# Hiring High-Skilled Labor through Mergers and Acquisitions*

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## Abstract

Using random H-1B visa lottery as a natural experiment, we document that firms respond to shortages of high-skilled workers by acquiring target firms that have these workers and negligible amount of tangible assets. Additional tests show that desire for the targets' skilled labor is an important driver of these acquisitions. Using employee profiles retrieved from LinkedIn and the H-1B visa microdata, we also provide direct evidence on the targets' skilled workers that are acquired through these acquisitions. Our findings suggest skilled labor is an important driver of acquisitions and acquisitions are an effective means of obtaining skilled labor.



Keywords: Acquihiring; Skilled foreign labor; H-1B visa; Mergers and acquisitions; LinkedIn

## 1. Introduction

Firms may find it difficult to recruit high-skilled workers through traditional means when they are in short supply and under non-compete agreements with current employers. To tackle the difficulty in hiring talent, many firms have resorted to "acquihire," the practice of hiring skilled labor through mergers and acquisitions (M&As). There has been ample anecdotal evidence of acquihire. For example, the Wall Street Journal reported that talent shortage is helping drive M&As in the tight labor market after the outbreak of Covid-19 (Loten, 2022). The New York Times reported that, "Companies like Facebook, Google and Zynga are so hungry for the best talent that they are buying startups to get their founders and engineers" (Helft, 2011). Many firms have also admitted that they acquire other firms primarily for their talent. Mark Zuckerberg, the founder and CEO of Facebook, acknowledged: "Facebook has not once bought a company for the company itself. We buy companies to get excellent people" (Hindman, 2010).[1] Evan Spiegel, the founder and CEO of Snap, similarly stated: "Typically if you buy a business, it comes with a really talented team and I think for us the team is everything" (Murphy and Kruppa, 2020). Tim Cook, the CEO of Apple, disclosed that Apple buys a company every two to three weeks on average, primarily to acquire talent (Feiner, 2019). In fact, acquihire has become commonplace not only among hi-tech firms but also among firms throughout the U.S. (Coyle and Polsky, 2012; Needleman, 2012).

While it is increasingly common in practice, causal evidence on acquihire is rare in academia. Several recent studies show that acquisitions are more likely to occur between firms with related human capital (Tate and Yang, 2016; Lee, Mauer, and Xu, 2018; Lagaras, 2021).[2] Ouimet and

[1] For example, Facebook acquired Spool, a young startup providing mobile-bookmarking service in July 2012 for its five employees, but not for its products or other assets: https://www.cnet.com/news/facebook-acquires-mobile-bookmarking-service-spool/.

[2] John, Knyazeva, and Knyazeva (2015) and Dessaint, Golubov, and Volpin (2017) show that enhanced employee protection and labor rights in the acquirer are associated with lower announcement returns to the acquirer and the acquirer-target combined. Although not directly related to acquihiring, the findings suggest that labor plays important roles in mergers and acquisitions.

Zarutskie (2020) parse target firms' 10-K filings for keywords such as "skill" and "skilled" and find a positive relation between these keywords and post-merger employment outcomes of target firm employees. Unlike ours, these studies do not aim to provide causal evidence on acquihire. Providing such causal evidence is challenging because demand for talent is endogenous and correlated with other firm characteristics. In addition, it is difficult to determine whether the acquirer buys the target firm for its skilled labor or for something else.

To our knowledge, Chen, Gao, and Ma (2021) offer the first causal evidence related to acquihire, showing that firms headquartered in states that adopt trade secret laws, which raise the cost of having their employees poached, are more likely to be acquired. Their finding hints that firms acquihire when poaching is more costly. Our study complements Chen et al. (2021) but is different on important dimensions. First, our exogenous shocks to the supply of skilled labor are at the (finer) firm level rather than at the (coarser) state level. It is useful to provide causal evidence on acquihire using a different, finer natural experiment. Second, we exploit exogeneous shocks to the supply of skilled labor rather than shocks to the cost of poaching talent. Thus, the underlying economic mechanism of our experiment is different than that of theirs. Third, we offer direct evidence on the skilled workers acquired through acquisitions, while Chen et al. do not.

Our natural experiment exploits the random lottery employed by the United States Citizenship and Immigration Service (USCIS) office to allocate H-1B visas.[3] H-1B is the primary work visa for U.S. employers seeking high-skilled foreign workers. The supply of H-1B visa is capped by an annual quota, which drastically dropped from 195,000 in 2003 to 65,000 in 2004 and has been binding since 2004. When the quota is binding, the USCIS uses lottery to allocate H-1B visas and,

[3] Later in the paper, we examine a variety of factors that might affect the design of our natural experiment and find that our results are robust to these factors. These factors include OPT visas, visa over-petition, education degree of H-1B visa applicants, and the possibility of temporarily relocating an H-1B worker to a foreign office after she loses the H-1B lottery.

by doing so, creates random variation in the likelihood that firms receive H-1B visas. The firm is short on high-skilled foreign workers after losing random H-1B lotteries.

After losing H-1B lotteries, firms have a variety of options. These include forgoing or delaying projects that require the H-1B workers, outsourcing the projects, forming strategic alliances with firms that have comparable high-skilled workers, recruiting such workers from the labor market, poaching them from competitors, or acquihire. Acquihire is one of the options. Thus, not all firms will acquihire after losing random H-1B lotteries.[4] Yet, given the ubiquity and the advantages of acquihire, we hypothesize that *some* firms will acquihire after losing H-1B lotteries. Acquihire circumvents non-compete laws and enables the firm to recruit an entire team, whose members possess team-specific capital that is crucial for innovation (Jaravel, Petkova, and Bell, 2018).

To test the acquihire hypothesis, we study firms' acquisition activity following H-1B lottery, with a focus on acquisitions of small target firms that have skilled workers and negligible amount of tangible assets, which are the characteristics of a typical acquihire target. The firms in our H-1B lottery experiment lose an average of 25.6 H-1B lotteries per year, which is unlikely to induce the firms to acquire a target with billions of dollars of assets and thousands of employees because consummating such a deal is costly and time consuming. By contrast, it is cheaper and less time consuming to acquire a small target firm with nothing but a few skilled workers. Consistent with the acquihire hypothesis and the anecdotal evidence, we find that firms that lose more H-1B visa lotteries acquire more such small target firms. Each one standard deviation reduction in the likelihood of winning H-1B visa lottery raises the number of such acquisitions by 4.8%.

[4] It would be interesting to examine which firm chooses which option, but we do not do so in this study because of the limitations of our data. Instead, we focus on whether some firms will acquihire after losing H-1B visa lotteries. Nor do we aim to quantify the fraction of firms that resort to acquihiring versus alternative strategies, to categorically identify which M&As are pure acquihires or to quantify the fraction of acquihires among all M&A deals. These objectives cannot be achieved here given the nature of our data.

Using employee profiles retrieved from LinkedIn and the H-1B visa microdata, we verify that the small target firms do possess skilled workers. The target firms have an average of 15.0 employees and 4.9 Science-Technology-Engineering-Math (STEM) employees (who are widely regarded as high-skilled workers) on LinkedIn, and the median numbers are 7 and 2, respectively. After losing an average of 25.6 H-1B visa lotteries per year, the firms acquire an average of 6.9 STEM workers (about 27.0% of the 25.6 visas lost) identifiable from LinkedIn and 4.8 H-1B workers (18.8% of the 25.6 visas lost) identifiable from the H-1B visa microdata.[5] Thus, the firms recover a meaningful fraction of the deficit in skilled workers through acquihires, or, stated differently, acquihires are a useful means to obtain skilled labor.

The effects of H-1B lottery on acquisition activity are stronger in high-tech target firms, which are more likely to have high-skilled workers, and weaker in low-tech targets. The effects also concentrate in target firms with skilled workers identifiable from LinkedIn and the H-1B visa microdata but become insignificant in target firms without skilled workers. In addition, the effects are significant regardless of whether the target firm owns intellectual property (i.e., patents) or not, indicating that the acquirers are not solely buying patents. Taken together, the results suggest that skilled labor is an important driver of the acquisitions. Of course, skilled labor is *one* driver but *not the only* driver of these acquisitions.

The effects also concentrate in target firms located in states with strong non-compete laws but is insignificant in target firms in states with weak non-compete laws, indicating that firms are more

[5] For acquisitions in which the acquirer is considered a "successor-in-interest", employers do not have to file amended H-1B petitions or new LCAs so long as the acquired H-1B worker's job function, duties, and work location are expected to remain unchanged. The acquirer is only required to place a "notice" in each impacted H-1B worker's "Public Access File" (i.e., subject to review by the U.S. Department of Labor) before the effective date of employment post-acquisition. This notice must indicate that the acquirer accepts the obligations and liabilities of the H-1B workers' LCAs filed by the target firm. Otherwise, the acquirer must file amended H-1B petitions or change of employer applications with the USCIS before the employee begins employment with the acquirer. Note that these new filings with USCIS, which have a median processing time of 13 days in our sample, are not subject to the H-1B visa cap.

likely to acquihire when poaching talent is more costly. In addition, the effects are weaker for firms with offices in Canada, which is consistent with the anecdotal evidence that some firms relocate H-1B workers to Canada after they lose H-1B lottery. These findings suggest that the difficulty in poaching talent and the availability of foreign affiliate are important economic mechanisms behind acquihire.

We add to the literature with causal evidence on acquihire and direct evidence on the skilled workers obtained through acquisitions. Our findings, albeit based on skilled foreign workers, have meaningful implications for acquihire of skilled domestic labor. The economics behind acquihire is likely similar for foreign and domestic skilled workers. Firms acquihire when they cannot access skilled workers because of non-compete agreements or when they need a whole team of skilled workers. Thus, we expect the causal effects of H-1B visa shortages on acquisition activity to extend to shortages of skilled domestic labor. The literature still lacks causal evidence on whether firms acquihire after being exposed to exogenous shortages of skilled domestic labor at the firm level, which calls for future studies.

We also add to the broader literature on why firms undertake M&As. Extant studies show that firms pursue M&As for various reasons. These include synergy gains, technological or regulatory changes, buying assets using overvalued equity, intellectual property, managerial overconfidence, empire building, and killing target firms' disruptive innovation.[6] We offer skilled labor as a factor in M&A decisions.

## 2. H-1B Visa Lottery and Acquisition Activity

[6] See, among others, Harford (2005), Harford and Li (2007), Rhodes-Kropf and Viswanathan (2004), Levi, Li, and Zhang (2010, 2014), Bena and Li (2014), and Cunningham, Ederer, and Ma (2020). See Betton, Eckbo, and Thorburn (2008) for a review of this literature.

### 2.1. Data sources and sample construction

We build a sample of U.S. public firms from CRSP and Compustat. We measure each firm's demand for H-1B visas using the Labor Condition Application (LCA) microdata downloaded from the U.S. Department of Labor (DOL) and identify the number of H-1B visas granted to the firm using the I-129 petitions microdata obtained from the U.S. Citizenship and Immigration Services (USCIS) through a Freedom of Information Act (FOIA) request on June 30, 2016. LCAs are records of H-1B applications, whereas I-129 petitions are records of H-1B visa grants. We use Thomson Reuters's SDC data to identify mergers and acquisitions undertaken by the firms in our sample and use the PatentsView database to gauge firm patenting activity. Lastly, we retrieve and clean data from LinkedIn to study the employees of the acquirers and the target firms.

We match firms in CRSP/Compustat with acquirer and target firms in SDC using CUSIP, and pair them to companies in LCAs, I-129 petitions, LinkedIn, and PatentsView using a fuzzy string-matching algorithm based on firm name following Chen, Hshieh, and Zhang (2021). Because firm names can have different formats across databases, we standardize firm names in all databases to ensure that legal entity type identifiers (e.g., "Inc", "corporation", etc.) and abbreviations are formatted consistently. To further safeguard the integrity of our matching procedure, we manually inspect the final set of matched firm names.

We form a firm-year panel from the merged datasets described above. Following the literature (e.g., Xu, 2018), we exclude from our sample utility firms (SIC code between 4900 and 4999), financial firms (SIC code between 6000 and 6999), and public sector firms (SIC code over 9000). Since the H-1B visa program follows the governmental fiscal year that starts on October 1, we construct our variables by the governmental fiscal year rather than calendar year. "Year" will refer to the governmental "fiscal year" henceforth. To conduct the analysis based on H-1B visa lotteries,

we keep firms that demanded at least one cap-subject H-1B visa in the years of 2008, 2009, and 2014-2017 because our H-1B data end in 2017 and the USCIS allocated all cap-subject H-1B visas through lotteries in these years (we detail H-1B visa lotteries in Section 2.2). Table 1, Panel A displays the frequency of firms and their H-1B visa demand and supply each year. The number of LCA-filing firms decreased from 741 in 2008 to 592 in 2014 and had stabilized around 600 between 2015 and 2017.

From the SDC database we retrieve mergers and acquisitions announced between 2008 and 2017 by the firms in the H-1B lottery sample. Following prior studies,[7] we require that the deal must be in the form of a merger, an acquisition of majority interest, or an acquisition of assets; the deal must also be a control bid in which the acquirer owns less than half of the target firm's outstanding shares before the deal and aims to own more than half after the deal.

### 2.2. H-1B visa lottery

The Immigration Act of 1990 created the H-1B visa program with an initial annual quota of 65,000 visas that lasted until 1999. The cap was raised to 115,000 in 1999 and further to 195,000 in 2001, but sharply reverted to 65,000 in 2004. In 2006, 20,000 H-1B visas were added for foreign workers with a master's degree or higher accredited by a U.S. institution. The annual cap has not been adjusted since then. The annual cap was never reached before 2004 but has always been binding since 2004.

To hire a skilled immigrant under the H-1B visa program, an employer must first file an LCA to the Department of Labor. The employer can file one LCA for multiple foreign workers in the same job category or position. Once the LCA is certified, the employer can submit an I-129 petition

[7] See, among others, Betton, Eckbo, and Thorburn (2008) and Bessembinder, Cooper, and Zhang (2019).

separately for each foreign worker specified in the LCA to the USCIS office. A granted H-1B work visa is valid for three years and may be extended once for another three years.

