



# H-1B Visas and Wages in Accounting: Evidence from Big 4 Payroll and the Ethics of H-1B Visas

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Received: 24 January 2024 / Accepted: 15 September 2024  
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## Abstract

We use payroll data from a Big 4 accounting firm to examine the starting wage differentials for H-1B visa holders. Prior research in other industries has found mixed results, but primarily relies on surveyed salary data. We observe that relative to U.S. citizen new hires—matched on office, position, and time of hire—newly hired accountants with H-1B visas receive starting salaries that are lower by approximately 10%. This finding calls into question the efficacy of regulatory mandates thought to prevent H-1B visa holders from being paid less than U.S. citizens in similar roles. In further tests, we find evidence that the hiring of H-1B visa holders has no or some small positive effect on the wages of peer U.S. citizen new hires (weakly indicative of complementarities or synergies), but no evidence of H-1B hiring driving down the wages for U.S. citizen peer new hires.

**Keywords** H-1B visa · Skilled workers · Immigration law · Accounting occupations

**JEL Classification** J31 · J38 · J61 · K37

## Introduction

In June 2017, the *Wall Street Journal* published an article titled “Accountants Jump Into Immigration Debate” (Rapoport, 2017). The story highlighted the growing use of H-1B visas by U.S. accounting firms. The trade groups and accounting firms providing comments for the piece stated

that this increasing use of guest workers was the result of a shortage of CPA-ready U.S. citizen accounting graduates. However, critics interviewed in the article stated that the real reason underlying this use was a desire to save on wage costs, as some H-1B employers have been accused of paying below market wages. We address this tension in our study, primarily using wage data from a Big 4 accounting firm that allows us to examine the starting wages for H-1B visa holders relative to their peers. Relatedly, we also estimate the effect H-1B hiring has on the wages of U.S. citizen peer workers in accounting, as some prior work in other industries has found that immigrants can substitute for native workers and drive down native worker wages.

We find, in line with the cost savings argument, that a Big 4 firm pays H-1B visa holders in tax and audit lower starting wages than U.S. citizen peer hires. There are several other explanations besides a desire to save on wage costs that could drive this wage discount (such as a difference in English communication skills or an attempt to recoup the considerable filing fees involved in hiring an H-1B worker). We are unable to identify the exact driver of this discrepancy, but our results are at least consistent with the pattern predicted by H-1B critics. In our secondary tests, we find no evidence that H-1B workers are substitutes for U.S. citizens

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in accounting, but rather some weak evidence of complementarities. That is, controlling for office size and growth, U.S. citizen new hires are paid slightly more in offices that have recently hired an H-1B visa holder in a peer role.

The H-1B visa program was signed into law via the Immigration Act of 1990 and in the decades since has become a key source of skilled foreign workers for U.S. employers looking to compete in an increasingly high tech economy (Mithas & Lucas, 2010). The visa restricts the ability of workers to switch jobs (which requires a new visa application, where denial can lead to deportation) and puts employers in a strong bargaining position. To protect against abuse stemming from this power imbalance, a tenet of the program, and the precursor H-1 visa, is that employers pay the H-1B visa holder at least the prevailing wage that is paid to peer workers.

There has been considerable debate in the public arena over the strength of this protection. The testimony and anecdotes put forth by those seeking to highlight employer malfeasance on this front are concerning (Hira, 2015, 2016; Smith et al., 2014), but empirical work tends to find the opposite effect (Aobdia & Srivastava, 2018; Chamberlain, 2017; Mithas & Lucas, 2010). That is, prior studies generally find that H-1B visa holders are paid *more* than their peers, which is regularly attributed to H-1B visa holders being more motivated and more qualified than their U.S. citizen peers.

Our research design contributes to this labor economics literature by examining H-1B visa-driven pay discrepancies in a tighter setting, in that we exploit actual wage data from a single firm. This avoids several weaknesses of the prior literature that relies heavily on surveys to measure wages, such as the trouble in identifying meaningful pay gaps between H-1B visa holders and peers across different employers for job titles that are frequently broad in scope (e.g., “software engineer” or “computer programmer”). Likewise, we avoid problems related to employer/employee matching processes and heterogeneous firm/industry shocks. Specifically, our approach avoids these endemic labor economics identification problems because we use payroll data from a single large employer (a Big 4 audit firm, a high-volume user of H-1B visas) and focus on divisions that have relatively narrow, strictly-defined job titles (tax and audit). Broadly, our empirical approach relies on matching newly-hired H-1B visa holders to other new hires by office location (e.g., Dallas, Chicago, San Diego), position (Staff, Senior Associate, Manager), service line (tax or audit), and start date (year-quarter). For more advanced new hires, one could argue that differences in experience could drive any observed wage differences between native and H-1B new hires, but this point is largely moot for Staff-level new hires, who tend to be very recent college graduates that perform equivalent tasks in junior roles (e.g., Doran, 2006; Madsen, 2011). We

observe, however, an H-1B wage discount (~10%) across all employee experience levels.

This discount is very likely the product of legal technicalities that grant employers surprising latitude in defining “prevailing wages” for H-1B hires (which we discuss in later sections), rather than any unlawful practice. It is, however, supportive of the largely anecdotal evidence put forth by some observers who claim that employers use the H-1B program to save on wage costs.

We believe that this result, along with our second finding identifying complementarities between H-1B visa holders and U.S. citizens in accounting, will inform policy and public discourse on immigration reform, and also provide scholars in accounting and labor economics with better insight into how large employers use the H-1B program. Where possible, we hope that our analysis also encourages other researchers to investigate similar patterns in the payrolls of other firms. These data sets are generally difficult to access, but given a large enough organization, they permit exacting econometric specifications. Relatedly, our results should be interpreted with the understanding that our analyses are based entirely on the pay practices of a single firm over a 2-year period (2004–2005). Whether or not the wage differentials we observe are generalizable to a broader group of employers is beyond the scope of our data, but theory suggests that such a pattern could be widespread given the inefficient nature of labor mobility for H-1B visa holders (Cain, 1986; Lundberg & Startz, 1983).

We preface the remainder of our paper with a warning that the payroll data on which we rely were not shared willingly by the firm, Deloitte. We discuss the details in a later section, but the data were hacked and publicly released by the hackers in December 2014. It is lamentable that Deloitte fell victim to this crime. Using hacked data in economics research is becoming more common (e.g., Carpenter et al., 2013; Griffin et al., 2019; Mironov, 2015; O’Donovan et al., 2019; O’Loughlin et al., 2010; Omartian, 2016; Rusch et al., 2013; Stice et al., 2022), though there is considerable debate in the broader academic community on the ethics of using hacked data. Some are strongly in favor of such use (Michael, 2015), while others urge caution (Egelman et al., 2012). However, those commentators who are predisposed against using hacked data tend to moderate their arguments on the lines of “do no harm” (Boustead & Herr, 2020; Egelman et al., 2012). The Deloitte data we analyze have been completely stripped (by Deloitte, prior to the hack) of identifying features like name, age, and Social Security Numbers, and what demographic data are included are very coarse (gender, race). Accordingly, it is difficult to envision a scenario in which any use of these data causes harm to the underlying subjects.

Furthermore, data released in the Panama Papers hack and the HSBC hack are currently being used by the IRS to

prosecute tax evasion cases (Lewis, 2015), and the Sony Pictures hack of 2014 allowed outside observers to identify wage disparities between male and female actors, which subsequently allowed the actresses involved to pressure Sony to (at least partially) remedy the gender wage gap (Robehmed, 2015; Sollosi, 2017).<sup>1</sup> We take this to suggest that hacked data can be used for good, and given the limited to null risk of harm that using this data set presents, we (cautiously) proceed.<sup>2</sup>

Finally, we stress that this manuscript is not intended as an attack on Deloitte. As we detail in later sections, the pay gap we identify between H-1B visa-holders and their matched U.S. citizen peers likely stems from the problematic definition of “prevailing wage” in the existing statute. Accordingly, Deloitte is likely one of many firms following a rational and legal compensation scheme that leads to H-1B visa holders being paid below market wages.

The following sections provide background on the H-1B program and related literature, as well as survey our predictions, empirical design, and results. A brief conclusion follows.

## Institutional Details and Empirical Predictions

### H-1B Visas

H-1B visas are temporary visas which exist to allow U.S. employers to hire foreign nationals into specialty occupations. Applicants must hold a bachelor’s degree or higher and can only be employed for a total of 6 years as an H-1B visa holder (two terms of 3 years). The number of new H-1B visas issued each year is congressionally capped at 65,000.<sup>3</sup>

<sup>1</sup> We are grateful to Shivaram Rajgopal for suggesting this line of reasoning.

<sup>2</sup> We cleared using these data with the university attorneys at our home institutions, who assured us that as long as we were not responsible for the hack, possession and use of these data is legal (similar to the arguments made by Michael 2015). We attempted to open a dialogue with Deloitte about using these data and the results that we find in this study, but the firm did not directly respond to our attempts to open a dialogue. Indirectly, the firm responded to our sharing this manuscript and attempting to start a discussion by lodging a complaint about our use of hacked data with the dean of the business school employing one of the authors of this study. We are grateful for that dean’s continued support.

