the reported use of connections that our survey finds.

Table 2: Turnover, Weeks to Hire, and Weeks to Productivity

	Voluntary turnover rate		Involuntary turnover rate		Total turnover rate	
	Multi-Site	Independent	Multi-Site	Independent	Multi-Site	Independent
Formal	32.3	17.3	18.9	3.7	51.2	21.0*
Informal	132.5*	53.2	37.9	19.0	170.4*	72.3
	Overall avg: 65.5		Overall avg: 23.8		Overall avg: 89.3	
	Avg. weeks to hire		Avg. weeks to productivity			
	Multi-Site	Independent	Multi-Site	Independent		
Formal	2.7	3.1	5.5	8.3		
Informal	2.9	2.8	4.7	6.3		
	Overall avg: 2.8		Overall avg: 6.0			

NOTE: Informal means an establishment uses exclusively informal labor, while formal means they use at least some formal labor. 98% of establishments are all informal or all formal. Multi-site means the establishment is part of a larger organization. Turnover rates are total turnover in past year divided by current employment of salespersons. Weeks to productivity is the average weeks it takes a new hire to reach acceptable productivity. We run t-tests of each mean against the three other means in that sub-table; a \* indicates a figure significantly different at the 5% level from all of the other three figures in that sub-table.

or able at the time of hire. As seen in the table, these times are longer for independent establishments than for multi-site ones, though the differences are not significant. If salesperson roles in multi-site firms required more complicated tasks we would expect time to productivity to be shorter for independent establishments.

## 4 A Simple Theory of Connections and Referrals

To provide a framework for thinking about owner connections, employee referrals, and their potential effects on establishments' outcomes, we sketch a simplified model. We have kept the model at a basic conceptual level so as not to exceed the limitations of our data. Still, the model illuminates three key, and non-obvious, points.

First, owner connections and employee referrals are different phenomena. The model shows that referrals will be beneficial to all types of establishments, while connections will be used more commonly by lower-productivity establishments. Second, connections can have heterogeneous effects on outcomes. When high-productivity establishments use connections, the result, on average, will be lower productivity. Low-productivity establishments, however, will use connections to find more productive workers than they otherwise could. Third, referrals should also have heterogeneous effects. High-quality establishments will benefit through higher productivity, whereas the benefit for lower-quality establishments is only in reduced turnover and hiring costs.

The model is stylized and meant to provide one potential explanation for the facts we’ve reported above. It is meant to be illustrative more than literal. By dividing establishments into two types, for instance, we are simplifying the many differences between establishments in our data. We nevertheless think there is value in illuminating these key points.

## 4.1 Model Setup

Suppose workers have a marginal value to the firm (“productivity”) of  $\theta$ . There are two types of workers: highly productive workers with productivity  $\theta_H$  and less productive workers with productivity  $\theta_L$ , where  $\theta_H > \theta_L$ .

Similarly, there are high-productivity (H) establishments and low-productivity (L) establishments. These types are exogenous and observable. H establishments offer higher wages and better working conditions than L establishments. Establishments are also either profit-maximizing establishments (P) or utility-maximizing establishments (U), which is not observable. The difference is that U establishments value employing someone connected to the owner even if this behavior is not profit-maximizing. We refer to this type of use of connections - where someone is hired to increase utility rather than profits - as nepotism (Bertrand and Schoar, 2006).<sup>7</sup>

### 4.1.1 Hiring Methods

We split potential hires into three groups: general (“arms-length”) applicants, candidates connected to the owner, and candidates referred by an employee. To reflect the fact that use of networks reduces search and screening costs (Burks et al., 2015; Hoffman, 2017), hiring a general applicant carries a cost premium of  $p$  relative to the other two methods. In line with consistent findings from the referrals literature, we assume that workers are less likely to quit if they are hired via a network (Burks et al., 2015).<sup>8</sup>

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<sup>7</sup>In the real world, this distinction may not always be perfect. Establishments may act as profit-maximizers sometimes and utility-maximizers at other times. Nevertheless, the distinction in the model captures broad contrasts in behavior.

