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ABSTRACT

This study examines the role of the Indian diaspora in the outsourcing of work to India. Our data are taken from oDesk, the world's largest online platform for outsourced contracts, where India is the largest country in terms of contract volume. We use an ethnic name procedure to identify ethnic Indian users of oDesk in other countries around the world. We find very clear evidence that diaspora-based links matter on oDesk, with ethnic Indians in other countries 32% (9 percentage points) more likely to choose a worker in India. Yet, the size of the Indian diaspora on oDesk and the timing of its effects make clear that the Indian diaspora was not a very important factor in India becoming the leading country on oDesk for fulfilling work. In fact, multiple pieces of evidence suggest that diaspora use of oDesk increases with familiarity of the platform, rather than a scenario where diaspora connections serve to navigate uncertain environments. We further show that diaspora-based contracts mainly serve to lower costs for the company contacts outsourcing the work, as the workers in India are paid about the market wage for their work. These results and other observations lead to the conclusion that diaspora connections continue to be important even as online platforms provide many of the features that diaspora networks historically provided (e.g., information about potential workers, monitoring and reputation foundations).

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1. Introduction

The economic integration of developing countries into world markets is an important stepping stone for economic transitions and growth. This integration can be quite challenging, however, due to the many differences across countries in language, cultural understanding, legal regulations, and much more. As a consequence, business and social networks are valuable mechanisms for achieving this integration (Rauch, 2001).

Ethnic-based interactions and diaspora connections are a prominent form of these networks. The benefits typically cited for diaspora networks include stronger access to information (especially very recent or tacit knowledge), matching and referral services that aid in linking firms together, language skills and cultural sensitivity that improve interactions, and repeated relationships that embed trust in uncertain environments and provide sanction mechanisms for misbehavior. Such traits are hard to construct yet crucial in many developed and emerging economies for business success. The history of these connections stretches back to the earliest of international exchanges (e.g., Aubert, 2001), and many studies continue to find important roles for diasporas in trade flows, foreign investments, knowledge diffusion, and similar.

Over the last two decades, the Internet has also risen to be a potent force for global economic exchanges. The Internet links customers and companies together worldwide, it enables labor to be provided at a distance, it provides instant access to information about foreign locations, and much more. How will the Internet and diaspora networks connect? On one hand, the substantial improvements in connectivity and reduced frictions of the Internet may reduce the importance of diaspora connections. On the other hand, the online capabilities may provide an effective tool that complements traditional diaspora connections. For example, Saxenian (2006) argues that ethnic connections and the more integrated world economy allow some countries to leap-frog traditional development stages.

To shed light on these important questions, we investigate the role of the Indian diaspora for online outsourcing of labor needs to India using data from oDesk. oDesk is the world's largest online labor market, processing \$30 million per month in contracts as of May 2012. oDesk provides an online platform for companies to post job opportunities. Workers worldwide can bid on these opportunities, and workers build public profiles of their past performance on

contracts. oDesk provides tools that aid companies in interviewing, monitoring, and paying workers selected for outsourced jobs.

The oDesk platform was founded in 2005, and today India is the largest country destination for outsourced contracts with more than a third of the worldwide volume. We investigate the role of the Indian diaspora in countries around the world for this performance using both descriptive and analytical techniques. A key feature of our data development, described in greater detail below, is that we identify company contacts located anywhere around the world who are likely of Indian ethnicity using ethnic name matching procedures. For example, individuals with the surnames Gupta or Desai are more likely to be of Indian ethnicity than individuals with the surnames Ming or Hernandez. Our measures of diaspora-linked outsourcing to India build upon this identification of ethnic Indians who are using oDesk.

Our evidence points to the following key relationships, which both resemble and differ from the prior work on diaspora networks:

- Ethnic Indians worldwide are more likely to contract with India when outsourcing than other non-ethnic Indian company contacts. The increase in likelihood is about 9 percentage points, or 32%, and it is most prominent for companies outside of the United States. This higher likelihood is evident in multiple types of contracts, including contracts involving companies with varied experience on oDesk and contracts at different points in time.
- Even with this increased likelihood of outsourcing to India, diaspora connections played a very small role in India's rapid development on oDesk. For example, ethnic Indians account for 3.9% of oDesk company users in the United States by contract volume, while 29% of outsourced contracts from the United States go to India. We repeatedly observe that the magnitude of diaspora-linked connections is too small to have accounted for much of India's development on oDesk given the overall size of the platform.
- The higher likelihood for ethnic Indians outsourcing to India is increasing with time. Moreover, this propensity is increasing as company contacts develop experience on the platform. These patterns suggest that the higher propensity is not due to ethnic connections overcoming uncertain environments. Instead, utilization of ethnic

connections increases with familiarity, suggesting a longer-term complementarity between online platforms and diaspora connections.

- Diaspora connections occur through the actions of many people in small ways and the extreme concentration of impact due to a few key people. We document below a fairly broad footprint of diaspora ties both across and within countries. We also show how a single ethnic Indian outsourced such a high volume of work that this individual's operations exceeded that of any country except the top four nations.
- Diaspora connections provide cost advantages to the company contacts sending work to India relative to the other contracts that these company contacts form on oDesk. On the other hand, the workers in India are paid wages that are typical on oDesk for the type of work being undertaken in India.
- In addition to these analyses that examine evidence on connections within the oDesk data, we demonstrate how the broader Indian diaspora in a country (measured as migrants from India as a share of country population) systematically connects to a greater ethnic Indian use of oDesk and a larger share of contracts being sent to India from the country. This background connects studies that consider diasporas from a macro perspective (e.g., linking trade flows to diaspora shares by country) with studies that consider micro evidence (e.g., that international patent citations are more likely on ethnic lines).

We find these results quite striking. As we describe in the next section, oDesk's business model focuses on reducing barriers to outsourcing work. oDesk seeks to minimize as many frictions as possible—for example, the platform provides companies with knowledge of workers for hire in India and their qualifications, provides a shared infrastructure for monitoring and payments between companies and workers, and creates a labor market where workers are building reputations that enable future work and higher wages. These frictions that oDesk minimizes, of course, are frictions that diaspora networks have historically been used to overcome. We thus view our results as a lower bound on the importance of diasporas, but also perhaps a view as to what their role will be in the future as these online capabilities further grow. The pattern of results predicts that diasporas will continue to use online platforms in an effective

manner, but that diasporas will not be responsible for a country's overall success on the platform (at least in countries of moderate to large size).