<sup>3</sup> This cap was raised for the years 1999 to 2003 to 195,000, with the cap never being reached during these years. One alternative explanation for our results could be that if visa supply exceeds demand, then salaries for visa-holders would face downward pressure. However, given that our analysis is on *new* hires from 2004 and 2005, both years when the lower cap was in place, and where demand far outstripped the supply of H-1B visas, this explanation is unlikely to influence our results. In fact, an opposite effect is more likely at play

Beginning in 2004, a further 20,000 H-1B visas were made available to foreign nationals who hold a master’s degree or higher from a U.S. university. Thus, a total of 85,000 new H-1B workers may enter the U.S. workforce every year.<sup>4</sup>

The supply of H-1B visas is limited by the U.S. government, and the quota for these visas is filled on a first-come, first-served basis, often in just a few days. In 2017 for example, U.S. Citizenship and Immigration Services (U.S.CIS) started accepting H-1B applications for fiscal year 2018 on April 3, 2017 and reached the mandated cap by April 7, 2017.<sup>5</sup> Angling for a better starting wage could delay the offer and subsequent paperwork (and lead to the available visa slots being filled), or encourage the employer to offer sponsorship to other candidates who may be more willing to accept lower starting wages for a chance to move to the U.S. This puts H-1B visa applicants at a distinct bargaining disadvantage when negotiating with potential employers, because employers likely understand the costs, fears, and constraints of applicants and can potentially use this information to depress offered wages (e.g., Svejnar, 1986).<sup>6</sup>

In an effort to mitigate the risk that employers will leverage their stronger bargaining position and exert downward wage pressure on H-1B visa holders, legislators have

Footnote 3 (continued)

where employers “compete” for visa-holders, potentially increasing salaries. However, it is possible that for 2004 new hires the prevailing wage could be based on prevailing wages calculated during 2003 (e.g. if the employer uses the Occupational Employment and Wage Statistics Survey performed in November (2003)) because applications for October (2004) employment begin in April (2004). If this is the case, downward pressure on wages may still exist in 2004 because H-1B visa slots exceeded H-1B applicants at the time of the survey. To alleviate this concern, we examine 2004 and 2005 new hires separately (untabulated). Our inferences remain unchanged—both 2004 and 2005 H-1B new hires have wages significantly lower than non-H-1B new hires.

<sup>4</sup> These figures do not reflect H-1B visa holders employed at academic institutions (universities, research institutions and the government are not subject to the H-1B visa cap). As a result, the actual number of new H-1B visa workers entering the country in a given year is about 115,000 (U.S. Citizenship and Immigration Services 2017b).

<sup>5</sup> U.S.CIS released the following statement on April 7, 2017 (U.S. Citizenship and Immigration Services 2017a): “U.S. Citizenship and Immigration Services has reached the congressionally mandated 65,000 visa H-1B cap for fiscal year 2018. U.S.CIS has also received a sufficient number of H-1B petitions to meet the 20,000 visa U.S. advanced degree exemption, also known as the master’s cap. The agency will reject and return filing fees for all unselected cap-subject petitions that are not duplicate filings.”

<sup>6</sup> Furthermore, H-1B visa holders with pending green card petitions have to move to the end of the green card queue if they change jobs (which requires them to reapply for a green card). This further increases the leverage that employers have over existing H-1B visa holders, but probably does not affect the new hires in our setting.

outlined the following in the stated requirements for H-1B contracts:

“The employer is offering and will offer during the period of authorized employment to aliens admitted or provided status as an H-1B non-immigrant wages that are at least the actual wage level paid by the employer to all other individuals with similar experience and qualifications for the specific employment in question, or the prevailing wage level for the occupational classification in the area of employment, whichever is greater, based on the best information available as of the time of filing the application.” (emphasis added, 8 U.S.C. Sect. 1182(n)).

While this mandate seems simple and explicit, the legal fine print allows employers surprising latitude in defining “prevailing wages.” Miano (2007) describes these legal requirements in detail, but for our purposes it is sufficient to understand that employers can pay H-1B visa holders wages below those of peer U.S. citizen employees in cases where the H-1B visa holders have below average qualifications.<sup>78</sup> The majority of H-1B filings in IT make this claim (Miano, 2005, 2007), and if accounting firms are likewise exploiting this technicality, it could lead to the “prevailing wage” requirement being largely avoidable for a firm like Deloitte, at least in the way that it would be commonly understood to a reasonable person (i.e., prevailing wages = the wages paid to peer employees).<sup>9</sup>

<sup>7</sup> For example, prevailing wages for entry level H-1B employees (referred to as “Level 1” in the legislation) are defined as the 17th percentile of wages for the occupation and locality (Thibodeau & Machlis, 2017). See also the discussion about prevailing wage levels in “Wage Methodology for the Temporary Non-Agricultural Employment H-2B Program”, 80 Fed. Reg. at 24,155.

<sup>8</sup> Employers go through two steps in applying for an H-1B workers. The first is to file the LCA to Department of Labor, where it identifies the “prevailing wage” based upon the position it defines. There is no worker identified in this step. The second step is when it files the I-129 with DHS and identifies an actual worker who will fill that approved LCA. This gives employers great latitude to define qualifications and salary.

<sup>9</sup> It is also worth noting that firms should be profit-maximizing and typically do not pay more than the market bears or what they are legally required to pay. H-1B workers gain something from working in the US and therefore are willing to work for less (they get benefits that go beyond the compensation, e.g., opportunity to apply for a Green Card). Additionally, the reservation wage for these workers is often much lower than that of local workers.

## H-1B Visa Holders in Professional Services

Research is mixed on the pay differentials of H-1B visa holders. Anecdotal evidence and the general consensus among policy makers and critics is that H-1B visa holders are typically underpaid, and that employers use the visa program to save on wage costs (e.g., Rapoport, 2017; Thrush et al., 2017; Torres, 2017). Employers, including major accounting firms like Deloitte, tend to reject claims insinuating that they use the H-1B program to save on wage costs (versus using the program to overcome labor shortages, see Hoopes et al., 2018; Rapoport, 2017), and research examining the question is mixed. What empirical evidence does support the notion of employers using the H-1B program to save on wage costs largely consists of brief analyses tacked on to policy whitepapers or opinion pieces (e.g., Matloff, 2003, 2013; Miano, 2005, 2007; Mukhopadhyay & Oxborrow, 2012; National Research Council, 2001, with the latter being the exception and a very thorough empirical treatment). Data is the largest barrier to precise econometric work in this area, and most of this research is based off of survey figures.

A larger bulk of the literature, still mostly based on surveys, finds an opposite effect (a positive wage differential for H-1B visa holders) (e.g., Aobdia & Srivastava, 2018; Lofstrom & Hayes, 2011; Mithas & Lucas, 2010). This finding is consistent with evidence which suggests that H-1B visa holders represent the best and brightest from their respective countries and are highly motivated (Kerr & Lincoln, 2010). Consistent with this line of reasoning, recent empirical work by Frost et al. (2024b) who provide evidence that foreign workers are associated with higher audit quality at audit firms and Dimmock et al. (2019) who find that having more H-1B visa-holders is associated with better access to venture capital funding and exit outcomes.

Besides this tension highlighted in prior research, our discussions with accounting practitioners suggest two other mechanisms that could potentially contribute to H-1B visa holders receiving starting wages lower than those of U.S. citizen peer new hires. First, with few exceptions, the above research is based on wage differentials for H-1B visa holders in IT-related fields (where most H-1B visas are issued, see U.S. Citizenship & Immigration Services, 2017b). A career in accounting potentially requires more soft skills than a technical field such as IT, as interaction with clients and other members of the audit team are important and individual quality and characteristics are important (Aobdia et al., 2024; Frost et al., 2024a). Accordingly, one possible explanation for a negative wage differential in accounting is that employers like Deloitte price in a wage discount to adjust for foreign national new hires likely being less familiar



with English communication and U.S. business norms.<sup>10</sup> If accounting firms like Deloitte use familiarity with American business norms and English language when determining peers for benchmarking the wages of H-1B new hires, then natural born American citizens are perhaps an unsuitable comparison group (as opposed to green card holders, for example). We are unable to adjust for this possibility in our tests, but note that it is likely a valid and legal explanation behind any observed H-1B wage discount.

Secondly, sponsoring an employee for an H-1B visa is costly. A recent GAO survey of major users of the H-1B program suggests that median filing costs are about \$4000 (U.S. GAO, 2011). If employers view this hiring cost as part of the new H-1B worker's compensation, then it would follow that this new visa holder would be paid less in cash compensation (given the up-front transfer in the form of H-1B visa sponsorship). Economically, this seems to be a reasonable explanation for observing H-1B visa holders being paid a discount, but federal regulations expressly prohibit employers from recouping filing fees in this manner (20 C.F.R. Part 655, Subparts H and I; Immigration and Nationality Act Sect. 212(n)). However, enforcement of this and other requirements of the H-1B program are lax (Overby, 2009), and evidence from (rare) H-1B compliance audits suggests that employers sometimes recoup fees in such a manner (U.S. Citizenship & Immigration Services, 2008).