<sup>8</sup>While there is evidence in the literature that referrals reduce turnover, we are not aware of such evidence for connections. We make this assumption here for both methods and will evaluate it in our results.

Because of the difference in wages and working conditions, all worker types (both  $\theta_H$  and  $\theta_L$  workers) apply to the H establishments, while only  $\theta_L$  workers apply to the L establishments. Establishments’ screening methods are imperfect. They observe the productivity of applicants with some small error, so that a worker who appears highly productive may turn out to have productivity  $\theta_L$ . However, L establishments know that all of their arms-length applicants are of low productivity, because the job characteristics of L establishments do not attract high-productivity arms-length applicants.<sup>9</sup>

Establishments can also hire someone referred by a current worker (“referrals”). Referrals are characterized by network homophily: a referred worker has the same productivity as the worker who referred them (Beaman and Magruder, 2012; Leo et al., 2016; McPherson et al., 2001; Pallais and Sands, 2016). Thus workers of (true) productivity  $\theta_H$  refer other workers of productivity  $\theta_H$ , and the same dynamic applies to  $\theta_L$  workers.<sup>10</sup>

A third option is to hire someone connected to the owner (“connections”). The firm owner knows both high- ( $\theta_H$ ) and low-productivity ( $\theta_L$ ) workers and can observe their productivity perfectly.

## 4.2 Model Implications

We can now discuss how H and L establishments use connections and referrals as well as the outcomes associated with their use.

### 4.2.1 Hiring for High-Productivity Establishments

First, consider profit-maximizing H establishments who wish to hire only  $\theta_H$  workers. They can and do access these workers through arms-length hiring. However, the superior job conditions of H establishments attract many  $\theta_L$  applicants in addition to

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<sup>9</sup>H establishments’ access to better applicants could also be due to their better name recognition among workers and ability to advertise. L establishments may not be well-known to workers. See Assaad (1993) for more discussion of how differences in information about workers and firms can influence the use of networks in hiring.

<sup>10</sup>An interesting extension of this model would consider workers’ incentives to refer those they know, and how firms could shape these incentives. We do not ask about this in our survey. For a detailed treatment of this aspect of referrals, see Heath (2018).

$\theta_H$  applicants, and the establishments' screening technologies are imperfect. As a result, H-type establishments end up hiring some number of  $\theta_L$  workers. The number of erroneously hired  $\theta_L$  workers is increasing in the proportion of  $\theta_L$  candidates in the applicant pool. In order to both minimize these errors and reduce screening costs, H establishments can turn to network-based hiring.

One form of network hiring involves employee referrals. The firm can figure out who its high-productivity workers are, and due to network homophily, referrals from these workers will result in a curated pool of  $\theta_H$  applicants. For a profit-maximizing H-type establishment, use of employee referrals will increase productivity due to the reduction in the number of erroneously hired  $\theta_L$  workers (which follows from the curated applicant pool).

Importantly, utility-maximizing H establishments will also realize these productivity improvements (relative to arms-length hiring) when they use employee referrals due to the same network homophily effects. Because they do not get direct utility from using employee referrals, they will take advantage of employee referral networks in the same way as the profit maximizers. Thus in the data, H-establishment use of employee referrals will be unambiguously associated with productivity improvements even in the absence of controls for unobserved P or U status.

The other network-based hiring option is use of owner connections. Profit-maximizing H establishments can also use this method to identify  $\theta_H$  workers. However, the number of successful hires via this channel will be much lower than the number associated with employee referrals due to the fact that 1) social networks are heavily stratified by class (Leo et al., 2016), and 2) only a subset of the potential workers an owner knows will have  $\theta_H$  productivity. In other words, it is likely that firm owners do not know as many productive front-line workers as their own productive front-line workers do, and some of the front-line contacts they do know – via family or other non-productivity-related ties – will not be high-productivity workers. In addition to this, these H establishments can reliably hire  $\theta_H$  workers via referrals, again reducing the need for using connections.

