

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. Using a unique survey, we document important differences in retail 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 have heterogeneous effects on hiring outcomes depending on establishment type. Our empirical results confirm the model's predictions. When high-productivity establishments use connections, it leads to lower-productivity hires (nepotism), yet when low-productivity establishments use connections, they find more productive workers. By contrast, referrals benefit high-productivity establishments more. 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 (e.g., Pallais and Sands (2016), Burks et al. (2015)), find better matches (e.g., Dustmann et al. (2016), Brown et al. (2016)), and give their existing workers the right incentives (Heath, 2018). But referrals can also disadvantage those with less social capital (e.g., Chandrasekhar et al. (2020), Beaman et al. (2018), 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 nepotism that is inefficient (e.g., Bertrand and Schoar (2006)). But 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.

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. Regression results find strong evidence 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.

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 (Montgomery (1991), Galenianos (2014), Hensvik and Skans (2016)), 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 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. As a result, 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-quality 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.

Using data from our survey, we find strong evidence in favor of these predictions. High-productivity establishments (multi-site stores using formal labor) use owner connections sparingly, but when they do, they take a large productivity hit. Low-productivity establishments, meanwhile, get more productive workers when using connections. Referrals bring more productive workers to high-productivity establishments, but only lower turnover and reduced hiring costs to others. These results are not driven by differences in establishment size, with effects 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 (e.g., Beaman et al. (2018), Furstenberg and Kaplan (2004), Ioannides and Loury (2004)) and firms (e.g. Pallais and Sands (2016), Brown et al. (2016), Burks et al. (2015), Beaman and Magruder (2012); see Topa (2011) and Topa (2019) for summaries). While there are models of firms’ use of referrals (e.g., Heath (2018), Dustmann et al. (2016)), we are not aware of a previous model that differentiates between owner connections and referrals. Typically hiring through owner connections is equated with “nepotism” or “cronyism” (Bertrand and Schoar (2006), Barnett et al. (2013)). We show that connections and referrals are used to solve different problems for the firm and are not necessarily used only in inefficient ways.

Second, we show that both owner connections and employee referrals have heterogeneous effects on 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 (Chandrasekhar et al. (2020), Burks et al. (2015), 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 (Ramady (2016), Wehr (1979)) and *guanxi* in China (Bian and Ang (1997), Wang (2013)). We pro-

vide 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. In 2016, Egypt faced a 33.4% unemployment rate among workers age 15-24, among the highest of any country (ILO, 2016), while 95% of the unemployed youth have completed at least secondary school (Ghanem, 2016). Egypt has also had a decade of well-documented political instability, starting with the Egyptian revolution of 2011.

In Egypt, it is commonly believed 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”. Only 2% said that jobs were not obtained by *wasta*. 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, followed by cashiers. 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.

The sample was recruited using 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 sampling somewhat more capable and productive establishments since they have been able to survive in competitive clusters.

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 who has authority over personnel and hiring matters. Each survey took approximately one hour and contained about 80 questions. We surveyed 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 them from the Census. They make 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 two 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. 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).¹

Second was information about employment, labor arrangements, and firm structure. This 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”. We also asked if the establishment is independent or “part of a larger organization” (i.e., one site of a multi-site firm).

We also 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 their workers, etc. Finally, we asked about the skill requirements for a salesperson; establishments answered yes or no to whether 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.

¹We designed our survey to distinguish between ties to owners and ties to employees, but we acknowledge that establishments with different management structures may interpret these terms differently. Still, they should capture two fundamentally different ways of finding workers.

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.