We present these latter two potential explanations for completeness, and we acknowledge that observing an H-1B visa holder starting wage discount (relative to other peer new hires) could be attributable in whole or part to these pressures, as opposed to employers having higher bargaining power (e.g., Aobdia et al., 2020) when negotiating starting wages for these employees. The Deloitte data we exploit does not permit identifying the underlying reason behind any observed H-1B starting discount (or premium), but we expect that each of these three rationales likely exerts some downward pressure on starting wages for H-1B workers.

Conversely, demand outstripping the supply of highly qualified junior accountants potentially leads to H-1B new hires seeing wages similar to or higher than U.S. citizen new hires. Between 2002 and 2012 (our sample comes from 2004 to 2005) the demand for accounting graduates increased by 10% each year while supply (from domestic graduates) increased by only 6.3%. Under these conditions, by necessity, employers must turn to other sources of labor (e.g., H-1B workers) to satisfy their hiring needs. Aobdia et al.

(2018), for example, find that the H-1B visa program fueled about one third of the growth of major accounting firms in recent years. Accounting firms and the AICPA (American Institute of Certified Public Accountants) have commented that this unmet demand for talent, and not a wish to drive down wages, explains the high level of H-1B visa usage in the industry (Rapoport, 2017).

These opposing forces drive the tension in prior research on H-1B wage differentials, and we likewise use it to motivate our first empirical analysis. Specifically, we examine whether we observe a difference in starting wages for H-1B new hires (in tax and audit at Deloitte) relative to peer new hires.

### H-1B Visas and Wage Pressure for U.S.-Citizen Employees

Beyond our first tests examining the wage differential for H-1B visa holders, our data is also well-suited to examine the pressures that H-1B employment can place on the wages of U.S. citizen peer employees. Some prior research has found that foreign workers can substitute for and displace native workers, which subsequently drives down wages for native workers (Altonji & Card, 1991; Goldin, 1994; Hunt, 1992; Monras, 2015; Orrenius & Zavodny, 2007). Much of this work focuses on low-skill workers and manual labor-type jobs, but this effect has been shown to persist in some labor markets for more educated workers as well, such as scientists and computer programmers (Borjas, 2005; Bound et al., 2015, 2018; Doran et al., 2016). This line of reasoning is rolled out often by policy makers interested in immigration reform, such as former President Trump's recent description of the H-1B program as an "initiative gone awry that has driven down wages for Americans" via low-wage immigrant labor (Thrush et al., 2017).

Despite criticisms along this line, and general widespread skepticism of the protections, use, and consequences of the H-1B visa program (e.g., Torres, 2017), not all work finds empirical evidence supportive of H-1B visa holders driving down wages for native peer workers. Rather, in many of these analyses, complementarities or synergies are credited with immigrants actually increasing wages for native peer workers (Peri et al. 2015; Mithas & Lucas, 2010; Aobdia et al., 2018). This is perhaps most easily understood for scientists, where one talented professional can make a breakthrough that increases the scope of scientific understanding and creates opportunities for other scientists or engineers to make profitable contributions (i.e., an "increasing the size of the pie" effect). For example, if hiring a genius foreign scientist increases the resources that a firm can profitably allocate towards research and development, then this increased investment level could lead to employment and wage gains

<sup>10</sup> That is, H-1B visa holders being more likely to have weaker English communication skills could lead to starting wages for H-1B visa holders being lower as a function of statistical discrimination based on uncertainties regarding the skill level of this group of workers, which may be a rational choice by employers (e.g., Lundberg and Startz 1983).

for native scientists (Chellaraj et al., 2008; Hunt & Gauthier-Loiselle, 2010; Kerr & Lincoln, 2010; Kerr et al., 2015).

In fields like audit and tax services, it is not clear whether talented foreign workers can effectively “grow the size of the pie” in such a manner. These markets tend towards zero sum (e.g., unlike a gifted scientist, an especially good auditor does not create profitable opportunities for other auditors). However, the possibility exists that H-1B visa employee wages do not match their (high) levels of contribution to their employer, and native workers could subsume part of this surplus (Dustmann et al., 2013).

Likewise, complementarities could emerge between native and foreign workers that could lead firms employing H-1B visa holders to pay higher wages to native workers. For example, if H-1B employees tend to have stronger quantitative skills and weaker English communication skills (Peri & Sparber, 2011), then hiring an H-1B worker could lead to an employer placing a higher marginal value (and subsequently being willing to pay higher wages) on a U.S. citizen new hire going forward (i.e., if my last hire has poor English communication skills, I need my next hire to have strong English skills to complement my last hire and round out my labor force). In line with this reasoning, Aobdia and Srivastava (2018) observe that audit offices with more intense H-1B hiring charge higher audit fees, and attribute that relation to wages for all auditors being driven higher in offices with lots of H-1B visa holders (which is reasonable, given that labor is the largest input in audit production, see Dopuch et al., 2003; Christensen et al., 2016; Hackenbrack & Knechel, 1997; Doogar et al., 2015; Bell et al., 2008).

Our data is well-suited to further test this relation, and we do so similarly to Aobdia and Srivastava (2018) by exploiting office-level variation in H-1B hiring. Unlike Aobdia and Srivastava (2018), however, we are able to examine differences in underlying wages using Deloitte payroll data, as opposed to inferring such differences via prices for services. As above, we focus on starting wages in this test to avoid the effects of performance-driven raises, and we specifically test whether starting wages for U.S. citizen new hires at Deloitte (in audit and tax) are related to the intensity of H-1B hiring in peer positions.<sup>11</sup>

<sup>11</sup> Our data is poorly suited to examine crowding-out effects, and we acknowledge that it is likely that many of the jobs that H-1B visa holders fill with Deloitte in our sample would, in the absence of the visa program, be filled with native employees (e.g., Card 2001; Matloff 2003). This is a point of much debate regarding H-1B visas, but not one that we are able to speak to.

## Sample and Research Design

Our data are drawn largely from two sources. First, we use a recently released data set of salaries of Deloitte employees as of February 2006. These data were originally collected in an internal study conducted by Deloitte to investigate whether the firm was underpaying minorities.<sup>12</sup> This internal study was never publicly released, but the results and underlying data were made public after the Sony Pictures hack of December 2014. These data are used in a recently published paper, Stice et al. (2022).

Reporters speculate that a human resources employee involved in the study moved from Deloitte to Sony Pictures at some point between 2006 and 2014 and inadvertently brought the Deloitte data over to the Sony computer network (perhaps via a portable hard drive or a personal laptop) (Roose & Madrigal, 2014). Sony Pictures was hacked in 2014 by suspected North Korean agents (a hacker group known by the moniker “Guardians of Peace”) in response to Sony’s release of a film that portrayed the assassination of the North Korean premier (*The Interview*, with James Franco and Seth Rogen) (Haggard & Lindsay, 2015), and hundreds of gigabytes taken in the hack were subsequently released online. The hack and subsequent releases triggered a flurry of press coverage, as the leaked data contained sensitive information such as emails between Sony executives, movie star contracts, and new, unreleased films (Swartz, 2014; Teodorczuk, 2014). The presence of the Deloitte salary data in the “Guardians of Peace” releases was quickly noticed by the press and received some coverage in business outlets (e.g., Bort, 2014; Gonzalez, 2014). Our use of this data set reflects the broader trend of using hacked/leaked data in academic research (Bohannon, 2010; Carpenter et al., 2013; Michael, 2015; O’Donovan et al., 2019; O’Loughlin et al., 2010; Omartian, 2016; Rusch et al., 2013). The Deloitte data we examine includes a variety of characteristics for employees hired before 2006, such as demographic information (gender, race), job description (title, service line, office location), salary, starting salary, bonus, and hire date.

Unfortunately, the data set does not include H-1B status, which would be ideal. To make up for this shortfall, we download Labor Condition Application (LCA) filings from the Department of Labor (DOL). This is a prerequisite form required for final H-1B approval, and has the advantage of being office specific, whereas actual H-1B approval data are only available at the national level per employer. As such,

<sup>12</sup> We note that the data we employ in this study originates from an internal study Deloitte commissioned to determine whether they were systematically paying lower salaries to women and minorities. While we find results consistent with H-1B visa holders making less in starting salaries than U.S.-citizen hires, we acknowledge and commend Deloitte’s attempt to be proactive on these social issues.

most research examining H-1B wage data that controls for geographic differences uses this LCA data as opposed to the actual H-1B approvals (e.g., Aobdia & Srivastava, 2018; Aobdia et al., 2018; Kerr & Lincoln, 2010; Miano, 2005), but these two sources are highly correlated (see Aobdia & Srivastava, 2018).

The LCA data includes the following entries for each H-1B visa applicant: employer, office location, job title, approximate start date, and proposed starting salary.<sup>13</sup> LCA applications are clearly identified by office location, but actual H-1B hires are not. We get around this issue by instead creating “pseudo” H-1B employees, where we assume that every LCA application leads to a new hire. With the LCA data, we create “pseudo” H-1B employees in the Deloitte data (exact identification of H-1B hires in the Deloitte data is complicated by the fact that the DOL start dates are estimates and that Deloitte often has multiple new employees start in the same position at the same office on the same day).<sup>14</sup> These “pseudo” H-1B employees are assigned an indicator to identify them as H-1B employees in our Deloitte dataset. Thus, in the dataset of Deloitte employees we now have two groups—those we suspect of being H-1B employees and those we do not.