For profit-maximizing H establishments, use of owner connections will be productivity-improving because they only hire  $\theta_H$  workers this way (that is, they avoid the hiring errors that sometimes occur with arms-length hiring). However, the factors mentioned above will limit use of the practice. By contrast, this model predicts that U-type

H establishments will make more frequent use of employer connections. For utility-maximizers, connections are a way not to maximize productivity but rather to achieve some other objective (e.g., provide an employment opportunity to a relative or friend). These utility-maximizing H establishments will seek to hire connected applicants with high productivity, but the existence of candidates who satisfy both nepotistic and productivity requirements is likely to be limited (Hu et al., 2018). Utility-maximizing behavior (the hiring of low-productivity connected applicants) will result in reduced productivity.

Because we do not observe P or U status, we can only observe the blended average effect of using owner connections for H establishments. We expect the profit maximizers to make limited use of owner connections, so among H establishments, utility maximizers will likely dominate use of employer connections. Thus we expect that we will observe an overall decrease in productivity for H establishments that use employer connections.

#### 4.2.2 Hiring for Low-Productivity Establishments

We now consider L establishments, who are only able to attract  $\theta_L$  workers via arms-length hiring. For these employers, using worker referrals cannot improve productivity. These establishments predominantly hire  $\theta_L$  workers, and, due to network homophily, these workers are only able to refer other low-quality workers. However, L establishments will still use this recruitment method because it can reduce both hiring costs (since referrals avoid the additional search cost premium associated with arms-length hiring) and turnover.

L establishments use owner connections differently than their H counterparts because it is their only way to access highly productive  $\theta_H$  workers. Because owner networks are of higher quality than low-productivity employee networks, owners will be able to secure some high-productivity employees via use of connections. This is true for both profit maximizers and utility maximizers.

For profit-maximizing L establishments, use of connections will be productivity-enhancing relative to arms-length hiring, due to adverse selection in the general applicant pool. Utility-maximizing L establishments will use connections because they gain utility from hiring any worker using this method. However, unlike utility-maximizing



H establishments, U-type L establishments cannot suffer a hit to productivity from using connections because their existing workforce already consists of  $\theta_L$  workers. As a result, the blended effect of the use of owner connections for all L establishments should be, on average, productivity-enhancing.

### 4.3 Model Summary

To summarize the model's implications, both connections and referrals should have different effects for different types of establishments. For owner connections: on average, H establishments' use of connections should be correlated with *reduced* productivity due to the impact of utility-maximizers, while L establishments that use connections, on average, should have *higher* productivity than otherwise similar employers. For employee referrals: both H and L establishments use referrals and benefit from the practice, but the benefits should be heterogeneous. H establishments realize *higher productivity* due to reduced errors in hiring, while L establishments only experience *reduced search costs and lower turnover*. While the model is simplified, it provides several novel, non-obvious predictions which we can empirically test in our data.

## 5 Regression Analysis

As highlighted by the model, our primary question is how the use of, and outcomes associated with, connections and referrals vary across establishment types. Our data are cross-sectional and thus do not allow us to claim causality, but we can analyze the empirical relationships between hiring methods and labor-market outcomes.

These exercises are useful because they establish previously unreported empirical patterns and show that use of connections and referrals can have heterogeneous relationships with outcomes depending on the type of establishment using them. It is worth stressing that our model's predictions - namely that the marginal productivity effects of connections and referrals will be diametrically opposite for high- and low-quality organizations - are both specific and non-obvious. Testing for the presence of this pattern contributes valuable new insights to the literature on these hiring methods, particularly in developing countries.

## 5.1 Empirical Strategy

The model makes a distinction between “high-productivity” (H) and “low-productivity” (L) establishments. This characteristic is not directly observable, but we can use the descriptive analysis from Section 3 to find proxies for these categories. Table 1 shows that the formal/multi-site establishments are clearly different from the other types of establishments. They have much higher employment on average, and larger firms tend to be more productive and employ better workers (Busso et al., 2012; Cardiff-Hicks et al., 2015; Headd, 2000; Loayza, 2018; Yang, 2012).