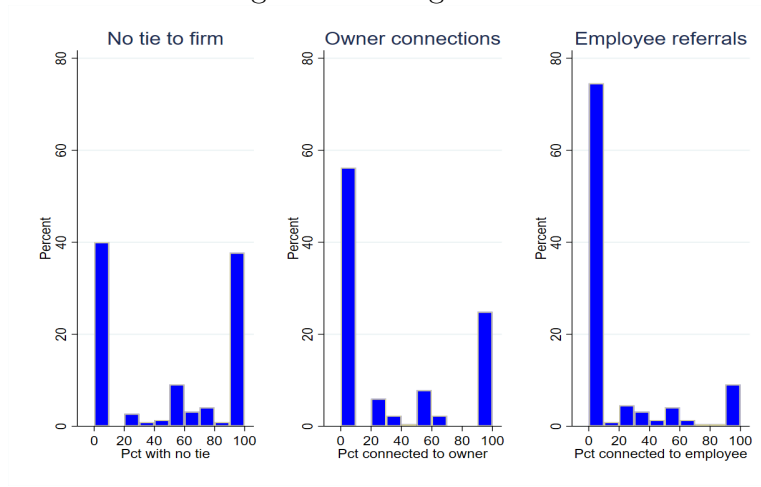
Network-based hiring is common, though far from universal (see Table 1 below, where we compare establishment types). On average, establishments report that 52.8% of hires are made not using any type of tie, 15.6% are made using employee referrals, and 29.7% are made using owner connections.²

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

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

²Here 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.

Figure 1: Hiring Methods



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 relationship 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 (e.g., Busso et al. (2012), Cardiff-Hicks et al. (2015)).³

³The monthly salary variable is missing for many establishments so should be interpreted with caution. Some establishments instead report hourly wage but not hours worked. We exclude one formal/multi-site establishment that is an extreme outlier on establishment size.

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.

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 heterogeneity in the use of owner connections. The formal/multi-site establishments almost never use connections (3.3%), 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%).

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 only to establishments under 25 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. 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. 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.

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 also ask how long it takes them to usually find a candidate and make a job offer. This does not vary much across types of establishment. Lastly, we ask how long it takes a newly hired worker to reach “acceptable productivity”. Given that all of the jobs we are asking about are salespersons, a longer time to productivity suggests the worker is less qualified or able at the time of hire. As seen in the table, these times are longer for independent establishments than for multi-site ones.

4 A Simple Theory of Connections and Referrals

To provide a framework for thinking about connections, referrals, and their potential effects on establishments' outcomes, we outline a simplified model. The model is not meant to explain everything about the use of these hiring methods, but it illuminates three key, and non-obvious, points.

First, owner connections and employee referrals are different phenomena. The model shows that referrals will be used by all types of establishments, while connections are more common among lower-productivity establishments. Second, connections will have heterogeneous effects on outcomes. High-productivity establishments will use connections sparingly, but when they do, they will result in lower productivity. Low-productivity establishments will use connections to find better workers. Third, referrals will also have heterogeneous effects. High-quality establishments will benefit through higher productivity, whereas the benefit for lower-quality establishments is only in reduced turnover.

4.1 Model Setup

Suppose workers have a marginal value to the firm (“productivity”) of θ . We split potential hires into three groups: general applicants, someone connected to the owner, or someone referred by an employee. Hiring a general applicant costs p , while the other two methods are free. We assume that workers are less likely to quit if they are hired via connection or referral.

There are two types of establishments, high-productivity (H) and low-productivity (L), where type is exogenous and observable. H establishments offer higher wages and better working conditions. The two types attract a different quality of job applicants. H establishments get applicants whose productivity is distributed as $N(\theta_H, \sigma)$. The L establishments only get low-productivity applicants of quality θ_L , and $\theta_H > \theta_L$. Suppose that each type of establishment hires any applicant whose productivity meets a certain threshold, with the threshold higher for H establishments.

All establishments can also hire a connection (with no hiring cost). Connections are drawn from a distribution of productivity $N(\theta_C, \sigma)$, where $\theta_H > \theta_C > \theta_L$. That is, connections are, on average, more productive than applicants to the L establishment

but less productive than applicants to the H establishment. This reflects two assumptions, which we think are reasonable. First, the H establishments are already getting the most productive workers, so these high-quality workers are not available to be hired via connections by any establishment. Second, the owners of L establishments are of higher social status than their workers and are thus able to pull from a higher-ability network.

