# DOES EMPLOYING SKILLED IMMIGRANTS ENHANCE COMPETITIVE PERFORMANCE? EVIDENCE FROM EUROPEAN FOOTBALL CLUBS

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Does Employing Skilled Immigrants Enhance Competitive Performance? Evidence from European Football Clubs

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## ABSTRACT

We investigate the effect of employing skilled immigrants on the competitive performance of organizations by studying European football (soccer) clubs in Germany, Italy, France, England, and Spain from 1990-2020. Detailed microdata from this setting offers unusual transparency on the migration and hiring of talent and their contribution to collective performance. Further, country-level rules govern how immigrant players are defined and the number of immigrant players that clubs can deploy. Using changes to these rules as the basis for instrumental variables, we find that the number of immigrant players in the club's starting lineup has a positive local average treatment effect on the club's performance. We find evidence that immigrant players enhance club performance because they exhibit higher individual talent than natives and because they enable their clubs to deploy a wider variety of on-field strategies and actions. The latter mechanism is novel to the literature.

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## 1. Introduction

This paper examines whether and why organizations that employ more skilled immigrants outperform their rivals. Immigration is a topic of vital interest to managers around the world, and yet classic studies of immigration typically abstract away from organizations, focusing instead on macroeconomic issues including how immigrants shape labor markets, productivity, growth, and innovation at the national or subnational level (see Peri (2016) for a recent review). Kerr, Kerr, and Lincoln noted that "there is very little tradition for considering firms in analyses of immigration" (2015, p. S148). Since then, a small but rapidly growing literature has shown that immigrants have meaningful effects on critical organizational phenomena such as employment structure (Kerr et al. 2015), investment choices (Burchardi et al. 2019, Glennon 2022, Hernandez 2014), and innovation (Beerli et al. 2021, Choudhury and Kim 2019, Foley and Kerr 2013).

Despite these advances, we have little systematic evidence of whether and why hiring skilled immigrants improves an organization's competitive performance. For example, Beerli et al. (2021, p. 977) recently stated that "our knowledge on how immigration policies affect firms' success … is limited." Shedding light on this fundamental question is urgent. Organizations in many parts of the world find that the cost and effort required to employ skilled immigrants is increasing, in part because of heightened debate in social and political circles regarding the economic merits of immigration. For example, managers find themselves navigating increasingly complex and unpredictable immigration regulations and engaging with political figures in increasingly fraught debates about immigration (e.g. Wiener-Bronner 2018). Managers need to understand the competitive payoffs of these costs. We seek to make progress on this issue by examining whether and why skilled immigrant employees improve the competitive performance of their organizations.

While it seems that some managers believe that skilled immigrant employees increase the performance of their organizations (otherwise they would not advocate for the liberalization of immigration rules), it is theoretically unclear whether organizations that employ skilled immigrants will—

on average—outperform their rivals. On the one hand, immigrants might help firms outperform rivals if immigrants are more talented than natives or if they bring unique skills to the organization that complement those of natives, as some literature suggests (Choudhury and Kim 2019, Mithas and Lucas 2010, Wang 2015). On the other hand, skilled immigrants might have a null—or even negative—impact on performance. Skilled immigrants may not differ much from natives, so employing them might not change firm performance very much (Doran et al. 2022), or immigrants and natives might have difficulty cooperating with each other, which could reduce competitive performance (e.g. Page 2010). Given the absence of clear theoretical guidance, we adopt an abductive, data-driven approach. We inform our inquiry with broad insights from related work and then rely on a series of empirical tests to help us spell out mechanisms that might explain any positive or negative relationship between hiring immigrants and organizational performance.

Adding to the theoretical challenges is an empirical one: organizations do not employ skilled immigrants randomly, so any empirical relationship between immigrant employees and organizational performance might be driven by unobservable differences between organizations. We make progress on this problem by choosing an empirical context well-suited to causal inference, namely, football (soccer) clubs in England, Italy, Spain, France, and Germany that played each other in pan-European competitions from 1990 to 2020. The setting has several desirable features. First, this economically significant industry bears many similarities with other industries that feature skilled human capital-intensive production and head-to-head competition, such as litigation and research and development. Second, the granularity of the data allows us to explore underlying mechanisms in ways that are impossible with other data sources. These data make it possible to accurately measure features that are traditionally very difficult to measure, such as firm competitiveness (match outcomes) and employee ability (e.g. goals, pass success). Third, these football clubs employ players from around the world (see Figure 1). Fourth, many sources of firm heterogeneity—which can often create challenges with measuring causality—are implicitly controlled for; for instance, rosters are the same size and all clubs play by the same rules. Finally, and most importantly, each league has different rules regarding immigrant player employment, and these rules change over time.

When clubs from these countries meet in inter-league competition, these differences in immigrant player rules across countries and over time create exogenous variation in the ability of these clubs to employ immigrant players, because teams from different countries experience changes in externally imposed rules affecting their ability to hire immigrant players at different times.

Using changes to these rules as the basis for an instrumental variables approach rooted in the gravity models used in the international trade and migration literatures (Tinbergen 1962), we find that the ability to have more immigrant players has a positive local average treatment effect on the competitive performance of the club. Each additional immigrant player improves a club's margin of victory (i.e. the goal difference) by about 0.17, a meaningful but plausible local average treatment effect that is about 30% of the sample mean.

Guided by existing theory, we then consider two mechanisms, one individual and one organizational, that could explain this relationship. At the individual level, the immigrant players that make it to top European leagues might possess more ability than natives, given the frictions involved in moving across borders (Borjas 1987). We find evidence consistent with this mechanism by documenting that immigrants outperform natives across a series of individual measures of performance such as pass accuracy, propensity to be in the starting lineup, and goals, even when accounting for club X season X position fixed effects.

But individual talent must be deployed by the organization, which leads us to explore a second and novel organizational mechanism: immigrants might increase the variety of strategic actions available to their organizations. When organizations have a wider variety of competitive actions at their disposal, they have more options for out-maneuvering their rivals, which may lead to higher competitive performance (Dooley et al. 1996, Larrañeta et al. 2014). Immigrants might enhance the variety of strategic actions available to their organizations. Prior literature suggests that immigrants, owing to their unusual backgrounds, bring novel ideas and routines to their organizations (Balachandran and Hernandez 2021, Choudhury and Kim 2019, Wang 2015), and these novel ideas and routines should expand the set of possible actions that the organization can take when confronting competitors. But having more options

available isn't enough if the organization is incapable of deploying them. Immigrants may also enhance the organizations' ability to use the greater variety of possible actions. By virtue of their diverse, multicultural experiences, immigrants are capable of playing a coordinating role: recognizing, coordinating, and bringing together the viewpoints and ideas of their coworkers (Benet-Martínez et al. 2006, Maddux et al. 2014, Szymanski and Ipek 2020, Tadmor and Tetlock 2006).

We find evidence consistent with immigrants increasing their organization's strategic variety by drawing on three different measures of strategic variety. Our instrumental variable has a positive effect on these measures of variety and, further, these measures are positively associated with club performance. Moreover, in reduced form regressions that rely on granular player-to-player passing data, we find that immigrant players are more likely to play the role of coordinator (e.g. Fernandez and Gould 1994), such that they are more likely than native players to be involved in complex passing networks and to be the middle player in triangular passing sequences.

Our study makes important contributions to the literatures on immigration, employee mobility, and competition between organizations. First, we assemble detailed, multinational data—including hand-collected national-level rule changes—that allow us to measure a local average treatment effect of immigrant employees on organizational performance. These data allow us to provide one of the first tests of the causal relationship between skilled immigrant employees and organizational performance (see also Doran et al. (2022), who use data from the H1-B visa lottery, and Beerli et al (2021), who study a Swiss reform). Second, we document two important channels by which immigrants improve organization performance: increased talent and increased strategic variety. The variety channel is conceptually novel, as we are unaware of prior work that links immigrant employees to organization-level performance through this mechanism. It is also important, because it suggests that organizations might benefit most from foreign-born employees when the organization needs to be more flexible, perhaps because the organization is in a dynamic, uncertain environment.

More work is needed to confirm our abductive conclusions and place appropriate boundary conditions on them, particularly given the specialized nature of the empirical setting.[1] We see this paper as a first step towards a more complete understanding of the link between hiring immigrant employees and organizational performance.

## 2. Background

Virtually all research linking migration to economic effects, whether at the macro or firm level, implicitly or explicitly assumes that an organization benefits by hiring immigrant workers. Much of the work assumes that firms hire immigrants because they bring above average abilities or skills (e.g. Borjas 1986). Other work argues that immigrants have experiences and network connections that differ from natives, thus helping link the firm to new sources of ideas, demand, or other resources (Hernandez and Kulchina 2020, Wang 2015). Some studies also argue that valuable complementarities arise from the interactions of immigrant and native workers, helping the firm be more innovative (Choudhury and Kim 2019, Doran and Yoon 2020, Moser et al. 2014, Moser and San 2020).

However, there are also reasons to believe that hiring immigrants might have a null, or even negative, causal effect on performance. Doran, Gelber, and Isen (2022) examine how adding an additional H1-B worker by winning a visa lottery among last-minute applicants impacts the innovation, employment, and profits of firms. They report consistently null effects and conclude that endogenous matching between immigrants and high-quality firms drives some of the positive outcomes discussed in previous studies. The group diversity literature, while not explicitly focused on immigrants, suggests that they might *hurt* organizational performance. While diversity can create novelty and creativity, it can also spur dissent and lack of cooperation in groups (e.g. Page 2010). If immigrants and natives cannot successfully cooperate, hiring immigrants might hurt organizational performance.

[1] We join scholars who have used football data to address a variety of important organizational research questions that are difficult to address with other data, such as the effect of taxation on labor mobility (Kleven et al. 2013), the effects of career prospects on employee motivation (Miklós-Thal and Ullrich 2016), and the degree to which cognitive biases affect managers' assessment of individual performance (Gauriot and Page 2019). While other scholars have used football data to study the relationship between national origin diversity and club performance (Ben-Ner et al. 2017, Tovar 2020), we add to this work theoretically by considering how immigrant players affect performance via strategic diversity, and we add to this work empirically by hand-collecting the rule change data and using those data to employ a 2SLS research design.

The little empirical evidence addressing the immigration-performance link directly does not resolve the theoretical ambiguity underlying the relationship between immigration and organizational performance. Beerli, Ruffner, Siegenthaler and Peri (2021) document that firms benefited from a Swiss reform that made it easier to hire migrants. And Mitaritonna, Orefice and Peri (2017) find that French firms grow more quickly when their neighborhood contains more immigrants. But these authors are unable to identify clear mechanisms through which immigrants improve firm performance. Consequently, there is much we still need to understand about the relationship between hiring immigrants and strategic performance.

Given the little theoretical precedent to help us develop deductive hypotheses to guide our inquiry, we adopt an abductive, data-driven approach. We begin by focusing on the main relationship between hiring immigrant workers and organizational performance, with the aim of establishing a causal relationship, whether positive or negative. We then draw on previous studies to explore potential mechanisms by which immigrant workers might improve or degrade organizational performance.

## 3. Data and Research Design

### 3.1 Institutional Context and Research Design

An ideal experiment to test the relationship between employing immigrants and competitive performance would randomly assign some organizations to employ immigrants, and then compare those organizations' outcomes to a control group. Further, if we subsequently wanted to understand the mechanisms underlying those outcome differences, we would need to directly measure the quality of the individual immigrants hired, the composition of all individuals involved in doing the organization's work, and the attributes of different organizations that may create variance in how hiring immigrants affects performance.

While the ideal experiment is impossible, we have identified a setting which offers many desirable features: professional football (soccer) in Europe. Football is an economically important

industry[2] in which talent is the most critical input for success. Because of its wide appeal, football attracts talent from virtually every country and draws from a broader and more flexible global labor pool than many other industries.[3] While every country has a professional league, there is wide agreement that five European leagues compete in a global labor market for the world's best players: the English Premier League, the Spanish Liga, the Italian Serie A, the German Bundesliga, and the French Ligue 1. Figure 1 shows that immigrant players from 134 unique countries have played in these five leagues over the past thirty years. Our study focuses on clubs from these prestigious domestic leagues who compete against each other in two cross-European tournaments (Champions League and Europa League).

*** INSERT FIGURE 1 HERE ***

In addition to its human capital-intensive and global nature, European football has an additional feature that plays to our advantage: the governing bodies (i.e. football associations) of each of the five country leagues have made significant—and different—changes over time to the rules regarding (1) how many foreign players clubs can sign and field, and (2) the countries from which players are considered foreign. For example, the Spanish Football Association (FA) allowed a maximum of three foreign players in 1990, then increased the limit to four between 1991-1995, then to six during 1996-1999, then down to five in 2000, down to four between 2001-2003, down to three in 2004, after which it jumped to five in 2005 and has remained at that number since. But who is considered "foreign" (i.e. who counts towards the cap on foreign players) also changed over time. Until 1996, any player born outside of Spain was counted towards the foreign player cap. Then the famous 1996 "Bosman rule" (see Appendix I) made anyone with a passport from the European Union equivalent to a domestic (non-foreign) player. And since 2004, other enlargements to the pool of countries considered non-foreign were made (e.g. Russia added in 2005, Cotonou Agreement countries added in 2008, changes to EU membership in various years). Every league made similar changes over time, but with different caps and definitions of who is considered "foreign" at

[2] Deloitte, a consulting firm, estimates a market size for the European football leagues of more than 30 billion dollars (Deloitte 2019). In 2020, the top 20 football clubs generated a combined revenue of 10 billion dollars (Deloitte 2020).
[3] Appendix I contains details on how the football labor market works, including the process of hiring and transferring immigrant players, along with some important differences relative to American sports.

different points in time. These changes are documented in Table 1a and 1b, and a detailed description of the data collection process for documenting them is in Appendix II. Crucial for our identification strategy, the politically contested process leading to these rule changes was unique in each country and plausibly unrelated to factors that explain clubs' performance outcomes. We document the rule changing process in Appendix III and provide evidence that the changes do not respond to changes in the performance of clubs in Section 4.1.5.