Our work is related to several literature strands. It first contributes to a developing literature that explores the operation of online labor markets. The closest related study is Agrawal, Lacetera, and Lyons (2012), who find that workers from less-developed countries find it more difficult to contract work with developed countries on oDesk. This is especially true for initial contracts, and the disadvantage closes somewhat with the worker's platform experience. The authors suggest that some of this difficulty may be due to challenges companies in advanced economies encounter when evaluating the experience of the workers abroad outside of the oDesk platform. It is possible that diaspora connections help in this capacity.¹

Our work relates to research investigating the outsourcing of work from advanced economies, the emergence of incremental innovation in developing countries, and connections between immigration and outsourcing.² More broadly, these findings contribute to understanding the role of diasporas and ethnic networks in economic exchanges across countries. Ethnic networks have been shown to play important roles in promoting international trade, investment, and cross-border financing activity, with recent work particularly emphasizing the role of educated or skilled immigrants.³ This work has further emphasized the role of diaspora

¹ Other studies of oDesk labor contracts include Stanton and Thomas (2011) and Pallais (2011). Autor (2001) and Horton (2010) review online labor markets. Montgomery (1991) models social networks in labor markets. Beyond labor markets, Forman, Ghose, and Goldfarb (2009) study the interplay between local and online consumer options. Freedman and Jin (2008) and Agrawal, Catalini, and Goldfarb (2012) study social networks in online lending. A recent example of off-line work in this regard is Fisman, Paravisini, and Vig (2012).

² For example, Feenstra and Hanson (2005), Liu and Trefler (2008, 2011), Amiti and Wei (2009), Blinder and Krueger (2009), Ebenstein et al. (2009), Puga and Trefler (2010), Ottaviano, Peri, and Wright (2010), Mithas and Lucas (2010), Harrison and McMillan (2011), and Tambe and Hitt (2012). Banerjee and Duflo (2000), Khanna (2008), and Ghani (2010) consider aspects of these phenomena for India specifically. Wang, Barron, and Seidmann (1997), Cacion and Harker (2002), and Novak and Stern (2008) provide related models of the sourcing choice.

³ Broad reviews of diaspora effects include Rauch (2001), Freeman (2006), Clemens (2011), Docquier and Rapoport (2011), and Gibson and MacKenzie (2011). Evidence on foreign direct investment includes Saxenian (1999, 2002, 2006), Arora and Gambardella (2005), Buch, Kleinert, and Toubal (2006), Kugler and Rapoport (2007, 2011), Bhattacharya and Groznik (2008), Docquier and Lodigiani (2010), Iriyama, Li, and Madhavan (2010), Huang, Jin, and Qian (2011), Nachum (2011), Hernandez (2011), Javorcik et al. (2011), Rangan and Drummond (2011), and Foley and Kerr (2012). Evidence on trade includes Gould (1994), Head and Ries (1998), Rauch (1999), Rauch and Trindade (2002), Kerr (2009), Rangan and Sengul (2009), and Hatzigeorgiou and Lodefalk (2011).

connections in technology transfer.⁴ Our analysis is among the first to be able to study outsourcing as a channel, and we derive evidence that links diasporas to both greater use of oDesk by ethnic Indians in the country and greater flows of outsourced work to India.

The next section of this paper describes the oDesk platform and our ethnic name matching procedures used to identify the Indian diaspora. Section 3 provides a descriptive analysis of the data for India to illustrate many of the above findings. Section 4 turns to more analytical approaches to quantify placement propensities, wage effects, and the links of ethnic Indians on oDesk to the broader Indian diaspora by country. The last section concludes.

2. oDesk Outsourcing Platform and Ethnicity Assignments

oDesk is a platform that connects workers who supply services with buyers who pay for and receive these services from afar. Examples include data-entry and programming tasks that do not require in-person interaction. The platform began operating in 2005, and hundreds of millions of dollars of transactions have since occurred. The market is rapidly growing, and oDesk is now the world's largest platform for online outsourcing. There are other sites that provide similar services, some of which pre-date oDesk's founding, but oDesk's expansion mainly reflects increasing demand for online labor services over time. Statistics from compete.com, a company that tracks Internet traffic, show that unique visits to oDesk and its four largest competitor sites increased simultaneously in recent years. The rate of overall growth for online outsourcing slowed with the financial crisis, but oDesk has continued to grow rapidly.

The oDesk market is a unique setting to study the diaspora impact on economic exchanges due to its recent emergence and exceptionally detailed records. One important feature is that any worker can contract with any firm directly, and all work takes place and is monitored via a proprietary online system. In exchange for a 10% transaction fee, oDesk provides a comprehensive management and billing system that records worker time on the job, allows easy communication between workers and employers about scheduled tasks, and takes random

⁴ Recent work includes Kapur (2001), Kapur and McHale (2005a,b), Agrawal, Cockburn, and McHale (2006), MacGarvie (2006), Nanda and Khanna (2010), Oettl and Agrawal (2008), Kerr (2008), Agrawal et al. (2011), and Foley and Kerr (2012). Singh (2005), Obukhova (2009), Choudhury (2010), and Hovhannisyan and Keller (2010) study related forms of international labor mobility and technology diffusion, and Keller (2004) provides a review. Marx and Singh (2012) consider knowledge flows and borders versus distance.

screenshots of workers' computer terminals to allow monitoring electronically. These features facilitate easy, standardized contracting, and any company and any worker can form electronic employment relationships with very little effort.

Some background about how workers post resumes and apply for jobs is necessary to understand the setting.⁵ A worker who wants to provide services fills out an online profile describing his/her skills, education, and experience. Workers can also take tests to certify competence in specialized subject areas like web development, C++ programming, or database administration. As a worker gains experience on the platform, his or her entire history of employment, including wages and hours, is publicly observable. For jobs that have ended, a feedback measure from previous work is publicly displayed. Figure 1 provides an example of a worker profile from oDesk.

On the buyer side of the market, a company or individual looking to hire fills out a description for each job, including the skills required, an assessment of the expected duration, and some preferred characteristics for a potential match. Historically most of the jobs posted were contracts paying an hourly rate for technology or programming related skills such as software or web development, but postings for administrative assistance, data entry, graphic design, and smaller categories became more prevalent after the first few years of oDesk's operation. After a company posts a position, workers apply to the opening and bid an hourly rate. After reviewing applications, the hiring contact at a firm sets up interviews. After this process, the firm and selected worker agree to begin an employment relationship.

We study the role of the Indian diaspora for facilitating oDesk contracts to India. oDesk does not collect a person's ethnicity or country of birth, so we use the names of company contacts and workers to probabilistically assign ethnicities. This matching approach exploits the fact that people with particular first names and surnames are likely to be of a certain ethnicity. For example, individuals with surnames like Chatterjee, Gupta, or Patel are significantly more likely to be Indian in ethnicity than individuals with surnames like Wang, Martinez, or Johnson.

Our matching procedure exploits two databases originally developed for marketing purposes by the Melissa Data Corporation and LSDI, common naming conventions, and hand-

⁵ This oDesk description follows closely from the original working paper of Stanton and Thomas (2011).

collected frequent names from multiple sources like population censuses and baby registries. The process assigns individuals a likelihood of being Anglo-Saxon, Chinese, European, Hispanic, Indian, Japanese, Korean, Russian, and Vietnamese. Kerr (2007, 2008) and Kerr and Lincoln (2010) provide extended details on the matching process, list frequent ethnic names, and provide descriptive statistics and quality assurance exercises.

