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Abstract

We explore co-ethnic hiring among new ventures using U.S. administrative data. Co-ethnic hiring is ubiquitous among immigrant groups, averaging about 22.5% and ranging from <2% to >40%. Co-ethnic hiring grows with the size of the local ethnic workforce, greater linguistic distance to English, lower cultural/genetic similarity to U.S. natives, and in harsher policy environments for immigrants. Co-ethnic hiring is remarkably persistent for ventures and for individuals. Co-ethnic hiring is associated with greater venture survival and growth when thick local ethnic employment surrounds the business. Our results are consistent with a blend of hiring due to information advantages within ethnic groups with some taste-based hiring.

JEL Classification: F22, J15, J44, J61, J62, J71, L26, M13, M51.

Keywords: Hiring, immigration, entrepreneurship, job creation, E-Verify.

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1 Introduction

Immigration has significantly reshaped the workplace in America over the past fifty years. Immigrants accounted for about 14% of the U.S. population in 2020, almost triple the 5% share that existed in 1970 (Migration Policy Institute 2020). In the workplace, immigrants represented almost 18% of the workforce in the 2018 American Community Survey (ACS). While immigration to the United States historically centered on inflows from Europe, migration from Latin America and Asia surged after the 1965 Immigration and Nationality Act. The combination of the growing immigrant share, now representing a stock of more than 40 million people, and the greater heterogeneity in sending countries has resulted in a significantly more diverse workforce.

Entrepreneurship is one domain where the impact of immigration has been particularly sharp. Using the 2012 Survey of Business Owners, Kerr and Kerr (2020) estimated immigrants owned about 25% of new employer businesses during the 2008-2012 period. Similarly, about 24% of incorporated self-employed individuals in the ACS were foreign-born in 2018. A growing literature documents similar evidence on the disproportionate role of immigrants in new business creation.¹

Despite these dramatic trends, we have remarkably little evidence on how immigration in the workplace connects to the creation and scaling of new firms. Azoulay et al. (2020) compare the firm size distributions of immigrant- and native-founded firms to assess job creation, and other important studies document the concentration of immigrants in the workplace—for example, Andersson et al. (2014) for the United States and Åslund et al. (2014) for Sweden, with more studies discussed below. Greater attention is warranted, however, given that a quarter of new firm births are immigrant-founded. Haltiwanger et al. (2013) describe the vital role that new businesses play in job creation, which raises the question of how new jobs in the economy are allocated across ethnic groups. Other studies like Ehrlich and Kim (2015) and Docquier et al. (2020) note the links of immigration and birthplace diversity to economic growth, but the degree this happens through different types of firms is less understood.

¹Examples include Borjas (1986), Lofstrom (2002, 2011), Clark and Drinkwater (2000, 2006), Fairlie and Meyer (2003), Schuetze and Antecol (2007), Fairlie et al. (2010), Fairlie and Lofstrom (2013), Lofstrom et al. (2014), Kerr and Kerr (2011, 2017, 2020), Azoulay et al. (2020), and Brown et al. (2020). Examples of studies for high-tech immigrant entrepreneurship include Saxenian (1999, 2002), Anderson and Platzer (2006), Monti et al. (2007), Wadhwa et al. (2007), and Hart and Acs (2011).

The objective of this paper is to characterize the co-ethnic hiring practices among immigrants in newly founded business. We quantify the degree to which new U.S. companies are comprised of individuals from the same country of birth; the factors that promote this co-ethnic hiring; the persistence of this concentration as the firm ages or as individuals move on to new ventures; and the connection of high co-ethnic hiring to business survival and employment growth. Compared to prior work, we focus in greater depth on ethnic-specific employments, vs. immigrants more broadly, and on the dynamics and performance implications of co-ethnic hiring.

We use these empirical findings to consider the extent to which three conceptual models of co-ethnic hiring are likely to be responsible for the patterns observed. A first model focuses on enhanced communications in the workplace if co-ethnic individuals are able to better communicate with each other and those with similar native languages. A second model emphasizes how co-ethnic hiring can result from better information flow within ethnic groups. To the extent that ethnic networks and concomitant resource access allow superior hiring within ethnic groups, co-ethnic hiring could enhance venture performance. A final conceptual model features taste-based rationales, where members of an ethnic group favor working together, that do not result in a performance advantage and may even lead to weaker outcomes.

We conduct this analysis using the Longitudinal Employer Household Dynamics (LEHD) database and the Longitudinal Business Database (LBD). The LEHD contains matched employer-employee data compiled by the United States Census Bureau for analyses of establishments and their workforces. Our data cover the years 1995-2014 and include all private sector establishments in 26 states. The worker-level records include an individual's country of birth and quarterly earnings. Our empirical strategy, developed in greater detail below, is to identify the ventures with a top initial earner who is foreign born. We study the degree to which the early workforce surrounding this lead individual comes from the same country of birth and how the business evolves over time.

We find striking levels of co-ethnic hiring. The average new venture with five or more workers has a co-ethnic share of about 22.5%, with an enormous range from as low as 1.8% (top earners from Germany) to as high as 45% (top earners from Vietnam). The variation within language groups is also striking, such as the co-ethnic hiring rates for top earners from Mexico being about four times larger than those evident for top earners from Guatemala, Colombia,

and Cuba. Our analyses show how these co-ethnic hiring rates systematically relate to the local workforce composition surrounding new firms, the native languages spoken by ethnic groups, and the cultural similarity of groups to the United States (Spolaore and Wacziarg 2016).

We observe remarkable persistence in co-ethnic hiring. Even five and ten years after the establishment birth, the co-ethnic share tends to increase slightly, rather than abate. We also follow top earners when they move to new ventures, finding substantial persistence at the level of individuals in terms of hiring patterns.

Turning to the dynamics of ventures, we find that higher initial co-ethnic shares are associated with an increased survival of the firm to five years. We also observe, conditional on survival, greater employment growth to five years with a higher initial co-ethnic share, although some of this effect appears connected to a reduced likelihood of the firm to shrink in size as it ages. Importantly, most of this survival and growth effect happens when the firm conducting co-ethnic hiring is situated in a city-industry setting where the ethnic group makes up a substantial share of local employment. Extensions consider differences by wage levels of firms, estimations using genetic and linguistic differences across immigrant nationalities, and local policy environments with E-Verify implementation.

Returning to the three conceptual models, our empirical results are mostly inconsistent with the model focused on overcoming communication barriers. A common language is a feature in hiring, but distinctly second-order to factors like thick local ethnic labor pools. Instead, the weight of evidence suggests that the co-ethnic hiring more typically follows from factors operating within ethnic groups. We find evidence that supports both the information advantage and group taste frameworks, concluding both play important roles. There is overall more support for the information advantage rationale as, on average, venture performance improves with co-ethnic hiring. We observe, however, negative employment growth with co-ethnic hiring when the surrounding local ethnic labor pool is very small, which is more consistent with the group taste rationale.

The striking empirical connections evident in this study suggest that the economic consequences of greater workplace and entrepreneurial diversity deserve closer attention. Andersson et al. (2014) is the closest prior study, where they too use the LEHD to characterize immigrants in the workplace. Their work focuses on a match to the Decennial Census and thereby develops a rich cross-sectional portrait. Our complementary work focuses instead on the em-

ployment dynamics associated with ventures over time. We also closely relate to Azoulay et al. (2020), who consider multiple Census Bureau datasets, but focus more on resulting firm size distributions rather than within-firm employment records. To the best of our knowledge, we provide some of the first evidence on the nationality-specific nature of workplace concentration, the persistence of the phenomenon as businesses age, and the intricate ways co-ethnic hiring interacts with local labor markets. Other studies of the U.S. experience include Garcia-Perez (2011), Hellerstein and Neumark (2008), and Hellerstein et al. (2011). These findings are important for understanding the economic opportunity associated with international migration (e.g., Borjas 1994, Clemens 2011, Docquier and Rapoport 2012).

Likewise, recent empirical work like Hegde and Tumlinson (2014) and Gompers et al. (2016) document the performance implications of ethnic ties in the high-growth entrepreneurship and venture capital space. Our work extends this literature strand to a significantly broader set of new ventures in the economy. These literatures contribute to our understanding of the development of entrepreneurial human capital for the country (e.g., Ehrlich et al. 2017) and how it is transferred within and across ethnic groups through young ventures and their employment patterns. Additional connections to the prior literature are discussed in the next section.

The rest of the paper is structured as follows: Section 2 reviews the literature on co-ethnic hiring and diversity within firms more generally; this section also outlines our three conceptual models in greater detail. Section 3 describes our data and the methodological choices made to construct the analysis database. Section 4 presents the key findings of our study, while the last section concludes the paper and discusses future research ideas.

2 Co-Ethnic Hiring and Workforce Diversity

The academic literature on the immigrant ethnic diversity of firms and their hiring practices is sparse. This under-development stems in large part from prior data constraints, as systematic investigation requires detailed employment records and ideally the ability to track outcomes for individuals and businesses over time. The development of employer-employee databases, first in Europe and later with the LEHD in America, has begun to alleviate those constraints. This section reviews the co-ethnic hiring literature from an immigrant nationality perspective and then provides some broader comments from the vast literature on workplace diversity. We

then describe in greater depth three conceptual models for co-ethnic hiring and some of their implications.

2.1 Literature on Co-Ethnic Hiring

Co-ethnic hiring is typically measured as the degree to which firm owners or managers hire employees from their ethnic groups. Many studies that focus on immigrants in the workplace treat immigrants as single group, measuring the total share of the workforce of a business who is foreign born. Other studies are able to delve deeper into countries of birth or nationalities to measure workplace heterogeneity. The latter data are often tailored for specific settings to reduce administrative burdens and/or protect worker identities. For example, the Swedish administrative data has more specific data on European-sending countries as compared to the United States, while U.S. administrative data has more specific data on Latin American-sending countries.

European studies have led the way, with Åslund et al. (2014) showing that Swedish firms with greater immigrant representation in the general workforce and/or managerial positions tend to hire more immigrants. The authors note that co-ethnic hiring may be due to productivity advantages (e.g., better communication), preferences for own-ethnicity, information asymmetries (e.g., better ability to evaluate skills), and the power of professional and ethnic networks. In addition, Hammarstedt and Miao (2020) find that self-employed immigrants in Sweden, especially non-European, are more likely to hire other immigrants than the native self-employed. Ansala et al. (2020) show a broad similarity between Sweden and Finland in the early employment patterns for immigrants.

Elsewhere in Europe, Nicodemo and Nicolini (2012) show the association between an immigrant manager and the hiring of immigrant low-skill employees is especially significant in Spain. den Butter et al. (2007) provide a broader set of theoretical and sociological perspectives on co-ethnic hiring practices, with focus on the Netherlands. The authors note that the key obstacle to minority integration appears to be the separation of native and ethnic minority business networks, resulting in the economic isolation of ethnic minorities and consequent formation of enclave economies. From a contrasting perspective, Orefice and Peri (2020) highlight how immigration to France increases the size of the French labor pool and thereby aids better firm-worker matching.