Our empirical strategy takes advantage of another critical feature of European football: clubs play in both domestic and international tournaments. Because all clubs from the same country are subject to the same caps and exceptions regarding "foreign" players, there is no variance in our instrument for domestic tournament matches. However, international tournaments such as the Champions League and the lower-tier Europa League, governed by the Union of European Football Associations (UEFA), pit the best 6-8 clubs from each country against each other. Because clubs from *different* countries are subject to *different* rules regarding immigrant players at any given point in time, we can use the international games as a setting to deploy our instrumental variable strategy. We use the variation caused by these changes between *countries* and over *time* as inputs to instrumental variables that allow us to identify the effect of hiring more immigrants on organizational performance.

*** INSERT TABLE 1a, TABLE 1b HERE ***

Of course, the uniqueness of the setting raises questions about the generalizability of results. We are aware of this issue and will note in the discussion how some of our findings may be peculiar to football (or sports) and not apply to a typical business organization.

**3.2 Football Data and Key Variables**

We collected longitudinal data for every match, player, and club from the five aforementioned leagues who played in the two major European international competitions (i.e. Champions League and Europa League) from the 1990/91 to the 2019/20 season from two primary data sources: Transfermarkt and WhoScored.

Transfermarkt is a leading website that covers football matches from all over the world and contains detailed individual web pages for each match, club, and player; its data have been widely used in previous research (e.g. Gauriot and Page 2019, Scelles et al. 2016). For each of the 61,027 matches (domestic and international) played by the clubs in our sample, we obtained all major events that occurred during the match (e.g. goals) and the list of players involved in the match (starting lineup and substitutions).[4] For each of the 28,199 players present in the club rosters, we gathered country of birth and details of their professional career. We classify a player born in any country other than the country in which he plays as an immigrant, regardless of their citizenship or league rules at that time.[5] Our explanatory variable of interest, *number of immigrant players,* counts the number of immigrant players in the club's starting lineup for the match.

Our primary measure of organizational performance is the *goal difference* at the end of each match, measured as the difference between the number of goals scored by the focal club and the number of goals scored by the opponent. This is a common performance indicator used in empirical research in this context (Hall et al. 2002, Karlis and Ntzoufras 2009). We also use a secondary measure in our models: the indicator *win*, coded as 1 if the focal club won the game and 0 otherwise.

WhoScored is a leading website offering granular play-by-play data—such as every ball touch, pass, and position for every player during a match—for each club, player, and match. These data are only available starting in the 2009/10 season, so we only have such fine-grained detail for about a third of the matches in our sample. We use these play-by-play data for testing mechanisms, which we describe later.

Tables 1c and 1d provide descriptive statistics for the main variables of interest (Appendix IV shows descriptive statistics at the player-match level).

*** INSERT TABLE 1c AND TABLE 1d HERE ***

**4. Results**

[4] Of these 61,027 domestic and international matches, 6,078 are international matches where we can deploy our instrumental variable strategy.

[5] We use the term immigrant even though foreign-born soccer players are not conventionally referred to as immigrants in the industry. We use the word "immigrant" rather than "foreign" to be consistent with terminology in the literature.

### 4.1 Does Hiring More Immigrants Have an Effect on Organizational Performance?

**4.1.1 Reduced form results.** We begin with a naïve OLS model that estimates the correlation between immigrant employees and organizational competitive performance:

$$Y_{gj} = \alpha_{sl} + \beta_1 immigrant_{gj} + \epsilon_{gj} \qquad (1)$$

Here, $Y_{gj}$ is the outcome of game *g* played by club *j* (goal difference or win) and $immigrant_{gj}$ is the number of immigrant players in the starting line-up in game *g* played by club *j*. The model includes season *(s)* by league (*l*) fixed effects in some variants,[6] and club (*j*) fixed effects in other variants. The results appear in Table 2, where columns 2 and 4 are estimated with club fixed effects and where the outcome variable is goal difference in columns 1-2 and the propensity to win in columns 3-4. All specifications show the same result: hiring more immigrant players is strongly positively associated with a better goal differential and a higher probability of winning. Specifically, each additional immigrant player is associated with a 0.03-0.06 increase in the goal differential and a 0.7-2% increase in the win probability. These are meaningful relationships in a sport in which the modal outcome is a tie (zero goal differential) and in which the typical win involves a one goal difference.

*** INSERT TABLE 2 HERE ***

**4.1.2 Instrumental variable strategy.** However, these results might be driven by omitted variables, such as culture or capabilities or resources, which affect both the choice to employ immigrants and club performance. To address these concerns, we use a two stage least squares (2SLS) strategy that exploits the previously described country-level changes in the rules governing (1) the number of foreign-born players allowed on a club and (2) the countries from which the players are considered as foreign.

We construct our instrument using a gravity model in four steps. First, we construct a yearly panel dataset composed of all pairwise combinations of the five destination countries (Spain, Italy, France, England, Germany) and 193 origin countries from which immigrant players can originate (30 years between 1990 and 2020). Second, we estimate a standard gravity model used in the international

[6] *Season x League* FE includes Europa and Champions League.

trade and migration literatures (e.g. Bahar and Rapoport 2018, Bertoli and Fernández-Huertas Moraga 2013, Feyrer 2019, Ortega and Peri 2013), which includes variables capturing the country-specific rule changes described above in addition to the standard country-dyad and year fixed effects. Third, we use the gravity regression to create time-series predictions of the number of immigrant players from each source country playing yearly in each destination country. Finally, we sum these predictions by destination country and year to generate the instrumental variable, which is the predicted number of total immigrant players (regardless of origin country) in each league per year

Before explaining each step in more detail, we briefly introduce the gravity model.[7] The earliest, traditional gravity equation, which was first pioneered by Tinbergen (1962), simply stated that trade or migration flows between two countries is proportional to their size or GDP and inversely proportional to their distance.[8] Later empirical work substituted country-dyad fixed effects for time-invariant dyadic variables (e.g. distance, common borders, language similarities) that were traditionally used in conventional gravity equations (e.g. Baier and Bergstrand 2007, Egger and Pfaffermayr 2003). In a longitudinal framework, time-varying policy changes can be added to the gravity model to determine the effect of such policies on bilateral flows (e.g. Bertoli and Fernández-Huertas Moraga 2015, Ortega and Peri 2013).

We use a gravity model specification rather than simply using the policy changes as instruments directly for two reasons. First, policies that determine whether players from certain source countries are considered "foreign" vary at the source-destination country dyad level (e.g. when France allowed players from Cotonou countries to qualify as domestic). Thus, we cannot simply use, say, the number of immigrant players allowed on a club as our instrument, because we would lose this important variation. Second, the gravity model allows us to use country-dyad fixed effects and time-varying controls to control for factors that correlate with migration flows—such as geographic distance, colonial ties, or

[7] A more comprehensive overview of the gravity model and its use in studying migration can be found in Beine Bertoli and Fernandez-Huertas Moraga (2015).
[8] Other variables have been found to be especially important in predicting these flows and are also typically included, such as GDP per capita for predicting migration.

language ties—and the possibility that a destination country might treat a particular origin country differently in its immigration rules. For instance, countries in the EU have treated each other's' players as domestic since 1996, or Spanish (La Liga) clubs tend to attract more players from Latin America. If we used the policy changes as instruments directly, we might bypass the deep determinants of migration flows between Spain and Latin America. The gravity model minimizes this potential problem.

We now explain in detail the steps we take to use the gravity model to construct the instrumental variable. We begin by estimating the following gravity model:

$$z_{odt} = \alpha_{od} + \alpha_t + \delta_1 dom\_pol_{odt} + \delta_2 maxfield_{dt} + \delta_3 UKvisa1_{dt} + \delta_4 UKvisa2_{dt} + \delta_5 pop_{dt} + \delta_6 pop_{ot} + \delta_7 GDPpercap_{ot} + \delta_8 GDPpercap_{dt} + v_{odt} \quad (2)$$

where $z_{odt}$ is the average number of immigrant players from origin country *o* playing in destination country *d*'s football clubs in a year *t*, and the independent variables include an indicator for whether domestic league policies consider players from country *o* as "foreign" in destination country *d* in year *t* ($dom\_pol_{odt}$), the maximum immigrant players that can be fielded per destination country *d*'s regulations in year *t* ($maxfield_{dt}$), two dummy variables for immigration law changes in the UK separate from league-specific changes ($UKvisa_{dt}$), population for each country, GDP per capita for each country, as well as country-dyad ($\alpha_{od}$) and year ($\alpha_t$) fixed effects.[9]

These regression results are shown in Table 3; the F-statistics show that the gravity model does an excellent job predicting the average number of immigrant players from country *o* in playing in country *d*. Each column shows a slightly different measure of $z_{odt}$ based on the percentage of matches an immigrant player must have been in the starting lineup to be counted. The columns also vary across another dimension: in some variants we predict the total number of immigrant players in the country, while in others we predict the average number of immigrant players per club in the country. As we will show below, the ultimate results are similar regardless of the measurement.

*** INSERT TABLE 3 HERE ***

[9] The results are robust to excluding GDP per capita and population from this model.

We then obtain predicted values from the regression estimation, $\hat{z}_{odt}$. Next, we sum these predicted values across all origin countries to come up with an "expected" number of immigrant players for each league country-year:

$$Z_{dt} = \sum_{o} \hat{z}_{odt}$$

$Z_{dt}$ then becomes our instrument. Figure 2 shows that this instrument, the expected number of immigrant players, performs quite well in predicting the actual number of immigrants by country-year.

*** INSERT FIGURE 2 HERE ***

We use $Z_{dt}$ as the instrument in a 2SLS estimation. The first-stage equation is as follows:

$$immigrant_{gj} = \gamma_{lt} + \theta_1 Z_{dt} + e_{gj} \qquad (3)$$

Where $immigrant_{gj}$ is the actual number of immigrant players on club *j* in the starting lineup of game *g*.

To obtain our local treatment effect estimates, we use the predicted value of $immigrant_{gj}$ in the second-stage equation (represented with ~ above it), as follows:

$$Y_{gj} = \gamma_{lt} + \beta_1 \widetilde{immigrant}_{gj} + \epsilon_{djt} \qquad (4)$$

As before, $Y_{gj}$ is the performance of club *j* in game *g* (goal difference or win). The logic is that the number of immigrant players predicted by the gravity equation is a valid instrument because it is externally imposed by rules that differ across years and countries, and these rules changes are driven by a host of factors, described in Appendix III, that are unrelated to the competitiveness of a league's clubs. The identifying variation now comes from the marginal number of immigrant players each club is *allowed* to deploy in any given year, under league rules that differ across countries and over time.

Recall that we estimate the 2SLS models only for games involving clubs from *different* countries, each of which is subject to different immigrant player rules. The specification thus includes international league X season fixed effects (i.e. either Europa or Champions League), but not club fixed effects as in some variants of the baseline OLS model. This is because the instrument, $Z_{dt}$, does not vary across clubs from the same home country. It only varies across destination countries (*d*) and years (*t*). Including club

fixed effects leaves us with almost no variation, making it difficult to identify the local average treatment effect. The standard errors in all 2SLS specifications are clustered at the country-by-season level because that is the level of variation of the instrument. The results are robust to clustering by club or club-by-season level.

**4.1.3 Instrumental variable regression results.** Table 4 reports the results of the second stage estimation. Columns 1-4 report the results when the dependent variable is the goal difference, while columns 5-8 report the results when the dependent variable is the win indicator. The various columns differ in how the instrument was constructed, as explained in the table notes, but the results remain qualitatively similar across specifications. Critically, the first stage F-statistic for the excluded instrument is well above 10 in all specifications, indicating that the instrument is not weak.

*** INSERT TABLE 4 HERE ***

Consistent with the reduced-form OLS results, the local average treatment effect of hiring additional immigrant players on goal differential and win probability is positive and statistically significant. The estimates suggest that hiring an additional immigrant player improves a club's performance in any given international match by between 0.12 and 0.22 goals and increases the probability of winning that match by between 2 and 5%.

**4.1.4 Interpretation of instrumental variable regression results.** It is important to explain the interpretation of the results from the instrumental variables (IV) regressions. We emphasize two potential issues with the analysis. First, the IV regressions recover an estimate of the local average treatment effect (LATE), a quantity with an unusual interpretation (Imbens and Angrist 1994). The LATE is the effect of employing an additional immigrant on club performance for only a subsample of clubs: those which respond to the liberalization of restrictions by hiring additional immigrant employees. The IV literature calls these clubs *compliers*. It is possible that these clubs might be different from non-compliers, resulting in a LATE that is larger than the average treatment effect that might apply to the entire sample, because complier clubs which want to hire more immigrants—but cannot without rule liberalization—are likely to get the biggest returns from hiring immigrants.