Several features of this work should be noted. First, some records will not be matched to an ethnicity, either due to incomplete records for listed ethnicities (e.g., very obscure names) or to uncovered ethnic groups (e.g., African ethnicities). Second, this approach can describe ethnic origins, but it cannot ascertain immigration status. For example, a U.S.-based company contact with the surname Singh will be assigned to be of ethnic Indian origin, but the approach cannot say whether the individual is a first- or later-generation immigrant. Third, while we focus on the Indian ethnicity, attempting to match on all nine ethnic groups is important given that some names overlap across ethnicities (e.g., D'Souza in the Indian context due to past colonization). Finally, while we use the terminology "Indian" for our ethnic assignment, it is worth noting that the procedure more broadly is capturing South Asian ethnic origin. Names originating from India, Pakistan, Bangladesh, etc. overlap too much to allow strict parsing.

We assign ethnicities to company contacts undertaking hiring on oDesk, with a raw match rate of 88%. This match rate is 89% when removing records that are either missing names or have non-name entries in the name field (e.g., either the company is listed in the name field or a bogus name like "test"). The four most common surnames linked with the Indian ethnicity are Kumar, Singh, Ahmed, and Sharma.

As a final note on our data, it is important to say more on the role of the company contacts to which we have made ethnicity assignments. The company contact is the individual within the firm that is undertaking the hiring and paying for the service. This is good for our study in that we want to evaluate the role of ethnic connections in outsourcing decisions, and this structure illuminates for us the person within the larger firm making the hiring choice. There is a limitation, however, in that oDesk does not link these individual company contacts into larger firms. Thus, we have multiple points of contact that are separately listed in the data for larger firms. This structure limits our potential to describe the firm size distribution on oDesk, but for most applications this has limited consequence.

3. Descriptive Features

We turn now to a descriptive analysis of the Indian diaspora's role in outsourcing contracts to India, to be followed in the next section with a more analytical approach. Our data begin at oDesk's founding in 2005 and run through August of 2010.

We begin in Table 1 with the geographical distribution of the top 20 countries outsourcing work to India on oDesk. The United States is by far the largest source of oDesk contracts going to India, with 31,261 contracts over the five-year period. A majority of all contracts on oDesk originate from the United States. The distribution of contract counts has a prominent tail. The United States is followed by Australia, the United Kingdom, and Canada, which combined equal about a third of the U.S. volume. Spain, the 10th largest country in terms of volume to India, is responsible for 269 contracts, which is less than 1% of the U.S. volume. Hong Kong, the 20th largest source, accounts for 125 contracts.

Columns 4 and 5 show the share of contracts originating from each country that go to India, both in total and relative to cross-border contracts only (i.e., excluding oDesk contracts formed with workers in the source country). Contracts to India represent a 29% share of all contracts originating from the United States and a 33% share of cross-border contracts. Across the top 20 countries, India's share of a country's contract total volume ranges from 18% in Switzerland to 55% in the United Arab Emirates (UAE). The unweighted average of the top 20 countries is 28%. The UAE is an exceptional case that we describe further below. The UAE is responsible for 989 contracts to India, and India's 55% share of contracts originating from the UAE is 17% higher than the next highest share of 39% for Italy.

The composition of the countries within Table 1 and their relative propensities to contract with India provide some suggestive insights about the traits of countries outsourcing work to India. First, distance to India does not have a visible role like it would in many international exchanges, reflective of the online labor market platform. Second, most of the countries in the top 20 have high income levels, perhaps indicating stronger potential cost savings from outsourcing to India. Third, it is noticeable that most of the top countries have large Indian diaspora populations, but there could be other factors that explain this association (e.g., English

language proficiency). We return below to a multi-variate analysis of contract flows to India by country to quantify these features more systematically.

Column 6 documents the share of company contacts in each country with an ethnically Indian name, regardless of how they use oDesk, while column 7 provides the ethnic Indian percentage for company contacts on contracts that are being outsourced to India. For the United States, 3.9% of all company contacts who use oDesk are ethnically Indian, while the share is 4.6% for outsourced work to India.

These numbers are very important for placing diaspora effects into context. As a first comparison point, 0.9% of the U.S. population in the 2010 Census of Populations was born in India. These numbers are not exactly comparable, as our measure is based off of ethnicity, rather than country of birth, and includes South Asia more generally. Nonetheless, even after taking these features into account, the role of Indians on oDesk is perhaps twice as strong as the overall Indian population share. This matches popular perceptions that Indians are very active in high-tech sectors that use oDesk and similar online tools.

As a second comparison point, Kerr and Lincoln (2010) estimate the Indian share of U.S. inventors to be about 5% in 2005 using patent records from the United States Patent and Trademark Office. This second comparison point uses exactly the same name matching approach as the current project. It thus suggests that Indians may use oDesk somewhat less as a share of total users compared to their general work in high-tech sectors.

Beyond the 3.9% share of U.S. company contacts that use oDesk, ethnic Indians account for 4.6% of outsourced work to India from the United States. This higher use for India specifically can be conveniently expressed as a ratio of 1.18 between the two shares. The higher ethnic share for Indian-specific contracts generally holds, with 13 of the top 20 countries having a ratio greater than one. The average ratio across all 20 countries is 1.30.

Thus, the descriptive data suggest a special role for diaspora connections in sending work to India. The next section more carefully quantifies this role when taking into account potential confounding factors (e.g., the types of projects being outsourced), finding that the special role persists. But, we also should not lose sight of the absolute quantity of the shares. Ethnic Indians in the United States only account for about 5% of all of the nation's outsourced work to India. The average across the top 20 countries is 7%, falling to 3% when excluding the UAE. While

ethnic Indians are more likely to send work to India, the rise of India to be the top worker country on oDesk has much broader roots than diaspora connections. With online platforms, diasporas still matter, but the bigger message may be that they matter much less than they likely did in the past for commencing trade or similar exchanges.

Finally, column 8 of Table 1 lists the average hourly wage paid to Indian workers on outsourced contracts. To reduce the impact of outlier wages, we take the average log wage and express this in U.S. dollars. The average wage paid by companies in the United States on contracts to India is \$8.30 per hour. The highest observed average wage is \$10.90 per hour for Spain, the lowest is \$4.60 per hour for New Zealand, and the average over the top 20 countries is \$8.40. As the average wage on oDesk for data entry and administrative support jobs is below \$3.00 per hour, the contracts being outsourced to India represent relatively skilled work that involves programming and technical skills. The correlation of columns 4 and 8 is 0.5, indicating that countries sending more of their work to India are also paying higher average wages. The correlation of columns 6 and 8 is 0.2, indicating that greater ethnic Indian involvement in placing work into India is correlated with higher average wages.