While the workplace concentration for immigrants is consistently observed, the impact of co-ethnic employment on the careers and economic advancement of immigrant employees is mixed.² Andersson Joonas and Wadensjö (2009) find lower initial incomes for immigrants to Sweden who are hired by their self-employed co-nationals, with a greater likelihood that these immigrants will later transition in the future to self-employment themselves. Tomaskovic-Devey et al. (2015) also note that although immigrant-native wage gaps differ dramatically across Swedish firms, such wage gaps are smaller in firms with a greater share of immigrant employees and managers. Another study by Daunfeldt and Fergin-Wennberg (2018) found that immigrants recently hired from unemployment are less likely to fall back into unemployment if they are in a workplace with at least one manager born in a non-Western country.

For the United States, important early studies documented examples and case studies of co-ethnic hiring within immigrant groups, especially among new arrivals (e.g., Portes and Wilson 1980, Waldinger and Lichter 2003), and the value of ethnic networks for jobs (e.g., Munshi 2003). Hellerstein and Neumark (2008) and Andersson et al. (2014) quantified these patterns more broadly across the economy. While most workers, including immigrants, work in larger workplaces that are not as segregated, workplace segregation among smaller firms is more pronounced. Garcia-Perez (2011) shows that small firms are especially likely to hire immigrants. She also observes a substantial portion of the immigrant-native wage difference can be explained by immigrants working for immigrant-owned business that pay lower wages on average. Chiswick and Miller (2012) study how the linguistic distance of a group to English shapes the rate and direction of assimilation, and Cassidy (2019) shows larger co-ethnic group sizes and lower rates of English language acquisition help explain some lower rates of earnings assimilation. These intriguing results from the labor literature mostly focus on the outcomes for workers, and we shift in this paper to investigating more the impact for firms.

2.2 Literature on Workplace Diversity

The topic of co-ethnic hiring is closely related to questions of diversity, a topic that has received much more attention in many literatures. One significant body of work has studied the impact

²Immigrants often experience downward mobility and underemployment when they first arrive in a destination country. This can result from under-recognition of past education and experience (e.g., Friedberg 2000, Li 2001, Batalova et al. 2008, Mattoo et al. 2008, Creese and Wiebe 2012), challenges of discrimination (e.g., Oreopoulos 2011, Edo et al. 2013), selection of who migrates (e.g., Nowotny 2016), or a lack of employment authorization.

of population and workforce diversity on aggregate outcomes.³ For example, focusing on immigration in the OECD countries, Alesina et al. (2016) study the relationships of birthplace, cultural, and linguistic diversity by skill level of immigrants to economic development. Studies have also looked at the impact of local immigrant diversity across cities.⁴

A parallel set of work utilizes case studies and data collected via experiments, in-person interviews, or mailed surveys to consider organizational implications of diversity (e.g., Milliken and Martins 1996, Williams Phillips and O'Reilly 1998). The impact of diversity on performance varies across studies (e.g., Richard 2000, Richard et al. 2003), and some argue that performance is maximized with highly heterogeneous or highly homogeneous groups compared to moderate diversity (e.g., Earley and Mosakowski 2000, Vermeulen 2003). Recent research on the effect of diversity on firms considers ethnic and gender diversity among the board of directors, management (including founders and CEOs), and the general workforce.⁵ Nguyen (2020), for example, uses micro-data to evaluate the importance of ethnic trust between CEOs and the scientists working in their firms. Diversity is often, but not always, found to positively correlate with firm innovation and productivity.⁶

2.3 Conceptual Framework

Building on Åslund et al. (2014) and the other studies above, we focus on three conceptual models that can lie behind co-ethnic hiring. Our data provide several important levers that we can apply to the analysis: detailed country-of-birth data that can be measured both within and outside of the venture, the ability to follow individual leaders over time, and the ability to connect initial co-ethnic hiring to subsequent venture survival and growth. As we describe the conceptual models below, we note some features of how each model might be visible in the data.

A first model focuses on communication in the workplace. Immigrant have varying degrees

³Examples include Easterly and Levine (1997), Collier (2001), Alesina et al. (2003), Alesina and La Ferrara (2005), Ashraf and Galor (2013a,b), Gören (2014), Bove and Elia (2017), and Bahar and Rapoport (2018).

⁴Examples include Ottaviano and Peri (2006), Highfill and O'Brien (2015), Rodriguez-Pose and Von Berlepsch (2018), Kemeny and Cooke (2018), Burchardi et al. (2020), Burstein et al. (2020), and Docquier et al. (2020). Related work on regional immigration for invention includes Hunt and Gauthier-Loiselle (2010), Kerr and Lincoln (2010), Peri et al. (2015), and Doran and Yoon (2019).

⁵Examples include Smith et al. (2005), Campbell and Minguez-Vera (2007), Adams and Ferreira (2009), Marimuthu et al. (2009), Carter et al. (2010), Torchia et al. (2011), Lee and Nathan (2013), Del Carmen Triana et al. (2014), Borghesi et al. (2016), Adusei et al. (2017), and Conyon and He (2017).

⁶Examples include Ozgen et al. (2013), Parrotta et al. (2014a,b, 2016), Lee (2015), Trax et al. (2015), Kerr et al. (2015a,b), and Mayer et al. (2018).

of fluency in English, and language barriers can limit workplace productivity by hampering communication among employees or between employees and customers or other external parties. Co-ethnic hiring might in part reflect the managerial desire to enhance workplace productivity through better communication. This model has a rather distinctive signature in the data as it suggests easier substitution over ethnic groups within the same language family, compared to across them. The model also more naturally fits in lower-wage sectors given the greater language proficiency among higher educated and better paid immigrants.⁷ The model predicts potentially improved venture outcomes, at least relative to others in the same city and industry, if communication within the firm is enhanced.

A second model brings together factors that would link co-ethnic hiring to improved venture performance. Information flows are stronger within ethnic groups than across them, and ethnic networks have been shown to be important in a variety of job search and hiring settings. In both low- and high-wage sectors, a leader may be able to collect superior information about the skills and workplace potential of job candidates when they are within his or her ethnic group. This model suggests a narrower hiring practice focused on the ethnic group vs. language family, and the strength of the practice should grow with larger local labor pools to draw upon. The model also predicts improved venture outcomes with co-ethnic hiring due to the advantageous resources acquired.⁸

A third model focuses on the preferences of members of an ethnic group to work together (e.g., Becker 1957). It is closely related to the second model in its reliance on ethnic-specific features for hiring, and we would not expect the co-ethnic hiring practice to diminish much over time. Given the lack of a productivity advantage, we anticipate flat or diminished venture performance as a consequence. This performance penalty may be less in environments where there is substantial employment for the ethnic group as the leader has a thicker pool of potential hires to draw from.

⁷In the 2000 Census, 90% of immigrants earning above the median wage spoke English well or fluently, while the share was 66% for those below the median wage.

⁸The better signal extraction for co-ethnic hiring relates to statistical discrimination models (e.g., Phelps 1972, Arrow 1973, Aigner and Cain 1977). Employers are risk averse, and they do not know the true productivity of potential employees but see noisy signals (e.g., education). Employers may be better able to extract information from these signals for the people of their own ethnicity, which leads them to prefer hiring them even if other ethnicities look "just as good" on paper. This process could persist as the firm ages if the hiring practice proves advantageous.

3 Data and Descriptive Tabulations

3.1 Census Bureau Data

We utilize the Longitudinal Employer Household Dynamics (LEHD) database and the Longitudinal Business Database (LBD).⁹ These datasets are confidential and housed by the U.S. Census Bureau to be used in the Federal Research Data Centers. The LEHD is constructed by the Census Bureau from state-level quarterly filings by employers for the administration of state unemployment insurance (UI) benefit programs. Records for each state identify each paid employee at an establishment and the employee’s quarterly compensation; employees with multiple jobs are recorded separately by each firm. The data longitudinally follow establishments, firms, and employees and provide characteristics of each. We have access to the data for 26 states for this project, including states like California and Texas that receive large numbers of immigrants to America.¹⁰ Our data extend through 2014, with start dates varying by state.

The person-level characteristics available in the LEHD include age, gender, race, place of birth, and citizenship status. The place of birth variable records the country of birth for persons arriving from major immigration countries to America; the data record a region of birth for the rest. The employment history files provide job-level earnings of each worker within the covered states, and a national indicator file contains the quarterly employment status of individuals across all U.S. states. We require individuals be aged 16-79, and we exclude job observations with less than \$200 in quarterly earnings. The quarterly firm and establishment characteristics include firm age and size, detailed location (county), detailed NAICS and SIC industry code, and payroll. We focus on ventures in metropolitan statistical areas (MSAs) to model the typical definition of the local labor market.¹¹

We build a dataset that contains all firms that are established after the LEHD start date of the state that they are located in. The LEHD start dates in our sample range from 1990 to 2000, with the majority of the states starting by 1995. As described further below, we focus on new ventures so that we can characterize the early hiring decisions being made by employers. We restrict the sample to firms where the highest earning person in the initial

⁹Data description: <https://www2.census.gov/ces/wp/2018/CES-WP-18-27.pdf>

¹⁰The covered states include Arkansas, California, Colorado, Delaware, Georgia, Hawaii, Illinois, Indiana, Iowa, Louisiana, Maine, Maryland, Missouri, Nevada, New Mexico, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, and Washington, as well as Washington D.C.

¹¹These metro areas are formally defined through Core-Based Statistical Areas (CBSA). The patterns that we document can also be seen at the county level in an analysis that incorporates rural areas.

founding team was born outside of the United States, excepting for when we are measuring the local labor composition surrounding a firm. We also focus on new entrants that employ five or more workers during their first year, which helps safeguard against husband-wife or family businesses being too important for our analysis; the LEHD does not document relationships among individuals.¹² A small number of odd cases with top initial earners associated with five or more firms are excluded. The LBD is used to construct the start date that corresponds to the founding year of the first establishment of the firm. We track each firm annually until 2014 or the last year of survival, and we end our sample with entrants in 2004 to ensure we have a potential ten-year observation window for each business depending upon firm survival.

The final sample has about 275,000 new businesses. Throughout this paper, Census Bureau disclosure requires observation counts be rounded, and all reported numbers are likewise rounded to a maximum of four significant digits.

We characterize firms by the ethnicity of the highest initial earner within the firm. Several studies, including our own, have used this top initial earner to proxy for the firm’s founder/owner.¹³ Our present study does not require such a strong interpretation of the top initial earner, only that this initial top earner be influential in employee hiring decisions in the firm. We are equally comfortable if this top initial earner is a founder/owner of the firm or just an early manager/leader in the new venture.