In our data, the formal/multi-site stores also pay significantly higher salaries (see Table 1), are the most likely to pay higher wages for overtime (61% vs. 43% for other stores) and are the most likely to take applications online (42% vs. 10%). For these reasons, we designate these formal/multi-site establishments as our “H” establishments and all others as our “L” establishments.

The model makes three basic predictions. First, referrals will be used by both H and L establishments, while connections will mostly be used by L establishments. We can already see that this is true from Table 1. The percentage of hires made using referrals is around 15-20% for both “H” and “L” types, while connections vary widely, from only 3.4% in H establishments to 38% in L establishments combined.

The second prediction is that using owner connections should reduce productivity for H establishments but increase it for L establishments. The third is that employee referrals will increase productivity for H establishments, but only give lower turnover (and not higher productivity) for L establishments. These will be tested in our regression analysis.

In terms of hiring outcomes, the model speaks to the quality/productivity of workers hired as well as the impacts of hiring on turnover. We do not have direct measures of the quality of hires in our data. Instead, we use three measures that can proxy for these outcomes. Our primary measure of the quality of hires is how long it takes a typical new hire to reach “an acceptable level of productivity”. Given that all of the hires we are talking about are for the same job (salespersons), we can interpret this as a measure of worker quality at the time of hire.<sup>11</sup> We further increase precision in

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<sup>11</sup>A worker’s productivity is notoriously difficult to measure, particularly in a survey of establishments and not workers. Our measure, while imperfect, has been used in establishment surveys in the

this quality measurement by controlling for detailed establishment-level skill demands in our empirical specifications.

For turnover, we have measures of both voluntary (quits) and involuntary (separations/firings) turnover. The third outcome, which the model does not speak to but we think is worth presenting, is the number of weeks that it typically takes to hire a new worker. In theory, longer hiring times may be a sign of greater hiring frictions. While we hypothesize that use of connections and referrals is about productivity and turnover, an alternative hypothesis is that they are used mainly to reduce hiring time (Sabatier, 2010). We include this as an outcome in order to test our hypotheses against this alternative.

A key element of our model relies on the distinction between profit-maximizing and utility-maximizing establishments. These attributes are not directly observable. However, the model does contain a precise prediction that allows identification of the incidence of utility maximization among high-productivity establishments. As noted above, the model predicts that H establishments, which already have access to high-quality employees via both referrals and the spot labor market, will only use connections if they are utility-maximizers, and will incur a productivity penalty if they do so. The incidence of H establishments that use connections can thus serve as an upper bound on utility-maximization among high-quality establishments.

It is worth stressing that we are not making a causal argument about the effect of recruitment practices. We are not, for example, arguing that adoption of recruitment via owner connections will lead to a particular change in a labor market outcome for a randomly chosen establishment. Rather, we are hypothesizing that the past adoption of these practices is not an accident and that the observable patterns of these practices—and their association with various labor-market outcomes—provides evidence that different organizations adopt these measures at different rates and for different reasons (in a manner consistent with the above-described model).

There are a number of additional factors that could influence an outcome that is 

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United States and seems to capture important differences in how well new hires perform (Osterman and Weaver, 2013). It is possible that our measure could reflect not only the quality of the hire but also internal firm dynamics that may differ based on how the individual was hired (e.g., if peers are less willing to give help to someone hired due to their connection to the owner). We are not able to assess this potential dynamic.

otherwise correlated with a recruitment practice. Given the cross-sectional nature of our data, it is important to control for these items. For example, longer times to acceptable productivity could be the result of skill requirements at a particular establishment. There are frequent assertions that businesses in developing countries, including the Middle East, face a situation in which potential workers have inadequate skills (Barbarasa, 2017; Dobbs et al., 2012; Gatti et al., 2014). There is evidence this concern is overblown in the U.S. (Weaver and Osterman, 2017), but it could be important in Egypt. We control for a detailed list of skill requirements at the establishment level, including performance of mental math, tracking of data and inventory, higher level reading and writing, spoken English, and unique skills not required by other area establishments.

Beyond skills, we include measures of other relevant organizational characteristics: above-average technology, provision of internal training, recent shift toward inside hiring, and above-median establishment employment size. We also control for market level factors, including local unemployment rate, incidence of poaching, and recent establishment employment growth.