To test whether the complier clubs in our sample are systematically different from the rest of our sample, and to see whether complier clubs form the majority of our sample, we draw on a long literature discussing IV results interpretation in the potential outcomes framework (Angrist et al. 1996). This literature describes methods for comparing compliers and noncompliers in terms of observable characteristics. For instance, Marbach et al. (2020) developed a method to compare covariates for compliers and noncompliers. However, these methods are only appropriate for cases in which the endogenous variable and the instrument are binary. Our case is different because both the endogenous variable (i.e. the number of immigrant players a club deploys) and the instrument (i.e. the expected number of immigrant players per club in a country) are continuous. Therefore, we conduct a related analysis focused on seasons in which at least one football association liberalized the immigrant player restrictions, and compare the clubs that reacted as expected (i.e. deploying more immigrant players) to those that did not react as expected.

First, using the changes in the rules documented in Table 1a, we identify the seasons in which the football association of each country liberalized the foreign player rules.[10] Second, we identify the clubs that responded by deploying more immigrant players in the years when the football association liberalized the foreign player rules. Third, we compare the performance of these clubs in the season prior to the liberalization. Panel A of Table 5 shows that the clubs that respond as expected when the rules are liberalized (i.e. by deploying more immigrant players) are not statistically different along a range of performance measures from the clubs that do not respond as expected. These results indicate that "complier" club-years do not look observationally different from the "noncomplier" club-years[11], suggesting that our LATE estimate may not differ substantially from the ATE of the sample and improving the external validity of our results.

[10] English Premier League liberalized the immigrant player rules in 1996; La Liga in 1991, 1996, 2005, and 2007; Bundesliga in 1996, 2004, and 2006; Serie A in 1996 and 2001; Ligue 1 in 1996, 2001, and 2003.

[11] "Complier" and "noncomplier" are in quotes because these do not strictly correspond to compliers and noncompliers. We are using a rough proxy in lieu of the fact that neither our instrument nor the endogenous variable are binary.

The second potential issue with our research design has to do with the spillover effects: changes in the rules for some clubs may influence clubs from other countries. Recall that all football clubs compete in a global market for talent. For example, when France makes it easier to deploy immigrant players, football clubs in *other* countries will face more competition for immigrant players. Thus, liberalization of immigrant employment rules in one country might drive down the quality or drive up the wages of immigrant employees in other countries. This aspect of the instrument might violate the stable unit treatment value assumption (SUTVA) that is required for correct LATE estimates.

To examine the extent of this problem, we analyzed whether clubs from a league that did not liberalize its immigrant rules were negatively affected when another league liberalized its rules. First, we identified the seasons in which at least one football association did not liberalize its immigrant player rules but in which at least one other football association did liberalize its rules. For instance, in 1991 and 2006 only one domestic league liberalized its immigrant rules: La Liga and Bundesliga, respectively. Second, we calculated the between-season difference in the number of immigrant players for clubs that did not simultaneously liberalize their rules that year. If spillovers are present, we expect a difference, but the results suggest that the opposite is true. Indeed, Panel B of Table 5 shows that the difference is not statistically different from zero ($p = 0.870$). Thus, the evidence suggests that the market for immigrant workers is deep enough or involves sufficient frictions that these increases in demand-side competition do not have large spillover effects.

*** INSERT TABLE 5 HERE ***

**4.1.5 Robustness of instrumental variable results.** We include an additional set of robustness tests of our 2SLS estimation in Table 6. Column 1 shows the baseline 2SLS estimates, copied from Column 3 of Table 4, for comparison purposes.[12]

First, we test the sensitivity of our results to the operationalization of players based on whether they are in the starting line-up of the game. In columns 2 and 3 of Table 6, we illustrate robustness to an

[12] Column 3 is our preferred specification and serves as the baseline for all following analysis.

alternate measure based on actual playtime during any given game. Measures derived using 50% of playtime or 70% of playtime yield quite similar results compared to our original estimates. Second, in column 4, we test the sensitivity of the specification to the exclusion of Brazil, the most common country of origin for foreign players (10% of immigrant players in our sample). Third, in column 5 we adjust t-ratio inference based on the first-stage F statistic following Lee, McCrary, Moreira, and Porter (2021) to ensure that our instrument is sufficiently strong. After the adjustment, the inflated standard error (0.0463) produces a 95% confidence interval that ranges from 0.0772 and 0.259. Thus, the positive effect of hiring immigrants we document in main results of the paper is robust to concerns of a weak instrument.

*** INSERT TABLE 6 HERE ***

Next, we test the robustness of our results to a relaxation of the exclusion restriction. Specifically, for our 2SLS results to have a causal interpretation, the instrument—the predicted number of immigrant players per country or per club—must not violate the exclusion restriction (i.e. the instrument cannot influence the club's performance via a channel that is unrelated to the club's number of immigrant players). We use methods introduced by Conley, Hansen, and Rossi (2012) to examine how strong a violation of the exclusion restriction would have to be in order to overturn our results. To use their notation, $\gamma$ is the correlation between our instrument and club performance that does not flow through the number of immigrant players, and then $\gamma=0$ under perfect exogeneity and $\gamma\neq0$ if there is any deviation from the exclusion restriction.

We use the union of confidence intervals approach described by Conley et al. (2012) to help us understand how large $\gamma$, the violation of the exclusion restriction, would need to be to overturn the 2SLS results in Table 4.[13] Figure 3 shows confidence regions of $\beta$ (the second-stage estimate of the impact of

[13] Conley, Hansen, and Rossi (2012) introduce four approaches for inference about $\beta$ (the second-stage estimate of the impact of more immigrant players on club performance) if $\gamma$ in fact does not equal zero. We utilize the union of confidence intervals approach because it does not require an assumption about the distribution of $\gamma$ and is the most conservative approach. Furthermore, Frake et al. (2022) note that in the strategy literature, the union of confidence intervals approach is typically recommended since we rarely know the appropriate distribution of $\gamma$. Assigning a prior distribution to $\gamma$ would produce narrower confidence intervals, such that the level of $\gamma$ overturning our results would have to be even higher. This method simply constructs a set of confidence intervals for all points in the

more immigrant players on club performance) for different values of γ. In the figure, we can visually see the levels of γ that would overturn the 2SLS results in Table 4. The second-stage estimate of the impact of immigrant players on competitive performance is bounded away from zero as long as γ is less than 0.08. To put the 0.08 quantity in context, it is 62 percent of the reduced form regression coefficient of Z (i.e. our instrumental variable) on Y (i.e. goal difference, our second stage outcome variable).[14] We thus see that the positive LATE of immigrant players on competitive performance is robust even for substantial departures from exogeneity.

*INSERT FIGURE 3 HERE*

Finally, one might be concerned that the rule changes are not actually exogenous; important omitted variables might be the true drivers of increased club competitiveness after policy liberalizations. In Table 7, we conduct a placebo test where we test the effects of changing the cap on the number of immigrant players in time *t* on club-match outcomes in *prior* years. The results show that the performance of clubs in international competitions in earlier years is not statistically associated with the cap set by the football associations. This result is consistent with our description of the politically contested process through which football associations change the rules regarding immigrant players (see Appendix III).

*** INSERT TABLE 7 HERE ***

**5. Mechanisms**

Now that we have found compelling evidence of a positive local average treatment effect of hiring more immigrants on organizational performance, we turn to exploring plausible mechanisms that could explain this relationship. We first consider individual talent as a possible explanation, and then turn to a novel organizational mechanism: strategic variety. To test these two mechanisms, we use event data collected from WhoScored, which covers all the events that take place during a match. Using this data, we

support of γ and then takes the union of those γ-specific confidence regions for β. Results for other approaches, such as the local-to-zero approach (Nanda et al. 2020) suggest that the results are robust to even larger values of γ.

[14] The coefficient of the reduced form regression of Z on Y is .137, with a standard error of .054. The regression sample includes all 7,777 observations from the main sample used in Table 4, and the estimation includes season x league fixed effects.

create individual-level measures of performance and club-level measures of strategic variety. These data are available for the seasons 2009/10 to 2019/20.

### 5.1 Mechanism 1: Are Immigrants More Talented than Natives?

Immigrants might contribute to organizational performance because they are unusually talented compared to domestic employees. Numerous frictions including search costs, discrimination, and more might prevent immigrants from being hired. Any immigrants able to overcome these frictions and achieve employment with a top European club might be especially able or motivated. A testable implication of this mechanism is that immigrants should display higher levels of individual performance than natives, ultimately benefitting the organization for which they work. This argument has been put forth previously in the context of immigration by Borjas, Borjas, and Trejo (1992), with roots in Roy's (1951) classic study of the distribution of earnings.

While reasonably straightforward as an argument, testing this idea is extremely difficult in most real-world settings because of the challenges in objectively measuring an individual's contribution to collective outcomes. Fortunately, the football context provides unusual transparency in this regard while still displaying the mobility frictions that exist in other settings.

**5.1.1 Measuring player talent.** We obtained data on four objective indicators of talent: whether a player is chosen as one of the starters for a game *(Player in Starting Lineup)*[15], the success rate when attempting to dribble (*Dribble Success*), the passing success rate (*Pass Success*), and whether the player scores one or more goals during a match (*Scores*). *Dribble Success* is the percentage of dribbles that are successful (successful dribbles/attempted dribbles), conditional on attempting at least one dribble. *Pass Success* is the percentage of passes that are successful (successful passes/total passes), conditional on attempting at least one pass. None of these statistics by themselves indicate superior individual performance, but collectively they are compelling. These indicators tend to favor players involved in offensive play

[15] Unlike in other sports, football clubs can only make a limited number of substitutions during a game (3 at the time of our study) and a player cannot return to the field after being subbed out. Thus, being in the starting lineup is a non-trivial indicator of player quality in this setting.

(midfielders and attackers) instead of those involved in defensive play (goalkeepers and defenders), and we will include position fixed effects in all specifications to account for that.

Additionally, we include other measures that should not be associated with individual talent or quality as a placebo test. To gauge whether immigrants simply touch the ball more often than natives, we tested if immigrant players are more likely to touch the ball (*Touches*). We also consider whether a player receives a yellow card (*Any Yellow*), is be expelled from the match (*Expelled*), or is substituted out of the match (*Substituted*). *Touches* is the actual number of times the player touched the ball during the match. *Any Yellow* is a dummy indicating whether the player received a yellow card. *Expelled* is a dummy indicating whether the player is expelled from the match (two yellows or a straight red card). *Substituted* is a dummy indicating whether the player was substituted after playing during part of the match. We use data from Transfermarkt to calculate the *Player in Starting Lineup*, *Scores*, *Any Yellow*, *Expelled*, *Substituted* variables. We use WhoScored to calculate the *Dribble Success*, *Pass Success*, and *Touches* variables.

**5.1.2 Individual Talent Results** Figure 4 shows a graphical representation of the difference in the number of goals scored by domestic players compared to immigrant players over time, based on the raw data. Two things stand out: (1) immigrant players have a much higher goal average than domestic players, and (2) the gap has closed over time. The closure of the gap is consistent with the story of how foreign transfer rules evolved. In the early 1990s, very few immigrants could be hired in any of the five domestic leagues. After the 1996 Bosman ruling, each league's restrictions loosened to varying degrees. Caps on immigrant players in the early 1990's thus prevented all but the very best immigrants from moving to top European clubs. As the restrictions loosened, the height of the hurdle that immigrant employees had to overcome to be signed by a top club also shrank. Notably, however, the gap is still quite large.

*** INSERT FIGURE 4 HERE ***

Regression results confirm the intuition from the raw data presented in Figure 4. Using all the variables mentioned before, we run models of this general form:

$$talent_{ig} = \alpha_{jsp} + \beta_1 immigrant_i + \beta_3 age_{is} + \beta_4 age_{is}^2 + \epsilon_{ig} \quad (5)$$

Note that, unlike in previous specifications, the regressions are at the individual-match level rather than at the club-match level, and they are meant to be suggestive descriptive analyses; we cannot use our instrument in these specifications. In the equation, $talent_{ig}$ represents one of the various measures described above of individual player quality for player *i* in match *g*. As before, the key variable of interest is the indicator *immigrant,* coded as 1 if the player was born in a foreign country and 0 otherwise. We control for the player's age in all models because it is a critical determinant of individual performance in the sport and might be correlated with immigrant status. We also include club (*j)* by season (*s)* by position *(p)* fixed effects.[16] Including such stringent fixed effects means that we are comparing talent metrics for immigrant and domestic players who play in the same position on the same club in the same season and league. Table 8 reports the results. As with all our specifications, the sample is limited to international tournament matches.

*** INSERT TABLE 8 HERE ***

We find that immigrant players, compared to domestic players, are 4.0% more likely to be named in the starting lineup (Column 1), exhibit a 3% higher dribble success rate (Column 2), exhibit a 0.7% higher passing success (Column 3), and are 1% more likely to score one or more goals during a match (Column 4). All these effects are significant at $p < 0.01$. Notably, immigrant players do not differ from domestic players in the likelihood of receiving a yellow card (Column 5), being expelled from the match (Column 6), being substituted (Column 7), or the number of times they touch the ball (Column 8). Immigrant players are thus more effective when they have possession, not because they touch the ball more often, and they are not simply more likely to be involved in any football event more generally. Altogether, the results strongly support the notion that immigrant players contribute to collective performance because they are more talented.

**5.2 Mechanism 2: Do Immigrants Enhance the Organization's Strategic Variety?**

[16] We distinguish between three positions in our data: defender, midfielder, and striker.