3.2 Descriptive Statistics

Table 1 provides descriptive statistics on the sample. Column 2 of Table 1 provides the count of new ventures by top initial earner ethnic group, and Column 3 shows this as a percentage of the total. The most prevalent countries of birth for the top initial earners include Mexico (24.6%), India (6.4%), South Korea (6.2%), Vietnam (5.8%), and China (5.6%). In total, 22 foreign countries are individually identified and cover 77% of the top initial earners in our sample; each of these countries contains at least 0.2% of the top initial earners, with Haiti being the smallest. The rest of the countries are grouped by the Census Bureau into 10 aggregate regions of birth that range from 4.0% (South East Asia) to 0.4% (Caribbean) of the sample.

We measure co-ethnic hiring by calculating the share of employees in each year who are

¹²Fairlie and Miranda (2017) consider choices to hire employees into start-ups. Related to this work, they observe Asian- and Hispanic-owned businesses are more likely to make the transition into being an employer firm.

¹³See discussions in Kerr and Kerr (2017), Choi et al. (2019), and Hyatt et al. (2020).

from the same country or region of birth as the top initial earner. Column 4 shows the strength and heterogeneity of co-ethnic hiring, and Figure 1 provides a graphical presentation of the top 15 highest co-ethnic shares among identified countries. The co-ethnic share of the initial employee base ranges from as low as 1.8% (Germany) to 45% (Vietnam), with an unweighted average co-ethnic share of 14.6%. To provide an explicit example, a co-ethnic share of 40% would suggest the top earner is of the same ethnicity as two of the five remaining employees in a six-person business. The weighted average co-ethnic share is 22.5%, reflecting that larger groups display more co-ethnic hiring, and it falls to 19.6% if excluding Mexican top earners and their firms.

While it is perhaps intuitive that the co-ethnic share for top initial earners from Canada and the United Kingdom will be lower than those from El Salvador or the Philippines, other variations are quite intriguing. Co-ethnic shares for top initial earners from Mainland China are twice the rate evident for top initial earners from Taiwan. Co-ethnic rates for Mexico exceed 30% but are less than 8% for Guatemala, Colombia, and Cuba.

The appendix extends these descriptive tabulations by ethnicity and industry. Appendix Table A1 documents co-ethnic shares as firms age to five and ten years. About half of firms survive to be five years old, and the attrition rate is even greater from five to ten years. Co-ethnic hiring is remarkably persistent (holding the ethnicity of the firm constant to that of the top initial earner even if the top earner in the firm is now someone different). The co-ethnic share does not change significantly as establishments age, with the unweighted and weighted averages rising slightly. Most ethnic groups show a very modest relative change in the co-ethnic composition of their firms over time, amounting usually to an increase or decline of less than 3%. Thus, hiring patterns do not become more diffuse with firm survival nor do they converge to mirror the overall U.S. labor market (or even its immigrant populations).

Appendix Tables A2a and A2b provide statistics for 12 industry groups, aggregating over ethnicities. Appendix Table A2a first documents the composition of entering firms by industry and the significant variation in co-ethnic shares, for example, from agriculture to professional service firms. The persistence of these co-ethnic shares as the firm ages to five years or more mirrors the tabulations in Appendix Table A1.

We also use the greater sample size at the industry level to disclose three additional features of co-ethnic hiring: 1) the comparable share of initial employment in the firm that comes from

other immigrant groups and a benchmark to what would be expected if hiring at random from the MSA-industry worker pool, 2) the average earnings percentile of co-ethnic employees within the firms (excluding the top initial earner), and 3) the distribution of co-ethnic hiring across granular hiring bins ranging from no co-ethnic employees are hired to where 75% or more of hires are co-ethnic.

3.3 Additional Approaches and Considerations

Our empirical analyses in the next section consider some of the causes and consequences of co-ethnic hiring. Before proceeding, it is important to describe the robustness of the approach taken to natural alternatives. Limits on implicit disclosure across samples by the Census Bureau only allow us to present a few of the robustness checks formally in the tables ahead.

First, our baseline metric treats all groups shown in Table 1 as distinct, such that the presumed ethnic distance from natives of Cuba to natives from Japan or the United States is the same as that to natives of the Dominican Republic. We later demonstrate robustness to employing continuous metrics of linguistic and genetic distance across ethnic groups using the work of Spolaore and Wacziarg (2016). While we will observe some measure of cross-ethnic hiring or substitution, firms not hiring from their own co-ethnic group tend to mostly hire U.S.-born workers rather than immigrants from other ethnicities, which makes the binary metrics quite reasonable and easy to interpret.

Second, the choice to focus on the top initial earner is quite robust. We find similar results when looking at matches to top two or three initial earners. We also find similar results when focusing on extreme cases for the top initial earner, when she earns significantly more than anyone else in the business, to isolate greater likely decision-making authority. We hold the ethnicity of the business fixed at that of the top initial earner as the firm ages. In many cases, the top earner in fact remains the same, and, when different, the subsequent top earner often has the same ethnicity. Either way, the results below are similar when focusing on cases where the top earner remains the same from the birth of the firm throughout the period we observe it in operation. Finally, the persistent co-ethnic shares over time shows that most future hiring mirrors the first year, and we have confirmed our results when looking only at new employees entering the firm after year one (and thus for certain after the top initial earner starts or otherwise enters the firm).

4 Regression Analysis

We break our analysis into two steps. We first quantify the determinants of co-ethnic hiring to assess which of our three models are consistent with the hiring patterns themselves, especially regarding the relative importance of the specific ethnic group vs. its broader language family. We then study the venture performance connected to co-ethnic hiring to differentiate among the two theories that are operate within ethnic groups.

4.1 Determinants of Co-Ethnic Hiring

Our first set of analyses quantify the tight relationship of co-ethnic hiring to local labor market conditions and the persistence of choices by top initial earners across ventures. We focus on the hiring conducted in the first year of the business, measuring the share of early employees that are from the same country of birth as the top initial earner.

The primary explanatory variables in Table 2 model the overall presence of the ethnic group in the local labor market, defined through two-digit NAICS industries and metropolitan areas. We use non-parametric indicator/dummy variables to allow for non-linearities in the empirical relationship; this approach also limits the overall influence of Mexico compared to a linear model. Coefficients are measured relative to settings where an ethnic group constitutes less than 1% of employment in the MSA-industry (53% of firms). In our sample, 25% of firms are in the 1%-5% cell, 8% are in the 5%-10% cell, 10% are in the 10%-25% cell, and 4% are in the >25% cell. Pre-existing firms and new ventures with U.S.-born top initial earners are used to calculate local workforce traits but otherwise excluded. The employment of the new venture itself is excluded from the local labor composition.

Column 1 of Table 2 shows a specification where we incorporate two measures for ethnic groups beyond the MSA-industry shares: a (0,1) indicator variable for the native language of the ethnic group being a language other than English and a continuous measure of cultural similarity of the ethnic group to U.S. natives. In our sample, 90% of firms are in ethnic groups where the native language is not English. Cultural similarity measures the bilateral similarity of culture between the top initial earner’s country of birth and natives of the United States. The measure is taken from Spolaore and Wacziarg (2016) and based upon genetic distances for groups, which we discuss in greater detail later. Positive values represent greater cultural similarity, and we express this variable in unit standard deviations to aid interpretation.

Estimations are unweighted and report robust standard errors.

Column 1 finds a quite strong empirical relationship, with businesses with surrounding local MSA-industry ethnic shares of 1%-25% showing a 10%-15% increase in the share of their initial workforce of the same ethnic group as the top initial earner compared to businesses in settings with a <1% local share. The co-ethnic hiring relationship further grows to a 33% workforce share gain when the local MSA-industry workforce is more than 25% of the same ethnic group as the top initial earner. Top initial earners with a non-English native language are also connected to 5% greater co-ethnic hiring, while a one-standard deviation increase in cultural similarity of top initial earners group to the United States links a 4% decline in co-ethnic hiring.¹⁴

These baseline estimations allow for large variations across U.S. regions, such as the more extensive immigrant entrepreneurship and immigrant workforce concentration in California and Texas compared to Iowa and Vermont. The specifications also allow for large industry variation: there is greater immigrant concentration in businesses like landscaping and food services at lower skill levels and in IT-connected fields at higher skill levels. Kerr and Kerr (2020) document in the 2012 SBO data that roughly half of immigrant-owned startups are in three sectors: accommodation and food services, retail trade, and professional and technical services.¹⁵ Column 2 accordingly augments the empirical model to include MSA-industry-year fixed effects, focusing attention on local differences across ethnic groups. The results are quite similar, indicating a mechanism that is deeper than spatial or industry concentration.¹⁶

Column 3 further includes ethnic fixed effects for top initial earners. With these fixed effects, we can no longer model language or cultural similarity of the ethnic group to U.S. natives. The role of the local labor force persists and, in fact, strengthens in this model. Businesses with surrounding local MSA-industry ethnic shares of 1%-25% exhibit a 11%-25% increase in the share of their initial workforce of the same ethnic group as the top initial earner

¹⁴As a complementary statistic, there is a 0.59 correlation between average co-ethnic shares for the first year of ventures shown in Table 1 with the in-marriage rate for the ethnic group in the 2000 Census. The latter is calculated as the share of child arrivals to the United States who subsequently have married another person from their country of birth.

¹⁵Immigrant entrepreneurs further display a remarkable concentration by ethnic group in terms of sectors, such as Vietnamese nail care salons, Korean dry cleaners, Gujarati Indian motels, and Punjabi Indian convenience stores. For example, Kalnins and Chung (2006), Roth et al. (2012), Patel and Vella (2013), Andersson et al. (2014), Battisti et al. (2016), and Kerr and Mandorff (2021).

¹⁶We have also confirmed throughout this project that food services are not overly influencing our results given the ethnic-based nature of many immigrant-owned restaurants.

compared to businesses in settings with a <1% local share. For settings where the local MSA-industry workforce is more than 25% of the same ethnic group, the co-ethnic share now reaches 41%. Across each stage of the non-linear estimation, the realized co-ethnic shares are greater than what the local workforce representation alone would predict. There is a disproportionate jump once the local share exceeds 1% and continued increases thereafter.

Column 4 shows these results are robust to adding controls for the age, gender, race, and education of top initial earners. Column 5 further shows robustness to adding controls for firm size and wage rate in entry year. The final two columns show that the pattern is similar when splitting the sample by the state-level median wage among new ventures in the sample.

When viewing these results, it is important to recognize that we do not have data on some factors that prior work connects to workplace segregation. The first is residential segregation of immigrant groups (e.g., Hellerstein et al. 2011, Andersson et al. 2014). Our fixed effects capture spatial isolation that is general to ethnic groups and in a city overall, but not idiosyncratic features.¹⁷ Second, while our MSA-industry shares reflect the extent of local worker pools, we do not have data on detailed personal networks that are influential in job matching.¹⁸ Our education controls are also incomplete characterizations of the deeper skill dimensions (e.g., cognitive, physical) of human capital on which immigrants and natives differ (e.g., Schoellman 2010). Nonetheless, the stability of our coefficients across these models in Table 2 is reassuring.