Our empirical approach revolves around matching these pseudo H-1B employees (our treated sample) to a control sample (actual Deloitte employees) using a coarsened exact matching technique (Blackwell et al., 2009; Iacus et al., 2011). We focus on new hire starting salaries to abstract from questions about performance-driven raises affecting wages. We match pseudo new hires holding H-1B visas (from the LCA data) against the larger set of Deloitte new hires (from the Deloitte payroll data) on the basis of office location, job title, service line (audit or tax), and start date (coarsened to quarters). The data from Deloitte is current as of February 2006 (for employees hired through the end of 2005), and we focus on new hires starting in the first quarter of 2004 through the fourth quarter of 2005. As an example, this method would match the pseudo new hires with H-1B visas starting in Staff accountant positions in the Seattle office of Deloitte working in the tax line in Spring 2004 (from the LCA filings data) to other Staff level new

hires in tax in Seattle during Spring 2004 (from the Deloitte payroll data).

We retain only the audit and tax service lines (as specified by Deloitte) because the hierarchy in these businesses is narrowly defined and strict. This design choice allows us to avoid one weakness of prior research on H-1B visa wages, as studies that focus primarily on IT employees wrestle with the issue of very broad job titles (e.g., the range of expertise, experience, and appropriate wages is quite wide for someone titled “programmer” or “software engineer”) (Matloff, 2003; Miano, 2007).<sup>15</sup>

We have no demographic information on the H-1B visa employees in our sample, and in alternate matching specifications we also control for or match on racial minority status. More than half of H-1B visas are issued to Asian employees, and if Deloitte is systematically underpaying minorities, our identified treatment effect could be driven by a racial bias as opposed to H-1B applicant bargaining power.<sup>16</sup> In these tests, we either add a control variable for minority status (which we set equal to one for all non-Caucasians in our control sample and all H-1B visa pseudo-observations, and zero otherwise) or only match H-1B visa new hires to ethnic minority control new hires, as opposed to all new hires (i.e., we exclude Caucasian new hires from the control sample).

Once we build this data set with the control observations from the Deloitte payroll data matched to Deloitte pseudo-H-1B new hires based on the LCA filings data, we estimate cross-sectional regressions that predict starting wages for new hires as a function of H-1B visa status. We include OLS and quantile (median) regressions to mitigate concerns about outliers influencing our findings. In our cross-sectional OLS tests, we cluster standard errors by office location (our

<sup>13</sup> We define proposed starting salary as the LCA database entry “wage\_rate\_1.”

<sup>14</sup> We refer to these H-1B new hires as “pseudo” employees because not all of the H-1B applications in the LCA data result in an actual new hire. As such, the pseudo H-1B employees we create from the LCA data do not map perfectly into the actual Deloitte workforce. That is, for our tests, we act as if every LCA results in a H-1B hire. This simplifying assumption is widely used in related research (e.g., Aobdia et al., 2018) due to inherent data restrictions, but it is not a first-best technique. We are grateful to Ron Hira for suggesting we clarify this point.

<sup>15</sup> Job titles in LCA are not always consistently formatted (see e.g., Frost et al. (2024b)). Fortunately, there are only 280 unique titles on LCA applications for Deloitte in our sample (for 2,394 LCA filings), but only 23 are common (appear at least 25 times). These common titles include some that we are unable to classify as either tax or audit (“Manager,” “Senior Associate”), but most are straightforward (“Audit Senior,” “Tax Staff”). We use a straightforward algorithm to classify these LCA applications. First, we classify by service line. Tax service line LCA applications are those that include the phrase “Tax,” and audit service line LCA applications are those that include the phrase “Audit” or “A&A” (Deloitte shorthand for “Audit and Assurance”). Once we classify LCA applications into audit and tax (and discard the unmatched LCA applications), we then classify based on seniority. For example, we code employees as staff level if their title includes the phrase “Staff,” “Associate,” or “Assistant” (Deloitte shorthand for “Staff Assistant”, another term for staff-level accountants). Importantly, because our data only has a few thousand observations, we also hand check each observation and are satisfied that the matching process is accurate.

<sup>16</sup> China and India are the two most common home countries for H-1B visa workers (e.g., U.S. Citizenship and Immigration Services 2013).

**Table 1** Descriptive statistics

Variable	<i>n</i>	Mean	SD	Minimum	1st Quartile	Median	3rd Quartile	Maximum
<i>Panel A<sup>a</sup></i>								
Starting wage	1046	51,019	7618	34,320	45,000	51,000	53,000	91,000
H-1B Visa holder	1046	0.17	0.38	0	0	0	0	1
Audit line	1046	0.83	0.38	0	1	1	1	1
Racial minority	1046	0.59	0.49	0	0	1	1	1
Female	864	0.51	0.5	0	0	1	1	1
Group size	1046	587.19	481.56	5	251	434	1371	1371
<i>Panel B<sup>b</sup></i>								
Starting wage	472	62,664	14,815	20,000	53,000	60,000	68,750	130,000
H-1B Visa holder	472	0.21	0.4	0	0	0	0	1
Audit line	472	0.74	0.44	0	0	1	1	1
Racial minority	472	0.67	0.47	0	0	1	1	1
Female	375	0.4	0.49	0	0	0	1	1
Group size	472	565.5	465.96	23	247	428	622	1371
<i>Panel C<sup>c</sup></i>								
Starting wage	79	92,716	21,860	59,000	75,000	90,000	110,000	160,000
H-1B Visa holder	79	0.32	0.47	0	0	0	1	1
Audit line	79	0.47	0.5	0	0	0	1	1
Racial minority	79	0.57	0.5	0	0	1	1	1
Female	54	0.48	0.5	0	0	0	1	1
Group size	79	494.13	393.32	80	211	434	622	1371

<sup>a</sup>In this panel we tabulate summary statistics of the Staff level employees we use for testing H1 (investigating whether or not new H1B employees are underpaid or overpaid relative to new employees with the right to work in the U.S.). Note that we do not have gender information on our sample of H1B employees, which leads to the reduced sample size for the *Female* control variable.

<sup>b</sup>In this panel we tabulate summary statistics of the Senior Associate level employees we use for testing H1 (investigating whether or not new H1B employees are underpaid or overpaid relative to new employees with the right to work in the U.S.). Note that we do not have gender information on our sample of H1B employees, which leads to the reduced sample size for the *Female* control variable.

<sup>c</sup>In this panel we tabulate summary statistics of the Manager level employees we use for testing H1 (investigating whether or not new H1B employees are underpaid or overpaid relative to new employees with the right to work in the U.S.). Note that we do not have gender information on our sample of H1B employees, which leads to the reduced sample size for the *Female* control variable.

matched sample includes 45 offices). Additionally, in line with the coarsened exact matching technique as designed (Blackwell et al., 2009; Iacus et al., 2011), we weight the matched observations such that each control and treatment group (for each position/line/office/hiring date bucket) takes a weight of one. This weighting scheme ensures that a disparity in the ratio of control to treatment observations in a particular bucket is not driving our results.

## Empirical Results

### Starting Wage Differentials for H-1B Visa Holders

Panel A of Table 1 reports the summary statistics for the matched Staff level new hires. Of the 1046 observations in the sample, 182 (17%) are the H-1B new hire pseudo-observations we create from the Department of Labor LCA data.

We also include the variable *Group Size* in this table, which equals the number of employees working in the same office on the same service line (e.g., the number of tax employees in the Seattle office). Panels B and C of Table 1 report similar measures for our subsamples of Senior Associate- and Manager-level employees, respectively.<sup>17</sup>

<sup>17</sup> In comparison, Frost et al. (2024b) provide statistics that indicate that Deloitte applied for H-1B visas equivalent to 7.79% of its workforce in 2020. There are several reasons for the difference between our sample statistics and theirs. First, not all the 178 “pseudo” new staff hires in our data actually translate to H-1B visas. In our time period, only about half of LCA applications are approved and lead to H-1B visas being issued (due to immigration caps enforced by the federal government). So, our 17% of “pseudo” hires likely results in about 8% or 9% actual hires, which is much closer to the 7.79% number quoted in Frost et al. (2024b). Additionally, our analysis is comparing the ratio of H-1B visas to all new hires at the staff level, whereas Frost et al. compare the ratio of H-1B visa holders to the total workforce of Deloitte. That H-1B visa holders represent a larger proportion of new, junior-level hires than they do total employees is



Table 2 reports the OLS regressions testing whether newly-hired H-1B visa holders are paid the same as matched control new hires (who are very likely to be U.S. citizens). Panel A reports a pooled regression including Staff-, Senior Associate-, and Manager-level employees (matched also on title/rank). Model 1 includes only a constant and our variable of interest, an indicator variable labeled *H-1B Visa Employee*. The constant is about \$60,000, which can be interpreted as the average starting salary for our control sample (all Deloitte new hires in our matched control sample). *H-1B Visa Employee* loads with a significant negative coefficient ( $p < 0.001$ ) of about  $-\$9000$ , suggesting that compared to other matched peer new hires, H-1B visa employees are paid about \$9000 (15%) less. Similar results obtain in Models 2 and 3, which account for racial minority status (assigned for all H-1B pseudo new hires and non-Caucasian new hires in our underlying data set from Deloitte) via a covariate or matching, respectively (in this third model, the H-1B pseudo new hires are only matched to control new hires in the underlying Deloitte data who are racial minorities).