Tables 2a and 2b provide a company-contact perspective, with the caveat noted earlier that we observe company contacts that are not linked into larger firms. While we are not allowed to disclose the identity of individual company contacts, we can provide some suggestive traits about them. Beginning with U.S.-based companies in Table 2a, the 12 largest company contacts in terms of outsourced work to India accounted for 708 of the United States' 31,261 contracts to India during this period. There is substantial heterogeneity in the geographic location of these 12 companies and the degree to which they typically utilize India for outsourcing. The largest U.S. company contact sponsored 118 contracts, is located in Virginia, and 100% of the company's contracts have gone to India. In contrast, the third largest company contact is located in Florida, with 73 contracts to India that represent only 26% of the company's total contract volume. This company contact footprint is thus very dispersed, with the largest company contact accounting for only 0.4% of the United States' outsourced work to India, although on absolute counts the company contact is comparable to the total volume originating from Hong Kong. Finally, echoing our earlier observation about the very broad roots of India's success on oDesk, only one of the 12 company contacts in Table 2a is of Indian ethnic origin.

Our most striking descriptive statistic is given in Table 2b, which provides a similar list to Table 2a for company contacts based outside of the United States. When discussing Table 1, we noted at several points the exceptional performance of the UAE: it ranked fifth on the overall country list, sent half its contracts to India, and over 90% of its company contacts were of ethnic Indian origin. Table 2b reveals this to be in large part the consequence of a single company contact that accounted for 906 of UAE's 989 contracts to India. This one company contact sent more work to India than the sum of the 12 largest company contacts in the United States! The next largest company contact sent 68 contracts to India, 36% of total company's contract volume, and was located in the United Kingdom. Overall, there is again substantial heterogeneity in Table 2b in how company contacts connected with India.

While disclosure restrictions again prevent us from naming the UAE-based company contact, its background is interesting for understanding its role. The company is the work of an entrepreneur who uses oDesk for placing and managing outsourcing work. The entrepreneur is of ethnic Indian origin, and much of the work is placed into India. Studies of diaspora networks have speculated about the likely concentrated importance of single individuals (e.g., Kuznetsov 2009), and oDesk provides some of the first quantifiable evidence of this concentration. The 906 contracts facilitated by this individual alone are responsible for the UAE's fifth-placed ranking, and this company contact accounts for 2.4 times as many contracts as the Netherlands, the sixth-ranked country.

Table 3 provides descriptive statistics by types of jobs undertaken on oDesk. Panel A reports contract counts, Panel B the distribution of job types, and Panel C the average hourly wages paid. Columns 2-6 report traits on U.S.-based companies. The various columns describe the behavior of ethnic and non-ethnic Indians who are hiring abroad in general (columns 3 and 4) and for those hiring in India specifically (columns 5 and 6). Columns 7-9 provide similar detail for companies located outside of the United States, excluding companies based in India itself.

Panels A and B further confirm the earlier result that ethnic Indians disproportionately hire workers in India, but that diaspora connections represent a small share of the contract volume between India and the rest of the world. There are 109,722 contracts originating from the United States, and 93,422 of these contracts involve hiring a worker abroad. Ethnic Indians formed 3,516 contracts with workers abroad, of which 1,358 (38.6%) of these contracts involved

a worker in India. Company contacts in the United States not of Indian ethnic origin formed 90,906 contracts abroad, with 29,716 (32.7%) contracts outsourced to India.

Panel B shows that companies tend to send relatively skilled jobs to India, in line with the higher salaries noted in Table 1. The job types are listed in descending order of salary, and column 2 provides the baseline point of comparison. Administrative support, the lowest skilled task according to average wages, makes up 21% of the contracts originating from the United States. 16% of the contracts that ethnic Indians send abroad are for administrative support jobs, but only 11% of the jobs that ethnic Indians send to India involve administrative support. Similarly, 21% of the contracts that non-Indians send abroad involve administrative support, but only 10% of the contracts sent to India by company contacts of non-Indian ethnic origin involve administrative support. A similar pattern holds for non-American companies.

Much of the work sent to India is technical in nature. Among ethnic Indians in the United States, web development makes up 42% of the contract volume sent abroad and over 55% of the contract volume sent to India. Web development includes tasks like programming in Perl, PHP, Python, or Java, website database development, and user interface programming and implementation. This tendency to outsource skilled work to India is even more striking for non-Indians in the United States who outsource 63% of their work to India for web development. The increased likelihood of observing high-end skills-based contracts is also evident for non-American companies, and is similarly extreme for non-ethnic Indians hiring in India.

In short, while we continue to collect evidence that ethnic Indians disproportionately select India as an outsourcing destination, there is not much evidence that these diaspora connections shift the type of work being outsourced. Ethnic-based connections appear to follow along the competencies of India's workers, and company contacts who are not of Indian ethnicity are also hiring at a rapid rate in India for technical tasks that require complex communication and project management.⁶

Panel C of Table 3 examines average wages paid. Ethnic Indians in the United States who hire abroad pay about \$7.00 per hour overall, compared to \$6.30 per hour for non-Indians hiring abroad. Part of this difference is explained by the skill composition of contracts. In the

⁶ One potential exception to this pattern is that ethnic Indians in the United States appear more likely to outsource writing and translation work to India, but this difference is a small part of the total distribution.

highest-skilled job tasks, the wages paid abroad by ethnic Indians and non-Indians in the United States are virtually identical. On contracts to India, however, ethnic Indians pay much lower wages than their non-Indian counterparts. For companies in the United States, ethnic Indians who hire in India pay about \$7.80 per hour overall, compared to \$8.40 for non-Indians. Some of this difference could be due to the distribution of contract types, but the wage differential is also apparent for the best-paid job categories as well. Indians from the United States who hire in India pay about \$10.50 per hour for web development work, while similar non-Indians pay about \$10.90 per hour. The difference is even more extreme, both in absolute and percentage terms, in software development. A similar pattern holds for companies outside of the United States.

4. Empirical Analysis of Ethnicity and Outsourcing

The descriptive features of the data exhibit many of the key features of diaspora connections that we observe, but the magnitudes have a sharper interpretation when quantified in more structured econometric frameworks. Table 4 quantifies the greater propensity of ethnic Indians for choosing India for outsourcing contracts, Table 5 considers the role of diasporas in gravity models taken from the trade literature, and Tables 6 and 7 consider wage outcomes in greater detail.

Diaspora Ties and Outsourcing on oDesk

Table 4 presents linear probability models where the dependent variable is a binary indicator that the chosen worker on a contract is located in India. The primary independent variable is the probability, assigned from the ethnic name matching algorithm, that the company contact is of ethnic Indian origin. Of our company contacts, 5.3% are linked to Indian names. Indian names are fairly distinct, so that in 90% of these cases the ethnic assignment is unique to the Indian ethnicity. In 10% of these cases, the Indian assignment overlaps with another ethnic group.