Appendix Table A3 presents a version of these estimations where we show ethnic fixed effects, with Canada being the reference category. For this purpose, we model a simpler linear ethnic share for surrounding MSA-industry-year employment; this linear model finds that a 10% increase in the share of the local labor force of the same ethnicity as the top initial earner correlates with a 12% higher co-ethnic hiring share. As would be expected, the coefficients on the ethnic fixed effects follow Table 1’s descriptive shares closely. For most ethnic groups, further adding MSA-industry-year fixed effects, local ethnic employment shares, and controls for the traits of top initial earners and firms has little consequence. The one exception is for top initial earners from Mexico, where the raw baseline effect of 0.292 (0.001) declines to 0.096

¹⁷As one characterization, we calculated the distribution of immigrants by birthplace across Public Use Micro Areas (PUMAs) within MSAs using the 2000 Census. The R-Squared of a regression of a birthplace’s share in a given PUMA on fixed effects for MSAs and birthplaces is 0.71. The R-Squared of a regression of squared deviation from underlying population for immigrants from a birthplace was 0.46.

¹⁸This literature includes Holzer (1987), Montgomery (1991), Elliot (2001), and Nijkamp (2003), with Caldwell and Danieli (2020) and Caldwell and Harmon (2020) providing powerful recent additions.

(0.003) in the presence of all these controls. In the raw baseline, the co-ethnic hiring propensity of top initial earners from Mexico is the third highest, behind only those from Vietnam and China, but it is in the middle of the pack (12th largest) in the full specification; immigrants from Mexico are a large share of many local labor forces, inflating the baseline co-ethnic hiring propensity.¹⁹

The next two exercises conduct tests that help us evaluate the conceptual models. The analysis in Table 3 starts by exploring the persistence of co-ethnic hiring choices at the level of individuals. We identify 10,000 new ventures where the top initial earner was the top initial earner of a prior business in a different MSA-industry. As discussed in the data section above, we have dropped a small number of cases where one individual was the top initial earner of five or more ventures. Thus, after excluding the initial venture for each top initial earner, a maximum of three follow-on ventures is feasible for a given top initial earner in this sample of 10,000 businesses. The format of Table 3 is identical to Table 2 excepting that we add as an explanatory variable the initial co-ethnic hiring present in the top initial earner's excluded first venture. (In comparing results over tables, one should bear in mind that the determinants of co-ethnic hiring among the types of individuals who are top initial earners in multiple new ventures could differ from the modal leader/manager who we observe only once.)

The prior co-ethnic hiring behavior of a top initial earner is very predictive of subsequent co-ethnic hiring behavior: a 10% higher share in a prior venture is associated with a 7% higher share in the current venture. This persistence of co-ethnic hiring at the individual level is consistent with both taste-based rationales and also information advantages (e.g., stronger personal networks of the top earner). Unreported analyses find a very modest decay in coefficients when moving from the second to the third to the fourth ventures of an individual. This past behavior of individuals completely captures the effect earlier measured for the language and cultural similarity measures. Interestingly, the local workforce composition continues to play a role, albeit diminished. Businesses with surrounding local MSA-industry ethnic shares of 1%-25% exhibit a 2%-5% increase in the share of their initial workforce of the same ethnic group as the top initial earner compared to businesses in settings with a <1% local share.

A final depiction of these co-ethnic hiring patterns is captured in Table 4, where we in-

¹⁹Appendix Table A3 also shows that co-ethnic hiring is usually comparable for lower- and higher-wage firms. Top initial earners from Vietnam, China, South-East Asia, Jamaica, and Cuba show the strongest tilt towards greater co-ethnic hiring in lower-wage firms, while top initial earners from South Korea, Russia, Poland, and Taiwan show instead relatively greater co-ethnic hiring in higher-wage firms.

investigate the degree to which the local workforce composition impacts hiring individuals with the same native language. The dependent variable is now the share of the initial workforce with the same language but different country of birth as the top initial earner. We restrict this sample to observations where a country of birth is known, excluding cases where we only know the region of birth. The negative coefficients compared to the reference category suggest a modest measure of substitution towards immigrants with a similar native language in settings where there is a very small local share of co-ethnic employment. These magnitudes however are quite small compared to those in Table 2, suggesting that the co-ethnic hiring effect is more specific than possession of a common native language.

What do the results of Tables 1-4 say about our three conceptual models? Several findings are inconsistent with common language being the essential element. Most important, Table 4 shows only a quite modest substitution towards other ethnicities of the same native language when an ethnic group is scarce locally. Table 2 also supports this conclusion when comparing different factors lying behind within-group hiring. While language plays a role that is material and precisely estimated, it is distinctly second-order in importance to the local ethnic group's presence in the workforce. Appendix Table A4 further provides additional evidence from the 2014 Annual Survey of Entrepreneurs that suggests native language use beyond Spanish in the workplace tends to be less common in industries that interact with final consumers.²⁰

By contrast, the evidence thus far is consistent with both the information advantage and group taste hypotheses. Both models align with Table 2's strong and persistent growth of co-ethnic hiring with local workforce composition. In the information advantage model, the deeper local labor pool would yield more potential matches where the ethnic connections and insight could be valuable. The deeper local labor pool also allows greater potential for matching based upon taste, although it less clear why that would necessarily continue to scale with labor pool

²⁰The 2014 Annual Survey of Entrepreneurs (ASE) recorded information on both the ethnic backgrounds of immigrant business owners and the languages spoken with customers. We calculate the share of first-listed business owners who report interacting with customers in the native language of their country of origin. About half of business owners from China and Vietnam, the two groups that show the highest co-ethnic hiring in Figure 1, report using their native language with customers (usually in addition to English and possibly with other languages, too). This rate is higher than what is evident for other groups that display lower co-ethnic hiring, like Indian and Korean business owners. Unsurprisingly, immigrant Hispanic owners report high rates of Spanish use. When separating out businesses that interact with final consumers (e.g., transportation, services) vs. those more removed (e.g., manufacturing, construction), we find the use of the owner's native language is lower for non-Hispanic owners in sectors that interact with final consumers. This difference suggests the patterns that we observe are not being dictated by local ethnic customer bases, with the potential exception of Hispanic populations.

depth vs. flatten out once a certain workforce availability is achieved. When looking that the persistence of co-ethnic hiring at the individual level, this could represent a fixed managerial approach or taste bias.

We turn next to venture performance to provide some additional insight about the models. Before doing so, we note that an appendix to this paper provides an initial examination of how the policy environment of an area towards immigrants might impact relative rates of co-ethnic hiring. While our paper focuses on quantifying venture hiring and dynamics, we explored if changes in legal and policy environments impact the workplace concentration of immigrants. We have kept this analysis for an extension in part because our data will not afford an analysis of venture performance implications due to the policy shifts. We hypothesize that a stricter enforcement background leads some employers to recruit fewer immigrants, perhaps leading to less competition for the labor pool for co-ethnic hiring. The appendix finds greater rates of co-ethnic hiring in harsher policy environments towards immigration, which would be consistent with both of the information advantage and group taste hypotheses.

4.2 Co-Ethnic Hiring and Venture Performance

Table 5 analyzes how the survival and employment growth of a firm relate to the firm's initial co-ethnic hiring share. The top panel of Table 5 considers a (0,1) indicator variable for a new venture surviving until age five. The key explanatory variable is the co-ethnic share of the firm workforce to the top initial earner in the firm's first year. The progression across columns is the same as in earlier tables.

The first column finds that a 10% higher initial co-ethnic share is associated with 0.9% higher business survival rate (compared to a sample average of 49%). This effect declines to 0.4% in the presence of controls but remains precisely measured. The survival effect is concentrated in firms that are paying above the median wage for new ventures in the state.

The bottom panel of Table 5 considers the employment growth of firms for five years from birth, conditional on survival. Employment growth is measured relative to average starting and ending employment, following Davis et al. (1996). The measure is thus symmetric around zero and bounded between -2 and 2. The first column finds that a 10% higher initial co-ethnic share is associated with 0.002 higher employment growth (compared to a baseline rate of 0.065 for ventures that survive five years). This effect remains or grows in the presence of controls.

For the split sample, we continue to separate ventures based upon the same wage as in the top panel. There is some interesting evidence of a negative growth effect in lower-wage firms from a high co-ethnic share, while the effect appears positive in higher-wage firms.

Unreported analyses further explored some the potential ways a higher growth measure can occur. Our growth measure includes many firms that have negative growth, as they shrink from the initial employment level of the entity (which was at least five workers in our sample design). It appears that a reduced likelihood to shrink, vs. a greater likelihood to expand, is more important for the higher growth estimates for firms with substantial amounts of initial co-ethnic hiring. In many ways, this aligns with two other results evident in this study: the substantial co-ethnic persistence as firms age and the higher survival rates evident in Panel A of Table 5.²¹

Table 6 extends these survival and growth estimations in two ways. As noted earlier, we want to test more continuous measures of distance between ethnic groups than our baseline binary approach of origin from the same country of birth. Spolaore and Wacziarg (2016) measure the bilateral genetic and linguistic similarity among countries. In earlier analyses, we quantified that top initial earners whose country of birth was genetically similar to the United States exhibited less co-ethnic hiring. In this extension, we measure instead the average genetic and linguistic similarity of the firm’s initial employees to the top initial earner. To construct those measures, we use data on all employees present in the firm, including those born in the United States. In cases where we have a regional mapping, we use a weighted average of distances based upon the prevalence of grouped nationalities in America. Positive values indicate greater team similarity, and we normalize the metrics to have unit standard deviation for ease of interpretation. (Columns 1 and 4 that repeat our baseline metric continue to be expressed in co-ethnic shares with a standard deviation of 0.279.)

Panel A of Table 6 first repeats the earlier survival and growth specifications (Column 5 of Table 5) for the continuous measures, with column headers indicating the dependent variable and type of hiring similarity used. A one-standard deviation increase in genetic or linguistic similarity among initial employees is associated with a 1% increase in firm survival rates,

²¹This is also consistent with results from other studies (e.g., Kerr and Kerr 2020) that show that immigrant entrepreneurs tend to start smaller firms in terms of worker counts than natives, with much of the higher firm growth subsequently being measured for immigrant-founded companies coming through employment convergence over time. In the present study, we are only comparing among companies whose top initial earner is foreign born, and we are also controlling for initial firm employment levels in the regressions.

roughly comparable to a 20% increase in initial co-ethnic hiring. A similar effect is estimated in the regressions for firm employment growth, which represents perhaps an even larger relative impact for the genetic and linguistic similarity metrics compared to the co-ethnic hiring metric.