As discussed previously, the differences in background and experience between H-1B visa holders and other new hires may explain wage differences at the Senior Associate- or Manager-level. To abstract from these concerns, we focus our discussion on Staff-level new hires in Panel B of Table 2. Staff-level new hires are almost always hired straight from college, and have little heterogeneity in experience (between H-1B visa holders and U.S. citizen new hires). Model 1 (Table 2, Panel B) reports that our treatment effect persists in this subsample. The constant is about

\$52,800, which can be interpreted as the mean starting salary for Staff-level new hires in our matched control sample. The coefficient of about  $-\$7,400$  on *H-1B Visa Employee* indicates that the starting salary for our H-1B pseudo employees is about 14% less than that of matched peer new hires ( $p < 0.001$ ). A similarly sized coefficient persists in Models 2 and 3, indicating that this treatment effect is robust to controlling for racial minority status.

Potentially omitted variables correlated with H-1B status (such as experience) make attributing causality more difficult at the more senior ranks, but Panels C and D of Table 2 report that this H-1B starting wage discount is also present in the subsamples of Senior Associates and Managers, respectively. If anything, the discounts at these senior levels are larger, with new hire H-1B Managers being paid about 23% less than U.S. citizen matched peer new hires (see Panel D).

Overall, the results in Table 2 suggest that during our sample period, Deloitte paid significantly lower starting wages, on average, to H-1B employees relative to their peer new hires (in audit and tax). In Table 3 we estimate models similar to those above, but use instead median (quantile) regressions. Both the pooled sample (Panel A) and the subsamples by level obtain results similar to the OLS models. For example, the starting wage discount for Staff-level new hires (Panel B of Table 4) with an H-1B visa is about 11%, as H-1B new hires earn, at the median, about \$6000 less than the matched peer median starting salary of \$51,000 ( $p < 0.001$ ). We interpret the consistency of these findings as evidence that the starting wage discount we observe for H-1B visa holders is not driven by outliers.

### H-1B Effects on Starting Wages for U.S. Citizens

Next, we test whether Deloitte's usage of the H-1B visa program has any influence on the starting salaries of native workers. We match newly-hired employees in our underlying set of Deloitte data in roles/locations (e.g., audit Staff in Seattle) that have recently hired an H-1B worker to those in comparable jobs in comparable offices that *have not* hired an H-1B worker.<sup>18</sup> We utilize a similar coarsened exact matching procedure in constructing these samples, but include additional office-level covariates as this test involves matching new hires across offices (as opposed to within offices). Specifically, we match on gender, position (Staff, Senior Associate, Manager), service line (tax, audit), minority status, service line office size (number of tax or audit practitioners in the local office, coarsened into quartiles), and local office growth (% of tax or audit practitioners in the local office with less than 1 year's tenure at the start of our sample period, also coarsened into quartiles). Effectively, we try to pair new hires to one another across offices where the only differentiating characteristic is whether or not the office hired a peer (same position, same quarter of hire, same office size/growth) with an H-1B visa.

This matched sample allows us to examine whether the presence of H-1B new hires affects the starting wages of peer new hires (who are mostly U.S. citizens). That is, does our data support the notion that (1) H-1B workers substitute for and drive down the wages of U.S. citizen peer employees (e.g., Bound et al., 2015, 2018), or (2) that synergies and complementarities with H-1B visa workers lead to U.S.

Footnote 17 (continued)

very much in line with our expectations, at least for a large, mature professional services firm like Deloitte.

<sup>18</sup> We cannot be certain that all of these employees in the underlying data are U.S. citizens, but we match on ethnic minority status in an attempt to adjust for possible foreign origin in the underlying Deloitte data.

**Table 2** H-1B visa new hire salaries vs other new hire salaries: OLS regressions

OLS Regressions, DV = starting wage for new employee			
	Model 1	Model 2	Model 3
<i>Panel A: All levels—OLS regressions<sup>a</sup></i>			
H-1B Visa employee (Dummy)	– 9241.874*** [– 8.646]	– 8872.884*** [– 6.521]	– 9310.624*** [– 9.400]
Racial minority (Dummy)		– 770.81 [– 0.404]	
Constant	59,688.902*** [36.228]	60,090.719*** [30.454]	59,206.656*** [32.040]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes
Sample	Staff, seniors, and managers	Staff, seniors, and managers	Staff, seniors, and managers
Observations	1597	1597	918
R <sup>2</sup>	0.046	0.047	0.068
<i>Panel B: Staff level—OLS Regressions<sup>b</sup></i>			
H-1B visa employee (Dummy)	– 7363.581*** [– 9.167]	– 7803.070*** [– 7.377]	– 7167.628*** [– 9.059]
Racial minority (Dummy)		977.89 [0.618]	
Constant	52,744.520*** [45.758]	52,206.121*** [43.581]	52,896.898*** [40.621]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes
Sample	Staff Only	Staff Only	Staff Only
Observations	1,046	1,046	589
R <sup>2</sup>	0.105	0.107	0.146
<i>Panel C: Senior Level—OLS regressions<sup>c</sup></i>			
H-1B visa employee (Dummy)	– 9087.952*** [– 8.036]	– 9958.534*** [– 9.660]	– 9452.914*** [– 9.735]
Racial minority (Dummy)		1,764.30 [0.841]	
Constant	62,532.551*** [45.787]	61,638.840*** [29.819]	63,760.023*** [50.617]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes
Sample	Seniors Only	Seniors Only	Seniors Only
Observations	472	472	295
R <sup>2</sup>	0.062	0.065	0.087
<i>Panel D: Manager level—OLS regressions<sup>d</sup></i>			
H-1B visa employee (Dummy)	– 23,513.066*** [– 3.751]	– 28,973.934*** [– 4.919]	– 32,437.619*** [– 5.973]
Racial minority (Dummy)		8,604.306** [2.802]	
Constant	99,210.664*** [44.829]	96,067.227*** [38.833]	105,447.617*** [39.444]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes

**Table 2** (continued)

OLS Regressions, DV = starting wage for new employee

	Model 1	Model 2	Model 3
Sample	Managers only	Managers only	Managers only
Observations	79	79	34
R <sup>2</sup>	0.308	0.338	0.519

<sup>a</sup>In this panel we tabulate OLS models regressing starting salaries of all matched employees in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>b</sup>In this panel we tabulate OLS models regressing starting salaries of all matched Staff level employees in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>c</sup>In this panel we tabulate OLS models regressing starting salaries of all matched Senior Associate level employees (above Staff, below Manager) in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>d</sup>In this panel we tabulate OLS models regressing starting salaries of all matched Manager level employees in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

citizen peer starting wages increasing after H-1B hires (e.g., Peri et al. 2015; Aobdia & Srivastava, 2018; Lofstrom & Hayes, 2011; Dustmann et al., 2013)?

Table 4 reports the univariate statistics of the samples we use in this analysis for Staff—level (Panel A), Senior Associate-level (Panel B), and Manager-level (Panel C) workers. In addition to the demographic and job level variables we include in our match, we also control for city-level covariates that may affect starting salary offers; and we include these covariates in the summary statistics (local population, local diversity, local education, local unemployment, and local

GDP growth) (e.g., Lee et al., 2022).<sup>19,20</sup> Consistent with our earlier approach, we are most confident in our treatment

<sup>19</sup> Metro area population estimates come from the U.S. Census Bureau. Other measures are defined at the state level and are drawn from the Bureau of Economic Analysis (GDP growth rate), Bureau of Labor Statistics (unemployment rate), and U.S. Census Bureau (diversity is measured as the percent of non-Caucasian residents, education is measured as the percent of the population over the age of 25 that hold a 4-year college degree).

<sup>20</sup> We acknowledge that having more detailed data regarding the quality of new hires' education would be helpful. Unfortunately, we do not have access to these interesting data and leave this issue to future research.