On the first business day in April, the USCIS starts accepting I-129 petitions for the coming fiscal year that starts in October. The USCIS must keep petitions open for at least five business days. If the annual quota is not reached within the first five days, the USCIS processes all petitions submitted before the date when the annual quota is reached and conducts lotteries to allocate the remaining H-1B visas to the petitions submitted on that date. If the volume of submitted I-129 petitions reaches the annual quota within the first five days, the USCIS will stop accepting I-129 petitions after a specific cutoff day that is unknown to petitioners in advance. The USCIS determines the cutoff day *ad hoc* once it thinks it already has or will have enough petitions by the cutoff day. The USCIS then uses lotteries to allocate the cap-subject H-1B visas to petitions submitted before the cutoff date. In fiscal years 2008 and 2009 and 2014–2017, the quota was reached within five days and all cap-subject H-1B visas were allocated using computer-based random algorithms. This lottery algorithm results in random variations in the fraction of a firm's demand for skilled foreign workers that is met. Therefore, our analysis focuses on fiscal years 2008 and 2009 and 2014–2017 because the lottery win rate is random across firms in these years.

Lucky firms have more of their demand for high-skilled foreign labor satisfied in H-1B lotteries, while unlucky firms have less (or none). The unlucky firms may opt to acquire other firms with high-skilled workers they need, as discussed in the introduction. We thus hypothesize that the higher the fraction of H-1B visa petitions a company fails to get approved, the more likely it will acquire talent through mergers and acquisitions.

### 2.3. Verifying the randomness of the H-1B visa lottery

We measure a firm's demand for cap-subject H-1B visas using its LCA filings and measure the number of cap-subject H-1B visas granted to the firm using the I-129 petitions data, following Kerr and Lincoln (2010), Xu (2018), and Chen, Hshieh, and Zhang (2021). See Internet Appendix B for details of the measures. A firm's fraction of demand for cap-subject H-1B visas that is met (i.e., its lottery win rate) is the ratio of the number of cap-subject visas received to the number requested by the firm. Our measures of H-1B visa demand and supply turn out to be accurate. The demand measure is positively associated with the supply measure, and the fraction of demand that is met is not correlated with firm characteristics or past firm performance. The lottery win rate based on our measures is also very close to the likelihood of winning H-1B lottery disclosed by the USCIS. Had our demand or supply measure been too noisy, we would not observe these results.

Table 1 Panel A reports summary statistics of the fraction of cap-subject H-1B visa demand that is met in each of the six lottery years (2008 and 2009 and 2014–2017) for the firms in our H-1B lottery experiment. The firms demand more and more H-1B visas over time: the average demand more than doubled from 17.30 visas in 2008 to 47.96 in 2017. The average number of cap-subject H-1B visas granted to each firm per annum also rose from 7.69 in 2008 to 12.52 in 2017, but the rate of growth is smaller than that of the demand. As a result, the fraction of demand met by supply fell from 52% in 2008 to 36% in 2017.

In Table 1 Panel B, we test whether the fraction of a firm's capped H-1B demand met by supply is random across observable firm characteristics. We regress the fraction of demand met on six firm characteristics: firm size, leverage ratio, ROA, Tobin's Q, cash holding, and labor intensity (employee count divided by book assets). Coefficients on these characteristics are all insignificant, suggesting the fraction of demand met varies randomly across firms and is not biased towards any

of the firm characteristics. This result is consistent with prior studies (Chen, Hshieh, and Zhang, 2021).

### 2.4. Likelihood of winning the H-1B visa lottery and acquisition activity

We identify the effect of the H-1B visa lottery on a firm's acquisition activity by estimating the following model:

$$y_{i,t+1} = \beta \times \%\, Demand\ Met_{it} + \gamma X_{it} + \alpha_i + \alpha_t + \varepsilon_{it}, \quad (1)$$

where $y_{i,t+1}$ is firm $i$'s acquisition activity in year $t+1$. We focus on acquisition activity one year ahead because identifying and negotiating with target firms often take time. $\%\, Demand\ Met_{it}$ is the fraction of firm *i*'s demand for cap-subject H-1B visas that is met in year *t*. $X_{it}$ is a vector of firm characteristics and $\alpha_i$ and $\alpha_t$ are firm and year fixed effects, respectively.

Table 2 Panel A presents summary statistics of the variables used to estimate model (1). The average firm has market capitalization of $12.4 billion, annual ROA of 0.7%, Tobin's Q of 2.2, leverage ratio of 22.1%, cash-to-asset ratio of 0.25, and employee count of 19,311. The pooled average fraction of H-1B demand met is 49.5% with a standard deviation of 37.9%. The average firm demands 36.5 H-1B visas and receives 10.9 H-1B visas in a year, leaving an annual deficit of 25.6 H-1B workers.

The annual deficit of 25.6 H-1B workers per firm may seem small compared to the average firm employment of 19,311, but it is not small once we consider the fact that only 7% of the U.S. workforce in 2019 are STEM workers (who are widely regarded as high-skilled workers) according to the U.S. Census Bureau's estimate (Martinez and Christnacht, 2021). About 79.6% of the H-1B workers in the I-129 database are STEM workers and these workers have at least a bachelor's degree, suggesting an annual deficit of 20.4 (= 25.6*79.6%) high-skilled STEM

workers per firm. The annual deficit of 20.4 H-1B STEM workers represents over 1.5% of the estimated average number of 1,351.8 (= 19,311*7%) high-skilled STEM workers in these firms.

A 1.5% deficit in high-skilled STEM workers per year will cumulate into a material shortage of talent if it is not addressed timely. Talent deficit is especially harmful when firms compete fiercely on innovation. Thus, firms have incentives to fill the talent deficit through direct hiring from the labor market or through acquihires.

A 1.5% deficit in high-skilled STEM workers is unlikely to warrant an acquisition that involves billions of dollars and years of negotiations. Yet it is reasonable for the firm to acquire a small, young startup that has a few high-skilled employees and negligible amount of tangible assets. The acquirer usually knows which firm has the skilled workers it needs; if not, it can figure this out after some research. Thus, the firm can initiate an acquihire shortly after losing H-1B visa lottery. Given the small amount of investment involved, the acquihire usually does not require the approval of the board of directors or shareholders, a lengthy due diligence process, or the help of M&A advisors. Negotiations with the acquihire target are also simpler: the acquirer usually writes bonus checks or offers stock options to the target firm's key employees as a condition for the acquihire.[8] As such, an acquihire is expected to take less time from the initiation to completion than a typical M&A.[9] Because of the appealing features of acquihire, technology companies in Silicon Valley have been acquihiring for years and acquihire has also been prevalent in non-tech industries throughout the U.S. (Coyle and Polsky, 2012; Needleman, 2012).

[8] See discussions about acquihires by law firms: https://www.linkedin.com/pulse/acqui-hire-transactions-place-ma-universe-pat-linden/; https://www.walkercorporatelaw.com/startup-issues/acquihires-101-tips-for-founders/

[9] Because of the lack of details of acquihire transactions, there has not been specific summary statistics about how long it takes to complete an acquihire. But the process is believed to be much shorter given the small amount of tangible assets involved.

Determining whether an acquisition is an acquihire is an empirical challenge. We meet this challenge in two steps. First, we screen the mergers and acquisitions in SDC and regard only those with undisclosed transaction value as possible acquihires. Anecdotal evidence suggests that talent-driven acquisitions often target small, young startups with high-skilled workers and negligible amount of tangible assets.[10] For example, Facebook acquired Spool in July 2012 solely for its five employees. Spool had no tangible assets to disclose in the acquisition. Thus, transaction value is less likely to be disclosed for talent-driven acquisitions because the target firms have less asset, ceteris paribus.[11] About half of the mergers and acquisitions undertaken by our sample of firms have an undisclosed transaction value.

Second, we check whether these target firms indeed have high-skilled workers using employee profiles retrieved from LinkedIn. We can identify at least one employee on LinkedIn for 638 of the 831 undisclosed-size acquisition target firms. These target firms have an average of 15.0 employees on LinkedIn and 4.9 of them are STEM workers, while the median target firm has 7 employees and 2 STEM employees (see Table 6 Panel A). STEM workers account for 32.6% of the target firms' employees. Thus, a typical undisclosed-size acquisition target firm has a few employees and a few STEM (skilled) workers. These findings suggest that the undisclosed-size acquisitions are likely to be acquihires, in which the acquirer intends to buy the target's skilled employees rather than other assets.

We therefore use the count of undisclosed-size acquisitions as our main dependent variable for model (1). On average, the sample firms initiate 0.22 acquisitions with undisclosed transaction

[10] See https://tomtunguz.com/startup-acquihire-trends/.

[11] The SEC requires the acquirer to disclose the transaction size if the target firm is large relative to the acquiring firm, which can be measured relative to investment, asset, or income. Therefore, an undisclosed transaction size does not necessarily mean that the target firm has no tangible assets. Yet an undisclosed transaction size likely indicates that the target firm has relatively less tangible assets, ceteris paribus.

value per year and the likelihood that a firm initiates undisclosed-size acquisitions in a year is 13.3% (Table 2 Panel A).

Table 2 Panel B presents the regression results for model (1). The dependent variable in column (1) is the natural logarithm of one plus the count of undisclosed-size acquisitions. In column (2), we replace the dependent variable with an indicator of undisclosed-size acquisitions in the year. The coefficient on the fraction of H-1B demand met is negative and statistically significant at the one percent level in both columns. The economic magnitudes of the effects are not trivial. Each one standard deviation (37.9%) reduction in the lottery win rate raises the number of undisclosed-size acquisitions by 4.8% and raises the probability of initiating undisclosed-size acquisitions by 1.1 percentage points.[12]

The results indicate that, after losing H-1B visa lotteries, firms acquire target firms with skilled workers and negligible amount of tangible assets. The finding is consistent with the acquihire hypothesis.

### 2.5. Robustness checks

#### 2.5.1. Alternative model specifications

We assess the robustness of the baseline results in a series of tests. In the first test, we exclude the control variables from the regressions in columns (1) and (2) of Table 2 Panel B and only keep the fraction of H-1B demand met and the firm and year fixed effects. The regression results (un-tabulated for brevity) reveal that the coefficient on the fraction of H-1B demand met remains negative and statistically significant at the one percent level. This result suggests that the effects of H-1B lottery on acquisition activity are not driven by other firm characteristics.

[12] Our regression has this form: $Ln(1+Y) = a + bX + u$. For each unit of change in $X$, the change in $Y$, $\Delta Y$, is approximately $(1+Y+\Delta Y)/(1+Y) = \exp(b)$. Solving the equation yields $\frac{\Delta Y}{Y} = [\exp(b)-1](1+1/Y)$. For each unit change in $X$, $Y$ changes by $100 * [\exp(b)-1](1+1/Y)$ percent.

In the baseline regressions, we normalize the count of undisclosed-size acquisitions using the natural logarithm function. Here we test whether the results are robust to alternative normalizing methods (N'guessan et al., 2017; Bellemare and Wichman, 2020). First, rather than using the natural logarithm function, we apply the inverse hyperbolic sine (IHS) transformation to the count of undisclosed-size acquisitions. The IHS transformation approximates the natural logarithm function and retains zero-valued observations without any further manipulations. We then re-estimate model (1) by replacing the dependent variable with the IHS transformed count of undisclosed-size acquisitions. The estimation results, presented in column (3) of Table 2 Panel B, show that the coefficient on the fraction of H-1B demand met remains negative and statistically significant at the one percent level. Second, we follow Cohn, Liu, and Wardlaw (2021) and estimate Poisson regressions, in which the dependent variable is the raw count of undisclosed-size acquisitions. The Poisson regression results, presented in column (4) of Table 2 Panel B, show that the coefficient on the fraction of H-1B demand met remains negative and statistically significant at the five percent level. Thus, the baseline results are robust to Poisson regression and IHS transformation of the count of undisclosed-size acquisitions.

**2.5.2. Over-petitioning**

Firms may apply for more visas than needed to secure enough H-1B visas (i.e., over-petitioning). Suppose *N* homogeneous firms compete for *S* visas. A cooperative outcome is that each firm applies for *S/N* visas when visas are rationed. But a firm will benefit if it defects (i.e., requests more than *S/N* visas) while other firms do not defect.[13] Over-petitioning would incur the petition cost (e.g., filing fees, attorney fees, etc.) and overstaffing cost (i.e., there would be

[13] Osborne and Rubinstein (1994) show that "in any finite repetition of this [prisoner's dilemma] game the only Nash equilibrium outcome is that in which the players choose (D, D) [i.e., defect] in every period."

redundant H-1B workers if the firm wins more visas than it needs). The costs will lower firms' incentive to over-petition.

Over-petitioning is unlikely to drive the baseline results for the following reasons. First, the lottery win rate is random and does not depend on over-petitioning. Thus, the lottery win rate will not affect firm acquisition activity only because of over-petitioning. Second, over-petitioning is a zero-sum game because of the H-1B visa quota. Only some firms can successfully implement the strategy. As such, over-petitioning adds noises to the observed fraction of H-1B demand met and makes it less likely for us to observe significant effects of the fraction of H-1B demand met on firm acquisitions. Yet the data still reveal that the fraction of H-1B demand met has significant effects on acquisition activity, which suggests that the baseline results are so robust that the noise in the key explanatory variable created by over-petitioning cannot mask them. Third, over-petitioning will have little impact on our estimates if all firms over-petition to similar degrees. Fourth, we additionally control for H-1B visa demand in Eq. (1) and find the coefficient on the fraction of H-1B demand met remains qualitatively unchanged and the coefficient on H-1B demand is insignificant (see columns (5) and (6) of Table 2 Panel B).

Growth firms might have stronger incentives to over-petition to secure skilled foreign workers for future growth. These firms may also grow by acquiring other firms. Therefore, we examine whether H-1B lottery win rate has stronger effects on growth firms' acquisition activity by adding to Eq. (1) the interaction variable between the fraction of H-1B demand met and the firm's book-to-market ratio. The regression results, reported in the first two columns of Table 3 Panel B, show that the effect of H-1B lottery win rate on acquisition activity is not different for growth and value firms. Viewed together, these results suggest that over-petitioning does not drive our results.

**2.5.3. H-1B worker education**

The USCIS conducts two sequential lotteries if all cap-subject H-1B visas are allocated through lotteries in the year. In the first lottery, the USCIS allocates the 20,000 advanced degree H-1B visas to applicants with master's degrees or higher. After losing the first lottery, the applicants with advanced degrees are still eligible for the second lottery in which the USCIS assigns the 65,000 regular H-1B visas to all applicants remaining in the lottery pool. As such, advanced degree H-1B petitioners have a higher lottery win rate than petitioners with bachelor's degrees.