When viewing these results, it is important to note that we have not observed in our research project significant evidence of cross-ethnic employment effects (e.g., among Spanish-speaking nationalities or genetically close European countries). Table 4 shows some modest spillovers for MSA-industry settings where an ethnic group is very weakly represented, and these results in Table 6 are consistent again with some modest effects. However, most of the explanatory power for the genetic and linguistic similarity measures comes because co-ethnic workers of the top initial earner are of the same genetic and linguistic background. As such, we view these results as robustness checks on our co-ethnic specification design rather than proof of cross-ethnic hiring spillovers. We note in the discussion below some exciting research opportunities to extend this work.

Panel B of Table 6 provides an important extension to connect the survival and growth estimations of Table 5 to MSA-industry analysis conducted in Tables 2-4. We now model jointly the hiring similarity measures, the local ethnic shares of workers, and an interaction of these variables. The striking finding is that little, if any, of the positive impact of ethnic hiring similarity for firm outcomes is evident in cases where the local ethnic worker share is <1%, which represents 53% of the sample. The positive effects instead are evident where there is a significant local worker base of the same ethnic background as the top initial earner. For survival, the peak comes in settings with the ethnicity represents 10-25% of the MSA-industry employment; for growth, the relationship is virtually monotonic to ethnic shares of >25%.

Returning to our models, we see evidence for both the information advantage and group tastes model. The information advantage model suggests equal or better venture performance following upon an advantage conferred by ethnic connections; the taste model suggests instead no effect or a penalty on average. Across Tables 5 and 6, the majority of the evidence points towards a positive impact of co-ethnic hiring on survival and growth, especially in higher-wage businesses and those with thicker surrounding labor markets. We conclude this model accounts for a the bigger part of the data.

But we also note the negative growth impact observed in lower-wage business and especially where co-ethnic hiring is done in an environment with very limited local presence of the

ethnicity. These negative effects are not consistent with the information advantage model, and it is important to note that they represent a significant share of businesses. They suggest hiring based upon group tastes are also contributing to the patterns observed. A corollary is that our average effects in Table 6 likely under-estimate the positive venture impact of co-ethnic hiring due to information advantages given its blend of several motivations.

5 Discussion and Future Research

This project has explored co-ethnic hiring among new ventures using U.S. administrative data. Co-ethnic hiring is ubiquitous among immigrant groups, averaging about 22.5% and ranging twenty-fold from less than 2% to more than 40%. Co-ethnic hiring grows in the presence of a large local workforce surrounding new firms with members of the ethnic community, greater linguistic distance of the group to English, and lower cultural/genetic similarity of groups to the United States. Perhaps even more striking is the remarkable persistence of co-ethnic hiring at the level of venture, growing slightly on average as the company ages to five or ten years old, and for top initial earners as they move over companies. Co-ethnic hiring is thus very persistent, and we do not observe convergence in hiring patterns over time.

Turning to venture performance, higher initial co-ethnic shares are associated with a higher likelihood of the venture surviving to five years and also a greater likelihood that the venture has kept its initial employment level or grown. This higher performance is concentrated, however, among new firms located in cities and industries with thick local employment of the ethnic group. The pattern of results is most consistent with a blend of co-ethnic hiring due to informational advantages within ethnic groups alongside taste-based hiring. The former model appears more important given the widespread advantages observed, but it cannot explain the negative growth findings we observed in some settings.

These results are important given that immigrants are a quarter of U.S. entrepreneurs, and new companies are also a critical source of net new jobs developed for the economy. In future research, we hope to develop a greater understanding of the policy and business environments that shape co-ethnic hiring. We made a first stab at one in the appendix with the E-Verify implementation, but a richer treatment of the local environment should encompass local regulations (e.g., minimum wages), depth of past assimilation for ethnic communities in markets, and so on. Occupational licensing may play a particularly strong role (e.g., Federman

et al. 2006, Cassidy and Dacass 2021). We are also fascinated by the lack of any convergence in employment patterns with time. Many studies demonstrate the benefits of diversity, and many policy efforts explicitly or implicitly encourage assimilation of new immigrants into the economy (e.g., training programs, English as a second language assistance, job banks). There may be some tension between realizing the short-term advantages of co-ethnic hiring and achieving the long-term assimilation for ethnic groups, along with the spillover benefits of diversity.

At a narrower and more managerial level, it is interesting to study whether a new venture can use strategic hires to bridge effectively into larger local ethnic groups for better labor market access. A surprising finding for us in this work is the relatively modest degree to which hiring spanned into neighboring ethnic groups beyond the top initial earner's country of origin. Interesting heterogeneity may lurk beneath this overall average. We suspect that a founder from a small ethnic group may be able to access some of the scaling benefits conveyed by a thick local labor pool of a larger ethnic group through careful early hires.

Finally, our work has focused mostly on the outcomes of co-ethnic hiring for ventures, but we earlier noted the larger parallel literature strand examining the career implications of co-ethnic hiring for the immigrants themselves. Most of this work has looked at outcomes in northern Europe, and it is important to know how the United States (and even regions of the country) resemble and differ from what is documented in the literature thus far. Such an inquiry can examine traits of the first job (e.g., comparability of wage levels and growth, job duration) and also the ability to jump later to new positions or open new businesses. These studies on how human capital develops for individuals over their careers will help discern the degree to which co-ethnic hiring is a boost or opportunity for immigrants when labor market access is difficult vs. a cul-de-sac that provides less long-term assimilation and growth.

Appendix: Policy Environments

This appendix provides an initial examination of how the policy environment of an area towards immigrants might impact relative rates of co-ethnic hiring. We first collect the state-by-state existence and timing of laws or executive orders that require employers use the E-Verify system to check the employment eligibility of new hires. Orrenius and Zavodny (2015) describe the development of E-Verify, initially under the name Basic Pilot, by the federal government as part of its effort to curb illegal immigration in the workplace. The resource became available to employers in California, Florida, Illinois, New York, and Texas in 1997, to Nebraska in 1999, and to employers in all states in 2003. While making the E-Verify system available nationally, the federal government did not mandate its use.²²

Starting in 2006, however, some states began requiring businesses use it. Within our sample of states, some like Georgia and Missouri mandated that nearly all businesses use E-Verify, while others like California and Illinois did not require E-Verify. More specifically, 12 of our 26 states mandated E-Verify use before our sample period ends in 2014. Some states implemented E-Verify in steps, beginning with government contractors and/or large employers before extending to other companies. In these cases, we take the implementation date that most closely matches small companies.²³ While the LEHD should only capture authorized workers, we hypothesize that a stricter enforcement background leads some employers to recruit fewer immigrants, perhaps leading to less competition for the labor pool for co-ethnic hiring.

We first model the implementation of E-Verify as an interaction term in our estimations that include our typical MSA-Industry-Year and Ethnic fixed effects, along with controls for the traits of top initial earners and firms. We model the MSA-industry-year ethnic workforce share as a linear term, similar to Appendix Table A3, and interact it with an indicator variable for whether a state has mandated E-Verify. There is no main effect for E-Verify as it is absorbed into the MSA-Industry-Year fixed effect. The baseline coefficient for the reference category is

²²Papers studying E-Verify include Amuedo-Dorantes and Bansak (2012, 2014), Leerkes et al. (2012), Bohn et al. (2014, 2015), Orrenius and Zavodny (2015, 2016), and Hasan et al. (2020).

²³States with E-Verify and coded date of implementation: Colorado (2006), Georgia (2012), Indiana (2011), Louisiana (2012), Missouri (2009), Oklahoma (2008), Pennsylvania (2013), Rhode Island (2011), South Carolina (2012), Tennessee (2013), Texas (2014), and Utah (2010). Indiana and Utah mandated E-Verify but explicitly did not enforce it. As only two states took this route during our sample period, Census Bureau disclosure restrictions require that we treat E-Verify passage as single group to achieve a minimum of three states. The reference category includes Arkansas, California, Washington D.C., Delaware, Hawaii, Iowa, Illinois, Maryland, Maine, New Mexico, Nevada, Oregon, Vermont, and Washington.

1.217 (0.015), indicating that a 10% increase in the local workforce of the same country of birth as the top initial earner correlates with 12.2% increase in co-ethnic hiring into the new firm. The interaction effect for E-Verify is 0.624 (0.096), indicating an even greater propensity towards co-ethnic hiring after its adoption.

An alternative model replaces the MSA-Industry-Year fixed effect with State and Year fixed effects. In this more typical differences-in-differences model, the baseline coefficient for the MSA-industry-year ethnic workforce share is 1.013 (0.007) and the post effect for E-Verify passage is 0.003 (0.004). The interaction of E-Verify’s passage and the MSA-industry-year ethnic workforce share is 0.696 (0.140). This model suggests that the accentuated co-ethnic hiring connected to E-Verify is most prevalent in settings where a more sizable local workforce of the ethnicity is present.

Finally, we also modelled at the cross-sectional level an overall measure of the “immigrant policy tone” from a study by Monogan (2013) of the 2005-2011 period. The policy tone metric captures the relative number and scope of “welcoming laws” (such as opposition to the 2005 REAL ID Act) vs. “hostile laws” (such as the requirement to report all suspected illegal immigrant arrestees to the U.S. Immigration and Customs Enforcement). In our sample of states, the tone variable ranges in value from a least-welcoming value of 1.78 (South Carolina) to a most-welcoming value of -1.51 (Rhode Island).²⁴ Similar to our first E-Verify estimation, we model these state policy tones as an interaction effect in an estimation that includes MSA-Industry-Year and Ethnic fixed effects, along with controls for the traits of top initial earners and firms. The baseline coefficient is 1.449 (0.020) with an interaction effect of 0.394 (0.022). These results again suggest that harsher policy environments towards immigrants may lead to greater co-ethnic hiring.

²⁴We have taken a negative of the original Monogan (2013) index so that the direction of the coefficients align with the introduction of E-Verify discussed above.