**Table 3** H-1B visa new hire salaries vs other new hire salaries—median regressions

Median Regressions, DV = starting wage for new employee			
	Model 1	Model 2	Model 3
<i>Panel A: All levels—median regressions<sup>a</sup></i>			
H-1B visa employee (Dummy)	– 7000.00*** [– 7.59]	– 7000.00*** [– 6.46]	– 6000.00*** [– 5.87]
Racial minority (Dummy)		0.00 [0.00]	
Constant	55,000.00*** [136.71]	55,000.00*** [87.25]	54,000.00*** [102.51]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes
Sample	Staff, seniors, and managers	Staff, seniors, and managers	Staff, seniors, and managers
Observations	1,597	1,597	918
Pseudo $R^2$	0.028	0.028	0.031
<i>Panel B: Staff level—median regressions<sup>b</sup></i>			
H-1B Visa employee (Dummy)	– 6000.00*** [– 12.58]	– 6000.00*** [– 11.06]	– 6000.00*** [– 9.60]
Racial minority (Dummy)		0.00 [0.00]	
Constant	51,000.00*** [256.32]	51,000.00*** [161.47]	51,000.00*** [158.57]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes
Sample	Staff only	Staff only	Staff only
Observations	1046	1046	589
Pseudo $R^2$	0.070	0.070	0.087
<i>Panel C: Senior level—median regressions<sup>c</sup></i>			
H-1B visa employee (Dummy)	– 7000.00*** [– 4.80]	– 9000.00*** [– 5.64]	– 7850.00*** [– 4.98]
Racial minority (Dummy)		4,000.00*** [3.03]	
Constant	60,000.00*** [90.85]	58,000.00*** [61.69]	62,000.00*** [78.59]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes
Sample	Seniors only	Seniors only	Seniors only
Observations	472	472	295
Pseudo $R^2$	0.041	0.053	0.074
<i>Panel D: Manager level—median regressions<sup>d</sup></i>			
H-1B visa employee (Dummy)	– 28,000.00*** [– 5.69]	– 40,000.00*** [– 8.25]	– 40,000.00*** [– 4.86]
Racial minority (Dummy)		15,000.00*** [3.30]	
Constant	98,000.00*** [35.41]	95,000.00*** [34.55]	110,000.00*** [20.81]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes
Matched on racial minority status	No	No	Yes



**Table 3** (continued)

Median Regressions, DV = starting wage for new employee

	Model 1	Model 2	Model 3
Sample	Managers only	Managers only	Managers only
Observations	79	79	34
Pseudo $R^2$	0.234	0.280	0.403

<sup>a</sup>In this panel we tabulate median regression models regressing starting salaries of all matched employees in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>b</sup>In this panel we tabulate median regression models regressing starting salaries of all matched Staff level employees in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>c</sup>In this panel we tabulate median regression models regressing starting salaries of all matched Senior Associate level employees (above Staff, below Manager) in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>d</sup>In this panel we tabulate median regression models regressing starting salaries of all matched Manager level employees in our sample on their visa status. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). In model 3 we also match on racial minority status, as most of the H-1B visa employees (for which we do not have exact race information) are likely racial minorities (most hail from China or India). This latter match ensures that we are not picking up a “racial minority pay penalty”, and that our results persist when comparing H-1B visa holders to comparable minority peers. \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

effect driving differences in starting salaries at the Staff-level, as disparities in skill and experience are unlikely to play a large factor in the starting salary offers made to these entry-level employees.

Table 5 reports OLS regressions using these different samples to estimate the starting salary of U.S. citizen new hires as a function of whether or not an H-1B visa worker was recently hired in their position in their office. We observe a positive and statistically significant treatment effect in Model 2 (which only includes Staff-level new hires), suggesting that (after matching on office/job characteristics) the presence of an H-1B peer increases starting salaries for U.S. citizens in Staff accountant positions. This increase is modest (about \$2000), and the effect is not robust in other subsamples (i.e., for Senior Associates or Managers) or in the median regression models in Table 6.

As such, we take this as suggestive of H-1B visa holders and U.S. citizen workers being somewhat complementary in our setting, which could lead offices with recent H-1B hires to increase starting salary offers when hiring U.S. citizens in similar roles.

We are reticent, however, to put much faith in this result. Relative to our other findings, it is economically marginal (~4% wage premium), and the fact that the result fails to persist in the median regression suggests that outliers likely drive the relation. Friedberg and Hunt (1995) undertake a wide-ranging literature review on the topic of immigration’s effect on host country wages, and their general consensus is that the impact is marginal and sensitive to specification. Our results seem to support this supposition.

**Table 4** Descriptive statistics

Variable	<i>n</i>	Mean	SD	Minimum	1st Quartile	Median	3rd Quartile	Maximum
<i>Panel A: Staff level<sup>a</sup></i>								
Starting wage	232	50,897	7264	39,000	45,000	50,000	55,000	80,000
Recent H-1B peer hire	232	0.36	0.48	0	0	0	1	1
Audit line	232	0.81	0.39	0	1	1	1	1
Female	232	0.38	0.49	0	0	0	1	1
Group size	232	133.58	92.68	8	57	124	205.5	355
Group new hire %	232	0.44	0.08	0.15	0.39	0.44	0.47	0.73
Local population	232	15.27	0.91	12.74	14.67	15.31	15.58	16.75
Local diversity	232	0.18	0.09	0.05	0.12	0.16	0.22	0.59
Local education	232	0.3	0.06	0.2	0.26	0.3	0.34	0.47
Local unemployment	232	0.05	0.01	0.04	0.05	0.05	0.05	0.07
Local GDP Growth	232	0.03	0.02	0.01	0.02	0.02	0.04	0.08
<i>Panel B: Senior level<sup>b</sup></i>								
Starting wage	151	63,895	13,044	20,800	56,600	64,000	70,000	100,000
Recent H-1B peer hire	151	0.25	0.44	0	0	0	1	1
Audit line	151	0.72	0.45	0	0	1	1	1
Female	151	0.33	0.47	0	0	0	1	1
Group size	151	122.53	81.28	4	62	124	169	393
Group new hire %	151	0.41	0.1	0.12	0.34	0.41	0.47	0.6
Local population	151	15.12	0.88	12.24	14.55	15.31	15.57	16.75
Local diversity	151	0.17	0.06	0.05	0.12	0.16	0.22	0.34
Local education	151	0.28	0.04	0.17	0.26	0.26	0.31	0.37
Local unemployment	151	0.05	0.01	0.04	0.05	0.05	0.05	0.07
Local GDP growth	151	0.03	0.02	0	0.01	0.02	0.04	0.08
<i>Panel C: Manager level<sup>c</sup></i>								
Starting Wage	29	95,241	17,872	70,000	80,000	95,000	110,000	140,000
Recent H-1B peer hire	29	0.34	0.48	0	0	0	1	1
Audit Line	29	0.21	0.41	0	0	0	0	1
Female	29	0.31	0.47	0	0	0	1	1
Group Size	29	155.93	119.29	8	57	142	221	355
Group New Hire %	29	0.37	0.07	0.23	0.35	0.39	0.41	0.5
Local population	29	15.6	0.97	13.21	14.98	15.42	16.75	16.75
Local diversity	29	0.19	0.07	0.05	0.14	0.22	0.25	0.32
Local education	29	0.29	0.04	0.23	0.26	0.3	0.31	0.37
Local unemployment	29	0.05	0.01	0.04	0.05	0.05	0.05	0.07
Local GDP growth	29	0.04	0.02	0.01	0.02	0.04	0.04	0.07

<sup>a</sup>In this panel we tabulate summary statistics of the Staff level employees we use for testing H2 (investigating whether or not the presence of new H1B employees affects the starting wages of new peer employees with the right to work in the U.S.)

<sup>b</sup>In this panel we tabulate summary statistics of the Senior Associate level employees we use for testing H2 (investigating whether or not the presence of new H1B employees affects the starting wages of new peer employees with the right to work in the U.S.)

<sup>c</sup>In this panel we tabulate summary statistics of the Manager level employees we use for testing H2 (investigating whether or not the presence of new H1B employees affects the starting wages of new peer employees with the right to work in the U.S.)

## Robustness Checks and Extended Analyses

### Excluding High Performer Peer Matches

One concerning omitted and possibly correlated variable

in our original tests identifying a starting wage discount for H-1B visa holders is worker quality. It is possible that the discount we observe is driven by H-1B accountants being of lower quality relative to the typical Deloitte hire (as opposed to Deloitte exploiting a stronger bargaining

**Table 5** H-1B visa hire influence on citizen hire salaries—OLS regressions

OLS Regressions: DV = Starting wage of U.S. citizen new hires				
	Model 1	Model 2	Model 3	Model 4
Recent H-1B peer hire	850.841 [0.655]	2,255.645** [2.306]	− 4,128.63 [− 1.491]	1,499.14 [0.204]
Audit line	− 1,956.11 [− 1.294]	− 4,137.687** [− 2.592]	2,737.05 [0.748]	− 363.44 [− 0.029]
Senior	14,738.463*** [10.345]			
Manager	42,205.457*** [13.065]			
Female	− 77.35 [− 0.094]	− 1136.382 [− 1.466]	1,918.92 [0.754]	516.70 [0.067]
Group size	10.293 [1.326]	4.677 [0.584]	23.38 [0.946]	− 12.231 [− 0.279]
Group new hire %	18,950.877*** [3.054]	12,997.205 [1.510]	17,463.99 [1.185]	− 5,978.89 [− 0.107]
Local population	2,111.742** [2.359]	2,061.106** [2.443]	577.932 [0.378]	− 2,753.42 [− 0.510]
Local diversity	− 7129.34 [− 0.732]	− 8,446.81 [− 1.186]	12,146.25 [0.622]	148,850.70 [1.636]
Local education	16,208.12 [1.180]	2,573.59 [0.204]	54,982.605* [1.978]	114,247.56 [0.955]
Local unemployment	306,658.063*** [3.121]	244,226.109** [2.545]	256,351.58 [1.070]	571,389.88 [0.936]
Local GDP Growth	123,036.125*** [3.384]	102,335.719** [2.495]	15,273.89 [0.221]	55,684.52 [0.193]
Constant	− 12,076.02 [− 0.755]	1,586.54 [0.099]	12,778.20 [0.433]	48,693.70 [0.609]
Observations	412	232	151	29
Matched on job, service line, group size, gender, race, office hiring intensity, and year-quarter of hiring	Yes	Yes	Yes	Yes
Sample	Staff, seniors, and managers	Staff	Seniors	Managers
R <sup>2</sup>	0.661	0.231	0.209	0.360