The four panels split the sample by the type of company or job opening. Panel A includes the entire sample of companies, excluding firms located in India. Panel B includes only companies in the United States, while Panel C contains only companies outside of India and the United States. Finally, Panel D takes the sample from Panel A, but conditions on whether a worker from India applied for the job prior to the contract formation. To control for the composition of work, the regressions include fixed effects for the year x job category of work.

The first column is for all contracts regardless of type. In each of the four samples we find a significant increase in the likelihood of selecting India as a destination for outsourcing contracts when the company contact is of ethnic Indian origin. In the whole sample, an ethnic Indian is nine percentage points more likely to select India as an outsourcing destination, conditional on job type and year, than a company contact of another ethnicity. This represents a 32% increase in the likelihood of selecting India relative to the constant. This effect is stronger outside of the United States than in the United States.

Columns 2 and 3 split the sample by contracts during 2008 and earlier versus contracts during 2009 and after. This partition looks at whether ethnic connections mattered more or less in oDesk's early development. The common pattern across this decomposition is that the Indian placement effect appears to be growing over time, with the surprising corollary that the effect was not significant economically or statistically for the United States in the very early days of oDesk. This is further evidence that diaspora connections were not important for the launch of India's success on oDesk, despite their localized importance in directing work to India.

Columns 4 and 5 split the sample by whether the job type is high-end or not, with high-end being defined by having an average wage rate equal to or higher than web development in Table 3 (i.e., networking and information systems, software development, and web development). The patterns here are not consistent, reflective of Table 3's finding that diaspora groups do not substantially shift the types of contracts outsourced. There was not a strong role for ethnicity in outsourcing high-end work from the United States, while more of a role was evident at the low-end. The opposite is true for company contacts outside of the United States.

Finally, columns 6 and 7 split the sample by whether the contract is the company contact's first contract on oDesk or not. These results suggest ethnicity's role strengthens with repeated use of the platform. This is quite interesting given that diaspora networks are often thought of as providing a substitute for well-defined contracts and/or as a mechanism for navigating uncertain environments. This rationale would have suggested that ethnic roles should have been stronger in the early days of oDesk or when a company contact is first testing the platform and uncertain about its strength. The fact that we find ethnicity ties instead matter more in later years and in follow-on contracts suggests that the ethnic connection is more centered on potential longer-run factors than these initial uncertainties. This is further striking given the

evidence from Agrawal et al. (2012) that workers in developing countries have an initial disadvantage on oDesk; one may have expected that diaspora-based links could have provided a fruitful opportunity to overcome the initial uncertainty about workers.

Overall, the results strongly suggest there is positive ethnic bias in hiring. Pulling back from the above partitions, a bigger message from Table 4 is that most every cut of the data finds economically and statistically important effects.

Link to Broader Diaspora Connections

To this point, our analysis has only exploited data derived from oDesk itself, and yet at multiple points we have framed our analysis in terms of the general diaspora literature. There remains something of a gap as it could be the case that use of oDesk by ethnic Indians across countries might be uncorrelated with the general Indian-ethnicity populations of countries. Rauch and Trindade (2002), for example, relate trade flows to the general distribution of the ethnic Chinese population across countries, rather than the greater likelihood that two observed traders are Chinese.

Table 5 closes this gap using empirical models similar to the gravity framework from the trade literature. The dependent variable in columns 1-6 is the share of contracts originating from the country on oDesk that are outsourced to India. We focus on shares of contracts, rather than contract volumes, as the adoption of oDesk across countries as a platform for e-commerce is still underway and somewhat idiosyncratic to date. Shares allow us to consider the choice of India for outsourcing independent of this overall penetration of oDesk.

The core dependent variable is taken from the World Bank's Bilateral Migration and Remittances 2010 database. This database builds upon the initial work of Ratha and Shaw (2007) to provide estimates of migrant stocks by country. We form the Indian diaspora share of each country's population by dividing these stocks by the population levels of the country. We complement this diaspora measure with distances to India calculated using the great circle method, population and GDP per capita levels taken from the United Nations, and telephone lines per capita in 2007 taken from World Development Indicators.

We also calculate a more specialized control that is the fit of the country's outsourcing needs with the typical worker in India. We calculate this control by first measuring the share of

contracts outsourced from the country in each of the nine job categories given in Table 3, independent of where the contract is filled. We likewise measure the distribution of oDesk work performed in India across the nine job categories, independent of where the company contact is located. We then calculate the sum of the squared deviations of these two distributions to measure how closely the work typically filled in India matches the needs of a given country. We subtract this sum of deviations from one, so that positive values represent a better fit, and we transform the measure to have unit standard deviation to aid interpretation.

Column 1 presents our base estimation. We have 92 observations, and we weight by the log number of worldwide contracts formed on oDesk. The first row shows the connection of oDesk outsourcing to the diaspora population share, which is quite strong. A 1% increase in the Indian diaspora share of a country is associated with a 1% increase in the share of oDesk contracts outsourced to India. The country-level placement of oDesk contracts to India systematically followed the pre-existing levels of Indian diaspora communities.

Looking at the other covariates, we find that distance does not matter in the oDesk context like it does in many estimates of economic exchanges. In fact, the share of contracts sent to India increases with distance from India. The overall fit of a country's outsourcing needs with the skillsets of Indian workers predicts greater shares of work are sent to India. There does not appear to be a systematic link beyond the diaspora share to country population, and the strength of telephone penetration does not predict higher or lower connections to India. We likewise found similar weakness to Internet penetration measures, but they were not as uniformly available. Finally, countries with higher GDP per capita send less of their work to India conditional on the other covariates.

Many countries on oDesk have very few contracts, which can generate noisy share estimates. Our main estimations thus weight by contract volume to focus attention on better measured data and more meaningful observations; we utilize log weights to not overly emphasize the United States experience in particular. Columns 3 and 4 show similar results when we weight by log country population or when we exclude the weights. In both cases, the coefficients decline somewhat and the standard errors grow given the greater emphasis placed on noisy outcomes, but the role of diasporas remains economically and statistically significant.

Column 5 shows similar results when adding a control for the total count of contracts on oDesk by the country worldwide.

Column 6 tests whether this connection is simply following on existing business relationships that countries have with India. We measure the extent to which India is an important trading partner of the country by the total volume of trade in 2007 between India and the country divided by the focal country's GDP. Introducing this as a control does not affect our results. Column 7 finds similar results when examining the dollar share of contracts being sent to India rather than the count share. The coefficient declines but remains economically and statistically important.