Firms that demand proportionally more advanced degree H-1B workers will have more of their demand met. That is, the fraction of demand met will not be completely random if H-1B worker education is not random across firms. Thus, H-1B worker education should be controlled in model (1). Unfortunately, it is omitted from the regression because it is unavailable in the LCA and I-129 data. This omitted variable could bias the coefficient estimate. If firms are more likely to acquihire after losing advanced degree H-1B visas, H-1B worker education will be positively correlated with both the fraction of demand met and acquisition activity. Hence, the coefficient estimate might be upward biased (Roberts and Whited, 2013).

The potential bias can be significantly mitigated by controlling for variables that explain most of the variation in H-1B worker education across firms. We find that our baseline control variables, including firm characteristics and firm and year fixed effects, explain about three-quarters of the variation in the fraction of H-1B worker with advanced education degree using a subsample of LCA applicants whose education level could be inferred through another data source.[14] Using the

[14] The Department of Labor requires that the wage offered to an H-1B worker must be the prevailing wage paid to similarly employed workers in the same occupation in the area of intended employment. The employer can satisfy this requirement in LCAs using prevailing wage rates from multiple sources including the National Prevailing Wage and Center (NPWC), the Occupational Employment Statistics program, and surveys conducted by the employer or its consultants. The NPWC prevailing wages (available since 2010) are based on job codes. For about half of these job codes, the NPWC also provides a typical worker's education degree. This allows us to infer the applicant's education degree if the employer chooses to use the NPWC data and if the job code has an associated education degree. We can

same data source, Chen, Hshieh, and Zhang (2021) and Dimmock, Huang, and Weisbenner (2021) both find that firm characteristics and firm and year fixed effects can explain the majority of the variation in the education degree of H-1B visa applicants. As such, H-1B worker education is unlikely to bias our estimates since the control variables absorb most of its variation.

Other evidence also suggests that the coefficient estimates are not biased. First, the coefficients are similar as those in our baseline regressions after adjusting for the omitted variable bias using the method of Oster (2019).[15] Second, the fraction of H-1B demand met is insignificantly associated with the firm characteristics in Table 1 Panel B. If the fraction of H-1B demand met were nonrandom and systematically biased toward certain firms after controlling for our baseline fixed effects, some coefficients on the firm characteristics would likely be statistically significant. In contrast, the coefficients are all insignificant.

Third, the potential bias will be small if only a small fraction of H-1B petitioners has advanced degrees. The bias shrinks to zero when this fraction drops to zero. This fraction, while increasing over time, was relatively low (about 20%) during our sample period. This relatively low fraction is unlikely to cause notable upward biases in the coefficients after controlling for variables that absorb most of the variation in H-1B worker education.

Last, we find comparable results in another natural experiment based on the sharp reduction in H-1B visa cap in 2004 (see Internet Appendix C). This experiment is unaffected by the higher lottery win rate of H-1B visa applicants with more advanced education degrees and thus is not subject to the concern of an upward biased coefficient on the fraction of H-1B demand met.

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infer the education degree of about 20% of the applicants in the cap-subject LCAs filed by our sample of VC-backed startups from 2014-2016.

[15] The bias-adjusted coefficients for the first three columns of Panel B of Table 2 are -0.0210, 0.026, and 0.027, respectively. Following Oster's (2019) suggestions, we set $R_{max} = 1.3\tilde{R}$ when computing the bias-adjusted coefficients. The results are qualitatively similar when we set $R_{max} = 1$.

In sum, H-1B worker education seems unlikely to result in considerable upward bias in the coefficient estimates, although one cannot completely rule out the possibility of an upward bias stemming from omitted variables.

**2.5.4. OPT visas and foreign affiliates**

In contrast to the potential upward bias in the baseline coefficient estimates because of H-1B applicant education degree, the coefficient estimates might understate the true effect of skilled labor shortage on acquihire for two reasons. First, after losing an H-1B lottery, a foreign worker can continue to work for the firm if she is still in the Optional Practical Training (OPT) period.[16] Second, some firms may be able to temporarily transfer a worker to a foreign affiliate (e.g., an office in Toronto, Canada) after she loses the H-1B lottery. OPT and the availability of foreign offices make losing H-1B lotteries less harmful for the firm. Thus, these two factors can lower the economic magnitude of the effect of H-1B lottery on acquihire and can make it more difficult for us to observe such effect. Yet we still observe material effects of H-1B lottery on acquisition activity.

The availability of a foreign affiliate mitigates a firm's need for acquihire because the firm can reapply for H-1B visa for the foreign worker in the future. To test whether the baseline results are stronger or weaker for firms with foreign affiliates, we employ two proxies for the existence of affiliates in Canada. More and more U.S. firms are opening Canadian offices to host high-skilled foreign workers, who can easily obtain a Canadian work visa through the Canadian Global Talent

[16] OPT allows foreign undergraduate and graduate students with F-1 visa who have completed or have been pursuing their degrees for one academic year to work for one year on a student visa towards obtaining practical training to complement their education. For STEM students, the OPT period was extended from 12 months to 27 months in 2008 and further to 36 months in 2016. An H-1B visa applicant can continue to work for his or her employer and reapply for an H-1B visa after losing the H-1B lottery if the applicant continues to be in F-1 student visa status while on OPT. The I-129 microdata do not allow us to identify which applicants are on OPT.

Stream program.[17] For each firm in the H-1B lottery experiment, we identify its employees on LinkedIn and compute the fraction of its employees who live in Canada. The first proxy we use is an indicator for high fraction of employees working in Canada, which takes the value of one if the fraction is above the sample median and zero otherwise. The second proxy is an indicator that takes the value of one if the firm has any employees working in Canada. We then interact the two proxies with the H-1B lottery win rate in model (1) to understand its cross-sectional effects. The estimation results, reported in the four columns of Table 3 Panel C, show that the coefficient on the lottery win rate remains negative and statistically significant at the one percent level. The coefficients on the interaction variables between the lottery win rate and the two proxies are positive and statistically significant at the five percent level. The results indicate that the availability of foreign affiliates lowers the firm's tendency to acquihire when the firm faces shortages of high-skilled workers.

Taken together, the results in Section 2.5 suggest that the baseline results are robust to alternative model specifications and several factors that might affect the design of our H-1B lottery experiment. The factors include visa over-petition, H-1B applicant education degree, OPT visas, and foreign affiliates.

### 2.6. Additional Evidence on Acquihire

The results above reveal that shortages of high-skilled foreign workers induce firms to acquire other firms with skilled workers and negligible amount of tangible assets. The results are consistent with the acquihire hypothesis. In a series of tests, this subsection provides additional evidence that talent is an important driver of the acquisitions undertaken by firms after losing H-1B lotteries.

[17] See https://insights.dice.com/2019/03/25/h-1b-hiring-moving-jobs-canada/ and https://syndesus.com/how-canadas-immigration-alternative-helped-a-u-s-opt-visa-holder-discover-home-in-vancouver/

### 2.6.1. Acquisitions of high-tech versus low-tech targets

High-tech industries rely on skilled workers for innovation. If firms acquihire when short on skilled labor, they are more likely to buy targets in high-tech industries. Following the literature (e.g., Goldschlag and Miranda, 2016; Kim, 2020), we classify the 4-digit NAICS industries with the highest fraction of STEM employment as high-tech sectors. About 36% of the target firms in our sample are from high-tech sectors (Table 3 Panel A).

We re-estimate model (1), replacing the dependent variable with the natural logarithm of one plus the number of undisclosed-size acquisitions targeting high-tech firms and the natural logarithm of one plus the number of undisclosed-size acquisitions targeting firms in low-tech sectors, respectively. The results, presented in columns (1) and (2) of Table 3 Panel D, show that the firms have greater propensities to buy high-tech target firms than low-tech targets. The coefficient on the H-1B lottery win rate is -0.014 and statistically significant at the one percent level in column (1), in which the dependent variable concerns high-tech targets. The coefficient shrinks to -0.010 and is significant at the ten percent level in column (2), where the dependent variable concerns low-tech targets.

In short, shortfalls in high-skilled labor result in more acquisitions of high-tech targets, which have skilled employees and are more likely to be acquihires. This effect is weaker for acquisitions of low-tech targets. The results are consistent with the acquihire hypothesis.

### 2.6.2. Acquisitions of targets with patents vs. targets without patents

Skilled workers can create intellectual property such as patents. Shortages of skilled labor curtail patent production in-house, which could force firms to buy patents through M&As. Skilled labor shortages could thus turn a firm's innovation strategy from internal development to external acquisition. If so, patents rather than talent could drive our main findings.

We test this possibility by distinguishing undisclosed-size acquisitions of targets with patents from those without patents. About 82% of the target firms do not have patents (Table 3 Panel A). The regression results in columns (3) and (4) of Table 3 Panel D, in which the dependent variable is the natural logarithm of one plus the count of undisclosed-size acquisitions of targets with and without patents, respectively, show that deficits in skilled labor result in more acquisitions regardless of whether the target firm has patents or not. The results suggest that the acquirers are not solely buying patents from the target firms.

### 2.6.3. Non-compete state laws

Poaching talent from a firm is more difficult if the firm operates in states with strong enforcement of non-compete laws. Thus, an acquisition is more likely to be an acquihire if the target firm is headquartered in states with strong non-compete laws (Chen, Gao, and Ma, 2021). We test this prediction by re-estimating model (1) and replacing the dependent variable with the natural logarithm of one plus the number of undisclosed-size acquisitions in which the target is headquartered in states with strong/weak enforceability of non-compete labor laws. We regard the target firm's headquarter state as having strong (weak) enforceability of non-compete labor laws if its enforceability index (from Garmaise (2011) and Ertimur et al. (2018)) is above (below) the median within our sample of targets.

Columns (5) and (6) of Table 3 Panel D report the estimation results. The coefficient on the H-1B lottery win rate is negative in both columns but is statistically significant only when the dependent variable is the number of targets located in strong enforceability states. Shortages of skilled labor induce firms to acquire targets located in states with strong enforcement of non-compete laws, but the effect is weaker for targets located in states with weaker enforcement of non-compete laws. The results are consistent with that firms are more likely to resort to acquihire

when it is more difficult to obtain the target's skilled employees in the presence of stronger non-compete laws.

### 2.6.4. Experienced acquirers

Prior studies show that experienced acquirers are better at retaining acquired employees (Puranam and Srikanth, 2007; Kim, 2020). Thus, we expect experienced acquirers to find it more appealing to hire skilled labor through acquisitions. We classify a firm as an experienced acquirer if its cumulative number of completed mergers and acquisition up to the lottery year exceeds the sample median.

To test the prediction, we interact the experienced acquirer indicator with the H-1B lottery win rate in model (1) to understand its cross-sectional effects. The coefficient on this interaction variable is negative and statistically significant in the last two columns of Table 3 Panel B. The results suggest that experienced acquirers, which are likely better at retaining acquihired employees, undertake more acquisitions than inexperienced acquirers when they lack H-1B workers.

### 2.6.5. Employee stock options

Firms often attract and retain talented employees by granting them stock options. We thus expect an increase in the acquirer's outstanding employee stock options and new options grants if the acquirer is truly recruiting talents through acquisitions.[18] To test this hypothesis, we estimate model (1) using several measures of employee stock options grants as dependent variables.

Table 4 reports the estimation results using four outcome variables related to employee stock options: (1) the ratio of employee stock options grants to outstanding employee stock options,

[18] Carter and Lynch (2004) and Babenko (2009), for example, measure employee turnover using the number of forfeited options deflated by the number of outstanding options.

averaged over years *t* and *t+1*; (2) the average new stock option grants per employee in years *t* and *t+1*; (3) the average percentage change in employee stock options in years *t* and *t+1*; and (4) the average change in outstanding stock options per employee in years *t* and *t+1*. We observe that the coefficient on the fraction of H-1B demand met is negative and statistically significant across the four columns. These results show that firms grant more stock options to employees after losing H-1B visa lotteries. Since firms often rely on stock options to attract and retain skilled employees, these results are consistent with the acquihiring hypothesis.

In sum, Section 2 shows that, after losing random H-1B visa lotteries, firms are more likely to acquire target firms that have skilled workers and negligible amount of tangible assets. The effect is stronger in hi-tech target firms – which are more likely to have skilled workers – and concentrate in target firms located in states with strong non-compete laws – from which it is more difficult to poach skilled workers. The effect is weaker for firms with offices in Canada, which can relocate H-1B workers to Canada after they lose H-1B lottery. In addition, the acquirers short on skilled workers are not solely buying the target firms' intellectual properties (i.e., patents). Furthermore, experienced acquirers, which are likely better at retaining acquihired employees, are more likely to respond to shortages of skilled workers with acquisitions. Firms short on skilled workers are also more likely to raise stock options grants, probably to retain skilled workers. Overall, these results suggest that firms respond to exogenous shortages of high-skilled workers by acquiring other firms with such workers.

## 3. Direct Evidence on High-Skilled Workers in the Target Firms

Section 2 shows that firms respond to shortages of skilled workers by acquiring target firms with skilled workers and negligible amount of tangible assets. In this section, we provide direct

evidence on the skilled workers in the target firms that are acquired. Ideally, we would like to have detailed information of all employees in the acquirers and the target firms. But we do not. To circumvent this difficulty, we focus on two groups of high-skilled workers whose information we can access. The first group is H-1B workers in the I-129 dataset. The second group is skilled workers (both domestic and foreign) who voluntarily disclose their information on LinkedIn, the world's largest professional network.

### 3.1. Direct evidence on high-skilled foreign workers in the target firm

We identify H-1B workers hired by the firms in the H-1B lottery sample and by the target firms from the I-129 dataset (whose coverage starts in 1999). As shown in Table 5 Panel A, the firms in the H-1B lottery sample hired a pooled average of 359.6 H-1B workers up to the lottery year, which account for 1.9% of the average employment reported in Compustat (Table 2 Panel A).