While talent is undoubtedly an important means by which immigrants contribute to collective performance, it is critical to understand the organizational mechanisms that transform the individual contributions of immigrant employees into superior organizational performance. We consider one novel organizational mechanism: immigrants might enable their clubs to adopt a richer set of possible strategic actions. When organizations have a wider variety of competitive actions at their disposal, they have more options for outmaneuvering their rivals, which may lead to higher competitive performance (Dooley et al. 1996, Larrañeta et al. 2014).

Immigrants might enhance the number of strategic actions available to their organizations. Immigrants may bring novel ideas and routines to their organizations simply because they have been exposed to different experiences and training (Choudhury and Kim 2019, Doran et al. 2022, Foley and Kerr 2013), and these novel ideas and routines should expand the set of possible actions that the club can take when confronting competitors.[17] Additionally, immigrants might help their clubs *deploy* a wider variety of actions. Social psychologists emphasize how immigrants' diverse, multicultural experiences provide them with the ability to play an integrative role in the organization: recognizing, coordinating, and bringing together the viewpoints and ideas of their coworkers (Benet-Martínez et al. 2006, Maddux et al. 2014, Tadmor and Tetlock 2006). Consequently, an immigrant employee may help the organization extract and act upon a wider variety of ideas and actions from her coworkers, whether those coworkers are immigrants or natives. Taken together, these ideas suggest that organizations that employ more immigrants may outperform others because they may deploy a wider variety of strategic actions.

**5.2.1 Measuring Strategic Variety** We test this mechanism using three different measures, each of which draws on detailed passing data. One measure comes from the empirical football literature, and the other two are motivated by the networks literature. We calculate these measures at the club-match level.

[17] Colloquial discussions of football often focus on the distinct playing philosophies of different countries: the defensive "catenaccio" of Italy, the dribbling-heavy "jogo bonito" of Brazil, or the physical "kick and run" of England. Perhaps the most famous example of immigration and tactical innovation in the industry happened when Johan Cruyff moved from Ajax (Netherlands) to FC Barcelona (Spain) in the 1970's and brought with him the uniquely Dutch "total football" approach to the game, involving highly intricate passing patterns inspired by field hockey. Cruyff revolutionized Barcelona's style first as a player and then as a coach.

Then, we use these variables as outcomes in our 2SLS design, i.e. we re-estimate Equation 4 with these measures as dependent variables. Finally, we test whether these measures are positively related to club performance in reduced form OLS models.

The first measure, referred to as the *strategic richness index* in the empirical football literature, captures the variety of routines deployed by a club on the pitch by measuring the number of distinct subteams of all possible sizes (i.e. 2-11 players) that emerge from the club's passing network (Rodriguez and Tovar 2019). The intuition of this measure is that a club that "has the option of commanding a larger number of subsets of different soccer players of any given size into play will be in a better position to respond to a greater number of tactical and strategic challenges offered by [its] rivals" (Rodriguez and Tovar 2019, p. 8). César Luis Menotti, a famous Argentine soccer coach, was the first to talk about how he wanted his club to have many "teams-within-teams" ("pequeñas sociedades" or "small societies") to maximize their optionality in response to rivals (Rodriguez and Tovar 2019:3).

The second measure of strategic variety is the *density* of the club's passing network. Network density is the ratio of observed edges to the number of possible edges for a given network. In our case, each club has 11 starting players and the network is a directed network, which means that there are (11*[11-1]) or 110 possible edges in a given club's network. Our measure of network density equals the number of starting 11 players connected by a directed pass in the focal game divided by 110. Denser networks reflect greater connectivity, which reflects variety and complexity of channels of exchange because resources could flow between any two nodes at any given time depending on the situation. The denser the network, the more difficult to predict the path by which passes will flow between two randomly chosen nodes separated by two or more degrees in the network.

Finally, we calculate the *integration* of the club's passing network in the game. Integration is the opposite of modularity—i.e. no distinctly separated clusters can be identified. An integrated network reflects strategic variety because players are continually passing to a large variety of other teammates, rather than consistently moving the ball among a small module of the same teammates. Note that density and integration capture different concepts. Density reflects the overall connectivity among nodes, whereas

integration reflects the extent to which the network can be partitioned into distinct communities (Tatarynowicz et al. 2016). We calculate the integration of a club's passing network using the memoryless community detection procedure described by Rosvall et al. (2014) and implemented with their infomap algorithm. Appendix V provides details on the calculation of this measure.

The latter two measures are intended to illustrate the degree to which immigrants help their organizations *deploy* a wider variety of actions, while the first measure illustrates the degree to which immigrants bring novel ideas and routines to their organizations.

**5.2.2 Strategic Variety Results** The results for these analyses are in Table 9, which displays results from the second stage of our 2SLS regressions. There are two differences between these models and those displayed in Table 4. First, the outcome variables are the strategic variety measures instead of performance. Second, the number of observations is smaller because of data constraints; for these analyses we only have data for international matches beginning in the 2009/10 season. Across the columns in Table 9, we see that more immigrant players cause an increase in all three measures of strategic variety. The estimates suggest that hiring an additional immigrant player improves the club's strategic richness index by 0.30, which is 23% of the sample mean of that variable. Finally, in Table 10, we provide OLS reduced form evidence that our three measures of strategic variety have precisely estimated and positive correlations with club performance. This pattern of results suggests that immigrant players improve the strategic variety of their clubs which, in turn, improves club performance.

**5.2.2.1 What Role Do Immigrants Play in Enabling Strategic Variety?** In Table 11, we push these results further by moving to the player*match level of analysis (i.e. Equation 5) and examining whether immigrants are more likely to serve a coordinating, integrative function on the pitch. If they serve an integrative role that brings together their coworkers' views and routines, then that would help to explain why their organizations are able to deploy greater strategic variety. While the analyses in Table 11 are descriptive, we believe that it is important to observe the role that immigrant employees may take in their organizations.

The first empirical test is motivated by Fernandez and Gould (1994) who describe how social coordinators move resources from one person to another in an A → B → C sequence, rather than moving resources back to their sender in an A → B → A sequence. We identified all the sequences in which a player is in the middle of a three-player sequence (# A → B → C sequences plus # A → B → A sequences). We then counted the number of instances in which the focal player is connecting two distinct players (i.e. # A → B → C). We divide this number by the number of times the player participates in a three-player passing sequence during a match. In Column 1 of Table 11, we document that, as compared to a domestic player, an immigrant player has a higher percentage of passing sequences with an A → B → C pattern instead of an A → B → A pattern. For the average player-match, about 48% of the passing sequences have an A → B → C pattern. The effect size is .9%, which is about 2% of 48%.

The second empirical test is motivated by the social psychology and sports literature, which argues that immigrants' multicultural experiences allow them to play an integrative role in organizations (Benet-Martínez et al. 2006, Maddux et al. 2014, Szymanski and Ipek 2020, Tadmor and Tetlock 2006). Owing to their multicultural experiences, immigrants may be more likely to be coordinators than natives are. We identified all the passing sequences of three or more players, and we recorded the position of each player within these passing sequences. We then created a set of three dummy variables that indicate whether the player is in the beginning, middle, or final part of the sequence. For instance, in a sequence of three (nine) players, a player is in the middle if he is in the second (fourth to sixth) position(s) of the sequence. In Columns 2-4, we document that immigrants are 0.4% more likely than natives to be in the middle of a passing sequence (Column 3), while immigrants and natives are equally likely to be in the beginning or final part of a passing sequence (Columns 2 and 4). Finally, in Column 5, we document that immigrant players participate in more complex passing sequences, or those that connect a larger number of distinct players. Specifically, immigrant players participate in sequences that connect 0.02 more distinct players than native players. In total, these patterns provide descriptive evidence that immigrants play a coordinating function on the pitch, which may help to explain why organizations with more immigrants exhibit higher strategic variety.

## 6. Discussion

We provide evidence that removing constraints on an organization's ability to deploy immigrants improves organizational competitive performance. European football clubs that employ an additional immigrant player tend to outscore their opponents in international (i.e. UEFA) competitions—which represents the toughest competition by pitting the best clubs from each country against one another. We justify a causal interpretation of this relationship by using an instrumental variable approach common in the trade and migration literatures. Our study joins a growing empirical literature documenting how immigrants benefit organizations.

The main effect documented in this study is important. It demonstrates that more liberal immigration policies lead to more competitive firms—a desirable outcome for managers and many policymakers. As we noted in the introduction, managers who wish to employ more immigrants often make costly interventions in political debates about immigration. Inasmuch as the results in our context generalize to other kinds of businesses, they suggest that managers who expect their organizations to benefit from liberalized immigration policies should consider incurring the costs involved with advocating for those policies, and policymakers who wish to enhance the competitiveness of local organizations should listen.

While our results agree with much prior work on the positive effects of immigration on organizations, a notable exception is Doran, Gelber, and Isen (2022). Using careful empirical techniques, they report no discernible innovation or employment growth gains from winning a marginal H1-B worker via lottery. Our results may differ because the industry, immigrant worker skills, or dependent variables are not the same. The organizations in Doran et al. (2022) are heterogeneous, and some have wide latitude to deploy alternative processes and capabilities to adjust for not being able to hire foreign workers. Football clubs, by contrast, are small and dependent on individual talent for organizational performance. An important aspect of the research design in Doran et al. (2022) is that their sample is comprised of firms who applied for H1-B workers on the very last day of the cycle (and thus were subject to a lottery). Those firms might differ from others who applied earlier in the cycle and thus weren't subject to the

lottery, and the visa allocation process in that study differs substantially from the immigrant selection process by clubs in our context. We see our findings as complementary, not contradictory to prior work, because they address different aspects of a highly complex issue.

Our study further complements prior research because we explore two mechanisms by which immigrant employees might improve the performance of their organizations: superior talent and enhanced strategic variety. Our analyses provide clear support for both mechanisms. While not theoretically novel, our talent results are a valuable empirical contribution because club X season X position fixed effects allow us to document that immigrants tend to outperform natives doing the same job in the same organization. Our interpretation is not that native-born players are inherently less talented, but that the frictions of making it into a top European club leads immigrant players to be particularly selected from the right tail of the distribution. This interpretation can easily be extended to any high-skilled immigrant.

The strategic variety mechanism is both theoretically and empirically novel to the migration and organizations literature. As we noted in the introduction, research has increasingly implied that migrants produce economic benefits within the boundaries of organizations, but that work has struggled to describe the internal organizational channels by which immigrants contribute to superior collective outcomes—especially in settings characterized by head-to-head competition, rather than science-driven contexts like patenting or academic publishing. Drawing from ideas in the strategy literature, we propose and find support for the concept of strategic variety. Because of their unique knowledge and experience with different cultures (Benet-Martínez et al. 2006, Maddux et al. 2014, Tadmor and Tetlock 2006), immigrants may contribute to strategic variety by adding new ideas to the organization and by serving as a coordinator (Fernandez and Gould 1994) who moves resources between different members of the organization.

Our theory and initial findings regarding strategic variety are noteworthy for several reasons. A handful of scholars have focused on the technological innovation benefits provided by skilled immigrants. Several papers show that immigrants are disproportionately responsible for the quantity and quality of patents and academic publications at both the individual and organizational levels (Bernstein et al. 2018,

Doran and Yoon 2020, Moser et al. 2014, Moser and San 2020). This work suggests that immigrants contribute to innovation through two mechanisms: bringing novel ideas or skills from their homelands ("importing") or combining their prior ideas or skills with those of native inventors ("recombination"). Our work is consistent with these ideas but adds some intriguing considerations related to organizational routines and coordination. Specifically, that immigrants not only add new technological ideas to their firms (as suggested by prior work), but that they also increase the variety of what the organization can *do* by adding new routines that help their organizations to outflank rivals. Even further, our theory and findings suggest that immigrants may play a coordinator role and thus help to *implement* new routines by linking other members of the organization.

**6.1 Limitations**

Our setting is not uniformly generalizable; it is characterized by small organizations, human capital-intensive competition, and a production process that both is relatively uniform (i.e the rules of football are the same everywhere) and does not require very high levels of proficiency in the native language or the native culture. Additionally, the international labor market in our setting is active and individual performance is highly visible. Moreover, strategic variety is important in our setting because it is characterized by head-to-head competition.

Many economically meaningful settings that are the focus of current immigration debates share these characteristics. For example, our results should be relevant to settings where highly technical expertise, embodied in visible publications, patents, or software, is more important than cultural knowledge (e.g. Clemens 2013). Such features are often the focus of the H1-B program in the US, for example. By contrast, our results are less likely to apply to situations where labor markets are not international in scope, where native language and cultural knowledge are more significant drivers of productivity (e.g. Neeley 2013) where organizations have extensive resources beyond human capital (e.g. Doran et al. 2022), and where competition is less salient.

One critical difference between professional football and other industries is that firms in our setting do not seek to maximize profits and, in many cases, only break even or operate at a (usually small)

loss. The most prominent clubs are in a constant spending battle to attract the most talented players in pursuit of winning prestigious leagues and tournaments. Because talent is, essentially, the only production input, players appropriate most of the economic value through their wages and other contractual clauses (e.g., image and likeness rights). Consequently, football clubs do not compete on profitability (Garcia-del-Barrio and Szymanski 2009); they maximize revenues (through TV rights, sponsorships, merchandise, and ticket sales – in that order of importance) so they can continue to afford the best talent possible. This creates a generalizability issue: the marginal benefit of hiring skilled immigrants may differ in settings where profit maximization is more important, because the best talent may not be cost effective.