Column 8 provides an important connection between Tables 4 and 5. The dependent variable is the share of company contacts using oDesk in the country that are of ethnic Indian origin (independent of whether or not the work is contracted with India). There is a very strong connection between an increase in diaspora shares of the country population generally and increases in the share of oDesk company contacts that are of Indian ethnic origin.

We have tested the robustness of this diaspora finding in several ways. First, the results are not overly-dependent upon a single country, and we find very similar results when excluding the United States, Pakistan, and similar. Excluding the UAE has the largest effect, resulting in a point estimate of 0.878 (0.660), which is not very surprising given that the Indian diaspora's share of 35% in the UAE is by far the largest, twice that of the next-highest states of Qatar (18%) and Oman (17%). As a second approach, we find a point estimate of 1.629 (0.654) when winsorizing diaspora shares to Oman's value to cap the UAE's extreme value. The role of the diaspora community is also very similar when including a control for English language proficiency, which we are able to assemble for about half of the countries in our sample.

Using the three partitions discussed earlier, the diaspora coefficient is 0.893 (0.263) for 2008 and prior, 1.085 (0.240) for 2009 and later, 0.798 (0.238) for high-end contracts, 0.592 (0.113) for low-end contracts, 0.448 (0.232) for initial contracts, and 1.134 (0.334) for subsequent contracts. The effect is again evident in all six groups, with the most important difference being the greater role in subsequent contracts versus initial oDesk work. This suggests that online platforms become more useful to diasporas with familiarity and that there may exist a long-term complementarity.

Estimated Wage Effects with Ethnic-based Connections

Our final analysis focuses on wage rate effects due to diaspora connections. We take two perspectives in these calculations. Table 6 first examines whether diaspora-linked contracts differ from the typical contract formed with workers in India. This approach corresponds to the perspective of the Indian worker. Table 7 takes the second perspective of the company contact. Do diaspora connections reduce the wages that company contacts need to pay for a given job type compared to their typical alternatives?

The outcome variable in Panel A of Table 6 is the log wage rate of the worker. The core independent variable is the likelihood that the company contact abroad is of Indian ethnicity. We include in these regressions fixed effects for year x job type x country of company contact. We thus identify, for example, whether ethnic-based contracts outsourced from the United States to India in “web development” in 2008 paid a lower average wage than similar contracts formed by U.S. company contacts not of Indian ethnicity. This strict regression framework isolates the variation around the ethnic connections, removing aggregate differences across countries and outsourcing job types.

The point estimates are all negative, suggesting modestly lower wages. The estimated coefficient in column 1 suggests that a typical \$10 per hour contract would be paid about \$9.76 with an ethnic-based connection. These effects, however, are not statistically different from zero. The one exception is high-end work, which has the largest point decline and is precisely estimated.

Panel B of Table 6 takes an alternative route where we compare the wage rate paid to the selected worker to the median proposal made by other workers that bid on the same job opportunity via oDesk. This is a very attractive baseline of comparison as the bids made by other workers are informative about how the work opportunity and its technical difficulty were perceived. It may be, for example, that there is heterogeneity in project types among “web development” that we miss in Panel A. By comparing selected bids to the set of proposals that company contacts received, we better isolate the potential ethnic role in wage determination.

The estimates in Panel B further weaken the case that workers in India are paid differently on diaspora-based contracts than usual. High-end contracts remain the most likely

candidate, but these effects are quite small. Most variations suggest less than a 1% differential in diaspora-linked outsourcing. We find similar results to these in variants that control for past performance ratings (in a smaller sample that conditions on being an experienced worker).

Table 7 repeats the specifications from the perspective of the company contact outside of India. Our sample is all of the contracts formed worldwide by ethnic Indians working as company contacts outside of India. We then compare the wages paid on these contracts to investigate if there is a differential for work outsourced to India. We include in these regressions fixed effects for year x job type x country of company contact. We thus identify, for example, whether ethnic Indians in the United States who outsourced contracts to India in “web development” in 2008 paid a lower average wage than similar contracts formed when outsourcing to countries other than India.

The effects in Table 7 are much stronger than in Table 6. Panel A finds lower wages across all variants for work outsourced to India compared to what ethnic Indians abroad normally pay. The estimates, of course, could be overstated due to the underlying heterogeneity in the type of work sent to India. Panel B identifies, however, that these lower wages persist even after comparing the wage to the median proposal bid received.

To summarize, the wage estimations suggest that diaspora-linked contracts to India provide lower costs to the ethnic Indians living abroad than what they typically pay for work. This wage rate is lower in absolute terms and relative to the pool of received bids for work. On the other hand, diaspora-linked contracts have minimal wage effects for the workers in India. The main effect of diasporas on outsourcing in the Indian context appears to be the advantageous placement of contracts to India, where workers are paid the typical wage rate for their efforts.

5. Conclusions

Diaspora-based exchanges have been important for centuries, but the online world reduces many of the frictions these networks solved. This study investigated the importance of Indian diaspora connections on the oDesk platforms for outsourcing. Our work finds strong evidence that diasporas still matter and influence economic exchanges, even when many frictions are minimized. In fact, our case study suggests more often than not that diaspora use increases as familiarity with the platform increases. This suggests a longer-term complementarity between

diaspora networks and online tools that may aid the persistence of these networks. On the other hand, the oDesk evidence also makes clear that the role of diaspora networks should not be overstated. While they contributed to India's success on oDesk, diaspora connections were clearly not a driving force in India becoming the top destination for oDesk contracts.

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Figure 1: Example of a worker profile in oDesk



Naveen Bali

Expert in PHP/ Mysql/ JS/ Ajax/ web scraping /jQuery/ codeignitor

📍 Panchkula, India

\$22.22/hr

★★★★★
30 jobs completed
1,234 oDesk hrs

[Post a job](#)
or
[Contact](#)

What's the difference?

Skills

- php
- mysql
- ajax
- jquery
- html

[more...](#)

Overview

Master in Project development i have deep knowledge of every stage of software development lifecycle . My last job was at Yahoo banglore my designation was senior software engineer in web development department. my area of skills is PHP5.0,mysql,javascript,jQuery,Ajax,JSON,HTML5.0 i have good understanding of MVC Architect i have worked in codeigniter and Zend framework . i have completed lot of projects in web scraping as well

Naveen Bali has added 7 portfolio pieces. [Create an account to review them.](#)

Tests Taken

PHP4 Test
92th percentile

PHP5 Test
90th percentile

Work History & Feedback

PHP Development & Support
May 2012 – Jun 2012 / \$3,030.56 (124 hrs @ \$24.44/hr)
★★★★★ Naveen did a great job with very little instruction.

Data Scraping
Mar 2012 – May 2012 / \$315.44 (fixed-price)
★★★★★ Naveen is great to work with and has a strong skill-set. For scraping we had some fields missing from the initial test runs but Naveen was quick to fix these and the final deliverables were spot on. You cannot go wrong working with him.