Within establishment type, there are profit-maximizing establishments (P) and utility-maximizing establishments (U). This is an unobservable characteristic. The difference between P and U establishments is that U establishments get utility from hiring someone connected to the owner. So while a P establishment maximizes profits π , a U establishment maximizes $\pi + \alpha C$, where C is the number of workers who the owner is connected to and $\alpha > 0$. We refer to this type of use of connections as nepotism.

Establishments can also hire someone referred by a current worker, also with no hiring cost ($p = 0$). A referred worker has productivity that is the same as the worker who referred them (e.g., Beaman and Magruder (2012)).

4.2 Model Implications

We now discuss how H and L establishments use connections and the outcomes associated with that use. H establishments, as long as they are profit-maximizers, have little use for connections, because their applicants are, on average, better than workers they could hire via connection. But utility-maximizing H establishments will use connections for nepotism, and when they do, they will get less productive workers than the H establishments that do not use connections. So H establishments will rarely use connections, but when they do, they are used only for nepotism.

For L establishments, hiring via connections can increase productivity, because connections are higher quality on average than their applicants. Utility-maximizing L establishments can use connections both to boost productivity and for nepotism. So L establishments use connections much more than H establishments, for some mix of productivity and nepotism. They may see a productivity benefit as a result.

Finally, we can discuss referrals. H establishments have high-quality workers who

can refer other high-quality workers. They will accept referrals from their best workers and should therefore get a productivity boost from using referrals.

L establishments, however, cannot get a productivity boost from referrals, because they only have workers of quality θ_L , who refer other low-quality workers. But they can reduce hiring costs and turnover by using referrals. Both H and L establishments will use referrals and benefit from the practice, but the benefits are heterogeneous. H establishments get higher productivity, while L establishments get lower turnover.

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 have heterogeneous effects 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 (e.g., Yang (2012), Headd (2000), Cardiff-Hicks et al. (2015), Busso et al. (2012), Loayza (2018)).

In our data, the formal/multi-site stores 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 connections should reduce productivity for H establishments but may increase it for L establishments. The third is that 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. From our data, we make use of three types of outcomes. The first 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.

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 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 (e.g. Dobbs et al. (2012), Barbarasa (2017), 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. 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 (everyone else) 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 delays, 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.⁴

By contrast, lower-productivity establishments that utilize connections see 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 high and low productivity groups is large and significant. Use of the practice in high job quality establishments (formal/multi-site) is associated with 7.5 weeks longer time to acceptable productivity than in lower job quality establishments.

⁴Note 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)	(2)	(3)	(4)	(5)
	Wks to Productivity	Quits	Terminations	Total Turnover	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)
Interactions					
<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***</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. ("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***</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>
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.

On referrals, we also find strong support for our model's predictions of heterogeneous effects on productivity. For lower-productivity establishments, use of referrals is associated with 2.6 weeks slower time-to-productivity ($p < 0.05$). Conversely, the practice in high job quality establishments predicts 2.5 weeks faster time-to-productivity. The difference in marginal productivity effects between high and low job quality use of referrals is a highly significant five weeks ($p < 0.01$).

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 effects 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.

Referrals show heterogeneous effects on turnover, as the model suggested. The low-productivity establishments, who did not see a productivity benefit from use of referrals, do see insignificantly lower turnover. The better 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.⁵

Interestingly, we do not see any effects of network-based hiring on 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.

⁵All of our results are robust to including only a smaller set of covariates in our regressions.

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 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 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 functioning of the labor market by facilitating or expanding referral networks should recognize that the productivity benefits from such networks will be concentrated among larger formal organizations. Independent, smaller, informal organizations may get some benefits from the practice, but these effects will be more limited and less related to 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.

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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)
Interactions					
<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.