In this panel we report OLS regression models regressing starting salaries of U.S. citizen new hires. These models investigate H2 (whether or not the presence of peers with H-1B visas affects the starting wages of U.S. citizen new employees). To do so, we match comparable U.S. citizen new hires to one another, exploiting variation in the presence of recent, peer H1B hire in their respective work groups (intersection of office location and service line). We use a coarsened exact matching scheme that matches on job title (Staff, Senior Associate, Manager), service line (audit, tax), date of hire (coarsened to year-quarter), gender, racial minority status, group size (coarsened into quartiles), and office hiring intensity (% of employees hired in the last two years, coarsened into quartiles). Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

position, benchmarking the starting wages of H-1B visa holders against other foreign national hires to control for weaker English communication skills, or attempting to recoup H-1B filing fees via lower wages). This possibility seems unlikely given the position and purpose of the H-1B visa program (to overcome domestic labor shortages by hiring the best and brightest from abroad), but it is one possible explanation for our findings.

We examine this possibility by exploiting data on ex post performance of the Deloitte employees in our control

sample.<sup>21</sup> While we cannot determine the quality of the H-1B pseudo-employees (as we build these observations from LCA data that does not contain performance or demographic information), we do have ex post measures of worker quality for our control sample, as the Deloitte payroll data we use contains entries for performance evaluation score. If Deloitte has some premonition about the quality of new

<sup>21</sup> We thank Scott Emett for suggesting this novel line of analysis.

**Table 6** H-1B Visa hire influence on citizen hire salaries—median regressions

Median regressions: DV = Starting wage of U.S. citizen new hires				
	Model 1	Model 2	Model 3	Model 4
Recent H-1B peer hire	– 571.275 [– 0.565]	53.521 [0.046]	– 2,008.37 [– 0.852]	– 1,000.00 [– 0.098]
Audit line	– 1,284.57 [– 1.001]	– 4,465.375*** [– 3.260]	4,191.09 [1.317]	8,527.51 [0.579]
Senior	15,566.318*** [14.753]			
Manager	40,121.488*** [21.364]			
Female	1,140.03 [1.161]	– 389.145 [– 0.349]	2,437.47 [1.073]	– 6,000.00 [– 0.581]
Group size	1.42 [0.224]	3.049 [0.432]	0.505 [0.030]	– 1.604 [– 0.029]
Group new hire %	23,402.975*** [3.915]	24,425.391*** [3.501]	15,526.60 [1.122]	– 25,845.70 [– 0.260]
Local population	2,597.635*** [3.596]	2,824.596*** [3.460]	711.227 [0.456]	– 2,840.01 [– 0.329]
Local diversity	– 862.417 [– 0.133]	– 6,446.17 [– 0.952]	8,354.93 [0.418]	69,972.57 [0.572]
Local education	3,653.40 [0.341]	1,552.63 [0.141]	48,828.172* [1.672]	127,982.98 [0.812]
Local unemployment	272,682.813*** [3.285]	284,741.844*** [3.201]	171,275.09 [0.870]	1,338,999 [1.220]
Local GDP Growth	122,309.008*** [3.896]	134,576.859*** [4.014]	82,142.58 [0.924]	336,979.22 [0.718]
Constant	– 17,078.50 [– 1.339]	– 17,725.87 [– 1.201]	17,600.58 [0.663]	15,935.82 [0.112]
Observations	412	232	151	29
Matched on job, service line, group size, gender, race, office hiring intensity, and year-quarter of hiring	Yes	Yes	Yes	Yes
Sample	Staff, Seniors, and Managers	Staff	Seniors	Managers
Pseudo $R^2$	0.661	0.231	0.209	0.360

In this table we report median regression models regressing starting salaries of U.S. citizen new hires. These models investigate H2 (whether or not the presence of peers with H-1B visas affects the starting wages of U.S. citizen new employees). To do so, we match comparable U.S. citizen new hires to one another, exploiting variation in the presence of recent, peer H1B hire in their respective work groups (intersection of office location and service line). We use a coarsened exact matching scheme that matches on job title (Staff, Senior Associate, Manager), service line (audit, tax), date of hire (coarsened to year-quarter), gender, racial minority status, group size (coarsened into quartiles), and office hiring intensity (% of employees hired in the last 2 years, coarsened into quartiles). \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

hires, and adjusts starting salaries accordingly, then a more conservative matched control sample for our H-1B new hires could be a “low quality” sample of other Deloitte new hires (if we assume that our H-1B visa holders may be viewed by Deloitte as low quality). To identify such a sample, in the following tests we repeat our original analysis but exclude high performing new hires from the control sample. Deloitte judges employee performance on a number scale 5 (worst) to 1 (best). The high score of 1 indicates strong performance,

2 indicates above average performance, 3 indicates average performance, 4 indicates that performance needs improvement, and 5 indicates that performance is inadequate. A score of 2 is the first quartile and median score in the underlying sample, and a score of 3 is the third quartile.

In Table 7 we report the results of tests utilizing an adjusted control sample, where our coarsened exact matching scheme remains unchanged, but the underlying sample of potential control observations omits all Deloitte new hires



**Table 7** H-1B visa new hire salaries vs other new hire salaries

OLS Regressions, DV = starting wage for new employee

	Model 1	Model 2	Model 3	Model 4
<i>Panel A: Low performers—OLS regressions.<sup>a</sup></i>				
H-1B visa employee (Dummy)	− 7819.032*** [− 5.758]	− 5988.623*** [− 6.661]	− 7658.870*** [− 4.875]	− 23,648.809** [− 2.361]
Constant	57,249.969*** [32.733]	50,817.121*** [37.812]	59,941.801*** [39.351]	99,398.813*** [22.092]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes	Yes
Matched on racial minority status	No	No	No	No
Sample	Staff, seniors, and managers	Staff only	Seniors only	Managers only
Control sample perf. eval. scores restricted to mediocre and poor performers	Yes	Yes	Yes	Yes
Observations	920	653	230	37
R <sup>2</sup>	0.039	0.088	0.072	0.283
<i>Panel B: Low performers—median regressions.<sup>b</sup></i>				
H-1B visa employee (Dummy)	− 4,000.00*** [− 5.02]	− 4,500.00*** [− 5.68]	− 6,000.00*** [− 3.08]	− 27,000.00*** [− 2.77]
Constant	51,000.00*** [141.45]	49,500.00*** [148.20]	57,500.00*** [58.73]	97,000.00*** [16.18]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes	Yes
Matched on racial minority status	No	No	No	No
Sample	Staff, seniors, and managers	Staff only	Seniors only	Managers only
Control sample perf. eval. scores restricted to mediocre and poor performers	Yes	Yes	Yes	Yes
Observations	920	653	230	37
Pseudo R <sup>2</sup>	0.021	0.068	0.053	0.319

<sup>a</sup>In this panel we tabulate OLS regression models regressing starting salaries of all matched employees in our sample on their visa status. Our control sample in this test includes only those newly hired employees who rated as mediocre or poor performers in their first year performance evaluation score. We hope to rule out the possibility that our results are driven by a worker quality effect (by only comparing H-1B new hire starting salaries to the starting salaries of low quality worker new hires). Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

<sup>b</sup>In this panel we tabulate median regression models regressing starting salaries of all matched employees in our sample on their visa status. Our control sample in this test includes only those newly hired employees who rated as mediocre or poor performers in their first year performance evaluation score. We hope to rule out the possibility that our results are driven by a worker quality effect (by only comparing H-1B new hire starting salaries to the starting salaries of low quality worker new hires). Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

who scored a 1 or 2 on their performance evaluations during their first year. This leaves only mediocre and poor performing new hires in our control sample. In both OLS models (Panel A) and median regressions (Panel B), we see that the H-1B visa wage discount remains negative and statistically significant. The magnitude of this discount is slightly reduced relative to our full sample tests, but not by a large

margin. For example, relative to matched middling and poor performing Staff-level U.S. citizen new hires, Staff-level H-1B visa new hires see starting wages lower by about 12% (this discount is about 14% when including high performers in the control sample, see Panel B of Table 2).

This pattern of results holds for all three levels of employees in our sample in both the OLS and median regressions.