Web Scraping / Data Harvesting
Sep 2011 – Mar 2012 / \$582.05 (fixed-price)
★★★★★ Naveen was is very professional and a great resource to work with.

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Table 1: Country distribution of companies hiring developers in India

N	Country	Number of contracts with worker in India	India's share of total contracts originating from country	India's share of total cross-border contracts originating from country	Share of company contacts with Indian ethnic name	Share of company contacts hiring in India with Indian ethnic name	Average wage in US dollars paid on contracts with worker in India
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	United States	31,261	0.285	0.329	0.039	0.046	8.3
2	Australia	4,162	0.287	0.293	0.033	0.029	8.3
3	United Kingdom	3,583	0.280	0.290	0.065	0.079	7.7
4	Canada	2,921	0.285	0.294	0.065	0.082	8.1
5	UAE	989	0.545	0.546	0.906	0.941	10.3
6	Netherlands	384	0.297	0.299	0.026	0.013	8.2
7	Germany	360	0.227	0.230	0.020	0.024	7.9
8	France	310	0.264	0.270	0.017	0.018	8.2
9	Ireland	305	0.300	0.301	0.029	0.059	10.2
10	Spain	269	0.237	0.243	0.010	0.019	10.9
11	Italy	232	0.375	0.387	0.010	0.011	10.5
12	Sweden	219	0.270	0.275	0.026	0.014	10.6
13	Israel	216	0.229	0.233	0.035	0.079	6.8
14	Belgium	170	0.276	0.278	0.023	0.038	8.7
15	Switzerland	170	0.184	0.184	0.008	0.024	8.8
16	New Zealand	165	0.198	0.198	0.038	0.012	4.6
17	Singapore	159	0.212	0.215	0.068	0.038	5.7
18	Denmark	149	0.246	0.247	0.004	0.017	8.3
19	Norway	135	0.325	0.325	0.010	0.000	8.3
20	Hong Kong	125	0.282	0.286	0.014	0.000	7.3

Notes: Table describes the country distribution and traits of companies hiring workers in India. Ethnicities are estimated through individuals' names using techniques described in the text. Average wages are calculated by transforming the average of log wages into levels.

Table 2a: Largest US companies hiring developers in India

N	Number of contracts with worker in India	India's share of total contracts originating from company	Company contact has ethnic Indian name	US State
(1)	(2)	(3)	(4)	(5)
1	118	1.00	No	Virginia
2	94	0.98	No	California
3	73	0.26	No	Florida
4	62	0.93	No	Virginia
5	53	1.00	No	Connecticut
6	51	0.98	No	Wisconsin
7	46	0.38	No	Florida
8	45	0.68	Yes	New York
9	44	0.39	No	California
10	42	0.36	No	Nevada
11	40	0.56	No	Arizona
12	40	0.63	No	California

Table 2b: Largest non-US companies hiring developers in India

N	Number of contracts with worker in India	India's share of total contracts originating from company	Company contact has ethnic Indian name	Primary country
(1)	(2)	(3)	(4)	(5)
1	906	0.58	Yes	United Arab Emirates
2	68	0.36	No	United Kingdom
3	58	0.53	No	United Kingdom
4	46	0.84	No	Italy
5	45	0.34	No	Australia
6	44	1.00	No	Netherlands
7	42	0.14	No	Spain
8	40	0.38	No	Australia
9	39	0.87	No	United Kingdom
10	29	0.31	No	Australia
11	29	0.32	No	United Kingdom
12	29	0.63	No	Denmark

Table 3: Distribution of oDesk job types and wage rates paid

Job category	Companies in United States					Companies outside of the United States, excluding India		
	Total	Ethnic Indians who are hiring abroad	Non-ethnic Indians who are hiring abroad	Ethnic Indians who are hiring in India	Non-ethnic Indians who are hiring in India	Total	Ethnic Indians who are hiring in India	Non-ethnic Indians who are hiring in India
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Observation counts								
Total count	109,722	3,516	90,906	1,358	29,716	58,338	1,719	13,443
Panel B. Distribution of job types (ordered by average wage as shown in Panel C)								
Networking & inform. systems	2%	2%	2%	2%	1%	2%	1%	0%
Software development	7%	9%	7%	9%	8%	8%	38%	8%
Web development	40%	42%	42%	56%	63%	38%	40%	67%
Design & multimedia	9%	8%	8%	6%	6%	10%	4%	0%
Writing & translation	10%	9%	8%	6%	3%	11%	2%	4%
Business services	2%	1%	2%	1%	1%	2%	2%	1%
Customer service	1%	1%	1%	0%	0%	1%	3%	0%
Sales & marketing	10%	11%	10%	9%	7%	10%	4%	9%
Administrative support	21%	16%	21%	11%	10%	19%	6%	10%
Panel C. Mean hourly wage paid to worker								
Total	7.0	7.0	6.3	7.8	8.4	6.8	9.0	8.0
Networking & inform. systems	14.9	13.5	13.5	11.2	11.2	13.7	8.9	11.3
Software development	14.9	13.5	13.5	11.3	12.9	13.6	10.8	11.9
Web development	12.2	11.0	11.0	10.5	10.9	11.3	10.3	10.6
Design & multimedia	9.0	9.0	8.2	9.6	9.2	9.2	8.5	8.9
Writing & translation	5.5	5.5	4.5	4.9	4.8	5.5	4.3	4.4
Business services	5.0	4.1	3.7	5.0	4.4	5.5	6.3	5.7
Customer service	4.1	3.0	3.3	3.0	4.8	5.4	11.3	4.2
Sales & marketing	4.1	4.1	3.7	4.5	4.2	4.1	4.3	4.3
Administrative support	2.5	2.2	2.2	2.3	2.4	2.2	2.6	2.2

Notes: Wage rates are calculated through average log wages paid to workers and are expressed in dollars. Sample includes contracts with ethnic name matches and identified job category classifications. Sample splits in columns 3-6 and 8-9 exclude company contacts for which a partial Indian ethnicity assignment is made.