Although H-1B workers comprise a small fraction of the total U.S. workforce, they represent a large fraction of high-skilled workforce in the U.S. Consider STEM workers, who are widely regarded as high skilled and are the prime candidates to be acquihired. STEM workers comprise only 7% of the U.S. workforce in 2019 according to the U.S. Census Bureau's estimate (Martinez and Christnacht, 2021). Among the STEM workers, one-fifth to one-quarter are foreign born according to the estimates of the American Immigration Council.[19] The share of foreign-born skilled labor is even higher for professions that require more advanced skills. For instance, the fraction of foreign-born workers is almost 40% for software engineers and is above 40% for physical and medical scientists. The substantive fraction of foreign-born high-skilled workers indicates that evidence based on H-1B workers is important for our understanding of acquihiring of all high-skilled workers.

[19] The research report is available at https://www.americanimmigrationcouncil.org/research/foreign-born-stem-workers-united-states

Whereas H-1B workers comprise a small fraction of the firms' total employment, they comprise a large fraction of the firms' high-skilled workers. As mentioned above, STEM workers make up only 7% of the entire U.S. workforce. Assuming 7% of all workers are high-skilled, H-1B workers would represent 27.1% (= 1.9%/7%) of high-skilled workers of the firms in the H-1B lottery experiment.

The firms undertook an average of 0.217 undisclosed-size acquisitions per year (Table 2 Panel A), and 34.1% of these acquisitions involve target firms that have hired H-1B workers before the acquisition (Table 5 Panel A). The firms acquired an average of 4.8 H-1B workers per year from the undisclosed-size target firms, which represent 1.3% (= 4.8/359.6) of the H-1B workers in the acquirer or 18.8% of the annual H-1B visa lotteries lost (= 4.8/(36.5 – 10.9)). These fractions suggest that the firms recover a significant fraction of the lost H-1B visa lotteries through undisclosed-size acquisitions.

The count of H-1B workers in the firms could be noisy for two reasons. First, the I-129 data start in 1999 and thus exclude H-1B workers hired before 1999. Second, H-1B workers may switch employers. The noise makes it difficult for us to observe significant effects of H-1B lottery on acquisitions involving high-skilled foreign workers in the target firm. Nevertheless, we still find strong and consistent effects that, after losing H-1B visa lotteries, firms acquire other firms that have hired H-1B workers.

If recruiting talent is a primary driver of the undisclosed-size acquisitions studied in Section 2, the baseline results will be stronger among acquisitions in which the target firm has hired H-1B workers. To test this prediction, we re-estimate model (1) and replace the dependent variable with the natural logarithm of one plus the number of undisclosed-size acquisitions in which the target firm had hired H-1B workers before the lottery year. The regression results, presented in the first

column of Table 5 Panel B, show that the coefficient on the H-1B lottery win rate is negative and statistically significant at the one percent level. In column (2) of Table 5 Panel B, we replace the dependent variable with the natural logarithm of one plus the number of undisclosed-size acquisitions in which the target firm had not hired H-1B workers before the lottery year, and observe that the coefficient on the H-1B lottery win rate becomes statistically insignificant. These results suggest that firms short on H-1B workers acquire target firms with H-1B workers but not firms without H-1B workers. The results are consistent with that hiring talent is a primary driver of these acquisitions.

We also estimate the similarity of the acquirer's and the target's H-1B workers before the acquisition as follows. For each firm, we construct a vector of H-1B worker counts. Each element of the vector corresponds to a unique job category specified in I-129 petitions. The similarity score for an acquisition equals the cosine similarity of the acquirer's and the target's job function count vectors.[20] The similarity score is zero if the acquirer/target has not hired H-1B workers before the acquisition. A higher similarity score means that the target firm's H-1B workers possess skills more like the acquirer's H-1B workers.

We argue that the higher the H-1B job function similarity score, the more likely the acquirer is buying the target's H-1B workers. Thus, we re-estimate model (1) with the dependent variable replaced with the natural logarithm of one plus the number of undisclosed-size acquisitions in which the acquirer's and the target's H-1B workers have positive job function similarity scores. The regression results show that the coefficient on the H-1B lottery win rate remains negative and statistically significant at the one percent level (column (3) of Table 5 Panel B). We repeat the analysis by replacing the dependent variable with the natural logarithm of one plus the number of

[20] This measure is similar to the product similarity measure developed by Hoberg and Philips (2010).

undisclosed-size acquisitions in which the target has no H-1B workers or the acquirer's and the target's H-1B workers do not have positive job function similarity scores. The regression results show an insignificant coefficient on the H-1B lottery win rate (column (4) of Table 5 Panel B). These results are also consistent with that hiring talent is a primary driver of the acquisitions.

In column (5) of Table 5 Panel B, we replace the dependent variable with the natural logarithm of one plus the number of acquired H-1B works from the target firms. The coefficient on the lottery win rate is negative and statistically significant at the one percent level. In terms of the economic magnitude, each one standard deviation reduction in the lottery win rate raises the annual number of acquired H-1B workers by 1.93%.

Viewed together, the results based on H-1B workers in the target firms are consistent with that hiring talent is a primary driver of the undisclosed-size acquisitions undertaken by the firms after losing random H-1B visa lotteries.

### 3.2. Evidence on skilled workers in the target firms identified from LinkedIn

Foreign and domestic high-skilled workers are closely related to each other. Firms resort to H-1B workers when domestic skilled workers are in short supply or when domestic workers lack the desired skills (Kerr, 2013). Firms may recruit or acquihire domestic skilled workers with similar skills when they cannot secure H-1B workers. Thus, we expect that, after losing random H-1B visa lotteries, firms will also acquihire high-skilled domestic workers, who are equally important as H-1B workers.

In this subsection we examine whether firms acquire target firms with high-skilled workers (both domestic and foreign) after losing random H-1B visa lotteries. To do so, we collected the near universe of LinkedIn profiles visible during 2020. Among over 700 million global profiles, we identified over 82 million profiles with work histories in the U.S. prior to December 31, 2020.

We fuzzy-string-match all unique LinkedIn employer names to firm names in CRSP-Compustat and SDC Platinum after name standardization (e.g., removing business entity identifiers, local office addresses, etc.) Consistent with Jeffers (2020), our employer-employee matched sample covers 5 to 6 million unique individuals each lottery year. We find at least one employee for 3,869 of the 3,877 firm-years in our H-1B lottery experiment, indicating the broad coverage of LinkedIn. The data we collected from LinkedIn include the following self-reported information about the employees: name, current and past employers, education history, and skillsets.

The LinkedIn data can provide direct evidence on the skilled workers acquired through acquisitions because a substantive fraction of the firms' high-skilled workers has LinkedIn profiles. A Pew Research Center study in 2021 found that 51% of adults with bachelor's or advanced degrees use LinkedIn, compared to 10% of those with a high school diploma or less.[21] In the six lottery years studied in our H-1B lottery experiment, the fraction of STEM workers among all LinkedIn profiles is 31.7% in 2008, 32.3% in 2009, 31.9% in 2014, 31.4% in 2015, 31.3% is 2016, and 32.0% in 2017.[22] These fractions are much higher than the unconditional fraction of 7% STEM workers among the U.S. workforce in 2019 according to the U.S. Census Bureau's estimate (Martinez and Christnacht, 2021). These findings are consistent with the notion that high-skilled workers are more likely to own a LinkedIn account.

Table 6, Panel A summarizes the information of the employees of the firms in our H-1B lottery experiment retrieved from LinkedIn. The average firm has 2,375 employees on LinkedIn, which represents 12.3% of the average number of 19,311 employees reported by Compustat (Table 1 Panel C). The median firm has 622 employees on LinkedIn, which is 17.4% of the median number

[21] See https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/.
[22] We designate a LinkedIn profile as a STEM worker at a certain point in time if the individual reported to hold a job title that contains STEM keywords (e.g., "software", "engineer", "scientist", etc.), which we derive from a list of STEM occupations provided by the U.S. Bureau of Labor Statistics (see https://www.bls.gov/oes/stem_list.xlsx).

of employees of 3,580 reported by Compustat. The average firm has 698 STEM workers on LinkedIn, which account for 29.4% of the average number of 2,375 workers on LinkedIn. Assuming 7% of all workers in these firms are STEM workers, 51.6% (= 12.3%*29.4%/7%) of these firms' STEM workers have a LinkedIn account.

Besides STEM workers, Table 6 Panel A also presents the count of workers on LinkedIn with technique skills and creative skills for the firms in the H-1B lottery experiment. LinkedIn constructs a list of technology skills and a list of creative skills, which LinkedIn users can include on their profiles (is this correct?).[23] The average firm has 886 workers with at least one technique skill and 888 workers with at least one creative skill. The LinkedIn data also contain the worker's education background. The average firm in the H-1B lottery experiment has 768 employees with bachelor's degrees as their highest degree, 388 with master's degrees, and 80 with doctoral degrees. Thus, employees with at least a bachelor's degree represent 52.0% (= (768 + 388 + 80) / 2375) of these firm's employees on LinkedIn. Viewed together, the LinkedIn data contain a substantive fraction of workers with technique and creative skills and college education.

The firms make an annual average of 0.167 undisclosed-size acquisitions of target firms identifiable on LinkedIn. Through the acquisitions, the firms acquire an average of 21.0 workers per year, among whom 6.9 are STEM workers, 7.1 are workers with technique skills, 7.8 are workers with creative skills, 6.3 have bachelor's degrees, 3.8 have master's degrees, and 0.7 have doctoral degrees. The number of acquired high-skilled workers are meaningful relative to the number of workers in the acquirer. For example, the 20.9 acquired workers represent 0.9% of the average number of 2,375 workers in the acquirers, the 6.9 acquired STEM workers represent 1.0%

[23] For example, the technique skills include cloud computing, software development, data science, etc. The detailed lists of technique and creative skills provided by LinkedIn can be found here: https://www.linkedin.com/learning/browse/technology

of the average number of 698 STEM workers in the acquirers, and the 3.8 acquired workers with master's degrees are 1.0% of the average number of 388 workers with master's degrees in the acquirer. Note that these fractions only include the workers acquired through the undisclosed-size acquisitions, which are more likely to be acquihires. These fractions indicate that acquired skilled workers are a meaningful source of the firms' skilled employees.

Turning to the target firms in the undisclosed-size acquisitions, the bottom section of Table 6 Panel A shows that these target firms have an average of 15.0 workers and a median of 7.0 workers on LinkedIn. They have an average of 4.9 STEM workers, 9.0 workers with technique skills, and 9.7 workers with creative skills. In terms of education degrees, the average firm has 7.4 workers with bachelor's degrees, 3.6 workers with master's degrees, and 0.7 workers with doctoral degrees. Note that high-skilled workers represent substantial fractions of the target firms' workforce. STEM, technique, and creative workers account for 32.6%, 59.8%, and 64.2% of the target firms' workforce. Employees with master's and doctoral degrees represent 23.7% and 4.7% of the target firms' workforce. Thus, these target firms indeed have high-skilled workers, indicating that these acquisitions are likely to be acquihires.

Table 6 Panel B presents the regression results of model (1) using the firms in the H-1B lottery experiment and their undisclosed-size acquisitions of target firms whose employees can be identified on LinkedIn. In column (1), where the dependent variable is the natural logarithm of one plus the number of undisclosed-size acquisitions, the coefficient on the H-1B lottery win rate is negative and statistically significant at the five percent level. In terms of the economic magnitude, each one standard deviation reduction in the lottery win rate raises the number of undisclosed-size acquisitions by 8.9%. We replace the dependent variable with the indicator of undisclosed-size acquisitions in column (2) and observe that the coefficient on the H-1B lottery win rate remains

negative and statistically significant at the five percent level. Each one standard deviation reduction in the lottery win rate increases the likelihood of undisclosed-size acquisition by 3.9 percentage points.

In column (3) of Table 6 Panel B, where the dependent variable is the natural logarithm of one plus the number of acquired workers identifiable on LinkedIn, the coefficient on the lottery win rate is negative and statistically significant at the one percent level. In terms of the economic magnitude, each one standard deviation reduction in the lottery win rate raises the number of acquired workers by 5.6%.

In columns (4)-(6) of Table 6 Panel B, we replace the dependent variable with the natural logarithm of one plus the number of acquired STEM, technique, and creative workers, respectively. The coefficient on the lottery win rate remains negative and statistically significant at the better than five percent levels. In terms of the economic magnitude, each one standard deviation reduction in the lottery win rate raises the number of acquired STEM, technique, and creative workers by 4.6%, 5.0%, and 5.7%, respectively.

Columns (7)-(9) of Table 6 Panel B report the regression results where the dependent variable is the natural logarithm of one plus the number of acquired worders with bachelor's degrees or higher, master's degrees or higher, and doctoral degrees, respectively. The coefficient on the lottery win rate is negative in all three columns and is statistically significant at the one percent, five percent, and ten percent level, respectively.

Firms acquire workers with the skills they want. Therefore, we examine the similarity between the skills of the acquirer's and the target's workers using two measures: the similarity score based on employee education majors and the similarity score based on employee technique skills classified by LinkedIn. For each firm, we construct a vector of worker counts. Each element of the

vector corresponds to a unique education major (or a unique employee technique skill). The similarity score for an acquisition equals the cosine similarity of the acquirer's and the target's education major (or technique skill) count vectors. A higher similarity score means that the target firm's workers possess skills more like the acquirer's workers.

In Table 6 Panel C, we test whether the firms are more likely to acquire target firms whose workers share similar skills as theirs. In column (1), the dependent variable is the natural logarithm of one plus the count of acquisitions in which the acquirer's and the target's workers have positive similarity scores based on education majors. The coefficient on the lottery win rate is negative and statistically significant at the five percent level. In column (2), the dependent variable is replaced with the natural logarithm of one plus the count of acquisitions in which the acquirer's and the target's workers have zero or negative similarity scores based on education majors. The coefficient on the lottery win rate becomes statistically insignificant. Columns (3) and (4) are the same as columns (1) and (2) except that the worker similarity score is now based on worker technique skills. The coefficient on the lottery win rate in column (3), where the dependent variable is the natural logarithm of one plus the count of acquisitions with similar worker technique skills between the acquirer and the target, is negative and statistically significant at the one percent level. The coefficient on the lottery win rate in column (4), where the dependent variable is the natural logarithm of one plus the count of acquisitions without similar worker technique skills between the acquirer and the target, becomes insignificant. On balance, the results suggest that firms are more likely to acquire target firms whose employees share similar skills as their own employees, but are not more likely to acquire other target firms.