We estimate variations of the following model using a negative binomial specification, with  $i$  indexing establishment (and total establishment employment as the exposure variable):

$$\begin{aligned}
 Outcome_i = & \beta_0 + \beta_1 Connect_i + \beta_2 Refer_i + \beta_3 EstabQuality_i + \\
 & \beta_4 Connect * EstabQuality_i + \beta_5 Refer * EstabQuality_i + \epsilon_i
 \end{aligned}
 \tag{1}$$

where the outcomes are weeks to productivity, turnover, and weeks to hire. We chose a negative binomial model as our data take the form of positively skewed counts with overdispersion. We specify total establishment employment as the exposure variable in order to control for the effect of scale on outcomes (we are thus estimating normalized count rates). We employ robust standard errors. Due to our limited sample size, we define binary measures of use of connections and referrals ( $Connect_i$  and  $Refer_i$ ), which we interact with dummy variables for high-quality (formal/multi-site) and low-quality (all other) establishments. Results are similar, but less precise, when using continuous measures of hiring practices.

Given our focus, our primary interest is not in the direct effects associated with connections and referrals. Rather, we are interested in the interactions between our proxy for establishment quality and the use of connections and referrals.

## 5.2 Results

Table 3 shows the marginal effects for the key model variables. The dependent variable in column 1 is weeks to productivity, a measure of the quality of hires (where a higher number of weeks means lower quality). We find strong evidence here in support of our model’s predictions. The formal multi-site (“H”) establishments that rely on owner connections show substantial productivity losses, with new hires taking 6.3 weeks longer to reach acceptable productivity than formal organizations that eschew the use of connections. To give some context, the mean of the weeks to productivity variable in the data is 6.6 weeks. This result suggests that most of the H-establishment use of employer connections that we observe is motivated by nepotism.<sup>12</sup>

In contrast, lower-productivity establishments that utilize owner connections see a small improvement in productivity – a reduction in time to productivity of just over a week – relative to other informal organizations, although the point estimate is not significant. The difference between the marginal effect of using connections for the H and L establishments is large and significant. Use of the practice in high job quality establishments (formal/multi-site) is associated with 7.6 weeks longer time to acceptable productivity than in lower job quality establishments.

On referrals, we also find strong support for our model’s predictions of heterogeneous associations with productivity. For higher-productivity establishments, consistent with the predictions of our model, use of referrals is associated with 2.5 weeks *faster* time-to-productivity ( $p < 0.10$ ), which is indicative of higher-quality hires. Conversely, the practice in lower-productivity establishments is associated with 2.6 weeks *slower* time-to-productivity ( $p < 0.05$ ), indicative of lower-quality hires. There is only a productivity benefit from the use of referrals for the H establishments. The difference in marginal productivity effects between high and low job quality use of referrals is a

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<sup>12</sup>Our results are not explained by differences in establishment size. Note that we control for being above or below median establishment size in these specifications. All results are similar when we restrict only to smaller establishments (under 25 or under 15 employees).