Table 4: Selection of India by ethnic origin of company contacts

	Total sample	2008 and prior	2009 and later	High-end contracts	Low-end contracts	Initial contracts	Subsequent contracts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable is a (0,1) indicator for choosing a worker in India Estimates include fixed effects for year x job type of contracts							
Panel A: Total sample, excluding Indian companies							
Probability that hiring contact is of ethnic Indian origin	0.090 (0.033)	0.044 (0.022)	0.101 (0.038)	0.111 (0.049)	0.066 (0.015)	0.061 (0.012)	0.095 (0.039)
Constant	0.279 (0.002)	0.371 (0.005)	0.251 (0.002)	0.417 (0.004)	0.153 (0.002)	0.317 (0.002)	0.269 (0.003)
Observations	168,060	39,888	128,172	80,295	87,765	35,856	132,204
Panel B: Companies located in the United States							
Probability that hiring contact is of ethnic Indian origin	0.049 (0.014)	0.026 (0.029)	0.056 (0.014)	0.028 (0.021)	0.071 (0.015)	0.051 (0.015)	0.047 (0.016)
Constant	0.283 (0.003)	0.375 (0.007)	0.251 (0.003)	0.422 (0.005)	0.154 (0.002)	0.318 (0.003)	0.273 (0.004)
Observations	109,722	28,083	81,639	52,662	57,060	23,541	86,181
Panel C: Companies located outside of the United States and India							
Probability that hiring contact is of ethnic Indian origin	0.131 (0.046)	0.074 (0.034)	0.141 (0.051)	0.192 (0.055)	0.056 (0.022)	0.082 (0.018)	0.137 (0.049)
Constant	0.273 (0.004)	0.363 (0.008)	0.250 (0.004)	0.406 (0.007)	0.152 (0.003)	0.313 (0.004)	0.262 (0.004)
Observations	58,338	11,805	46,533	27,633	30,705	12,315	46,023
Panel D: Total sample conditional on a worker in India applying							
Probability that hiring contact is of ethnic Indian origin	0.098 (0.048)	0.026 (0.019)	0.115 (0.055)	0.088 (0.060)	0.119 (0.032)	0.074 (0.015)	0.096 (0.050)
Constant	0.629 (0.003)	0.778 (0.004)	0.578 (0.003)	0.738 (0.003)	0.460 (0.005)	0.554 (0.003)	0.658 (0.004)
Observations	75,147	19,107	56,040	45,723	29,424	20,538	54,609

Notes: Contract level regressions estimate propensities to select a worker in India by the ethnic origin of the company contacts. The dependent variable is (0,1) for selecting a worker located in India. Panel A documents the whole sample, Panel B focuses on US company contacts only, and Panel C considers company contacts in any other country besides the United States and India. Panel D considers cases where a worker from India applies for the position. Column headers indicate sample composition. Initial and subsequent contracts are from the perspective of the company contact. Regressions are unweighted, include fixed effects for year x job category, and cluster standard errors by originating company. The reported constant is the mean of the fixed effects.

Table 5: Estimations of contract volumes formed on oDesk with workers in India

	Dependent variable is share of oDesk contracts formed with workers in India						DV is India's share of dollar value of contracts for country	DV is share of company contacts with Indian ethnic name
	Base estimation	Including distance covariates only	Weighting by log population	Unweighted estimation	Adding worldwide oDesk contracts	Adding trade with India control		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indian diaspora share of country population	1.086 (0.198)	0.727 (0.157)	0.817 (0.376)	0.717 (0.429)	1.131 (0.221)	0.999 (0.234)	0.683 (0.354)	2.596 (0.193)
Indicator for geographical distance to India of 5,000-10,000 kilometers	0.071 (0.030)	0.041 (0.026)	0.114 (0.046)	0.110 (0.047)	0.069 (0.031)	0.077 (0.033)	-0.033 (0.056)	0.005 (0.058)
Indicator for geographical distance to India of >10,000 kilometers	0.095 (0.029)	0.088 (0.030)	0.129 (0.045)	0.119 (0.046)	0.119 (0.027)	0.102 (0.033)	0.058 (0.063)	-0.073 (0.047)
Log population	-0.009 (0.007)		-0.013 (0.010)	-0.013 (0.010)	0.010 (0.008)	-0.009 (0.007)	0.011 (0.013)	0.001 (0.007)
Log GDP per capita	-0.041 (0.022)		-0.049 (0.024)	-0.044 (0.027)	-0.008 (0.025)	-0.041 (0.023)	0.010 (0.039)	-0.079 (0.034)
Log telephone lines per capita	0.004 (0.034)		-0.031 (0.043)	-0.036 (0.043)	0.005 (0.030)	0.004 (0.034)	-0.057 (0.055)	0.053 (0.041)
Overall fit of project types with India's developer profile	0.078 (0.039)		0.013 (0.057)	0.004 (0.058)	0.085 (0.039)	0.075 (0.040)	0.014 (0.057)	-0.032 (0.082)
Log count of oDesk contracts worldwide					-0.027 (0.009)			
Trade with India as share of GDP						0.660 (1.046)		

Notes: Country-level regressions estimate traits associated with a larger share of work being contracted to India. Regressions contain 92 observations, weight by log number of worldwide contracts formed on oDesk, and report robust standard errors.

Table 6: Wage rate effects within India due to ethnic-based contracts to India

	Total sample	2008 and prior	2009 and later	High-end contracts	Low-end contracts	Initial contracts	Subsequent contracts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
The sample is contracts formed with workers in India							
Estimates include fixed effects for year x job type of contracts x company country							
Panel A: DV is log hourly wage paid to worker							
Probability that contract is ethnic-based, derived from name classification	-0.024 (0.019)	-0.017 (0.028)	-0.027 (0.023)	-0.037 (0.021)	0.003 (0.037)	-0.031 (0.020)	-0.025 (0.025)
Observations	47,729	14,902	32,827	33,982	13,747	11,481	36,248
Panel B: DV is percentage differential between accepted contract and median proposal							
Probability that contract is ethnic-based, derived from name classification	-0.007 (0.007)	-0.009 (0.008)	-0.007 (0.009)	-0.013 (0.009)	0.004 (0.013)	-0.012 (0.009)	-0.004 (0.010)
Observations	47,727	14,902	32,825	33,980	13,747	11,491	36,236

Notes: See Table 4. The sample includes contracts formed between a non-Indian company contact and a worker in India. Regressions are unweighted, include fixed effects for year x job category x company country, and cluster standard errors by originating company. Observation counts are different from Table 3 because probabilistic matches are included in the sample that were excluded in the descriptive tabulations.

Table 7: Wage rate effects comparing ethnic Indians hiring in India and elsewhere

	Total sample	2008 and prior	2009 and later	High-end contracts	Low-end contracts	Initial contracts	Subsequent contracts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
The sample is contracts formed with ethnic Indian company contacts Estimates include fixed effects for year x job type of contracts x company country							
Panel A: DV is log hourly wage paid to worker							
(0,1) indicator that worker is in India	-0.154 (0.044)	-0.099 (0.040)	-0.168 (0.050)	-0.195 (0.049)	-0.084 (0.047)	-0.127 (0.036)	-0.163 (0.053)
Observations	8,132	1,552	6,580	4,436	3,696	1,687	6,445
Panel B: DV is percentage differential between accepted contract and median proposal							
(0,1) indicator that worker is in India	-0.022 (0.009)	-0.035 (0.014)	-0.019 (0.010)	-0.026 (0.012)	-0.015 (0.014)	-0.047 (0.015)	-0.012 (0.009)
Observations	8,132	1,552	6,580	4,436	3,696	1,687	6,445

Notes: See Table 6. The sample excludes contracts involving company contacts located in India.