It is important to emphasize that the local average treatment effect (LATE) we estimate may constitute an upper bound on the positive effect of immigrant employees on organizational performance. This is because the LATE represents the effect of hiring immigrants on performance for clubs who wish to hire immigrants but cannot until their leagues' rules are liberalized (i.e. compliers). Clubs that wish to hire immigrants are probably well-suited to extracting the most value from them, which is why this estimate should be thought of as an upper bound.

**6.2 Future Work**

We see multiple important paths for future work. The first involves discovering boundary conditions. Under what circumstances do firms struggle to obtain performance benefits from immigrant workers? Our mechanism tests suggest two conditions: when the returns to talent are not very high, and when strategic variety is not very important. There are likely many other conditions and articulating them will provide better guidance to managers about whether their circumstances would be well-suited to immigrants' contributions. More generally, we do not claim that talent and strategic variety are the only mechanisms by which immigrants affect performance. Instead, we hope that future work will build on the two we have emphasized by adding others and testing which ones are more or less important for different types of organizations and under different conditions.

In keeping with this idea, another exciting opportunity for future work involves the exploration of organizational policies and capabilities that might help firms to access the competitive benefits of

employing immigrants. Assessing manager characteristics is one intriguing possibility. What is the role of managers in harnessing the skills and strategic variety brought by immigrant workers? Does the match between manager and worker nationality matter? What other attributes of managers matter? These questions are critical because managers are ultimately the ones who design the organizational structure, determine the production routines, and establish the culture that governs the interactions among immigrant and native workers.

Additionally, we think it is particularly promising to explore why some organizations are better at exploiting complementarities between immigrant and native workers and why some organizations are better at assimilating immigrant employees into the local culture and the organization quickly and effectively. Complementarity between immigrants and natives is one of the oldest concerns in the immigration literature, but organizations have been largely absent from academic and policy discussions about how complementarities might be achieved. Relatedly, assimilation is another core migration concern where organizations are underemphasized, although it is inside of firms that immigrants interact with natives, contribute their skills and ideas, and learn important details about local culture. Managerial characteristics may matter here, as well.

Next, we see exciting opportunities to explore the network positions of immigrants inside of organizations. We document that immigrant players are more likely to serve in informal coordinator roles and pass resources between coworkers, but a more formal network-based analysis is outside the scope of this paper. Future work can do more. For instance, do some immigrant employees serve as brokers between groups of immigrant workers and groups of native workers? What pressures and payoffs do immigrant employees encounter when they occupy these kinds of brokerage roles? Are the network positions of immigrant employees crucial to unlocking complementarities between immigrant and native workers? We see many opportunities for networks researchers to contribute to our understanding of how immigrant employees affect their organizations.

Finally, we see an opportunity for organizational researchers to study how firms identify and evaluate immigrant workers in global labor markets. For example, an intriguing pattern we noticed in our

data is that immigrant footballers tend to play in positions where individual performance in the form of goals scored is easier to observe (e.g. striker). Thus, it seems possible that organizations—even in this setting with robust international labor market institutions—may have trouble evaluating immigrant workers in the absence of easily observable signals of individual quality. Firms able to overcome this problem should reap significant rewards as labor markets continue to globalize.

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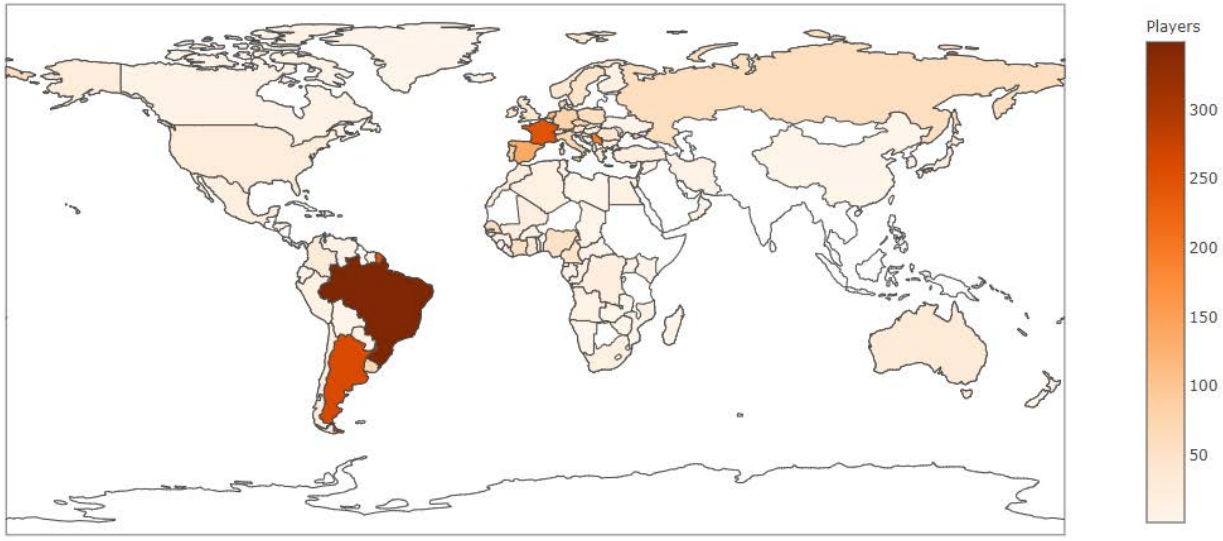
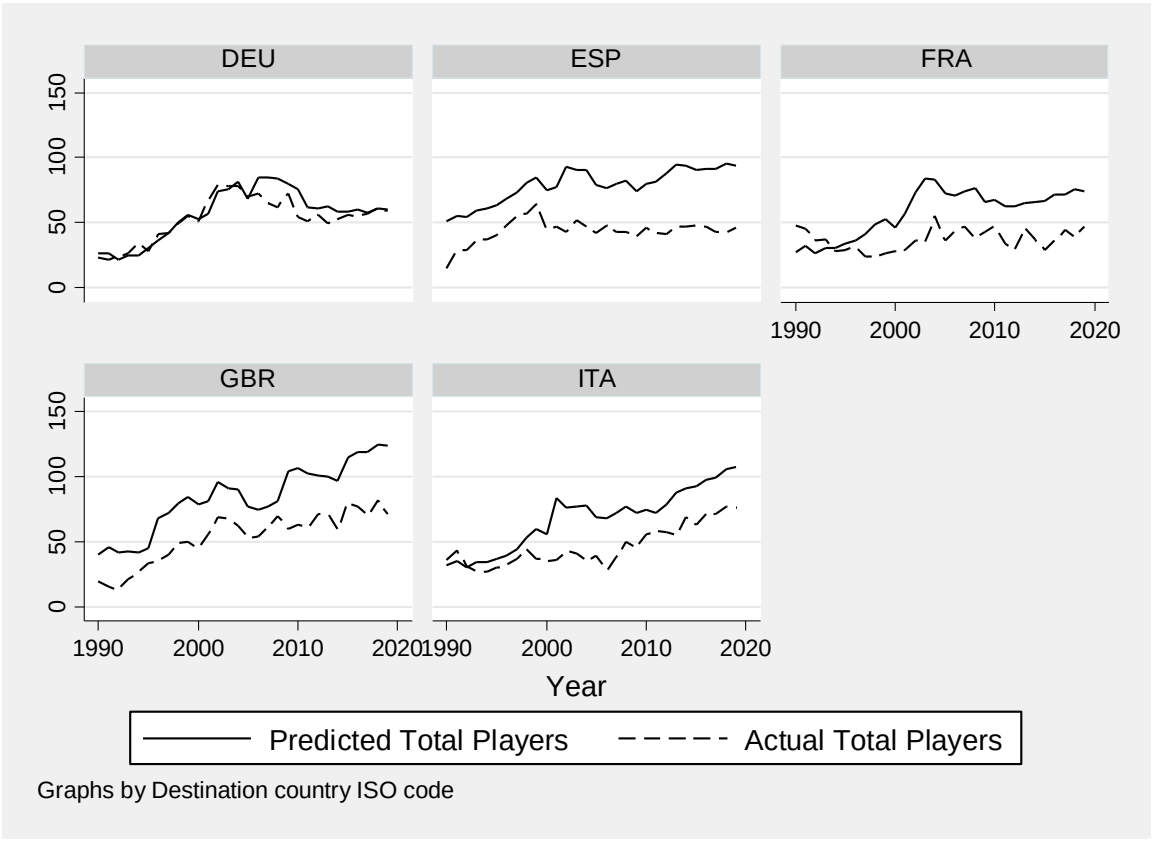
**Figure 1: Immigrant Players' Country of Birth**



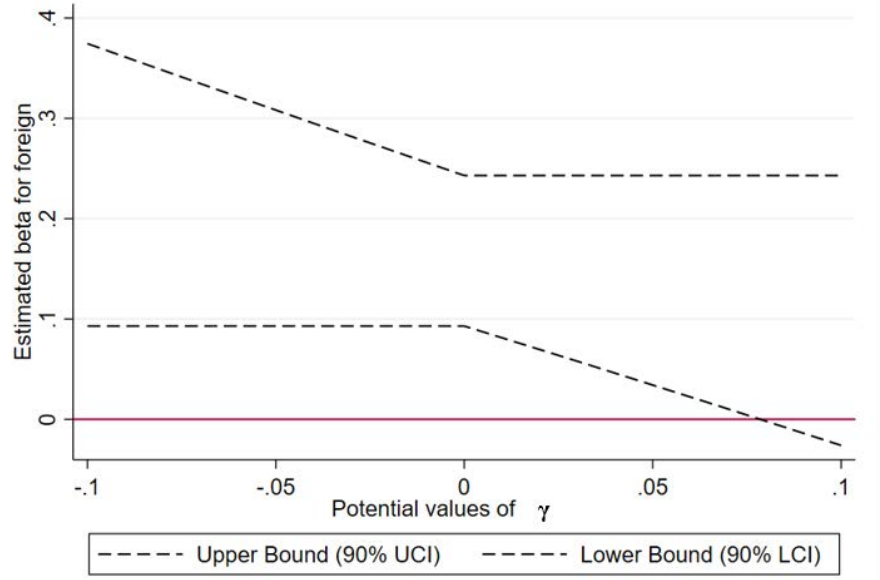

Notes: The graph shows the countries of birth for the immigrant players in our sample. Specifically, the graph shows the number of immigrant players born in every country for the sample of players that participated in the UEFA tournaments during the seasons 1990/91 to 2019/20. Darker colors indicate that a larger number of immigrant players were born in the country.

**Figure 2: Correlation Between the Instrumental Variable and Actual Immigrant Players**



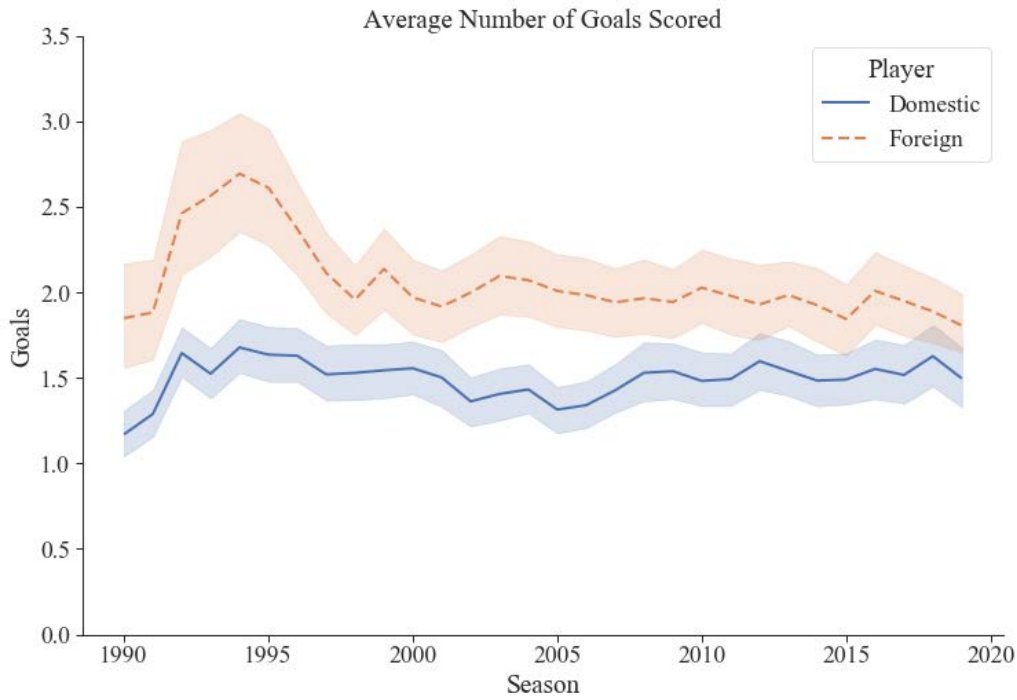

Notes: The graph shows the predicted number of immigrant players and the actual number of immigrant players for each season by league.

**Figure 3: Sensitivity of 2SLS Results to Violations of Exclusion Restriction**




This figure replicates the estimation of Table 4 using the "union of confidence intervals" method of Conley et al. (2012). The graph corresponds to Model 3 of Table 4. The parameter γ represents the effect of the instrument in the second stage.