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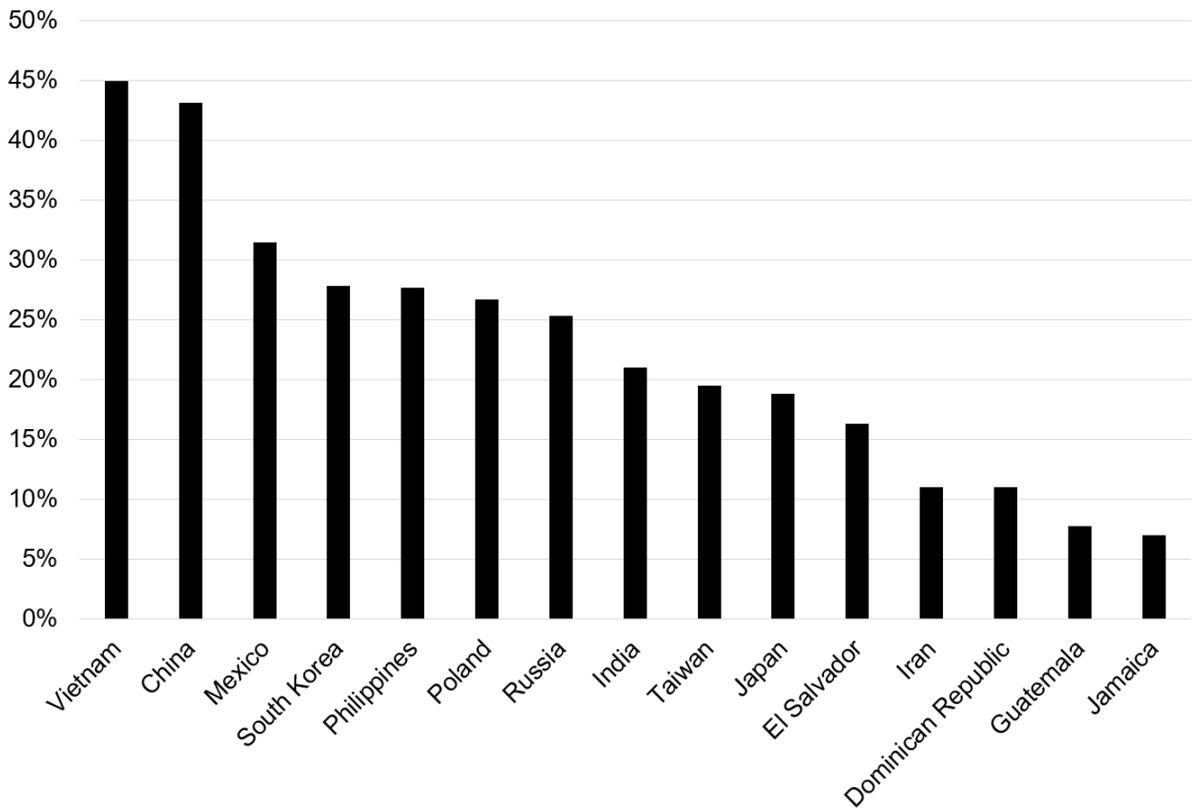
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Figure 1: Levels of co-ethnic hiring in new firms



Notes: See Table 1. Figures shows 15 highest co-ethnic hiring rates among country-specific places of birth.

Table 1: Descriptive statistics on new firm sample with top initial earner being foreign-born

Country of birth of top initial earner in new firm	Number of firms at entry	Composition of age 1 entering firms	Share of employees with same country of birth as initial top earner at entry
(1)	(2)	(3)	(4)
<u>Country-specific places of birth:</u>			
Mexico	67,500	24.6%	31.4%
India	17,500	6.4%	21.0%
South Korea	17,000	6.2%	27.8%
Vietnam	16,000	5.8%	45.0%
China	15,500	5.6%	43.1%
Philippines	12,000	4.4%	27.7%
Taiwan	8,100	2.9%	19.5%
El Salvador	7,500	2.7%	16.3%
Germany	7,100	2.6%	1.8%
Canada	6,400	2.3%	2.3%
United Kingdom	6,400	2.3%	2.3%
Iran	6,300	2.3%	11.0%
Russia	5,000	1.8%	25.4%
Japan	4,900	1.8%	18.8%
Guatemala	3,300	1.2%	7.8%
Italy	2,800	1.0%	5.2%
Poland	2,200	0.8%	26.7%
Colombia	1,600	0.6%	5.6%
Cuba	1,500	0.5%	4.6%
Jamaica	1,200	0.4%	7.0%
Dominican Republic	850	0.3%	11.0%
Haiti	450	0.2%	3.7%
<u>Regional places of birth for those not mapped to a specific country:</u>			
South-East Asia	11,000	4.0%	19.0%
Middle East / North Africa	10,500	3.8%	11.6%
Western Europe	10,500	3.8%	5.6%
Africa	7,300	2.7%	15.6%
Central Asia	7,300	2.7%	16.1%
South America	6,400	2.3%	6.2%
Eastern Europe	4,100	1.5%	13.3%
Central America	3,200	1.2%	5.5%
Oceania	2,200	0.8%	6.6%
Caribbean	1,200	0.4%	2.5%

Notes: Sample includes entering new firms that have a foreign-born top initial earner and employed five or more workers during their first year. Top earners and workers are required to earn at least \$200 in quarterly earnings and be aged 16-79. A small number of cases with top initial earners associated with five or more firms are excluded. The sample builds off the 1990-2014 LEHD, with the start dates for states depending upon when their records are included in the LEHD. Counts are rounded following Census Bureau disclosure requirements. Appendix Tables A1 and A2 provide further tabulations.

Table 2: OLS estimations of co-ethnic hiring in new firms

	Estimation without controls	Column 1 incorporating MSA-Industry- Year FE	Column 2 further adding Ethnicity FE	Column 3 further adding controls for top earner traits	Column 4 further adding controls for firm traits	Column 5 with firms below state median wage	Column 5 with firms above state median wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DV: Share of initial workforce from same country-of-birth as top initial earner							
(0,1) MSA-industry ethnic share <1%	Reference						
(0,1) MSA-industry ethnic share 1%-5%	0.131 (0.002)	0.122 (0.002)	0.111 (0.002)	0.110 (0.002)	0.110 (0.002)	0.100 (0.003)	0.112 (0.003)
(0,1) MSA-industry ethnic share 5%-10%	0.099 (0.002)	0.092 (0.003)	0.188 (0.003)	0.186 (0.003)	0.188 (0.003)	0.169 (0.005)	0.208 (0.005)
(0,1) MSA-industry ethnic share 10%-25%	0.145 (0.002)	0.134 (0.002)	0.247 (0.003)	0.245 (0.003)	0.246 (0.003)	0.225 (0.005)	0.266 (0.005)
(0,1) MSA-industry ethnic share >25%	0.334 (0.002)	0.266 (0.005)	0.411 (0.005)	0.410 (0.005)	0.412 (0.005)	0.399 (0.008)	0.434 (0.009)
(0,1) Ethnic native language in not English	0.049 (0.002)	0.045 (0.002)					
Ethnic group's cultural similarity to US	-0.037 (0.001)	-0.040 (0.001)					
MSA-Industry-Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Ethnic group of top initial earner FE			Yes	Yes	Yes	Yes	Yes
Controls of top initial earner traits				Yes	Yes	Yes	Yes
Controls of firm traits					Yes	Yes	Yes
Observations	275,000	275,000	275,000	275,000	275,000	137,000	137,000
R-Squared value	0.16	0.18	0.28	0.28	0.30	0.35	0.27

Notes: See Table 1. Estimations quantify the OLS relationship between co-ethnic hiring in the first year of the venture and local availability of workers from the same country-of-birth as the top initial earner. Firms with US-born top initial earners are used to calculate local workforce traits but otherwise excluded. NAICS industries are defined at the two-digit level. Share of sample by MSA-industry group: 53% of firms are in <1% cell, 25% are in 1-5% cell, 8% are in 5-10% cell, 10% are in 10-25% cell, and 4% are in >25% cell. 90% of firms are in ethnic groups where the native language is not English. Cultural similarity is defined to have unit standard deviation, with positive values representing greater similarity. Top earner traits control for age, gender, race, and education. Firm traits control for firm size and wage rate in entry year.

Table 3: OLS estimations of co-ethnic hiring in new firms controlling for past hiring behavior by same top initial earner

	Estimation without controls	Column 1 incorporating MSA-Industry- Year FE	Column 2 further adding Ethnicity FE	Column 3 further adding controls for top earner traits	Column 4 further adding controls for firm traits	Column 5 with firms below state median wage	Column 5 with firms above state median wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DV: Share of initial workforce from same country-of-birth as top initial earner							
Co-ethnic hiring share in founding year in the first venture of the top initial earner	0.718 (0.008)	0.709 (0.012)	0.694 (0.014)	0.694 (0.014)	0.684 (0.014)	0.679 (0.021)	0.672 (0.025)
(0,1) MSA-industry ethnic share <1%	Reference						
(0,1) MSA-industry ethnic share 1%-5%	0.026 (0.004)	0.023 (0.007)	0.024 (0.009)	0.024 (0.009)	0.024 (0.008)	0.021 (0.013)	0.022 (0.016)
(0,1) MSA-industry ethnic share 5%-10%	0.013 (0.006)	0.013 (0.011)	0.031 (0.016)	0.031 (0.016)	0.034 (0.016)	0.046 (0.026)	0.006 (0.029)
(0,1) MSA-industry ethnic share 10%-25%	0.035 (0.006)	0.027 (0.011)	0.046 (0.018)	0.047 (0.018)	0.049 (0.018)	0.048 (0.028)	0.039 (0.033)
(0,1) MSA-industry ethnic share >25%	0.072 (0.009)	0.015 (0.027)	0.045 (0.031)	0.046 (0.031)	0.047 (0.030)	0.029 (0.042)	0.129 (0.073)
(0,1) Ethnic native language in not English	-0.002 (0.004)	-0.008 (0.009)					
Ethnic group's cultural similarity to US	0.000 (0.002)	0.001 (0.003)					
MSA-Industry-Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Ethnic group of top initial earner FE			Yes	Yes	Yes	Yes	Yes
Controls of top initial earner traits				Yes	Yes	Yes	Yes
Controls of firm traits					Yes	Yes	Yes
Observations	10,000	10,000	10,000	10,000	10,000	5,100	5,100
R-Squared value	0.72	0.72	0.72	0.72	0.72	0.75	0.71

Notes: See Table 2. Sample includes new firms where the top initial earner is observed two or more times in that role, to a maximum of four ventures. The first venture for an individual is excluded and a control for the initial co-ethnic hiring present in that first venture is included as an explanatory variable for the initial co-ethnic hiring in the individual's current new firm.

Table 4: OLS estimations of similar language group hiring in new ventures excluding workers from country-of-birth

	Estimation without controls	Column 1 incorporating MSA-Industry- Year FE	Column 2 further adding Ethnicity FE	Column 3 further adding controls for top earner traits	Column 4 further adding controls for firm traits	Column 5 with firms below state median wage	Column 5 with firms above state median wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DV: Share of initial workforce from same language but different country-of-birth as top initial earner							
(0,1) MSA-industry ethnic share <1%	Reference						
(0,1) MSA-industry ethnic share 1%-5%	-0.031 (0.001)	-0.032 (0.001)	-0.011 (0.001)	-0.010 (0.001)	-0.010 (0.001)	-0.012 (0.002)	-0.005 (0.002)
(0,1) MSA-industry ethnic share 5%-10%	-0.056 (0.001)	-0.052 (0.002)	-0.038 (0.002)	-0.038 (0.002)	-0.038 (0.002)	-0.029 (0.003)	-0.038 (0.003)
(0,1) MSA-industry ethnic share 10%-25%	-0.031 (0.001)	-0.041 (0.002)	-0.025 (0.002)	-0.025 (0.002)	-0.025 (0.002)	-0.021 (0.003)	-0.022 (0.003)
(0,1) MSA-industry ethnic share >25%	-0.029 (0.001)	0.009 (0.005)	0.012 (0.004)	0.012 (0.004)	0.012 (0.004)	0.032 (0.006)	-0.013 (0.008)
(0,1) Ethnic native language in not English	-0.637 (0.002)	-0.618 (0.002)					
Ethnic group's cultural similarity to US	-0.005 (0.000)	-0.007 (0.001)					
MSA-Industry-Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Ethnic group of top initial earner FE			Yes	Yes	Yes	Yes	Yes
Controls of top initial earner traits				Yes	Yes	Yes	Yes
Controls of firm traits					Yes	Yes	Yes
Observations	213,000	213,000	213,000	213,000	213,000	108,000	106,000
R-Squared value	0.67	0.68	0.75	0.75	0.75	0.73	0.76

Notes: See Table 2. The dependent variable in these estimation is share of the initial workforce with the same ethnic language but different country-of-birth location to the top initial earner.