For brevity, we do not tabulate the models that account for racial minority status, but the results hold in direction and approximate magnitude for those tests as well (treatment effects all  $p < 0.01$ ). Furthermore, we see similar results in untabulated tests using only poor performing new hires in our control sample (only those new Deloitte hires that scored a 4 or 5 on their first performance evaluation score).<sup>22</sup>

In summary, these results indicate that even when compared to presumably low-quality peer new hires, H-1B visa workers are underpaid in our sample. The magnitude of the H-1B wage discount on the starting salaries of new hires remains on the order of at least 10%. We cannot say with certainty that this observed H-1B starting wage discount is driven by the employer in our setting leveraging their bargaining power to save on wage costs (or paying less as a function of weaker English communication skills, attempting to recoup filing fees, etc.), but we believe that these Table 7 results can preclude worker quality as an alternative explanation for the pattern of our findings. Even if all of the H-1B workers hired by Deloitte in our sample are low quality, they are still paid about 10% less than their low-quality peer new hires.

## Accounting for Slack in LCA Wage Numbers

A recent article in *Computerworld*, a press outlet focusing on information technology, highlights a potential weakness in our treatment of LCA filings. Like prior work examining wage differentials for H-1B visa holders (e.g., Aobdia & Srivastava, 2018; Aobdia et al., 2018; Miano, 2005, 2007), we treat proposed starting wages stated on LCA filings as representative of starting wages the firm pays H-1B visa holders. However, Thibodeau and Machlis (2017) note in their *Computerworld* article that instead of filing accurate proposed starting wages for the position in question, in some cases, the immigration attorneys filing LCAs on behalf of employers instead use the lowest legally permissible wage in order to give the employer maximum latitude in any final wage negotiations. That is, the employer sometimes pays wages above that stated on the LCA, but file lowball LCAs in order to maintain flexibility.

It is possible that Deloitte is engaging in this strategy. In that case, our results above could instead be interpreted as whether or not the prevailing wage mandate is binding. Our finding that legally permissible H-1B wages (on LCA filings) are well below peer wages would in this case be

suggestive of weak legal protections of H-1B visa holders as opposed to actual underpayment.

Ideally, our payroll data would include H-1B status, but as discussed in our above analyses, we add H-1B visa holders to our payroll data as pseudo-observations based on LCA filings. If Deloitte is lowballing the LCA filings and paying higher wages to H-1B visa holders, then the LCA filing wages from the Department of Labor would likely be outside of the range of starting wages we observe in our payroll data. Next, we run analyses where this is not the case. That is, we only include observations in treatment–control buckets (same quarter of hire, same service line, same position, same office) in which the starting wages listed on the LCA for the H-1B hire is above the lowest paid matched control observation. This leaves us with a sample of observations where the starting wages for H-1B visa holders are within the range of starting wages of peers. We then re-run our primary analysis to see if H-1B wages still differ from the mean/median of peer wages. We take this to be an especially conservative test, in that it removes from our sample the cases where we have the most statistical power to detect wage differentials (i.e., where treatment starting wages are lower than all matched control starting wages).

We report OLS regressions with this abbreviated sample in Table 8. Consistent with our prior arguments, we are most confident in interpreting wage differentials for Staff-level new hires, as experience and prior performance could drive starting wages for more advanced new hires. The results in Table 8 for Staff-level new hires (Model 2) are consistent with those reported elsewhere in this study, but smaller in magnitude (e.g., the negative wage differential in this case is about 6.5%, as opposed to 14% in our broader sample). That is, even when LCA filing wages are not lower than all other matched peer new hires, H-1B visa holders are still paid considerably less than their matched peers (at the mean). We do not report median regressions for brevity, but similar results obtain for the Staff-level employees in quantile regressions.

The samples reported in these models are substantially reduced, which decreases our statistical power. However, this reduced sample is one in which we can be more confident that Deloitte is not lowballing LCA filing wages, and that LCA filing wages are representative of actual wages in the underlying payroll data. Accordingly, these findings are indicative of our results not being driven by the slack sometimes built into LCA filings alluded to in Thibodeau and Machlis (2017).<sup>23</sup>

<sup>22</sup> This result becomes marginally statistically significant in tests involving Manager level new hires due to the small size of the control sample (very few of the newly hired Managers in the underlying Deloitte payroll sample earn a performance evaluation score of a 4 or 5 in their first year), but the effect size remains considerable.

<sup>23</sup> Even if this slack was responsible for our results, we believe this study would still be valuable, in that we demonstrate that legally permissible wages under the H-1B program (i.e., those authorized by the DOL that include slack) are not representative of “prevailing wages” as widely understood (i.e., wages paid to peers).

**Table 8** H-1B Visa new hire salaries vs other new hire salaries—alternative matching

OLS Regressions, DV = starting wage for new employee				
	Model 1	Model 2	Model 3	Model 4
H-1B Visa employee (Dummy)	– 1860.086 [– 1.028]	– 3,319.693** [– 2.883]	– 2514.171 [– 1.426]	17,833.334 [1.004]
Constant	56,800.363*** [42.856]	51,370.996*** [50.833]	57,615.145*** [33.514]	87,833.336** [13.877]
Matched on job, office location, service line, and year-quarter of hiring	Yes	Yes	Yes	Yes
Matched on racial minority status	No	No	No	No
Sample	Staff, seniors, and managers	Staff only	Seniors only	Managers only
Sample restricted to matched treatment–control buckets where H-1B visa holders are not the lowest paid in the bucket	Yes	Yes	Yes	Yes
Observations	433	222	204	7
R <sup>2</sup>	0.002	0.017	0.005	0.334

In this table we report OLS regression models regressing starting salaries of matched employees in our sample on their visa status. Our sample in this case is restricted to matched treatment–control buckets (quarter of hire, service line, office, position) where H-1B visa holders do not have the lowest starting wage. We hope to rule out the possibility that our results are driven by a Deloitte lowballing LCA wages to maintain flexibility but then paying H-1B visa holders more. In the sample for these regressions, wages stated on LCA filings are within the range of starting wages paid to peer new hires. Our variable of interest is *H-1B Visa Employee (Dummy)* which equals one in cases where the new employee in question holds an H-1B visa. Negative coefficients on *H-1B Visa Employee (Dummy)* indicate a negative differential in starting salaries for H-1B visa holders. We use a coarsened exact matching scheme to match the H-1B visa holders in our sample to comparable peer employees. We match on office location, job title (Staff, Senior Associate, Manager), service line (audit, tax), and date of hire (coarsened to year-quarter). Standard errors are clustered at the office level, and \* ( $p < 0.1$ ), \*\* ( $p < 0.05$ ), and \*\*\* ( $p < 0.01$ ) denote statistical significance (two-tailed).

## Conclusion

We use hacked payroll data from Deloitte to examine how the firm pays accountants with H-1B visas relative to their peers. We observe that the starting salaries of H-1B visa holders in audit and tax are about 10% lower than their newly-hired peers (matched by office, position, and time of hire) during our sample period (2004–2005).

We see this relation across all levels of new hires in our data (Staff, Senior Associate, and Manager) and when we exclude high performers from the control sample. The fine points of the law governing the H-1B visa program allow for this pay differential in certain cases where the visa holder is underqualified relative to U.S. citizen peers. Deloitte seems to be utilizing this strategy in our sample, and while it may be legal, it runs contrary to the spirit and intention of the initial legislation and the general understanding of the law requiring employers of H-1B visa holders to pay the prevailing wage.

In further tests, we find no evidence of H-1B employment driving down the wages of peer U.S. citizen employees. If anything, we see weak evidence that peer employee starting wages are higher following an H-1B hire, indicating that perhaps some complementarities are realized by a mixed workforce, at least in accounting (as in Aobdia & Srivastava, 2018).

We believe our findings are informative to the literatures in labor economics and accounting that address questions related to H-1B employment. We bring unique insights from payroll data to bear on these lines of inquiry, and while the generalizability of our result is unclear (given that we focus on a single firm, albeit 45 offices), we believe that the stronger econometric identification permitted by our data allows us to avoid some of the measurement problems that have plagued prior empirical work in this area.

More broadly, we believe our results can inform the current public debate on immigration reform. New efforts at adjusting U.S. immigration policy are put forth regularly by various congressmen and executive branch officials (and hopefuls). Going forward, we hope that our findings will encourage these policymakers to pursue more aggressive definitions of “prevailing wage” if they wish to avoid the H-1B driven pay disparities we observe in our sample. Furthermore, given the insight that the Deloitte payroll data set has allowed, perhaps requiring more frequent regulatory audits of H-1B employer payrolls could correct or deter such disparities.

**Acknowledgements** For helpful feedback, we thank Ted Christensen, Scott Emett, Lucile Faurel, Ron Hira, Phillip Lamoreaux, Justin Leiby, Jordan Lowe, Eldar Maksymov, Michal Matějka, John Miano, Paul Piveteau, Shivaram Rajgopal, Patrick Ryu, Christy Sims, Kay Stice, Juliet Stumpf, Ben Whipple, Anastasia Zakolyukina, and workshop participants at Arizona State University and the University of

Georgia. Professor Derrald Stice is an Affiliated Researcher at the HKU Jockey Club Enterprise Sustainability Global Research Institute.

## Declarations

**Conflicts of interest** The authors are not aware of any conflicts of interest related to this submission.

**Research involving Human Participants and/or Animals** No human or animal participants were used in this study.

**Informed Consent** Informed consent does not apply to this study.

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