**Figure 4: Average Number of Goals Scored by Foreign vs. Domestic Players**




Notes: The graph shows the average number of goals scored by foreign vs. domestic players. The data includes all domestic league matches. These graphs are composed of raw data without controls or fixed effects. The error bars are bootstrapped 95% confidence intervals.

## Table 1a: Maximum Number of Immigrant Players Allowed

| | England Premier League[b] | | Spain La Liga | | Italy Series A[c] | | Germany Bundesliga[d] | | France Ligue 1 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Season** | *Roster* | *Field* | *Roster* | *Field* | *Roster* | *Field* | *Roster* | *Field* | *Roster* | *Field* |
| 1990 | 3[a] | 3[a] | 3 | 3 | 5 | 3 | 2 | 2 | 3 | 3 |
| 1991 | 3[a] | 3[a] | 4 | 3 | 5 | 3 | 2 | 2 | 3 | 3 |
| 1992 | 3[a] | 3[a] | 4 | 3 | 5 | 3 | 3 | 3 | 3 | 3 |
| 1993 | 3[a] | 3[a] | 4 | 3 | 5 | 3 | 3 | 3 | 3 | 3 |
| 1994 | 3[a] | 3[a] | 4 | 3 | 5 | 3 | 3 | 3 | 3 | 3 |
| 1995 | 3[a] | 3[a] | 4 | 3 | 5 | 3 | 3 | 3 | 3 | 3 |
| 1996 | 25 | 11 | 6 | 4 | 5 | 3 | 3 | 3 | 5 | 3 |
| 1997 | 25 | 11 | 6 | 4 | 5 | 3 | 3 | 3 | 5 | 3 |
| 1998 | 25 | 11 | 6 | 4 | 5 | 3 | 3 | 3 | 5 | 3 |
| 1999 | 25 | 11 | 6 | 4 | 5 | 3 | 3 | 3 | 5 | 3 |
| 2000 | 25 | 11 | 5 | 3 | 5 | 3 | 3 | 3 | 5 | 3 |
| 2001 | 25 | 11 | 4 | 3 | 25 | 11 | 3 | 3 | 5 | 5 |
| 2002 | 25 | 11 | 4 | 3 | 3 | 3 | 3 | 3 | 5 | 5 |
| 2003 | 25 | 11 | 4 | 3 | 3 | 3 | 3 | 3 | 5 | 5 |
| 2004 | 25 | 11 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 |
| 2005 | 25 | 11 | 5 | 3 | 3 | 3 | 4 | 4 | 5 | 5 |
| 2006 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2007 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2008 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2009 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2010 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2011 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2012 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2013 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2014 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2015 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2016 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2017 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2018 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |
| 2019 | 25 | 11 | 5 | 3 | 3 | 3 | 25 | 11 | 5 | 5 |

Notes:

[a] Clubs were also allowed to employ 2 “assimilated players”, defined as those that played for 5 consecutive years in the country or started playing in the country at the youth level.

[b] There were changes in visa rules for the UK as a whole during this time that significantly affected the ability of clubs to sign immigrant players, but these were separate from Premier League rules regarding how many foreign players a club could have. The Premier League also implemented the Home-Grown Player criteria at the start of the 2010/2011 season (see Appendix II).

[c] In the post-2001 period, Italy tended to restrict the signing of *new* players that are non-EU born.

[d] Since the 2006/2007 season, there has been a “local player” limit. Though the Bundesliga requires clubs to register a certain number of homegrown players, there is no upper limit on the number of players a German club can register each season. Appendix II provides more detail.

**Table 1b: Countries/Regions Not Considered Foreign by League**

| Season | England Premier League | Spain La Liga | Italy Serie A | Germany Bundesliga | France Ligue 1 |
|---|---|---|---|---|---|
| **1990** | None | None | None | None | None |
| **1991** | None | None | None | None | None |
| **1992** | None | None | None | None | None |
| **1993** | None | None | None | None | None |
| **1994** | None | None | None | None | None |
| **1995** | None | None | None | None | None |
| **1996** | EU | EU | EU | UEFA | EU |
| **1997** | EU | EU | EU | UEFA | EU |
| **1998** | EU | EU | EU | UEFA | EU |
| **1999** | EU | EU | EU | UEFA | EU |
| **2000** | EU | EU | EU | UEFA | EU |
| **2001** | EU | EU | EU | UEFA | EU |
| **2002** | EU | EU | EU | UEFA | EU |
| **2003** | EU | EU | EU | UEFA | EU + Cotonou |
| **2004** | EU | EU | EU | UEFA | EU + Cotonou |
| **2005** | EU | EU + Russia | EU | UEFA | EU + Cotonou |
| **2006** | EU | EU + Russia | EU | UEFA | EU + Cotonou |
| **2007** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2008** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2009** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2010** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2011** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2012** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2013** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2014** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2015** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2016** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2017** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2018** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |
| **2019** | EU | EU + Russia + Cotonou | EU | UEFA | EU + Cotonou |

Notes: There were EU enlargements in 2004, 2007, and 2013 that changed the number of countries considered to be non-foreign for all leagues. “Cotonou” refers to countries party to the Cotonou Agreement between 78 African, Caribbean, and Pacific states and 15 EU member states. Please see Appendix II for more detail.

**Table 1c: Descriptive Statistics at the Club-Match Level**

| | (1)<br>International<br>Tournament Matches |
|---|---|
| Goal difference | 0.51 |
| | (1.86) |
| Win | 0.48 |
| | (0.50) |
| Number of immigrant players | 5.46 |
| | (2.34) |
| N | 7777 |
| Strategic richness index | 1.33 |
| | (2.12) |
| Density | 0.59 |
| | (0.08) |
| Integration | 0.52 |
| | (0.07) |
| *N* | 2740 |

Note: Mean coefficients; standard deviations in parentheses. International Tournament Matches are composed of Europa League and Champions League matches from season 1990/91 to 2019/20. There are fewer observations for strategic richness, density, and integration because these measures rely on passing data only available starting in 2009/10.

**Table 1d: Correlations Among Key Variables (Club-Match Level)**

| | | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| 1 | Goal difference | 1.000 | | | | | |
| 2 | Win | 0.792*** | 1.000 | | | | |
| 3 | Number of immigrant players | 0.064*** | 0.065*** | 1.000 | | | |
| 4 | Strategic Richness index | 0.269*** | 0.199*** | 0.126*** | 1.000 | | |
| 5 | Density | 0.141*** | 0.091*** | 0.090*** | 0.677*** | 1.000 | |
| 6 | Integration | 0.148*** | 0.099*** | 0.102*** | 0.773*** | 0.533*** | 1.000 |

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Table 2: Baseline ("Naïve") OLS Results**

| | (1)<br>Goal difference | (2)<br>Goal difference | (3)<br>Pr(win) | (4)<br>Pr(win) |
|---|---|---|---|---|
| Number of immigrant players | 0.0575*** | 0.0304** | 0.0119*** | 0.00792** |
| | (0.0110) | (0.0141) | (0.00281) | (0.00397) |
| Constant | 0.196*** | 0.344*** | 0.417*** | 0.439*** |
| | (0.0645) | (0.0811) | (0.0170) | (0.0227) |
| Observations | 7,777 | 7,777 | 7,777 | 7,777 |
| R-squared | 0.011 | 0.047 | 0.008 | 0.036 |
| Season x League FE | YES | YES | YES | YES |
| Focal Club FE | | YES | | YES |

Notes: The level of analysis is the club-match. Sample period = 1990/91-2019/20. Models 1-4 include only the international matches (played during Europa and Champions tournaments). For international matches, the League in Season X League FE includes Europa and Champions. Number of immigrant players refers to the number of immigrant players in the starting lineup of the match. Standard errors clustered at the country X season level. *** p<0.01, ** p<0.05, * p<0.1

**Table 3: Gravity Model Instrument Construction**

| | DV = Total immigrant players in country/league | | | DV = Avg immigrant players per club | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | 30% | 50% | 70% | 30% | 50% | 70% |
| Is player from origin country considered an immigrant? | 0.411*** | 0.273** | 0.157** | 0.0212*** | 0.0140*** | 0.00811** |
| | (0.146) | (0.106) | (0.0651) | (0.00742) | (0.00543) | (0.00334) |
| Max immigrant players allowed on the field | 0.0308** | 0.0259** | 0.0170** | 0.00170** | 0.00142** | 0.000932*** |
| | (0.0148) | (0.0111) | (0.00687) | (0.000751) | (0.000567) | (0.000356) |
| UK Visa Change 1 | 0.287 | 0.254* | 0.167* | 0.0146 | 0.0129* | 0.00849* |
| | (0.185) | (0.144) | (0.0868) | (0.00926) | (0.00722) | (0.00435) |
| UK Visa Change 2 | 0.172 | 0.111 | 0.110 | 0.00811 | 0.00516 | 0.00522 |
| | (0.161) | (0.126) | (0.0804) | (0.00809) | (0.00633) | (0.00406) |
| Origin Country Population | 7.66e-09* | 5.16e-09* | 2.98e-09* | 3.83e-10* | 2.58e-10* | 1.50e-10* |
| | (4.37e-09) | (2.88e-09) | (1.57e-09) | (2.18e-10) | (1.44e-10) | (7.81e-11) |
| Destination Country Population | -1.58e-08 | -8.11e-09 | -9.15e-09 | -6.63e-10 | -2.71e-10 | -3.50e-10 |
| | (3.15e-08) | (2.23e-08) | (1.23e-08) | (1.57e-09) | (1.12e-09) | (6.18e-10) |
| Origin GDP per capita | 2.32e-06 | 1.56e-06 | 5.36e-07 | 1.35e-07 | 9.03e-08 | 3.22e-08 |
| | (4.04e-06) | (3.01e-06) | (1.75e-06) | (2.05e-07) | (1.53e-07) | (8.82e-08) |
| Destination GDP per capita | -7.23e-05*** | -5.21e-05*** | -3.20e-05*** | -3.43e-06** | -2.48e-06** | -1.52e-06** |
| | (2.63e-05) | (1.90e-05) | (1.22e-05) | (1.33e-06) | (9.74e-07) | (6.33e-07) |
| Constant | 3.609 | 2.394 | 1.711* | 0.167 | 0.107 | 0.0765 |
| | (2.414) | (1.691) | (0.941) | (0.118) | (0.0832) | (0.0467) |
| Observations | 17,150 | 17,150 | 17,150 | 17,150 | 17,150 | 17,150 |
| R-squared | 0.728 | 0.704 | 0.649 | 0.731 | 0.706 | 0.650 |
| Country Dyad and Year FEs | YES | YES | YES | YES | YES | YES |

Notes: The level of analysis is a source country-destination country-year. The dependent variable in each model is $z_{odt}$ from Equation 2. Each column shows a slightly different measure of $z_{odt}$ based on the percentage of matches an immigrant player must have been in the starting lineup to be counted towards a club's limit on immigrant players. The columns also vary across another dimension: in columns 1-3, we predict the total number of immigrant players in the country, while in 4-6 we predict the average number of immigrant players per club. *** p<0.01, ** p<0.05, * p<0.1

**Table 4: Second Stage Results (2SLS Models)**

| | DV = Goal Difference | | | | DV = Pr(win) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) Avg 50% | (2) Total 50% | (3) Avg 70% | (4) Total 70% | (5) Avg 50% | (6) Total 50% | (7) Avg 70% | (8) Total 70% |
| Number of immigrant players | 0.124*** | 0.171*** | 0.168*** | 0.219*** | 0.0231* | 0.0353*** | 0.0347*** | 0.0479*** |
| | (0.0433) | (0.0485) | (0.0460) | (0.0553) | (0.0118) | (0.0129) | (0.0125) | (0.0146) |
| Observations | 7,777 | 7,777 | 7,777 | 7,777 | 7,777 | 7,777 | 7,777 | 7,777 |
| Season x League FE | YES | YES | YES | YES | YES | YES | YES | YES |
| First stage F | 102.4 | 65.17 | 88.06 | 56.67 | 102.4 | 65.17 | 88.06 | 56.67 |

Notes: The level of analysis is the club-match. The sample consists of all international matches from 1990/91-2019/20 in the Europa and Champions Leagues. The column headings describe the decision rules used to construct the dependent variable in the first stage regression (see footer to Table 3). Number of immigrant players refers to the number of immigrant players in the starting lineup of the match. Standard errors clustered at the country X season level. *** p<0.01, ** p<0.05, * p<0.1

**Table 5**

**Panel A. Prior season characteristics of clubs based on their response to rule liberalization.**

| | Club deploys more immigrant players after liberalization? | | | |
|---|---|---|---|---|
| | No | Yes | Difference | p-value |
| Qualifies to Playoffs in UEFA Tournament | 0.7 | 0.7 | -0.04 | 0.786 |
| Final Position in Domestic Competition | 3.2 | 3.6 | 0.39 | 0.548 |
| Goal Difference in Domestic Competition | 23.1 | 22.5 | -0.61 | 0.870 |
| Total Points in Domestic Competition | 65.6 | 62.7 | -2.91 | 0.311 |
| Had a Foreign Manager | 0.3 | 0.2 | -0.03 | 0.818 |

Notes: Clubs in the analysis are those that participate in a UEFA tournament in a season when the club's domestic football association liberalized the immigrant player cap. The variables in each row describe the characteristics of the clubs during the previous season. Qualifies to Playoffs in UEFA Tournament is equal to one when the club advance from the group stage to the playoffs or knockout stage and equals to zero otherwise. Final Position in Domestic Competition is the rank at the end of the domestic league season. Goal Difference in Domestic Competition is the accumulated goal difference at the end of the domestic league season. Total Points in Domestic Competition is the total number of points a club earns during the domestic league competition. Had a Foreign Manager is a equal to one when the club had a foreign-born manager during the previous season and equals to zero otherwise. Percentage of club X season that react as expected: 61.2%. Number of observations: 49 club-seasons.