Table 3: Connections, Referrals, and Hiring Outcomes

Dependent variable:	(1) Wks to Productivity	(2) Quits	(3) Terminations	(4) Total Turnover	(5) Wks to Hire
Owner connections	0.653 (0.760)	-2.143*** (0.644)	-0.171 (0.413)	-2.386*** (0.850)	-0.059 (0.286)
Employee referrals	1.516* (0.891)	0.401 (0.683)	-0.240 (0.281)	0.066 (0.725)	0.051 (0.339)
Formal, part of larger org.	2.273* (1.188)	-0.427 (0.685)	0.172 (0.511)	-0.490 (0.921)	0.039 (0.432)
<b>Interactions</b>					
<i>Marg. effect of connections by:</i>					
Formal, part of larger org. ("H")	6.431*** (2.037)	-2.686** (1.103)	0.438 (1.280)	-2.489 (1.588)	0.049 (0.719)
Other type ("L")	-1.139 (0.886)	-1.849*** (0.662)	-0.407 (0.278)	-2.360*** (0.851)	-0.092 (0.337)
<i>Difference in marginal effects</i>	<i>7.569*** (2.370)</i>	<i>-0.837 (1.153)</i>	<i>0.845 (1.301)</i>	<i>-0.129 (1.643)</i>	<i>0.141 (0.839)</i>
<i>Marg. effect of referrals by:</i>					
Formal, part of larger org. ("H")	-2.539* (1.511)	1.843 (1.183)	0.043 (0.615)	1.707 (1.148)	-0.131 (0.506)
Other type ("L")	2.616** (1.152)	-0.787 (0.683)	-0.359 (0.318)	-1.062 (0.924)	0.106 (0.399)
<i>Difference in marginal effects</i>	<i>-5.154*** (1.874)</i>	<i>2.630* (1.390)</i>	<i>0.402 (0.674)</i>	<i>2.769* (1.490)</i>	<i>-0.237 (0.606)</i>
Observations	414	414	414	414	414
Pseudo R-squared	0.033	0.102	0.069	0.089	0.030

NOTE: The coefficients reported in the table are marginal effects from negative binomial regressions with total establishment employment as the exposure variable. Regressions also include controls for establishment skill demands (e.g., whether they require mental math, extended reading and writing, and speaking English), organizational characteristics (e.g., whether they have above-average technology, offer internal training, and pay below-market wages), market characteristics (the local unemployment rate, whether employment is growing in the industry, and the frequency of worker poaching), and a binary for above/below median establishment size. The full results are available in Table A2. Robust standard errors in parentheses. Significance \* .10; \*\* .05; \*\*\* .01.

highly significant 5.2 weeks ( $p < 0.01$ ).<sup>13</sup>

On turnover (columns 2-4), we find weaker results that are again consistent with our model. Use of owner connections is associated with reduced turnover for both high- and low-quality organizations. These relationships are primarily concentrated in quits. For example, informal organizations that utilize connections experience 1.8 fewer quits per year. It is possible that use of owner connections gives employers some level of monopsony power over workers.

<sup>13</sup>While we interpret time to productivity as a measure of the quality of hires, it could also reflect the quality of training and mentoring the establishment provides to new hires. Regardless of the interpretation, a longer time to productivity for hires indicates that the establishment is paying a cost in its hiring choices.

Referrals show heterogeneous associations with turnover, as the model suggested. The low-productivity establishments who use referrals see insignificantly lower turnover. The H establishments relying on referrals see insignificantly higher turnover, possibly reflecting the marketability of these workers recruited from high-quality networks. While these interactions are not significant, the differences between them in quits and overall turnover are marginally significant. So the conventional wisdom that referrals lead to lower turnover and higher productivity is dependent on the type of establishment.<sup>14</sup>

Interestingly, we do not see any significant relationships between network-based hiring and the time required to hire workers (column 5). Our results suggest that connections and referrals are used mainly to improve productivity and reduce turnover (as our model predicted), not to reduce the time needed to hire. Overall, the productivity and turnover results support the non-obvious predictions of our model, while the turnover results establish consistency with prior findings.

Looking at the main effects without interactions, use of owner connections is associated with significantly lower turnover, primarily via reduced quits. Use of employee referrals is weakly correlated with longer times to acceptable productivity, as is the direct effect of status as a larger formal organization. This latter effect may be picking up the fact that jobs in high quality organizations are more complex and thus have longer baseline times to acceptable productivity.

The regressions also include a number of controls that we omit for space reasons. These can be seen in Table A2. The results indicate that detailed skill demands are not associated with significantly greater hiring times or lower worker productivity. Requirements to track inventory and demands for skills unique to a particular establishment are associated with greater turnover, but requirements for mental math and spoken English are associated with lower turnover.

### 5.3 Discussion

The results demonstrate that not all network-based hiring methods are equivalent. Owner connections and employee referrals are distinct phenomena. Furthermore, these

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<sup>14</sup>All of our results are robust to including only a smaller set of covariates in our regressions.

practices cannot be simply characterized as invariably productivity-enhancing, on the one hand, nor as evidence of corrupt nepotism on the other. Rather, our detailed empirical results are consistent with the idea that the rationale for a given practice will vary based on the type and characteristics of a given business establishment.