To summarize, firms acquire target firms with high-skilled workers and negligible amount of tangible assets after losing random H-1B visa lotteries. The high-skilled workers they acquire

include both domestic and foreign workers and share similar skills as their own workers. While H-1B workers and skilled workers on LinkedIn do not represent the complete population of high-skilled workers in the target firms, these findings provide direct evidence on high-skilled workers acquired through M&As.

## 4. Conclusions

Skilled labor is crucial for firm innovation and operating performance. Firms used to hire skilled labor directly from the labor market, but more and more firms recruit skilled labor through mergers and acquisitions. As competition for skilled workers intensifies, acquihire has become commonplace in Silicon Valley and has also been widely adopted by firms throughout the U.S. Yet academic research on acquihire is rare. The literature lacks causal evidence on acquihire and direct evidence on high-skilled workers acquired through mergers and acquisitions.

In a natural experiment based on random H-1B visa lottery, we document that, when exposed to exogenous negative shocks to the supply of skilled workers, firms pursue more acquisitions, especially more acquisitions targeting firms that possess the skilled workers they need. We also find that acquisitions are an effective means of obtaining high-skilled workers. Using employee profiles retrieved from LinkedIn and the I-129 dataset, we provide direct evidence that firms acquire high-skilled workers from the target firms. To our knowledge, this is the first direct evidence on skilled workers that are acquired through mergers and acquisitions. We conclude that skilled labor is an important driver of acquisitions and acquisitions are an effective means of obtaining skilled workers.

This study advances our understanding of acquihire but leaves some questions unanswered. For example, although the natural experiment allows us to show that shortages in skilled labor

drive firms' merger and acquisition activities, we and previous studies cannot categorically identify which acquisitions are pure acquihires and which are not. To meet this challenge, future studies will need detailed information on the acquirer's needs for skilled workers and more complete information about all employees in the target firms. In addition, our direct evidence based on the target firms' H-1B workers and workers on LinkedIn cannot paint a complete picture of acquihire. Future studies can make the picture more complete with the help of detailed information on *all* employees in the acquirer and target firms.

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**Appendix: Variable Definition**

| Variable | Definition |
|---|---|
| | *a. Dependent Variables* |
| *ln(No. of Acq.)* | The natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* |
| *Has Acq.* | An indicator of whether the firm (acquirer) has an acquisitions with undisclosed transaction value in year *t+1* |
| *Percentage of New Options Granted* | The ratio of new employee option grants to outstanding employee options, averaged over years *t* and *t+1* |
| *New Options Granted per Employee* | The average new option grants per employee in years *t* and *t+1* |
| *Percentage Change in Outstanding Options* | The average percentage change in employee options in years *t* and *t+1* |
| *Chang in Outstanding Options per Employee* | The average change in outstanding options per employee in years *t* and *t+1* |
| *No. Existing H-1B Workers* | The cumulative number of H-1B visas a firm has received from 1999 up to year *t* |
| *No. Acquired H-1B Workers* | The aggregate of existing H-1B workers over all target firms acquired by a firm in year *t* |
| | *b. Firm Characteristics* |
| *No Cap-subject H-1B visas granted* | The number of cap-subject H-1B visas granted to the firm in year *t*, which is estimated from the I-129 dataset. See Internet Appendix B for details of the estimate. |
| *No Cap-subject H-1B demanded* | The number of cap-subject H-1B visas the firm demands in year *t*, which is estimated from the LCA dataset. See Internet Appendix B for details of the estimate. |
| *% H-1B Demand Met* | The fraction of the firm's demand for cap-subject H-1B visas in year *t* that is met. This is also the firm's win rate in the H-1B visa lotteries. |
| *Size* | The natural logarithm of total market capitalization in year *t* |
| *Leverage* | Long-term debt plus debt in current liabilities divided by book assets in year *t* |
| *ROA* | Net income divided by book assets in year *t* |
| *Tobin's Q* | Firm market value (book assets plus market capitalization minus book equity) divided by replacement cost of assets (book assets) in year *t* |
| *Cash* | Cash holdings divided by book assets in year *t* |
| *Employment* | Employee count divided by book assets in year *t* |

**Table 1: The Fraction of a Company's Demand for High-Skilled Foreign Labor that is Met**

Panel A reports the number of public companies filing cap-subject Labor Condition Applications, the average number of cap-subject foreign workers each LCA filer demanded, the average number of cap-subject H-1B visas granted to the company, and the fraction of demand for high-skilled foreign labor that is met, by year. The sample period is over the years of 2008-2009 and 2014-2017 in which lotteries are held to allocate all cap-subject H-1B visas. We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). Panel B presents the OLS regression results of company-year panel regressions using the sample of public companies that demand at least one cap-subject H-1B visa in the year. The dependent variable is the fraction of the company's demand for cap-subject H-1B visa that is met by supply in year *t*. The explanatory variables are company characteristics related to size, leverage, ROA, Tobin's Q, cash, and employment in year *t*. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**A. Demand for and Supply of High-Skilled Foreign Workers Subject to H-1B Visa Cap, by Year**

| Year | # Companies Filing Cap-subject LCA | # Cap-subject H-1B visas demanded | # Cap-subject H-1B visas granted | % Cap-subject H-1B demand that is met |
|---|---|---|---|---|
| 2008 | 741 | 17.30 | 7.69 | 0.52 |
| 2009 | 735 | 22.39 | 10.08 | 0.54 |
| 2014 | 592 | 44.33 | 13.16 | 0.62 |
| 2015 | 615 | 51.81 | 11.51 | 0.46 |
| 2016 | 622 | 42.77 | 11.55 | 0.42 |
| 2017 | 572 | 47.96 | 12.52 | 0.36 |

**B. Company Characteristics and the Fraction of Demand for Cap-subject H-1B Visa that is Met**

| | (1) | (2) |
|---|---|---|
| | % H-1B Demand Met | |
| Size | 0.040 | 0.030 |
| | (0.035) | (0.020) |
| Leverage | -0.035 | 0.046 |
| | (0.077) | (0.068) |
| ROA | 0.159 | -0.097 |
| | (0.150) | (0.081) |
| Tobin's Q | 0.016 | -0.001 |
| | (0.020) | (0.008) |
| Cash | 0.148 | -0.043 |
| | (0.231) | (0.086) |
| Employment | 7.530 | -3.990 |
| | (6.172) | (4.501) |
| Observations | 3877 | 3877 |
| Adj. R-Squared | 0.012 | 0.196 |
| Company FE | No | Yes |
| Year FE | Yes | Yes |

**Table 2: H-1B Visa Lottery Outcome and Firm Acquisition Activity**

Panel A presents summary statistics of the variables relevant to model (1). Panel B presents OLS estimation results of company-year panel regressions in model (1) over the years of 2008-2009 and 2014-2017. The main independent variable is the fraction of the company's demand for H-1B visas that is met (i.e., the lottery win rate). We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). The dependent variable is the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* in columns (1), (4), and (5). The dependent variable is an indicator of whether the firm (acquirer) has an acquisitions with undisclosed transaction value in *t+1* in columns (2) and (6). The dependent variable is replaced with the inverse hyperbolic sine (IHS) transformation of the number of acquisitions with undisclosed transaction value in year t+1 in column (3). Column (4) of Panel B present Poisson estimation results while the other columns present OLS estimation results of company-year panel regressions specified in model (1). Other explanatory variables are a set of firm characteristics measured in year *t*. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**Panel A: Summary Statistics**

| | N | Mean | Std. Dev. | 5-%ile | 25-%ile | 50-%ile | 75-%ile | 95-%ile |
|---|---|---|---|---|---|---|---|---|
| No Cap-subject H-1B visas granted | 3877 | 10.916 | 58.338 | 0.000 | 0.000 | 1.000 | 4.000 | 30.000 |
| No Cap-subject H-1B demanded | 3877 | 36.477 | 267.803 | 1.000 | 1.000 | 3.000 | 8.000 | 71.000 |
| % H-1B Demand Met | 3877 | 0.490 | 0.379 | 0.000 | 0.000 | 0.500 | 0.900 | 1.000 |
| No. Acq | 3877 | 0.217 | 0.729 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Acq | 3877 | 0.133 | 0.340 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Size ($B) | 3877 | 12.368 | 46.041 | 0.044 | 0.400 | 1.674 | 6.974 | 52.260 |
| Leverage | 3877 | 0.221 | 0.238 | 0.000 | 0.013 | 0.184 | 0.338 | 0.607 |
| ROA | 3877 | 0.007 | 0.236 | -0.409 | -0.024 | 0.061 | 0.116 | 0.221 |
| Tobin's Q | 3877 | 2.246 | 1.699 | 0.860 | 1.221 | 1.714 | 2.636 | 5.450 |
| Cash | 3877 | 0.249 | 0.227 | 0.014 | 0.070 | 0.175 | 0.372 | 0.735 |
| Employment (thousands) | 3877 | 19.311 | 51.804 | 0.095 | 0.778 | 3.580 | 14.100 | 83.756 |

**Panel B: Regression Results**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Ln(No. Acq.) | Has Acq. | IHS(No. Acq.) | No. Acq. (Poisson) | Ln(No. Acq.) | Has Acq. |
| % H-1B Demand Met | -0.023*** | -0.029*** | -0.030*** | -0.172** | -0.020*** | -0.027*** |
| | (0.007) | (0.010) | (0.009) | (0.079) | (0.007) | (0.010) |
| ln(# Cap H-1B Demanded) | | | | | 0.015 | 0.008 |
| | | | | | (0.010) | (0.011) |
| Size | 0.026** | 0.027** | 0.034** | 0.419*** | 0.024** | 0.026* |
| | (0.011) | (0.013) | (0.014) | (0.149) | (0.011) | (0.013) |
| Leverage | -0.083** | -0.074 | -0.108** | -1.836** | -0.088** | -0.077 |
| | (0.041) | (0.047) | (0.053) | (0.745) | (0.042) | (0.047) |
| ROA | -0.024 | -0.012 | -0.031 | -0.278 | -0.022 | -0.011 |
| | (0.025) | (0.033) | (0.032) | (1.170) | (0.025) | (0.033) |
| Tobin's Q | -0.003 | -0.003 | -0.003 | -0.060 | -0.002 | -0.003 |
| | (0.005) | (0.006) | (0.006) | (0.076) | (0.005) | (0.006) |
| Cash | 0.031 | 0.027 | 0.041 | 0.114 | 0.038 | 0.031 |
| | (0.061) | (0.074) | (0.079) | (0.761) | (0.061) | (0.074) |
| Employment | -0.658* | -0.976** | -0.835* | -4.893 | -0.619* | -0.955** |
| | (0.344) | (0.473) | (0.439) | (5.428) | (0.339) | (0.470) |
| Observations | 3877 | 3877 | 3877 | 3877 | 3877 | 3877 |
| Adj./Pseudo R-Squared | 0.316 | 0.234 | 0.315 | 0.216 | 0.317 | 0.234 |
| Company FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 3: H-1B Visa Lottery Outcome and Firm Acquisition Activity: Cross-Sectional Tests**

Panel A presents summary statistics of acquisitions of different types of target firms undertaken by the firms in our H-1B lottery sample. Book/Market Ratio is the firm's book-to-market ratio in year *t*. Experienced Acquirer is an indicator that takes the value of one if the firm's cumulative number of completed M&As up to the lottery year exceeds the sample median. For each firm in the H-1B lottery sample, we compute the fraction of its employees on LinkedIn that lives in Canada, and construct two indicators: (1) the indicator for high fraction of employees in Canada that takes the value of one if the fraction is above sample median and zero otherwise; and (2) the indicator for any employees in Canada. We add the interaction between the fraction of H-1B demand met and Book/Market Ratio, Experienced Acquirer, the indicator of high fraction of employees in Canada, or the indicator of any employees in Canada to model (1) and present the OLS estimation results of the augmented model over the years of 2008-2009 and 2014-2017 in Panels B and C. The main independent variable is the fraction of the company's demand for H-1B visas that is met (i.e., the lottery win rate). We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). In Panels B and C, the dependent variable is the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* or an indicator of whether the firm (acquirer) has any acquisitions with undisclosed transaction value in *t+1*. In Panel D, the dependent variable is the natural logarithm of one plus the number of acquisitions of different types of target firms with undisclosed transaction value in year *t+1*. Other explanatory variables are a set of firm characteristics measured in year *t*. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**Panel A: Impacts of Book/Market Ratio and Acquirer Experience**

| | N | Mean | Std. Dev. | 5-%ile | 25-%ile | 50-%ile | 75-%ile | 95-%ile |
|---|---|---|---|---|---|---|---|---|
| No. Acq | 3877 | 0.217 | 0.729 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Acq | 3877 | 0.133 | 0.340 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. of Foreign Targets | 3877 | 0.193 | 0.635 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Acq. of Foreign Targets | 3877 | 0.124 | 0.329 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. High-tech Acq | 3877 | 0.102 | 0.417 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Low-tech Acq | 3877 | 0.115 | 0.553 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq of Targets w/o Patent | 3877 | 0.179 | 0.663 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq of Targets with Patent | 3877 | 0.038 | 0.213 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| No. Acq of Targets in States with Strong Non-Compete Laws | 3877 | 0.093 | 0.399 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq of Targets in States with Weak Non-Compete Laws | 3877 | 0.123 | 0.464 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |

**Panel B: Impacts of Book/Market Ratio and Acquirer Experience**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Ln(No. Acq.) | Has Acq. | Ln(No. Acq.) | Has Acq. |
| % H-1B Demand Met | 0.001 | 0.001 | | |
| x Book/Market Ratio | (0.006) | (0.007) | | |
| % H-1B Demand Met | | | -0.028*** | -0.034*** |
| x Experienced Acquirer | | | (0.008) | (0.012) |
| % H-1B Demand Met | -0.011*** | -0.016*** | -0.002 | -0.003 |
| | (0.003) | (0.004) | (0.004) | (0.005) |
| Size | 0.006 | 0.007 | 0.004 | 0.003 |
| | (0.007) | (0.010) | (0.007) | (0.009) |
| Leverage | -0.043* | -0.051 | 0.029 | 0.038 |
| | (0.026) | (0.033) | (0.020) | (0.027) |
| ROA | -0.024 | -0.030 | 0.012 | 0.020 |
| | (0.016) | (0.021) | (0.015) | (0.022) |
| Tobin's Q | -0.000 | -0.000 | -0.001 | -0.001 |
| | (0.002) | (0.003) | (0.002) | (0.003) |
| Cash | -0.008 | -0.003 | -0.055 | -0.085 |
| | (0.034) | (0.044) | (0.050) | (0.071) |
| Employment | -0.187 | -0.257 | 4.379 | 6.360 |
| | (0.127) | (0.162) | (3.317) | (4.741) |
| Observations | 3877 | 3877 | 3877 | 3877 |
| Adj. R-Squared | 0.125 | 0.118 | 0.319 | 0.237 |
| Company FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