**Panel B: Do clubs from countries that did not liberalize immigration caps deploy fewer immigrant players?**

| | Mean | 95% Confidence Interval | p-value | Obs. |
|---|---|---|---|---|
| Difference in the Number of Immigrant Players | 0.015 | [ -0.167 ; 0.197 ] | 0.870 | 127 |

Notes: Clubs in the analysis are those that participate in a UEFA tournament in a season when the club's domestic football association did not liberalize the immigrant player cap but one or more of the other four leagues did liberalize the cap. The main variable shown is the difference between the average number of immigrant players deployed by the firm during the current and the previous season.

**Table 6: Robustness Checks of 2SLS Model**

| | (1) Baseline | (2) Players defined by having played 70% of the match | (3) Players defined by having played 50% of the match | (4) Excluding Brazil | (5) Lee et al. (2021) Adj. SE |
|---|---|---|---|---|---|
| Number of immigrant players | 0.168** | 0.207*** | 0.129*** | 0.188*** | 0.168*** |
| | (0.0460) | (0.0514) | (0.0446) | (0.0486) | (0.0460) |
| Observations | 7,777 | 7,777 | 7,777 | 7,777 | 7,777 |
| Season x League FE | YES | YES | YES | YES | YES |
| First stage F | 88.06 | 80.23 | 95.09 | 48.09 | 88.06 |
| Lee et al. (2021) – Adj. SE | | | | | 0.0463 |
| Lee et al. (2021) – Adj. 95 CI LB | | | | | 0.0772 |
| Lee et al. (2021) – Adj. 95 CI UB | | | | | 0.259 |

Notes: The level of analysis is the club-match. The sample consists of all international matches from 1990/91-2019/20 in the Europa and Champions Leagues. The dependent variable is goal difference in all columns. In columns 1, 4, and 5, we use the instrument constructed using the average number of immigrant players that participated in the starting lineup for at least 70% of the matches. Number of immigrant players refers to the number of immigrant players in the starting lineup of the match. In column 5, we report the adjusted standard error (SE) for the coefficient of the main variable, number of immigrant players. We also report the lower bound (LB) and upper bound (UB) of the 95% confidence interval. We followed the procedure proposed by Lee et al. (2021) ╔. Standard errors clustered at the country X season level. *** p<0.01, ** p<0.05, * p<0.1

**Table 7: Placebo Test**

| | (1) Goal difference | (2) Goal difference | (3) Goal difference | (4) Goal difference | (5) Goal difference |
|---|---|---|---|---|---|
| Immigrant Player cap (t+1) | 0.00445 | | | | |
| | (0.00739) | | | | |
| Immigrant Player cap (t+2) | | 0.00116 | | | |
| | | (0.00732) | | | |
| Immigrant Player cap (t+3) | | | -0.00111 | | |
| | | | (0.00721) | | |
| Immigrant Player cap (t+4) | | | | -0.00252 | |
| | | | | (0.00747) | |
| Immigrant Player cap (t+5) | | | | | -0.00195 |
| | | | | | (0.00753) |
| Constant | 0.485*** | 0.504*** | 0.514*** | 0.523*** | 0.517*** |
| | (0.0516) | (0.0523) | (0.0524) | (0.0542) | (0.0547) |
| Observations | 7,497 | 7,197 | 6,898 | 6,621 | 6,326 |
| R-squared | 0.008 | 0.008 | 0.009 | 0.009 | 0.009 |
| Season x League FE | YES | YES | YES | YES | YES |

Notes: The level of analysis is the club-match. The sample consists of all international matches from 1990/91-2019/20 in the Europa and Champions Leagues. The dependent variable is goal difference in all columns. Standard errors clustered at the country X season level. *** p<0.01, ** p<0.05, * p<0.1

**Table 8: Are Immigrant Players More Talented than Natives? OLS Results**

| | (1) Player in Starting Lineup | (2) Dribble Success | (3) Pass Success | (4) Scores | (5) Any Yellow | (6) Expelled | (7) Substituted | (8) Touches |
|---|---|---|---|---|---|---|---|---|
| Immigrant Player | 0.0403*** | 0.0295*** | 0.00648** | 0.0100*** | -0.00497 | 0.000336 | 0.00641 | 0.562 |
| | (0.00719) | (0.00967) | (0.00250) | (0.00366) | (0.00392) | (0.000769) | (0.00504) | (0.729) |
| Age | 0.209*** | -0.00136 | -0.00494 | 0.0255*** | 0.0213*** | 0.00150* | 0.0109* | 4.197*** |
| | (0.00756) | (0.0112) | (0.00318) | (0.00339) | (0.00388) | (0.000769) | (0.00605) | (0.751) |
| $Age^2$ | -0.00355*** | 6.25e-05 | 8.49e-05 | -0.000447*** | -0.000368*** | -2.75e-05* | -0.000187* | -0.0696*** |
| | (0.000145) | (0.000208) | (5.97e-05) | (6.23e-05) | (7.04e-05) | (1.41e-05) | (0.000110) | (0.0136) |
| Constant | -2.584*** | 0.536*** | 0.868*** | -0.261*** | -0.175*** | -0.0141 | 0.0350 | -10.94 |
| | (0.0965) | (0.148) | (0.0416) | (0.0452) | (0.0528) | (0.0102) | (0.0809) | (10.02) |
| Observations | 200,953 | 18,849 | 35,294 | 101,288 | 101,288 | 101,288 | 101,288 | 35,426 |
| R-squared | 0.095 | 0.103 | 0.268 | 0.109 | 0.051 | 0.038 | 0.090 | 0.261 |
| Position x Club x Season FE | YES | YES | YES | YES | YES | YES | YES | YES |

Notes: The level of analysis is the player-match in models 1-8. The sample of matches consists of all international matches from 1990/91-2019/20 in the Europa and Champions Leagues. The indicator *Immigrant Player* = 1 if the player was born abroad. The sample sizes differ across models because we use different subsets of the data. In model 1, we predict whether the player starts the match in the starting lineup. Thus, we created a dataset with all the club's matches for each player. *Player in Starting Lineup* is a dummy indicating whether the player is in the starting lineup. In models 2-3, we create two measures of talent that require data from WhoScored. *Dribble Success* is the percentage of dribbles that are successful (successful dribbles/attempted dribbles), conditional on attempting at least one dribble. *Pass Success* is the percentage of passes that are successful (successful passes/total passes), conditional on attempting at least one pass. In models 4-7, we use data from Transfermarkt. Thus, we can include all the international matches of our sample. *Scores* is a dummy indicating whether the player scored one or more goals. *Any Yellow* is a dummy indicating whether the player received a yellow card. *Expelled* is a dummy indicating whether the player is expelled from the match (two yellows or a straight red card). *Substituted* is a dummy indicating whether the player was substituted after playing during part of the match. In model 8, we also use data from WhoScored. Thus, the sample size is smaller than the analyses in which the data comes from Transfermarkt. *Touches* is the actual number of times the player touched the ball during the match. Standard errors are clustered at the club level. *** p<0.01, ** p<0.05, * p<0.1

**Table 9: Do Immigrant Players Increase Their Clubs' Variety of Actions on the Field? Second Stage Results**

| | (1)<br>Strategic Richness Index | (2)<br>Density | (3)<br>Integration (1-Modularity) |
|---|---|---|---|
| Number of immigrant players | 0.306** | 0.0115*** | 0.00964*** |
| | (0.120) | (0.00382) | (0.00310) |
| Observations | 2,740 | 2,740 | 2,740 |
| Season x League FE | YES | YES | YES |
| First stage F | 60.39 | 60.39 | 60.39 |

Notes: The level of analysis is the club-match. The sample consists of all international matches from 2009/10-2019/20 in the Europa and Champions Leagues. The column headings denote which measure of strategic variety is used as the outcome variable in the 2SLS regression. The first stage is the same as Table 4. Specifically, we use the instrument constructed using the average number of immigrant players that participated in the starting lineup for at least 70% of the matches. Number of immigrant players refers to the number of immigrant players in the starting lineup of the match. Standard errors clustered at the country X season level. *** p<0.01, ** p<0.05, * p<0.1

**Table 10: Strategic Variety Is Correlated with Positive Club Performance: OLS Results**

| | (1) Goal difference | (2) Goal difference | (3) Goal difference | (4) Pr(win) | (5) Pr(win) | (6) Pr(win) |
|---|---|---|---|---|---|---|
| Strategic Richness Index | 0.259*** | | | 0.0405*** | | |
| | (0.0195) | | | (0.00618) | | |
| Density | | 1.838*** | | | 0.230* | |
| | | (0.485) | | | (0.127) | |
| Integration (1-Modularity) | | | 2.460*** | | | 0.385** |
| | | | (0.583) | | | (0.166) |
| Constant | 0.159*** | -0.570** | -0.773** | 0.423*** | 0.342*** | 0.277*** |
| | (0.0458) | (0.282) | (0.331) | (0.0133) | (0.0751) | (0.0872) |
| Observations | 2,698 | 2,698 | 2,698 | 2,740 | 2,740 | 2,740 |
| R-squared | 0.077 | 0.086 | 0.089 | 0.085 | 0.067 | 0.068 |
| Season x League FE | YES | YES | YES | YES | YES | YES |

Notes: The level of analysis is the club-match. The sample consists of all international matches from 2009/10-2019/20 in the Europa and Champions Leagues. Standard errors clustered at the country X season level. *** p<0.01, ** p<0.05, * p<0.1

**Table 11: Passing Patterns of Immigrant Players: OLS Results**

| | (1) % Passing Sequences with A → B→ C Sequencing | (2) % of sequences that player is located at the beginning of a passing sequence | (3) % of sequences that player is located in the middle of a passing sequence | (4) % of sequences that player is located in the final part of a passing sequence | (5) Average Length of the Player's Passing Sequences |
|---|---|---|---|---|---|
| Immigrant Player | 0.00903* | 0.0000419 | 0.00417* | -0.00422 | 0.0207** |
| | (0.00458) | (0.00238) | (0.00241) | (0.00335) | (0.00965) |
| Age | -0.00225 | 0.000260 | -0.00300 | 0.00274 | -0.0187 |
| | (0.00336) | (0.00258) | (0.00240) | (0.00303) | (0.0125) |
| Age2 | 7.17e-05 | 1.71e-05 | 7.12e-05 | -8.83e-05 | 0.000288 |
| | (6.04e-05) | (4.75e-05) | (4.33e-05) | (5.58e-05) | (0.000228) |
| Constant | 0.483*** | 0.273*** | 0.342*** | 0.385*** | 5.278*** |
| | (0.0459) | (0.0345) | (0.0328) | (0.0408) | (0.169) |
| Mean DV | 0.48 | 0.29 | 0.32 | 0.39 | 5.00 |
| Observations | 35,159 | 35,108 | 35,108 | 35,108 | 35,158 |
| R-squared | 0.298 | 0.446 | 0.166 | 0.311 | 0.334 |
| Position x Club x Season FE | YES | YES | YES | YES | YES |

Notes: The level of analysis is the player-match. The sample of matches consists of all international matches from 2009/10-2019/20 in the Europa and Champions Leagues. The indicator *Immigrant Player* = 1 if the player was born abroad. In Column 1, the dependent variable captures the percentage of passing sequences involving the player where the ball went from player A to player B to player C, rather than from player A back to player B. In Columns 2-4, the dependent variable captures the location of the player in a passing sequence of three or more players. In column 2, the dependent variable is the percentage of passing sequences in which the player is located at the beginning of the sequence. In column 3, the dependent variable is the percentage of passing sequences in which the player is in the middle of the sequence. In column 4, the dependent variable is the percentage of passing sequences in which the player is in the final part of the sequence. In Column 5, the dependent variable is the average length of a player's passing sequence measured by the number of distinct players that participate in the player's passing sequences. Standard errors are clustered at the club level. *** p<0.01, ** p<0.05, * p<0.1

**Appendix I: Characteristics of the International Football Labor Market**

The labor market in the football industry has several characteristics that are important to understand as the institutional context of this study. Other than the rules and restrictions on the number and definition of "foreign" players, which we explain the main text, the market operates with few restrictions. Clubs and players can bargain unrestrictedly for whatever market-based salary they agree upon. As in any professional sport, players have agents who negotiate on their behalf. Players sign contracts with clubs for a specific period and salary, but there are no rules (other than basic contract law) that bind players or clubs to each other for the entire duration of the contract. Any club wishing to sign a player at another club, even if that player is under contract, can make a bid for that player's services to the club in which the player currently plays. The buying club pays a transfer fee to the selling club (i.e. buyout clause) and separately agrees to a salary with the player. There are no truly binding restrictions on transfer fees or salaries. In 2011, UEFA (the association that sets rules for European football) announced plans to gradually implement certain "Financial Fair Play" rules that could have indirectly affected transfer fees and salaries (e.g. auditing the fair market value of club sponsorship deals). But those rules were not immediately adopted and, in practice, football clubs had significant leeway to get the players they wanted. As an illustration, Paris Saint-Germain (PSG) broke the transfer fee record (€222 million) in 2017 when it hired Neymar, a Brazilian player, from FC Barcelona. For all intents and purposes, the market operates like any labor market in a corporate setting except that (1) one firm pays a fee to another firm when hiring a player away and (2) the transfers must take place during a designated transfer period (a window of a few weeks during the summer and winter).