Table 5: OLS estimations of firm survival and growth with co-ethnic hiring

	Estimation without controls	Column 1 incorporating MSA-Industry- Year FE	Column 2 further adding Ethnicity FE	Column 3 further adding controls for top earner traits	Column 4 further adding controls for firm traits	Column 5 with firms below state median wage	Column 5 with firms above state median wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. DV: Survival of the firm for five years							
Co-ethnic share of firm workforce to top initial earner	0.086 (0.003)	0.036 (0.004)	0.045 (0.004)	0.047 (0.004)	0.042 (0.004)	0.003 (0.006)	0.053 (0.005)
MSA-Industry-Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Group FE			Yes	Yes	Yes	Yes	Yes
Controls of top earner traits				Yes	Yes	Yes	Yes
Controls of firm traits					Yes	Yes	Yes
Observations	275,000	275,000	275,000	275,000	275,000	137,000	137,000
R-Squared value	0.00	0.21	0.21	0.21	0.33	0.27	0.35
B. DV: Employment growth of the firm for five years, conditional on survival							
Co-ethnic share of firm workforce to top initial earner	0.019 (0.007)	0.033 (0.008)	0.064 (0.009)	0.065 (0.009)	0.014 (0.009)	-0.039 (0.016)	0.021 (0.012)
MSA-Industry-Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Ethnic group of top initial earner FE			Yes	Yes	Yes	Yes	Yes
Controls of top initial earner traits				Yes	Yes	Yes	Yes
Controls of firm traits					Yes	Yes	Yes
Observations	135,000	135,000	135,000	135,000	135,000	50,000	84,500
R-Squared value	0.00	0.04	0.04	0.04	0.08	0.11	0.06

Notes: See Table 2. The dependent variable in Panel A is an indicator variable for the survival of firms for five years from birth. The dependent variable in Panel B is the employment growth of firms for five years from birth, conditional on survival. Employment growth is measured relative to average starting and ending employment, following Davis et al. (1996).

Table 6: OLS estimations of firm survival and growth with co-ethnic hiring by local traits

	Firm survival estimations			Firm growth estimations		
	Country of birth	Genetic similarity	Linguistic similarity	Country of birth	Genetic similarity	Linguistic similarity
	(1)	(2)	(3)	(4)	(5)	(6)
A. Baseline estimation						
Hiring similarity (see column header)	0.042 (0.004)	0.010 (0.001)	0.013 (0.001)	0.014 (0.009)	0.009 (0.003)	0.006 (0.003)
Observations	275,000	275,000	275,000	135,000	135,000	135,000
R-Squared value	0.33	0.32	0.33	0.08	0.08	0.08
B. Interaction with local workforce shares						
Hiring similarity (see column header)	0.010 (0.006)	0.002 (0.002)	0.005 (0.002)	-0.059 (0.014)	-0.001 (0.004)	-0.008 (0.004)
(0,1) MSA-industry ethnic share 1%-5%	-0.009 (0.003)	0.003 (0.003)	0.002 (0.003)	0.000 (0.009)	0.023 (0.007)	0.025 (0.007)
(0,1) MSA-industry ethnic share 5%-10%	-0.010 (0.007)	0.016 (0.006)	0.008 (0.005)	0.000 (0.017)	0.053 (0.014)	0.042 (0.014)
(0,1) MSA-industry ethnic share 10%-25%	-0.013 (0.007)	0.024 (0.006)	0.010 (0.006)	0.009 (0.018)	0.039 (0.016)	0.036 (0.015)
(0,1) MSA-industry ethnic share >25%	0.016 (0.013)	0.027 (0.010)	0.027 (0.011)	0.019 (0.036)	0.059 (0.026)	0.044 (0.029)
<u>Hiring similarity x</u>						
(0,1) MSA-industry ethnic share 1%-5%	0.040 (0.008)	0.007 (0.002)	0.010 (0.002)	0.099 (0.019)	0.005 (0.006)	0.017 (0.006)
(0,1) MSA-industry ethnic share 5%-10%	0.067 (0.013)	0.018 (0.004)	0.018 (0.004)	0.156 (0.032)	0.028 (0.010)	0.029 (0.010)
(0,1) MSA-industry ethnic share 10%-25%	0.088 (0.013)	0.027 (0.004)	0.023 (0.004)	0.102 (0.032)	0.017 (0.011)	0.023 (0.010)
(0,1) MSA-industry ethnic share >25%	0.030 (0.021)	0.009 (0.007)	0.003 (0.007)	0.131 (0.053)	0.039 (0.018)	0.041 (0.017)
Observations	275,000	275,000	275,000	135,000	135,000	135,000
R-Squared value	0.33	0.33	0.33	0.08	0.08	0.08

Notes: See Column 5 of Table 5. Estimations in Panel A consider alternative definitions of closeness to same country-of-birth by using genetic and linguistic similarity across groups. Estimations in Panel B interact these variables with local ethnic share in the MSA-industry workforce. Estimations include MSA-Industry-Year fixed effects, ethnicity fixed effects, and controls for traits of top initial earners and firms.

Appendix Table A1: Extended descriptive statistics by ethnic group

Country of birth of top initial earner in new firm	Number of firms at entry and surviving to indicated age			Composition of age 1 entering firms	Survival rate from entry		Share of employees with same country of birth as initial top earner in firm at indicated age		
	Age 1	Age 5	Age 10		Age 5	Age 10	Age 1	Age 5	Age 10
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<u>Country-specific places of birth:</u>									
Mexico	67,500	32,500	15,000	24.6%	48.1%	22.2%	31.4%	32.3%	32.4%
India	17,500	10,000	4,300	6.4%	57.1%	24.6%	21.0%	26.6%	26.9%
South Korea	17,000	8,100	3,200	6.2%	47.6%	18.8%	27.8%	30.2%	31.8%
Vietnam	16,000	7,200	3,000	5.8%	45.0%	18.8%	45.0%	43.3%	41.1%
China	15,500	6,800	2,500	5.6%	43.9%	16.1%	43.1%	45.0%	41.2%
Philippines	12,000	5,900	2,600	4.4%	49.2%	21.7%	27.7%	28.5%	28.0%
Taiwan	8,100	4,500	2,300	2.9%	55.6%	28.4%	19.5%	20.2%	21.0%
El Salvador	7,500	3,400	1,500	2.7%	45.3%	20.0%	16.3%	16.4%	15.4%
Germany	7,100	3,400	1,600	2.6%	47.9%	22.5%	1.8%	2.1%	2.0%
Canada	6,400	3,200	1,500	2.3%	50.0%	23.4%	2.3%	2.2%	2.2%
United Kingdom	6,400	3,200	1,500	2.3%	50.0%	23.4%	2.3%	2.3%	2.3%
Iran	6,300	3,500	1,700	2.3%	55.6%	27.0%	11.0%	12.7%	13.3%
Russia	5,000	2,300	1,000	1.8%	46.0%	20.0%	25.4%	25.0%	25.9%
Japan	4,900	2,600	1,300	1.8%	53.1%	26.5%	18.8%	21.5%	23.0%
Guatemala	3,300	1,500	700	1.2%	45.5%	21.2%	7.8%	7.2%	6.9%
Italy	2,800	1,500	800	1.0%	53.6%	28.6%	5.2%	6.2%	6.3%
Poland	2,200	1,200	550	0.8%	54.5%	25.0%	26.7%	28.0%	29.3%
Colombia	1,600	750	300	0.6%	46.9%	18.8%	5.6%	6.6%	7.1%
Cuba	1,500	700	300	0.5%	46.7%	20.0%	4.6%	4.0%	4.9%
Jamaica	1,200	500	200	0.4%	41.7%	16.7%	7.0%	7.7%	7.0%
Dominican Republic	850	300	100	0.3%	35.3%	11.8%	11.0%	12.8%	11.0%
Haiti	450	200	60	0.2%	44.4%	13.3%	3.7%	3.2%	1.5%
<u>Regional places of birth for those not mapped to a specific country:</u>									
South-East Asia	11,000	5,400	2,400	4.0%	49.1%	21.8%	19.0%	19.2%	18.2%
Middle East / North Africa	10,500	5,200	2,300	3.8%	49.5%	21.9%	11.6%	14.1%	13.9%
Western Europe	10,500	5,600	2,900	3.8%	53.3%	27.6%	5.6%	6.1%	5.5%
Africa	7,300	3,600	1,400	2.7%	49.3%	19.2%	15.6%	14.3%	9.2%
Central Asia	7,300	3,600	1,500	2.7%	49.3%	20.5%	16.1%	20.4%	21.5%
South America	6,400	3,000	1,300	2.3%	46.9%	20.3%	6.2%	6.9%	7.1%
Eastern Europe	4,100	1,900	850	1.5%	46.3%	20.7%	13.3%	12.7%	11.3%
Central America	3,200	1,400	550	1.2%	43.8%	17.2%	5.5%	4.8%	5.7%
Oceania	2,200	1,000	400	0.8%	45.5%	18.2%	6.6%	5.2%	4.6%
Caribbean	1,200	550	200	0.4%	45.8%	16.7%	2.5%	2.3%	1.5%

Notes: See Table 1.

Appendix Table A2a: Extended descriptive statistics by industry

Industry	Number of firms at entry	Composition of entering firms	Co-ethnic share at entry	Other immigrant share at entry	Share hiring other immigrants more than MSA-Industry share	Average earning percentile within firm of co-ethnics	Survival rate to Age 5	Co-ethnic share in Age 5
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Agriculture, Forestry, Fishing and Hunting; Mining; Utilities (11,21,22)	9,700	3.5%	47.3%	16.5%	45.4%	53.0%	57.7%	46.2%
Construction (23)	24,000	8.7%	24.1%	18.5%	52.1%	56.7%	45.8%	24.5%
Manufacturing (31-33)	21,000	7.6%	27.9%	34.9%	47.1%	55.4%	46.2%	25.8%
Wholesale Trade (42)	12,000	4.4%	26.0%	30.3%	53.3%	58.9%	51.7%	26.8%
Retail Trade (44-45)	31,500	11.5%	20.1%	22.9%	55.6%	59.5%	50.8%	24.2%
Transportation and Warehousing (48-49)	6,400	2.3%	26.9%	21.2%	48.4%	56.6%	45.3%	26.7%
Information; Finance and Insurance; Real Estate (51,52,53)	12,500	4.5%	15.9%	21.8%	50.4%	56.9%	43.2%	16.9%
Professional, Scientific, and Technical Services; Mgmt. of Companies (54,55)	16,500	6.0%	17.8%	22.6%	47.3%	57.6%	46.7%	18.3%
Administrative and Support and Waste Mgmt. and Remediation (56)	16,500	6.0%	21.3%	22.5%	50.9%	55.2%	46.1%	21.6%
Education Services; Health Care and Social Assistance (61,62)	25,000	9.1%	18.2%	20.6%	44.0%	56.5%	58.0%	17.5%
Arts, Entertain., and Recreation; Other Services; Public Admin. (71,81,92)	22,500	8.2%	25.3%	22.1%	44.4%	58.0%	46.7%	25.0%
Accommodation and Food Services (72)	77,500	28.2%	20.3%	22.0%	47.7%	59.8%	48.4%	21.7%

Notes: See Table 1.