**Panel C: Impacts of Foreign Affiliates**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Ln(No. Acq.) | Has Acq. | Ln(No. Acq.) | Has Acq. |
| % H-1B Demand Met | 0.019** | 0.029** | | |
| x High Perc of Employee in Canada | (0.010) | (0.013) | | |
| % H-1B Demand Met | | | 0.019** | 0.031** |
| x Has Employee in Canada | | | (0.008) | (0.012) |
| % H-1B Demand Met | -0.034*** | -0.046*** | -0.037*** | -0.051*** |
| | (0.005) | (0.008) | (0.004) | (0.007) |
| Size | 0.026** | 0.027** | 0.027** | 0.028** |
| | (0.011) | (0.013) | (0.011) | (0.013) |
| Leverage | -0.083** | -0.075 | -0.085** | -0.077 |
| | (0.041) | (0.047) | (0.041) | (0.047) |
| ROA | -0.024 | -0.010 | -0.023 | -0.011 |
| | (0.025) | (0.032) | (0.025) | (0.032) |
| Tobin's Q | -0.003 | -0.004 | -0.003 | -0.004 |
| | (0.005) | (0.006) | (0.005) | (0.006) |
| Cash | 0.031 | 0.027 | 0.031 | 0.027 |
| | (0.061) | (0.074) | (0.061) | (0.074) |
| Employment | -0.458 | -0.753 | -0.684** | -1.018** |
| | (0.360) | (0.492) | (0.342) | (0.468) |
| Observations | 3877 | 3877 | 3877 | 3877 |
| Adj. R-Squared | 0.316 | 0.234 | 0.316 | 0.234 |
| Company FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

**Panel D: H-1B Lottery Outcome and Acquisitions of Different Types of Target Firms**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Ln(No. High-tech Acq) | Ln(No. Low-tech Acq) | Ln(No. Acq of Targets without Patent) | Ln(No. Acq of Targets with Patent) | Ln(No. Acq of Targets in States with Strong Non-Compete Laws) | Ln(No. Acq of Targets in States with Weak Non-Compete Laws) |
| % H-1B Demand Met | -0.014*** | -0.010* | -0.019** | -0.005* | -0.029*** | -0.012 |
| | (0.005) | (0.005) | (0.007) | (0.003) | (0.010) | (0.012) |
| Size | 0.009 | 0.022*** | 0.026*** | 0.002 | 0.013* | 0.019** |
| | (0.007) | (0.008) | (0.010) | (0.005) | (0.007) | (0.008) |
| Leverage | -0.024 | -0.062** | -0.056 | -0.037* | -0.013 | -0.087*** |
| | (0.028) | (0.027) | (0.036) | (0.019) | (0.028) | (0.030) |
| ROA | 0.007 | -0.037** | -0.012 | -0.019 | -0.008 | -0.025 |
| | (0.020) | (0.017) | (0.022) | (0.013) | (0.017) | (0.020) |
| Tobin's Q | -0.001 | -0.002 | -0.002 | -0.001 | -0.001 | -0.004 |
| | (0.004) | (0.003) | (0.004) | (0.002) | (0.003) | (0.004) |
| Cash | 0.007 | 0.026 | 0.027 | -0.001 | 0.039 | -0.004 |
| | (0.048) | (0.036) | (0.059) | (0.023) | (0.043) | (0.046) |
| Employment | 0.332 | -0.977*** | -0.616* | -0.060 | -0.617* | -0.104 |
| | (0.288) | (0.124) | (0.354) | (0.067) | (0.372) | (0.143) |
| Observations | 3877 | 3877 | 3877 | 3877 | 3877 | 3877 |
| Adj. R-Squared | 0.225 | 0.293 | 0.312 | 0.072 | 0.196 | 0.245 |
| Company FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 4: H-1B Lottery Outcome and Employee Stock Options**

This table presents OLS estimation results of company-year panel regressions in model (1) over the years of 2008-2009 and 2014-2017. The main independent variable is the fraction of the company's demand for H-1B visas that is met (i.e., the lottery win rate). We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). The dependent variables in the four columns are: (1) the ratio of new employee options grants to outstanding employee options, averaged over years *t* and *t+1*, (2) the average new option grants per employee in years *t* and *t+1*, (3) the average percentage change in employee options in years *t* and *t+1*, and (4) the average change in outstanding options per employee in years *t* and *t+1*. The control variables include size, leverage, ROA, Tobin's Q, cash, employment, company fixed effects, and year fixed effects. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent Variable | Percentage of New Options Granted | New Options Granted per Employee | Percentage Change in Outstanding Options | Change in Outstanding Options per Employee |
| % H-1B Demand Met | -0.030** | -0.799* | -0.021** | -0.341** |
| | (0.013) | (0.413) | (0.010) | (0.143) |
| Size | -0.011 | -0.351 | -0.009 | -0.102 |
| | (0.011) | (0.341) | (0.008) | (0.163) |
| Leverage | 0.050 | 2.083 | 0.010 | 1.500* |
| | (0.039) | (1.792) | (0.025) | (0.794) |
| ROA | -0.125*** | -5.296* | -0.063** | -1.914 |
| | (0.037) | (3.160) | (0.029) | (1.235) |
| Tobin's Q | 0.003 | 0.001 | 0.000 | -0.081 |
| | (0.004) | (0.156) | (0.003) | (0.078) |
| Cash | -0.104* | -1.072 | -0.070 | -0.115 |
| | (0.058) | (2.131) | (0.047) | (1.113) |
| Employment | -0.316 | -19.704 | -0.272* | -6.643 |
| | (0.262) | (21.737) | (0.140) | (8.243) |
| Observations | 3877 | 3877 | 3877 | 3877 |
| Adj. R-Squared | 0.413 | 0.641 | 0.351 | 0.616 |
| Company FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

**Table 5: H-1B Visa Lottery Outcome and Acquisitions of H-1B Workers from the Target Firm**

Panel A presents summary statistics of acquisitions of different types of target firms undertaken by the firms in our H-1B lottery sample. Panel B presents the OLS estimation results of model (1) over the years of 2008-2009 and 2014-2017. The main independent variable is the fraction of the company's demand for H-1B visas that is met (i.e., the lottery win rate). We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). In the first four columns, the dependent variable is the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* in which the target firm or the deal has certain characteristics: the target has H-1B workers or not (columns (1)-(2)), the target has H-1B workers with positive job function similarity scores as the acquirer's workers or not (columns (3)-(4)). In column (5), the dependent variable is the natural logarithm of one plus the number of H-1B workers acquired through acquisitions with undisclosed transaction value in year *t*+1. We identify the firm's H-1B workers from the I-129 dataset starting from 1999. Other explanatory variables are a set of firm characteristics measured in year *t*. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**Panel A: Summary Statistics of Acquisitions with and without H-1B Workers**

| | N | Mean | Std. Dev. | 5-%ile | 25-%ile | 50-%ile | 75-%ile | 95-%ile |
|---|---|---|---|---|---|---|---|---|
| No. Acq. with H-1B Workers | 3877 | 0.074 | 0.320 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. w/o H-1B Workers | 3877 | 0.143 | 0.570 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. with H-1B Workers of Similar Skills | 3877 | 0.066 | 0.300 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. w/o H-1B Workers of Similar Skills | 3877 | 0.150 | 0.585 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acquired H-1B Workers | 3877 | 4.789 | 156.068 | 0.000 | 0.000 | 0.000 | 0.000 | 2.000 |
| No. of Existing H-1B Workers | 3877 | 359.619 | 1533.684 | 0.000 | 16.000 | 55.000 | 185.000 | 1209.000 |
| No Cap-subject H-1B demanded | 3877 | 36.477 | 267.803 | 1.000 | 1.000 | 3.000 | 8.000 | 71.000 |
| No Cap-subject H-1B visas granted | 3877 | 10.916 | 58.338 | 0.000 | 0.000 | 1.000 | 4.000 | 30.000 |

**Panel B: H-1B Visa Lottery Outcome and Acquisitions of H-1B Workers from the Target Firm**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Ln(No. Acq. with H-1B Workers) | Ln(No. Acq. without H-1B Workers) | Ln(No. Acq. with H-1B Workers of Similar Skills) | Ln(No. Acq. w/o H-1B Workers of Similar Skills) | Ln(No. Acquired H-1B workers) |
| % H-1B Demand Met | -0.024*** | -0.015 | -0.026*** | -0.014 | -0.043*** |
| | (0.009) | (0.013) | (0.009) | (0.013) | (0.011) |
| Size | 0.007 | 0.023** | 0.007 | 0.023** | 0.010 |
| | (0.007) | (0.009) | (0.007) | (0.009) | (0.021) |
| Leverage | -0.041 | -0.058* | -0.035 | -0.065* | -0.112 |
| | (0.025) | (0.034) | (0.023) | (0.035) | (0.083) |
| ROA | -0.026 | -0.005 | -0.020 | -0.012 | -0.055 |
| | (0.016) | (0.021) | (0.014) | (0.023) | (0.050) |
| Tobin's Q | -0.001 | -0.003 | 0.000 | -0.003 | 0.002 |
| | (0.003) | (0.004) | (0.002) | (0.004) | (0.008) |
| Cash | -0.005 | 0.029 | 0.001 | 0.022 | -0.044 |
| | (0.034) | (0.052) | (0.032) | (0.053) | (0.102) |
| Employment | -0.193* | -0.545 | -0.149 | -0.585 | -0.462 |
| | (0.116) | (0.379) | (0.105) | (0.377) | (0.401) |
| Observations | 3877 | 3877 | 3877 | 3877 | 3877 |
| Adj. R-Squared | 0.125 | 0.262 | 0.116 | 0.270 | 0.056 |
| Company FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |

**Table 6: H-1B Visa Lottery Outcome and Acquisitions of Skilled Workers Identified from LinkedIn**

We retrieve from LinkedIn the information about the employees of the firms in our H-1B lottery sample and the target firms they acquire in acquisitions with undisclosed transaction value. The analysis in this table only includes the sample firms and the target firms that have at least one employees identified on LinkedIn. The upper session of Panel A presents summary statistics of the employees on LinkedIn of the sample firms and their acquisitions with undisclosed transaction value, while the bottom session of Panel A presents summary statistics of the employees on LinkedIn of the target firms of these acquisitions. Panels B-C presents the OLS estimation results of model (1) over the years of 2008-2009 and 2014-2017. In Panel B, the dependent variables are the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* (column 1), an indicator of acquisitions with undisclosed transaction value in year *t+1* (column 2), the natural logarithm of one plus the number of acquired workers on LinkedIn in year *t*+1 (column 3), the natural logarithm of one plus the number of acquired STEM workers on LinkedIn in year *t*+1 (column 4), or the natural logarithm of one plus the count of acquired workers on LinkedIn in year *t*+1 with technique skills (column 5), with creative skills (column 6), with bachelor's degree or higher (column 7), with master's degree or higher (column 8), or with doctoral degree (column 9). For each acquirer-target pair, we compute the similarity score between their workers based on their education majors or technique skills. The dependent variable in Panel C is the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t*+1, in which the similarity score based on employee education majors or employee skills is positive (or non-positive). The main independent variable is the fraction of the company's demand for H-1B visas that is met (i.e., the lottery win rate). We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). Other explanatory variables are a set of firm characteristics measured in year *t*. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**Panel A: Summary Statistics of the Sample Firms' and Their Target Firms' Employees on LinkedIn**

| | N | Mean | SD | 5-%ile | 25-%ile | 50-%ile | 75-%ile | 95-%ile |
|---|---|---|---|---|---|---|---|---|
| **Summary statistics of workers on LinkedIn for firms in the H-1B lottery sample** | | | | | | | | |
| No. of all workers (thousands) | 3869 | 2.375 | 5.590 | 0.010 | 0.162 | 0.622 | 1.969 | 9.944 |
| No. of STEM workers (thousands) | 3869 | 0.698 | 2.001 | 0.003 | 0.050 | 0.175 | 0.535 | 2.743 |
| No. workers with tech skills (thousands) | 3869 | 0.886 | 2.428 | 0.003 | 0.050 | 0.219 | 0.730 | 3.280 |
| No. workers with creative skills (thousands) | 3869 | 0.888 | 2.120 | 0.003 | 0.063 | 0.257 | 0.800 | 3.454 |
| No. workers with bachelor's degree (thousands) | 3869 | 0.768 | 1.724 | 0.003 | 0.051 | 0.208 | 0.674 | 3.216 |
| No. workers with master's degree (thousands) | 3869 | 0.388 | 1.030 | 0.002 | 0.027 | 0.098 | 0.317 | 1.643 |
| No. workers with doctoral degree (thousands) | 3869 | 0.080 | 0.283 | 0.000 | 0.004 | 0.015 | 0.047 | 0.278 |
| No. Acq | 3869 | 0.167 | 0.582 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Acq | 3869 | 0.112 | 0.315 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. of all workers acquired | 3869 | 20.968 | 421.950 | 0.000 | 0.000 | 0.000 | 0.000 | 14.000 |
| No. of STEM workers acquired | 3869 | 6.949 | 147.970 | 0.000 | 0.000 | 0.000 | 0.000 | 5.000 |
| No. Acquired workers with tech skills | 3869 | 7.089 | 57.262 | 0.000 | 0.000 | 0.000 | 0.000 | 13.000 |
| No. Acquired workers with creative skills | 3869 | 7.759 | 67.418 | 0.000 | 0.000 | 0.000 | 0.000 | 14.000 |
| No. Acquired workers with bachelor's degree | 3869 | 6.305 | 51.390 | 0.000 | 0.000 | 0.000 | 0.000 | 11.000 |
| No. Acquired workers with master's degree | 3869 | 3.833 | 35.100 | 0.000 | 0.000 | 0.000 | 0.000 | 5.000 |
| No. Acquired workers with Doctoral degree | 3869 | 0.687 | 6.146 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. with similar education majors | 3869 | 0.159 | 0.557 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. without similar education majors | 3869 | 0.058 | 0.334 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| No. Acq. with similar tech skills | 3869 | 0.159 | 0.552 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Acq. without similar tech skills | 3869 | 0.058 | 0.328 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Summary statistics of workers on LinkedIn for the target firms** | | | | | | | | |
| No. of all workers | 640 | 15.023 | 17.678 | 1.000 | 3.000 | 7.000 | 19.500 | 57.000 |
| No. of STEM workers | 640 | 4.900 | 5.956 | 0.000 | 1.000 | 2.000 | 7.000 | 18.000 |
| No. workers with tech skills | 640 | 8.986 | 7.648 | 0.000 | 2.000 | 7.000 | 18.000 | 20.000 |
| No. workers with creative skills | 640 | 9.652 | 8.016 | 0.000 | 2.000 | 7.000 | 20.000 | 21.000 |
| No. workers with bachelor's degree | 640 | 7.445 | 6.546 | 0.000 | 1.500 | 5.000 | 16.000 | 17.000 |
| No. workers with master's degree | 640 | 3.564 | 3.108 | 0.000 | 1.000 | 3.000 | 8.000 | 8.000 |
| No. workers with doctoral degree | 640 | 0.708 | 0.860 | 0.000 | 0.000 | 0.000 | 2.000 | 2.000 |