Use of owner connections appears to be a departure from productivity enhancement for high-productivity organizations, which likely have access to a high-quality applicant pool via other channels. By contrast, the use of connections in lower-quality organizations is associated with higher productivity. These organizations have less access to high-quality recruitment networks, and use of connections is likely a mix of nepotism and productivity enhancement.

Different from connections, employee referrals are associated with increased productivity in high-quality organizations and decreased turnover in lower-quality establishments. Both types of businesses benefit, but in different ways. High-quality organizations seem to utilize the practice in order to tap into high-productivity (homophilous) employee networks, while lower-quality organizations (who use referrals at similar rates) rely on the practice for other reasons.

These empirical findings have a number of policy implications. Efforts to reduce corruption by limiting the use of connections (*wasta*) in hiring must take into account the fact that the practice may be productivity-enhancing for some organizations. By the same token, policymakers who seek to improve the labor-market outcomes for disadvantaged workers by facilitating or expanding their access to referral networks should recognize that the productivity and pay benefits from such networks will be concentrated among larger formal organizations. Independent, smaller, informal organizations may get some benefits from using referrals, but they will not improve productivity. Ultimately, our results indicate that it is critical to think through the types and characteristics of target organizations when analyzing recruitment practices or designing labor market interventions.

## 6 Conclusion

Using a unique survey of Egyptian retail establishments, we establish new facts about the use of owner connections and employee referrals in hiring. The two methods are



clearly different, used by different types of establishments to solve different economic problems. Both are important labor market practices, with complex consequences for both firms and workers. Our model and results show that use of connections can represent inefficient nepotism for some establishments, but it can be profit-maximizing for others. Use of referrals can benefit all establishments, but in different ways.

Employee referrals have received a great deal of study, including careful field work and convincing randomized experiments. We encourage researchers to do the same for owner connections. This is a widespread practice that needs to be better understood, and the effects likely depend heavily on the context and type of firm. These topics are ripe for additional theoretical and empirical contributions. For example, while our simple model outlines how labor market dynamics are consistent with our data in this context, a more formal model with data collection that includes information on expectations and incentives for hiring could yield further insights into these important phenomena.

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Table A1: Use of Network-Based Hiring for Small Establishments

	Percent of Establishments		Average Establishment Size		Average Monthly Salary	
	Multi-Site	Independent	Multi-Site	Independent	Multi-Site	Independent
Formal	23.7	6.2	7.9	6.5	1,815	1,403
Informal	21.5	48.6	7.1	6.4	1,381	1,346
	Avg. % "no ties"		Avg. % owner connections		Avg. % employee referrals	
	Multi-Site	Independent	Multi-Site	Independent	Multi-Site	Independent
Formal	80.1	53.1	3.4	22.7	14.9	17.7
Informal	44.5	41.5	31.6	44.6	20.4	12.6

NOTE: We restrict here to establishments of fewer than 25 employees. Informal means an establishment uses exclusively informal labor, while formal means they use at least some formal labor. 98% of establishments are all informal or all formal. Multi-site means the establishment is part of a larger organization. Monthly salary is in Egyptian pounds. The bottom panel shows the percentage of hires made using each method by establishment type. We exclude one formal/multi-site establishment that is an extreme outlier on establishment size.