Appendix Table A2b: Extended descriptive statistics by industry, continued

Industry	Share of firms by co-ethnicity share at entry				
	0%	(0, 0.25)	[0.25, 0.50)	[0.50, 0.75)	[0.75, 1.00]
(1)	(2)	(3)	(4)	(5)	(6)
Agriculture, Forestry, Fishing and Hunting; Mining; Utilities (11,21,22)	12.4%	11.3%	22.7%	33.0%	19.6%
Construction (23)	35.8%	23.3%	20.4%	13.3%	6.7%
Manufacturing (31-33)	28.6%	28.1%	19.1%	13.8%	11.0%
Wholesale Trade (42)	33.3%	25.8%	18.3%	13.3%	9.2%
Retail Trade (44-45)	41.3%	28.9%	15.6%	9.5%	6.0%
Transportation and Warehousing (48-49)	34.4%	23.4%	17.2%	14.8%	10.2%
Information; Finance and Insurance; Real Estate (51,52,53)	50.4%	24.8%	12.0%	6.4%	5.2%
Professional, Scientific, and Technical Services; Mgmt. of Companies (54,55)	50.3%	23.0%	10.9%	7.9%	7.3%
Administrative and Support and Waste Mgmt. and Remediation (56)	39.4%	27.3%	16.4%	11.5%	6.7%
Education Services; Health Care and Social Assistance (61,62)	48.0%	24.8%	11.6%	8.8%	6.4%
Arts, Entertain., and Recreation; Other Services; Public Admin. (71,81,92)	41.3%	22.7%	12.0%	9.8%	13.3%
Accommodation and Food Services (72)	36.1%	34.2%	14.2%	8.9%	7.0%

Notes: See Table 1. Shares are calculated using rounded firm counts.

Appendix Table A3: OLS estimations of co-ethnic hiring with ethnic-specific coefficients

Country of birth of top initial earner in firm	Estimation with year fixed effects and no controls	Column 1 incorporating MSA-Industry-Year FE	Column 2 further adding ethnic share in MSA-NAICS-Yr	Column 3 further adding controls for top earner traits	Column 4 further adding controls for firm traits	Column 5 with firms below state median wage	Column 5 with firms above state median wage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Country-specific places of birth:</u>							
Mexico	0.292 (0.001)	0.252 (0.002)	0.125 (0.002)	0.100 (0.003)	0.096 (0.003)	0.091 (0.005)	0.085 (0.005)
India	0.188 (0.002)	0.192 (0.003)	0.182 (0.003)	0.145 (0.004)	0.140 (0.004)	0.131 (0.005)	0.148 (0.005)
South Korea	0.255 (0.003)	0.254 (0.003)	0.257 (0.003)	0.220 (0.004)	0.214 (0.004)	0.178 (0.006)	0.249 (0.006)
Vietnam	0.427 (0.003)	0.410 (0.003)	0.403 (0.003)	0.360 (0.004)	0.354 (0.004)	0.416 (0.006)	0.246 (0.006)
China	0.408 (0.003)	0.415 (0.003)	0.404 (0.003)	0.365 (0.004)	0.354 (0.004)	0.406 (0.006)	0.269 (0.006)
Philippines	0.254 (0.003)	0.246 (0.003)	0.212 (0.003)	0.176 (0.004)	0.177 (0.004)	0.161 (0.006)	0.181 (0.006)
Taiwan	0.173 (0.003)	0.162 (0.003)	0.165 (0.003)	0.128 (0.004)	0.121 (0.004)	0.106 (0.006)	0.126 (0.006)
El Salvador	0.140 (0.003)	0.124 (0.003)	0.114 (0.003)	0.089 (0.004)	0.083 (0.004)	0.077 (0.006)	0.082 (0.006)
Germany	-0.004 (0.001)	0.001 (0.002)	-0.003 (0.002)	-0.005 (0.002)	-0.005 (0.002)	0.006 (0.004)	-0.014 (0.003)
Canada	Reference						
United Kingdom	0.000 (0.001)	0.000 (0.002)	0.000 (0.002)	-0.001 (0.002)	-0.002 (0.002)	0.000 (0.004)	-0.004 (0.003)
Iran	0.088 (0.003)	0.079 (0.003)	0.085 (0.003)	0.086 (0.003)	0.084 (0.003)	0.081 (0.005)	0.086 (0.004)
Russia	0.231 (0.004)	0.222 (0.005)	0.223 (0.005)	0.226 (0.005)	0.220 (0.005)	0.179 (0.008)	0.239 (0.006)
Japan	0.166 (0.004)	0.173 (0.005)	0.178 (0.005)	0.149 (0.005)	0.146 (0.005)	0.136 (0.007)	0.149 (0.007)
Guatemala	0.055 (0.003)	0.036 (0.003)	0.047 (0.003)	0.021 (0.004)	0.017 (0.004)	0.023 (0.006)	0.000 (0.006)
Italy	0.029 (0.002)	0.022 (0.003)	0.025 (0.003)	0.023 (0.003)	0.024 (0.003)	0.030 (0.005)	0.010 (0.005)
Poland	0.244 (0.007)	0.226 (0.008)	0.211 (0.008)	0.211 (0.008)	0.206 (0.008)	0.194 (0.012)	0.214 (0.010)
Colombia	0.033 (0.003)	0.036 (0.004)	0.039 (0.004)	0.023 (0.005)	0.021 (0.005)	0.023 (0.008)	0.017 (0.007)
Cuba	0.023 (0.003)	0.021 (0.004)	0.028 (0.004)	0.008 (0.005)	0.007 (0.005)	0.024 (0.009)	-0.009 (0.007)
Jamaica	0.047 (0.004)	0.053 (0.006)	0.052 (0.006)	0.009 (0.006)	0.007 (0.006)	0.027 (0.009)	-0.010 (0.009)
Dominican Republic	0.087 (0.007)	0.073 (0.008)	0.076 (0.008)	0.052 (0.008)	0.051 (0.008)	0.046 (0.010)	0.042 (0.013)
Haiti	0.015 (0.005)	0.016 (0.007)	0.023 (0.006)	-0.019 (0.007)	-0.017 (0.007)	-0.017 (0.009)	-0.016 (0.012)
<u>Regional places of birth for those not mapped to a specific country:</u>							
South-East Asia	0.167 (0.003)	0.169 (0.003)	0.168 (0.003)	0.128 (0.004)	0.123 (0.004)	0.160 (0.006)	0.075 (0.006)
Middle East / North Africa	0.093 (0.002)	0.088 (0.003)	0.089 (0.003)	0.089 (0.003)	0.086 (0.003)	0.094 (0.004)	0.074 (0.004)
Western Europe	0.033 (0.002)	0.024 (0.002)	0.025 (0.002)	0.021 (0.002)	0.022 (0.002)	0.027 (0.004)	0.018 (0.003)
Africa	0.134 (0.003)	0.137 (0.003)	0.126 (0.003)	0.093 (0.004)	0.093 (0.004)	0.097 (0.006)	0.080 (0.005)
Central Asia	0.139 (0.003)	0.146 (0.003)	0.143 (0.003)	0.109 (0.004)	0.105 (0.004)	0.118 (0.006)	0.091 (0.006)
South America	0.039 (0.002)	0.036 (0.003)	0.039 (0.003)	0.022 (0.003)	0.020 (0.003)	0.027 (0.005)	0.010 (0.005)
Eastern Europe	0.110 (0.004)	0.104 (0.004)	0.103 (0.004)	0.102 (0.004)	0.096 (0.004)	0.090 (0.006)	0.095 (0.006)
Central America	0.032 (0.002)	0.026 (0.003)	0.032 (0.003)	0.010 (0.004)	0.008 (0.004)	0.012 (0.006)	-0.005 (0.006)
Oceania	0.043 (0.004)	0.041 (0.004)	0.046 (0.004)	0.040 (0.004)	0.039 (0.004)	0.043 (0.007)	0.034 (0.006)
Caribbean	0.002 (0.003)	0.003 (0.004)	0.006 (0.004)	-0.030 (0.004)	-0.031 (0.005)	-0.026 (0.007)	-0.037 (0.007)
Ethnic share MSA-Industry-Year			1.221 (0.015)	1.216 (0.015)	1.228 (0.014)	1.175 (0.020)	1.321 (0.023)
MSA-Industry-Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Controls of top initial earner traits				Yes	Yes	Yes	Yes
Controls of firm traits					Yes	Yes	Yes
Observations	275,000	275,000	275,000	275,000	275,000	137,000	137,000
R-Squared value	0.20	0.25	0.28	0.28	0.29	0.35	0.26

Notes: See Table 2.

Appendix Table A4: Share of immigrant-owned firms serving customers in the native language of the owner's country of origin

	Businesses in industries interacting with final consumers	Businesses outside of industries interacting with final consumers
	(1)	(2)
Hispanic immigrant groups	0.764	0.666
Non-Hispanic immigrant groups		
High co-ethnic hiring in group	0.473	0.590
Low-to-medium co-ethnic hiring in group	0.234	0.410

Notes: Data collected from the 2014 Annual Survey of Entrepreneurs. Entries are the share of business owners who report interacting with customers in a native language of the first-listed owner's country of origin. Hispanic owners are treated separately due to the pervasive use of the Spanish language; immigrant owners from countries with English as the native language are excluded. Hispanic immigrant groups are identified through the owner's ethnic declaration to be of Hispanic origin. Immigrant owners placed into non-Hispanic high co-ethnic hiring groups include those specifying their race to be Chinese or Vietnamese. Immigrant owners placed into non-Hispanic low-to-medium co-ethnic hiring groups include Asian Indian, Filipino, Japanese, and Korean (terms as described in ASE). Immigrants from some smaller racial groups (e.g., Pacific Islander) are excluded due to the lack of a potential corresponding ethnic language in the language spoken with customers section of the ASE form. Industries interacting with final consumers include NAICS 44-45, 48, 52-56, 61-62, 71-72, and 81.