**Panel B: H-1B Visa Lottery and Acquisitions of Skilled Workers Identified on LinkedIn**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| Dependent variable | Ln(No. Acq.) | Has Acq. | Ln(No. Acquired workers) | Ln(No. Acquired STEM workers) | Ln(No. Acquired workers with tech skills) | Ln(No. Acquired workers with creative skills) | Ln(No. Acquired workers with bachelor's degree or higher) | Ln(No. Acquired workers with master's degree or higher) | Ln(No. Acquired workers with doctoral Degree) |
| % H-1B Demand Met | -0.034** | -0.039** | -0.151*** | -0.111*** | -0.124** | -0.142*** | -0.145** | -0.098** | -0.054* |
| | (0.014) | (0.016) | (0.055) | (0.041) | (0.052) | (0.055) | (0.059) | (0.047) | (0.030) |
| Size | 0.023** | 0.025** | 0.081** | 0.052** | 0.067** | 0.086*** | 0.078** | 0.047* | 0.022 |
| | (0.009) | (0.012) | (0.033) | (0.022) | (0.032) | (0.033) | (0.036) | (0.027) | (0.015) |
| Leverage | -0.086** | -0.089* | -0.242* | -0.115 | -0.233 | -0.273* | -0.269* | -0.203* | -0.089 |
| | (0.040) | (0.046) | (0.146) | (0.112) | (0.143) | (0.148) | (0.154) | (0.120) | (0.072) |
| ROA | -0.028 | -0.024 | -0.075 | -0.047 | -0.047 | -0.070 | -0.069 | -0.022 | 0.002 |
| | (0.024) | (0.032) | (0.096) | (0.071) | (0.099) | (0.097) | (0.107) | (0.081) | (0.044) |
| Tobin's Q | -0.005 | -0.006 | -0.013 | -0.009 | -0.007 | -0.011 | -0.010 | -0.006 | -0.002 |
| | (0.004) | (0.006) | (0.015) | (0.012) | (0.015) | (0.015) | (0.016) | (0.012) | (0.007) |
| Cash | 0.012 | 0.020 | -0.008 | 0.047 | 0.035 | 0.032 | -0.002 | -0.027 | -0.025 |
| | (0.055) | (0.069) | (0.173) | (0.126) | (0.169) | (0.172) | (0.185) | (0.141) | (0.087) |
| Employment (Compustat) | -0.696** | -1.019** | -5.427*** | -0.462 | -3.340* | -4.457** | -5.472*** | -4.580*** | -2.525*** |
| | (0.314) | (0.458) | (1.719) | (0.967) | (1.857) | (1.824) | (2.040) | (1.550) | (0.695) |
| Employment (LinkedIn) | -0.029*** | -0.025** | -0.164* | -0.150 | -0.170** | -0.149* | -0.136 | -0.131 | -0.088 |
| | (0.008) | (0.010) | (0.094) | (0.099) | (0.086) | (0.090) | (0.089) | (0.093) | (0.076) |
| Observations | 3869 | 3869 | 3869 | 3869 | 3869 | 3869 | 3869 | 3869 | 3869 |
| Adj. R-Squared | 0.253 | 0.206 | 0.157 | 0.121 | 0.180 | 0.157 | 0.165 | 0.133 | 0.050 |
| Company FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Panel C: H-1B Visa Lottery and Acquisitions of Target Firms with Employees of Similar Skills**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Ln(No. Acq. with similar education majors) | Ln(No. Acq. without similar education majors) | Ln(No. Acq. with similar skills) | Ln(No. Acq. without similar skills) |
| % H-1B Demand Met | -0.032** | -0.010 | -0.036*** | -0.005 |
| | (0.013) | (0.009) | (0.013) | (0.008) |
| Size | 0.026*** | 0.004 | 0.025*** | 0.005 |
| | (0.009) | (0.006) | (0.009) | (0.006) |
| Leverage | -0.094** | 0.007 | -0.095** | 0.006 |
| | (0.039) | (0.017) | (0.039) | (0.016) |
| ROA | -0.032 | 0.005 | -0.035 | 0.007 |
| | (0.024) | (0.010) | (0.024) | (0.010) |
| Tobin's Q | -0.005 | 0.001 | -0.005 | 0.001 |
| | (0.004) | (0.002) | (0.004) | (0.002) |
| Cash | -0.007 | 0.047 | 0.032 | 0.003 |
| | (0.052) | (0.033) | (0.052) | (0.033) |
| Employment in Compustat | -0.722** | 0.031 | -0.737** | 0.041 |
| | (0.294) | (0.114) | (0.294) | (0.114) |
| Employment in LinkedIn | -0.036*** | 0.036 | -0.029*** | 0.032 |
| | (0.013) | (0.031) | (0.008) | (0.029) |
| Observations | 3869 | 3869 | 3869 | 3869 |
| Adj. R-Squared | 0.248 | 0.228 | 0.245 | 0.239 |
| Company FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

**Internet Appendix to:**

# Hiring High-Skilled Labor through Mergers and Acquisitions

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# Internet Appendix A: Additional Tables

**Table A1: H-1B Visa Lottery Outcome and Firm Acquisition Activity: Robustness Checks**

Panel A presents summary statistics of the number of acquisitions undertaken by the firms in our H-1B lottery sample. These acquisitions are further divided into sub-categories depending on whether the transaction value of the acquisition is disclosed on not. Panel B presents OLS estimation results of company-year panel regressions in model (1) over the years of 2008-2009 and 2014-2017. The main independent variable is the fraction of the company's demand for H-1B visas that is met (i.e., the lottery win rate). We estimate a company's demand for cap-subject foreign workers using its LCA filings and the number of cap-subject H-1B visas granted to the company using its processed I-129 petitions (detailed in Internet Appendix B). The dependent variable is the natural logarithm of one plus the number of all acquisitions (or the number of acquisitions with disclosed/undisclosed transaction value) in year *t+1*, or the indicator of any acquisitions (or the indicator of any acquisitions with disclosed/undisclosed transaction value) in year *t+1*. Other explanatory variables are a set of firm characteristics measured in year *t*. See the Appendix for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**Panel A: Summary Statistics**

| | N | Mean | Std. Dev. | 5-%ile | 25-%ile | 50-%ile | 75-%ile | 95-%ile |
|---|---|---|---|---|---|---|---|---|
| No. Undisclosed-Size Acq | 3877 | 0.217 | 0.729 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Undisclosed-Size Acq | 3877 | 0.133 | 0.340 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. Disclosed-Size Acq | 3877 | 0.182 | 0.487 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Disclosed-Size Acq | 3877 | 0.149 | 0.356 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| No. All Acq | 3877 | 0.399 | 0.930 | 0.000 | 0.000 | 0.000 | 0.000 | 2.000 |
| Has All Acq | 3877 | 0.246 | 0.430 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |

**Panel B: Regression Results**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Ln(No. Undisclosed-Size Acq.) | Has Undisclosed-Size Acq. | Ln(No. Disclosed-Size Acq.) | Has Disclosed-Size Acq. | Ln(No. All Acq.) | Has All Acq. |
| % H-1B Demand Met | -0.023*** | -0.029*** | -0.011* | -0.015** | -0.032*** | -0.038*** |
| | (0.007) | (0.010) | (0.006) | (0.007) | (0.008) | (0.010) |
| Size | 0.026** | 0.027** | 0.008 | 0.015 | 0.035** | 0.041*** |
| | (0.011) | (0.013) | (0.011) | (0.013) | (0.014) | (0.016) |
| Leverage | -0.083** | -0.074 | -0.059 | -0.057 | -0.127** | -0.098* |
| | (0.041) | (0.047) | (0.039) | (0.049) | (0.055) | (0.059) |
| ROA | -0.024 | -0.012 | -0.009 | 0.004 | -0.034 | -0.014 |
| | (0.025) | (0.033) | (0.041) | (0.044) | (0.046) | (0.051) |
| Tobin's Q | -0.003 | -0.003 | 0.005 | 0.006 | 0.001 | -0.001 |
| | (0.005) | (0.006) | (0.004) | (0.005) | (0.006) | (0.007) |
| Cash | 0.031 | 0.027 | 0.117** | 0.123* | 0.119 | 0.078 |
| | (0.061) | (0.074) | (0.055) | (0.070) | (0.081) | (0.092) |
| Employment | -0.658* | -0.976** | 0.416 | 0.582 | -0.239 | -0.397 |
| | (0.344) | (0.473) | (0.288) | (0.411) | (0.521) | (0.732) |
| Observations | 3877 | 3877 | 3877 | 3877 | 3877 | 3877 |
| Adj. R-Squared | 0.316 | 0.234 | 0.190 | 0.165 | 0.346 | 0.269 |
| Company FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

## Internet Appendix B:
## Measuring Demand and Supply of High-Skilled Foreign Labor Subject to H-1B Visa Cap

### B.1. Demand for cap-subject high-skilled foreign labor

Companies must file LCAs and have their LCAs certified before petitioning the USCIS for H-1B visas. We therefore proxy their demand with their LCA filings, following Kerr and Lincoln (2010) and Xu (2018). Each LCA filing contains information on the intended hires, including employment start date and end date, job title, prevailing wage and worksite address. However, LCA petitioners do not indicate whether their intended hires are subject to annual H-1B visa cap or not. We determine whether the intended hires are cap-subject using the certification or approval date of the LCA by the U.S. Department of Labor.

LCAs certified after April are unlikely intended for cap-subject H-1B visas. The USCIS starts accepting I-129 petitions on the first business day in April; employers race to file I-129 petitions as early as possible because the annual cap is usually reached within a few days in the recent years. To win the race, employers have to obtain approved LCAs prior to April. Therefore, LCAs certified after April are unlikely intended for petitions subject to the annual H-1B visa cap.

Although employers must have their LCAs certified before April to be eligible for H-1B visa lotteries, they also have incentives to have their LCAs certified as late as possible. To illustrate this point, take the fiscal year 2009 as an example. Suppose a firm won an H-1B visa in the lotteries conducted on April 14, 2008. The earliest day the beneficiary H-1B foreign worker can start working for the firm is October 1, 2008, the start date of the government fiscal year of 2009.[1] The H-1B visa allows the worker to work for the firm for a maximum of three years; the firm has to petition the USCIS for an extension to the H-1B visa three years later if it wants to continue employing the worker after the H-1B visa expires. At the time of submitting the I-129 petition for the H-1B visa, the firm must also submit the certified LCA. The LCA itself has an employment start date, which is at most 180 days after the LCA certification date. For example, if the LCA was certified by the Department of Labor on November 1, 2007, the employment start date associated with the LCA can be any day in the 180-day window from November 1, 2007 to April 29, 2008.

[1] While H-1B workers do not actually have to start employment exactly on October 1, their visa status will change on October 1; any previously held visa status (e.g. student visas) will no longer be valid. This means whether employment begins on October 1 or not, their H-1B visa will expire in roughly three years from that date unless extended earlier.

The LCA is also valid for three years. Suppose the firm chose the LCA employment start date to be April 29, 2008 (the latest possible employment start date), the LCA would expire on April 28, 2011. But the earliest employment start date on the H-1B visa is October 1, 2008, which corresponds to an expiration date of September 30, 2011. The beneficiary H-1B worker has to stop working for the firm when the H-1B visa expires or when the LCA expires, whichever is earlier. Therefore, the H-1B worker can only work for the firm from October 1, 2008 (the H-1B employment start date) to April 28, 2011 (the LCA expiration date), which is 2 years and 7 months rather than 3 years. If the firm wants to continue to hire the H-1B worker after the LCA expires on April 28, 2011, it has to petition the USCIS for an extension to the H-1B visa, which is costly and time consuming. On the other hand, if the LCA was certified on March 31, 2008, the employment start dates of the LCA and the H-1B visa will coincide with each other (October 1, 2008). And they will expire on the same day (September 30, 2011). In this case, the H-1B worker can work for the firm for three years. To maximize the H-1B visa validity period, the firm should have the LCA certified as late as possible but before April 1, 2008 to avoid being excluded from the H-1B visa lotteries.

The example illustrates that companies have incentives to have their cap-subject LCAs certified on a day as close as possible to April 1 but before that so that they can submit their I-129 petitions on or right after April 1. Indeed, LCA filings drastically surge in March every year. Companies do try to maximize the H-1B visa validity period. Yet this does not exclude the possibility that some companies choose to file LCAs earlier than March, probably because of worries that the LCA will not be certified in time for I-129 petition starting on April 1 (it usually takes one week for the Department of Labor to certify an LCA, but the time it takes is uncertain ex ante). In addition, some companies could have filed cap-subject LCAs after April 1 in the few years after 2004. The H-1B visa cap of 65,000 was reached within 192 days after April 1 in 2004, within 132 days in 2005 and within 56 days in 2006. In these years, I-129 petitions submitted in late April (or even in May) were still eligible for cap-subject H-1B visas. But in the more recent years, only petitions submitted within a few days after April 1 are eligible for H-1B lotteries.