Table A2: Connections, Referrals, and Hiring Outcomes

Dependent variable:	(1) Wks to Productivity	(2) Quits	(3) Terminations	(4) Total Turnover	(5) Wks to Hire
Owner connections	0.653 (0.760)	-2.143*** (0.644)	-0.171 (0.413)	-2.386*** (0.850)	-0.059 (0.286)
Employee referrals	1.516* (0.891)	0.401 (0.683)	-0.240 (0.281)	0.066 (0.725)	0.051 (0.339)
Formal, part of larger org.	2.273* (1.188)	-0.427 (0.685)	0.172 (0.511)	-0.490 (0.921)	0.039 (0.432)
<b>Interactions</b>					
<i>Marg. effect of connections by:</i>					
Formal, part of larger org.	6.431*** (2.037)	-2.686** (1.103)	0.438 (1.280)	-2.489 (1.588)	0.049 (0.719)
Other type	-1.139 (0.886)	-1.849*** (0.662)	-0.407 (0.278)	-2.360*** (0.851)	-0.092 (0.337)
<i>Difference in marginal effects</i>	<i>7.569***</i> <i>(2.370)</i>	<i>-0.837</i> <i>(1.153)</i>	<i>0.845</i> <i>(1.301)</i>	<i>-0.129</i> <i>(1.643)</i>	<i>0.141</i> <i>(0.839)</i>
<i>Marg. effect of referrals by:</i>					
Formal, part of larger org.	-2.539* (1.511)	1.843 (1.183)	0.043 (0.615)	1.707 (1.148)	-0.131 (0.506)
Other type	2.616** (1.152)	-0.787 (0.683)	-0.359 (0.318)	-1.062 (0.924)	0.106 (0.399)
<i>Difference in marginal effects</i>	<i>-5.154***</i> <i>(1.874)</i>	<i>2.630*</i> <i>(1.390)</i>	<i>0.402</i> <i>(0.674)</i>	<i>2.769*</i> <i>(1.490)</i>	<i>-0.237</i> <i>(0.606)</i>
<i>Skill controls</i>					
Mental math	0.415 (0.751)	-1.600** (0.784)	-0.740* (0.384)	-2.615** (1.166)	-0.038 (0.386)
Track customer/sales data	0.319 (0.851)	-0.922 (0.760)	-1.243** (0.606)	-2.135* (1.219)	-0.059 (0.377)
Track inventory	-0.863 (0.929)	2.423*** (0.847)	1.407** (0.667)	3.746*** (1.331)	-0.572 (0.406)
Extended reading	-1.388* (0.835)	0.339 (0.962)	-0.030 (0.415)	0.772 (1.330)	-0.350 (0.450)
Extended writing	-0.729 (0.754)	1.021 (1.069)	-0.340 (0.301)	0.362 (1.187)	0.638 (0.544)
Speak English	0.598 (0.901)	-2.251*** (0.604)	-0.640** (0.260)	-2.924*** (0.791)	0.860 (0.573)
Unique skills	1.380 (1.060)	2.247** (0.979)	0.854* (0.440)	3.354*** (1.300)	0.244 (0.388)
<i>Organizational characteristics</i>					
Above-average technology	2.073* (1.212)	-0.593 (0.738)	-0.218 (0.299)	-0.746 (0.925)	0.170 (0.414)
Internal training	-1.288* (0.735)	1.737*** (0.535)	0.696** (0.334)	2.231*** (0.729)	-0.274 (0.354)
Shift to inside hiring	-0.296 (0.602)	1.249** (0.601)	0.102 (0.269)	1.296* (0.767)	-1.107*** (0.326)
Below-market wage	4.404* (2.420)	1.858 (1.650)	-0.425 (0.316)	1.479 (1.753)	-0.607 (0.402)
Above-median estab. emp.	0.657 (0.737)	1.611** (0.682)	0.442 (0.366)	2.045** (0.925)	-0.320 (0.268)
<i>Market-level controls</i>					
Local unemployment rate	0.247 (0.163)	0.558*** (0.211)	-0.124 (0.092)	0.247 (0.237)	-0.199** (0.089)
Pos. employment growth (1yr)	-0.276 (0.767)	0.151 (0.711)	-0.028 (0.321)	0.267 (0.911)	-0.206 (0.336)
Frequent worker poaching	-1.888*** (0.669)	6.734*** (2.080)	1.687* (0.894)	8.007*** (2.706)	0.122 (0.392)
Observations	414	414	414	414	414
Pseudo R-squared	0.033	0.102	0.069	0.089	0.030

Notes: The coefficients reported in the table are marginal effects from negative binomial regressions with total establishment employment as the exposure variable. Robust standard errors in parentheses. Significance \* .10; \*\* .05; \*\*\* .01.