Taking these factors into account, we measure a company's demand for cap-subject high-skilled foreign workers with the number of intended hires in its LCAs certified between January and April. LCAs certified prior to January or after April are most likely for H-1B visa extensions or are not capped by the annual quota. In addition, the recruiting cycle of high-skilled foreign labor

might start at the beginning of the year in January. We further require that the intended LCA hires must have an employment start date falling in the window of five to six months after the LCA certification date, because companies want to choose the LCA employment start date as close as possible to October 1 (the first day a cap-subject H-1B employee can legally work under H-1B) in order to maximize the validity period of the cap-subject H-1B visa.

**B.2. The number of cap-subject H-1B visas a company wins in lotteries**

The I-129 petitions database from the USCIS includes three types of processed H-1B petitions: 1) cap-subject petitions (notably, these include the lucky petitions that have been selected through lotteries); 2) cap-exempt petitions; and 3) petitions for extension of existing H-1B status, which are also cap-exempt. The second category includes I-129 petitions for foreign workers who hold advanced degrees and are to be employed in higher education or non-profit institutions in the U.S.; they are exempt from the annual cap.

The key to measure the supply of cap-subject H-1B visas for each firm is to determine to which of the above three categories a processed I-129 petition belongs. The employer must indicate whether an I-129 petition is for a visa extension. Therefore, it is easy to single out petitions in the third category. Yet it is more difficult to separate petitions in the first and second categories. The I-129 form does not contain any questions about whether the sought H-1B visa is cap-subject or cap-exempt until the version dated November 23, 2010. This and all subsequent versions of the I-129 form require the employer to specify whether the petition is cap-subject or cap-exempt. Although the I-129 forms after 2010 contain the information on identifying cap-subject vs. cap-exempt petitions, we only have such information for petitions after 2015 in the I-129 database. This is because USCIS continues to accept older versions of the I-129 form.

For petitions filed before 2015, we determine whether they are cap-subject using the following four criteria. First, we filter out petitions filed by non-profit organizations and higher education and government research institutions. These institutions are cap-exempt by definition. Second, we filter out I-129 petitions filed in months other than April to June. Cap-subject employees are expected to file I-129 petitions within a short period after April 1, to be eligible for working in the U.S. in the coming fiscal year that starts on October 1. Third, we require cap-subject petitions to have an employment start date after October 1. Whereas a cap-exempt applicant may very well have the leisure of belatedly submitting an I-129 petition in May to start a job in August, cap-

subject applicants have to apply for H-1B visas for the next fiscal year that starts on October 1. That is, the employment start date of cap-subject petitions cannot be before October 1. Lastly, cap-subject petitions must check "new employment" for part 2 of question 2 on the I-129 form. We filter out petitions that do not check "new employment".

The four filters accurately separate cap-exempt petitions from cap-subject ones. To verify their accuracy, we apply the four filters to the sample of processed I-129 petitions in 2015 and 2016, for which we have information on their cap status directly from the I-129 database. Among the 194,303 cap-subject petitions, with our filters we identify 193,606 of them, with a rate of 99.6%. Among the 534,162 cap-exempt petitions, we identify 528,154 of them, with a rate of 98.9%.

Our demand and supply measures turn out to be accurate. The demand measure is positively associated with the supply measure. In addition, the fraction of demand that is met, the ratio of supply to demand, is not correlated with company characteristics or past company performance. Furthermore, the fraction of capped H-1B visa demand met based on our measures is very close to the likelihood of winning H-1B lotteries disclosed by the USCIS. Had our demand or supply measure been too noisy, we would not observe these results.

## Internet Appendix C:
## Exogenous Reduction in H-1B Visa Quota and Acquisition Activity

The annual H-1B quota reverted to 65,000 in 2004 from 195,000 in 2003 (see Table C1). This abrupt drop was largely unanticipated (Kato and Sparber, 2013; Xu, 2018) and caused a shortage of high-skilled workers for firms dependent on H-1B workers. We hypothesize that these H-1B dependent firms are more likely to acquire firms (and especially firms with H-1B workers) than other firms that are not reliant on H-1B workers.

We classify a firm into the treated group if it received H-1B visas before 2004 and into the control group otherwise.[1] We then estimate the following diff-in-diff model:

$$y_{i,t+1} = \beta(Treatment_i \times Year_t \geq 2004) + \gamma X_{it} + \alpha_i + \alpha_t + \varepsilon_{it}. \quad \text{(C1)}$$

The dependent variable is firm *i*'s acquisition activity in year *t+1*. $Treatment_i$ is a dummy variable equal to one for the treated firms, and zero otherwise. $Year_t \geq 2004$ is a dummy variable equal to one if year $t$ is greater than or equal to 2004, and zero otherwise. $X_{it}$ is a vector of firm characteristics. $\alpha_i$ and $\alpha_t$ are firm and year fixed effects, respectively. We cluster standard errors at the firm level following the suggestions of Petersen (2009). We estimate the model using firms active in 2003 over the seven years (2001–2007) around 2004. The estimation sample starts in 2001 because LCAs data are unavailable before 2001; the sample ends in 2007 to avoid any confounding effects of the financial crisis starting in 2008 or any overlap with the sample period for the H-1B lottery-based natural experiment.[2]

Table C2 Panel A reports summary statistics of the variables used to estimate model (C1). About 47% of the firm-year observations are from treated firms and 51% of the firm-years occur after 2004. The average company acquires 0.29 targets per annum and about 34% (0.10/0.29) of the target firms have hired H-1B workers prior to their acquisition announcement date.

Table C2 Panel B presents the estimation results for model (C1). The dependent variables in the two columns are the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year t+1 and the indicator for acquisitions with undisclosed transaction value in year t+1. The two dependent variables are the same as those in the first two columns of Table 2

[1] Our treatment classification is similar to Kerr and Lincoln (2010) and Xu (2018). The results remain qualitatively unchanged when we classify a firm into the treated group if it filed LCAs before 2004.

[2] Our diff-in-diff results are unlikely to be driven by confounding events in 2004. Such confounding events must not only affect acquisition activities of firms, but also have effects that correlate with H-1B-dependency.

Panel B, which are the baseline results for our H-1B lottery experiment. The coefficient on the interaction variable is positive and statistically significant at the one percent level in both columns. The results show that the 2004 reduction in H-1B visa cap caused H-1B-dependent firms to make more acquisitions, particularly acquisitions targeting firms that have hired H-1B workers.

The average treatment effects are economically substantial. Compared to the control firms, the treated firms acquired 22% more target firms with undisclosed transaction value per annum after 2004 than before. Concerning the extensive margins, the treated firms are about 1.8 percentage points more likely to acquire target firms with undisclosed transaction value.[3]

A diff-in-diff model could produce false positive treatment effects if the treated and control firms have heterogeneous characteristics that are not controlled for in model (C1) (Roberts and Whited, 2013). To address this concern, we conduct the following falsification test. Pretending that the annual H-1B quota significantly dropped in 2014, we classify a firm into the treated group if it received H-1B visas before 2014, and into the control group otherwise. We then estimate a diff-in-diff model identical to model (C1) with two differences: 1) replacing the post-2004 indicator with the post-2014 indicator and 2) altering the estimation period to 2011-2017. The falsification test results, reported in Table C3, show that the coefficient on the interaction variable is insignificant throughout the four columns. These results indicate that the diff-in-diff model does not produce false positive treatment effects in our setting.

In sum, Internet Appendix C shows that H-1B-dependent firms are more likely to acquire firms with negligible amount of tangible assets than the control firms after the 2004 reduction in the annual H-1B visa cap. This result and the results based on H-1B visa lotteries are all consistent with our hypothesis that firms obtain high-skilled workers through mergers and acquisitions when facing shortages of high-skilled labor.

[3] Un-tabulated results show that these baseline results are robust to excluding the control variables from the regressions, inverse hyperbolic sine transformation of the dependent variable, and Poisson regressions. In addition, the results are similar for growth and value firms.

**Table C1: Frequencies of Companies and their Acquisitions**

This table summarizes the number of public companies, the number of public companies filing Labor Condition Applications (LCAs), the number of public companies with approved I-129 petitions, the number of acquisitions with undisclosed transaction value made by public companies, and the number of acquisitions made by public companies involving targets with H-1B workers for each fiscal year in our sample. The last column lists the annual H-1B visa cap for each fiscal year.

| | # Public Companies | # Companies Filing LCA | # Companies Filing I-129 | # Acquisitions | H-1B visa quota |
|---|---|---|---|---|---|
| 2001 | 4356 | 1403 | 1283 | 407 | 195000 |
| 2002 | 4012 | 1619 | 1445 | 404 | 195000 |
| 2003 | 3744 | 1454 | 1295 | 352 | 195000 |
| 2004 | 3698 | 1561 | 1431 | 439 | 65000 |
| 2005 | 3610 | 1568 | 1440 | 421 | 65000 |
| 2006 | 3537 | 1480 | 1345 | 523 | 85000 |
| 2007 | 3423 | 1445 | 1283 | 492 | 85000 |
| 2008 | 3210 | 1326 | 1167 | 478 | 85000 |
| 2009 | 3024 | 1194 | 1045 | 339 | 85000 |
| 2010 | 2908 | 1114 | 1022 | 372 | 85000 |
| 2011 | 2836 | 1101 | 1004 | 495 | 85000 |
| 2012 | 2795 | 1064 | 950 | 442 | 85000 |
| 2013 | 2844 | 1054 | 940 | 496 | 85000 |
| 2014 | 2966 | 1073 | 977 | 526 | 85000 |
| 2015 | 2931 | 1086 | 934 | 469 | 85000 |
| 2016 | 2855 | 1016 | 901 | 395 | 85000 |
| 2017 | 2837 | 1005 | 631 | 410 | 85000 |

**Table C2: Diff-in-Diff Estimation Results Based on the 2004 Reduction in H-1B Visa Cap**

Panel A presents summary statistics of the relevant variables in the diff-in-diff model (C1). Panel B presents the OLS regression results of the diff-in-diff model (C1) over the 2001-2007 period. The dependent variables are the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* in column (1), and an indicator of whether the firm (acquirer) has an acquisitions with undisclosed transaction value in *t+1* in column (2). Treatment is a dummy variable equal to 1 if the firm received any approved I-129 petitions prior to 2004, and 0 otherwise. The control variables include size, leverage, ROA, Tobin's Q, cash, employment, company fixed effects, and year fixed effects. See the Appendix in the text for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

**Panel A: Summary Statistics**

| | N | Mean | Std. Dev. | 5-%ile | 25-%ile | 50-%ile | 75-%ile | 95-%ile |
|---|---|---|---|---|---|---|---|---|
| Treatment | 21930 | 0.473 | 0.499 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
| Year≥2004 | 21930 | 0.506 | 0.500 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| No. of Acq. | 21930 | 0.123 | 0.555 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Has Acq. | 21930 | 0.077 | 0.267 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Size ($B) | 21930 | 3.047 | 14.710 | 0.011 | 0.073 | 0.316 | 1.229 | 11.070 |
| Leverage | 21930 | 0.205 | 0.277 | 0.000 | 0.007 | 0.149 | 0.313 | 0.600 |
| ROA | 21930 | -0.024 | 0.974 | -0.501 | -0.025 | 0.060 | 0.115 | 0.216 |
| Tobin's Q | 21930 | 2.182 | 3.376 | 0.803 | 1.147 | 1.579 | 2.418 | 5.274 |
| Cash | 21930 | 0.222 | 0.238 | 0.005 | 0.035 | 0.127 | 0.342 | 0.744 |
| Employment (thousands) | 21930 | 9.770 | 45.175 | 0.037 | 0.236 | 1.089 | 5.250 | 40.670 |

**Panel B: Regression Results**

| | (1) | (2) |
|---|---|---|
| | Ln(No. Acq.) | Has Acq. |
| Treatment x Year≥2004 | 0.024*** | 0.018** |
| | (0.007) | (0.007) |
| Size | 0.017*** | 0.018*** |
| | (0.003) | (0.003) |
| Leverage | -0.014 | -0.015 |
| | (0.009) | (0.009) |
| ROA | -0.002 | -0.002 |
| | (0.001) | (0.001) |
| Tobin's Q | -0.000 | -0.000 |
| | (0.000) | (0.001) |
| Cash | 0.003 | 0.005 |
| | (0.015) | (0.017) |
| Employment | -0.020 | -0.024 |
| | (0.021) | (0.027) |
| Observations | 21930 | 21930 |
| Adj. R-Squared | 0.358 | 0.273 |
| Company FE | Yes | Yes |
| Year FE | Yes | Yes |

**Table C3: Falsification Test of the Diff-in-Diff Model**

This table presents results of a falsification test of the diff-in-diff model. Pretending that the annual H-1B quota were significantly reduced in 2014, we classify a firm into the treated group if it had been granted H-1B visas before 2014 and into the control group otherwise. We then estimate a diff-in-diff model identical to model (2) except for two changes: the post-2004 indicator is replaced with the post-2014 indicator and the estimation period is changed to 2011-2017. The dependent variables are the natural logarithm of one plus the number of acquisitions with undisclosed transaction value in year *t+1* in column (1), and an indicator of whether the firm (acquirer) has an acquisitions with undisclosed transaction value in *t+1* in column (2). Treatment is a dummy variable equal to one if the firm received any approved I-129 petitions prior to 2014, and zero otherwise. The control variables include size, leverage, ROA, Tobin's Q, cash, employment, company fixed effects, and year fixed effects. See the Appendix in the text for variable definitions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors in parentheses are clustered at the firm level.

| | (1) | (2) |
|---|---|---|
| | Ln(No. Acq.) | Has Acq. |
| Treatment x Year≥2014 | -0.003 | -0.003 |
| | (0.009) | (0.009) |
| Size | 0.020*** | 0.018*** |
| | (0.004) | (0.004) |
| Leverage | -0.025** | -0.031** |
| | (0.012) | (0.014) |
| ROA | -0.008** | -0.007* |
| | (0.003) | (0.004) |
| Tobin's Q | 0.000 | -0.000 |
| | (0.000) | (0.000) |
| Cash | 0.011 | 0.018 |
| | (0.017) | (0.021) |
| Employment | -0.324*** | -0.453*** |
| | (0.115) | (0.158) |
| Observations | 16488 | 16488 |
| Adj. R-Squared | 0.397 | 0.281 |
| Company FE | Yes | Yes |
| Year FE | Yes | Yes |