The competitive structure and rules of European football (soccer) differ substantially from popular professional sports in the U.S. (e.g. baseball, basketball, American football, hockey), which have been the setting for several research studies in management. First, football clubs are not guaranteed to stay in the same league every season; they can be demoted to a lower league or promoted to a higher league based on their performance. Second, there is no "draft" in which clubs get to pick rookies who are entering the profession in a certain order (and are allowed to pay them below market wages for a designated number of years). Football clubs can hire players from any country at any stage of their career, except for minors (FIFA has implemented rules to prohibit child exploitation). Third, as already noted, football clubs face almost no rules regarding the overall wage bill or the maximum/minimum individual wage that can be offered to a player. Fourth, football clubs not only compete (for players and on the field) with clubs from their own leagues, but also compete with clubs from leagues in other countries, making the market truly global. American professional sports leagues face almost no competition from rival leagues. Finally, when a football player is transferred to a new club, the old contract is terminated. While in highly exceptional cases clubs can trade contracts, virtually all transfers are different to those in the American sports, where players move with their existing contracts to the new team.

As a result, the labor market in football is economically significant and global. For instance, according to a FIFA report, in 2019 there were 4,162 football clubs involved in 18,042 international transfers affecting more than 15 thousand players from almost 180 different countries (FIFA 2019). In terms of value, transfers involving at least one European club generated close to USD 7 billion and accounted for 95% of the total value of transfer fees in 2019.

**Appendix II: Data Collection Process for League Rules Regarding Immigrant Players**

We created a hand-collected database documenting temporal changes in rules governing the acquisition and transfer of immigrant players for each of the five leagues in our sample. As described in the methods section, we use changes in national caps on the number of immigrant players and in the countries subject to those caps to instrument the actual number of immigrant players hired by each club. To collect these data, we relied on several sources. We started by collecting information from league's websites on their current rules as of 2020. However, data for previous years was not available for most seasons. While some major changes to immigrant players rules are well documented, such as the Bosman ruling of 1996, most of the incremental amendments made by individual leagues are not documented by a single source. We thus manually collected the information from various sources for each of the five leagues in our sample by searching the main newspapers from each country. If we found inconsistencies across historical accounts, we contrasted different data sources. We also contacted several experts to resolve conflicting information. Based on the information we collected, we created a league-year dataset that records the number of immigrant players allowed in a squad during a season and on the field during a game (Table 1a), and the countries or regions exempted from immigration rules (Table 1b).

To illustrate our data gathering procedure, take the case of Spain's La Liga. In 1988, *El País*, Spain's main newspaper, reported that the national football assembly passed a rule that allowed clubs to have 3 immigrant players beginning in the 1988/89 season. In 1991, the same newspaper reported that clubs could employ 4 immigrant players by the 1991/92 season. Because major announcements regarding the rules were not available for all seasons, we also took advantage of articles describing clubs that breached immigrant players rules. In 1994, for instance, the Spanish FA fined Real Madrid because they fielded four immigrant players in a match against SD Compostela. At that time, clubs could employ 4 immigrant players, but could only field 3 of them at the same time during a match. Jorge Valdano, Real Madrid's coach, mistakenly substituted a Spaniard, Luis Enrique, with Czech player Peter Dubovsky. During the last 10 minutes of the match, Real Madrid played with an Argentinian, a Danish, a Chilean, and a Czech player. As a result, Real Madrid was fined for violating the rules. Each league can implement different constraints on the number of immigrant players that a club can employ during a season and play during a match.

Additionally, leagues can implement different definitions of which countries of origin are subject to the immigrant player cap. In some cases, these definitions directly follow from the country's more general immigration regulations. In other cases, the league defines "foreign" differently than immigration authorities. Two major agreements shape player migration in European football: the European Union (EU) and the Cotonou Agreement. First, players from EU member states were considered nonimmigrant players starting in the 1996/97 season, after the watershed Bosman case ruling. The ruling indicated that athletes born in any EU state should be allowed to work freely in any other EU state. Before 1996, none of the football leagues were required to exempt players from EU nations from the immigrant player quota. The EU further enlarged its list of member states in 2004, 2007, and 2013. Second, the Cotonou Agreement extended some of the EU's rules on freedom of labor mobility to 78 African, Caribbean, and Pacific states. Thus, Cotonou allows individuals from non-EU states to benefit from some of the immigration exemptions.

Leagues may also lift restrictions of their own accord or because of court rulings that deem it illegal to impose restrictions on individuals from certain countries. For instance, Bundesliga (Germany) does not impose limits on the number of players born in any of the UEFA countries. Another example is

La Liga (Spain), which in the early 2000s lifted restrictions for Russian players after a court ruled that Russian individuals had to be treated like individuals from EU member states.

There is a straightforward (but not always easy) way for a foreign-born player to overcome the cap imposed by a league: becoming a citizen of the focal league's country, after which they no longer count towards the immigrant player cap. For example, Lionel Messi, born in Argentina, is a Spanish citizen so he was not counted as foreign when playing for FC Barcelona. However, players are subject to applicable immigration laws if they desire citizenship—there is no special path to citizenship for footballers. Typically, a player who is not exempt from the cap on immigrants must reside in the country for years before becoming a citizen.

These various considerations mean that the actual number of foreign-born players on a club can exceed the cap on immigrants defined by league rules. For instance, a club from Spain might field more than the maximum three "foreign" players allowed if some of the players were, say, naturalized citizens or born in the EU or from a Cotonou country. Thus, the league rules are not deterministic in predicting the number of immigrant players on a club. But they do place important constraints that, on average, lead to a close correspondence between the actual vs. maximum immigrant players allowed. Our instrumental variable is based on this logic.

**Appendix III: Process Behind the Changes in Immigrant Player Rules**

Our identification strategy relies on the assumption that the data generating process for the league-specific caps on immigrant players and the country-specific exceptions are uncorrelated with factors that also explain the performance differentials across clubs from different countries when they play one another in international tournaments. By and large, our investigation of the circumstances influencing the rule changes suggest that the assumption is reasonable.

The process leading to changes in caps on immigrant players was political and contested by various stakeholders:

- Players' unions, who represent local players
- Club owners, whose motives for ownership are complex (sporting/fandom, long-term club valuation, personal motives, community development)
- Football associations (FAs), who organize the league in each country
- Commercial partners, who sponsor the league and individual clubs
- Representatives of the national team
- Government officials
- The media and the public

The local players' unions were historically wary of relaxing caps on immigrant players or of exempting countries from those caps. They usually took the position that immigrant players would undermine the wages and job security of domestic players (e.g. El País, 1999). The extent of opposition varied somewhat across leagues, but even at their most supportive the unions advocated for a highly controlled rollout of quota expansions to have time to prove that native players weren't severely harmed. There was no agreement on what highly controlled meant, and no players union developed a preset rollout in terms of cap numbers or countries exempt. The issue was debated at different points in time, sometimes resulting in no changes and other times resulting in relaxations of caps, but never in a predictable manner.

Representatives of the national team were perhaps the party most aligned with players' unions. This might require explanation for those unfamiliar with the football (soccer) industry. In addition to playing for professional clubs that pay their wages, players can represent their countries in prestigious international tournaments such as the World Cup, the European Championship, or the Copa America. This is like NBA or NHL players representing their countries at the Olympics. But more than with other sports, playing for the national team is highly desirable and important for a player's career. Thus, in each country—and especially in the five countries in our study—those representing the interests of the national team (managers, coaches, and the public) are powerful stakeholders influencing the decisions of the FA and local professional clubs. The expansion of immigrant player quotas was frequently opposed (and still is, in some cases) under the argument that immigrant players would crowd out domestic players in local clubs, which would in turn harm the national team's performance in prestigious tournaments by not allowing native players to fully develop their skills (e.g. Goddard, Sloane, & Wilson, 2012). For instance, this is often stated as an explanation for England's consistent underperformance in the World Cup and in the Euros considering the Premier League's high openness to immigrant players (The Guardian, 2010). In the last few years, the opposite argument (that competition from immigrant players makes native players stronger) has gained some traction. But this is still a highly contested issue.

Club owners, commercial partners, and FAs have typically been more open to allowing immigrant players for two reasons. First, they want to attract the most talented players to make the local clubs more competitive. Second, and closely related, they believe they can enhance revenues by having

more talented players. This is particularly true for attracting commercial sponsors for the league as a whole (e.g. branding the league itself, as in the "Barclays Premier League" or "La Liga Santander") and for individual clubs (e.g. Chevrolet sponsoring Manchester United). Further, the market value of TV rights—by far the largest source of revenue—is likely to be higher the more global supporters the league and its clubs have around the world, which is correlated with the quality of players and the variety of countries those players represent.

Government officials, such as labor regulators or foreign office officials, did not get directly involved in the minutiae of FA rules. However, they could influence the process indirectly. For example, immigration rules remained as potential obstacles to hiring immigrant players in England and Germany even after those two FAs eliminated all quotas. In 2021, the Prime Minister of the United Kingdom threatened a number of football clubs with legislation that would make it more difficult to hire immigrant players (The Guardian, 2021). The geopolitical interests of certain countries also played an indirect role in affecting which countries might be exempt from quotas. For example, France's complex relationships with former colonies likely influenced the decision to exempt Cotonou agreement countries from the quotas.

Similarly, the media and the public are not directly involved in the rule-setting process, but they do play a role in putting pressure on clubs, FA officials, and other relevant actors. For example, the timing of when to relax quotas on immigrant players is sometimes correlated to public sentiment about job security due to economic conditions like recessions.

The interest of club owners in expanding the pool of available foreign talent requires further consideration. A particular concern for our study would be that clubs drive the changes in rules to enhance their performance in UEFA-level tournaments, or that the clubs that benefit most from marginal loosening of quotas are "better" clubs that are more likely to perform well in UEFA-level tournaments. To some extent, it is true that clubs view attracting the best talent from abroad as critical to their overall performance and that smaller/poorer clubs have in some cases been concerned about suffering competitive disadvantages in the *domestic* league. This was the case in Spain during the early 1990's, for instance. But it is also crucial to note that owners have varying motives for owning a club, and that ownership models and motives differ within and across leagues over time. Some owners are in it for personal reasons, such as being lifelong fans of a particular club or seeking bolster their personal image. Owners with financial motives seek to increase the long-term valuation of the club (not necessarily profits, as this is a revenue and valuation-driven business). Other clubs are "member owned" and thus have strong community orientations. Motives for ownership are even more varied than these three examples. The point is that varied motivations make it difficult for clubs within a league to collude or coordinate their desires for more or fewer foreign-born players.

With all the considerations in mind, residual concerns that certain clubs are especially motivated to reduce caps on foreign players are not that relevant in our empirical contest. On the one hand, this document should have made it clear by now that clubs were only one of many stakeholders. They did not and still do not have power to unilaterally influence immigrant player rules. Instead, quotas are the result of a complicated process of negotiating and compromising various interests. Further, even if the secular trend has been to relax quotas and allow more immigrant players (which is in the interest of clubs and the FA), it is very hard for any one stakeholder to influence the timing of rule changes in a manner that correlates with the competitive needs of certain clubs in UEFA-level tournaments. On the other hand, the smaller and poorer clubs who (initially) resisted expanding the pool of immigrant players are not the types of clubs that usually compete in UEFA-level tournaments, so they do not factor in our identification

strategy. But even within the domestic leagues, these clubs soon realized that they also benefited significantly from expanding the pool of available talent to foreign markets. They didn't have to compete as fiercely for a limited set of native players but could take advantage of the attractiveness of the European leagues to entice young players from other parts of the world, particularly South America and Africa. This led them to quickly align their interests in immigrant players with the larger and wealthier clubs in their leagues.

A final consideration is that our identification strategy relies on variance across clubs from different countries being able to hire a *marginal* immigrant player. Such players are unlikely to be the superstars that clubs make sure to prioritize (e.g. Messi or Ronaldo), but rather other players who still play important roles—and are highly talented—but whom they would not prioritize.

## Appendix IV: Descriptive Statistics for Player-Match Observations

| | | Mean | Std. Dev. |
|---|---|---|---|
| **1** | Immigrant Player | 0.47 | 0.50 |
| **2** | Starting Lineup | 0.43 | 0.50 |
| **3** | Dribble Success | 0.56 | 0.40 |
| **4** | Pass Success | 0.79 | 0.15 |
| **5** | Any Goal | 0.05 | 0.21 |
| **6** | Any Yellow | 0.13 | 0.33 |
| **7** | Expelled | 0.01 | 0.08 |
| **8** | Substituted | 0.19 | 0.39 |
| **9** | Touches | 49.37 | 26.71 |

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | Immigrant Player | 1.000 | | | | | | | | |
| **2** | Starting Lineup | 0.005 | 1.000 | | | | | | | |
| **3** | Dribble Success | 0.034*** | 0.038*** | 1.000 | | | | | | |
| **4** | Pass Success | 0.028*** | 0.048*** | 0.102*** | 1.000 | | | | | |
| **5** | Any Goal | 0.046*** | 0.066*** | -0.008 | -0.039*** | 1.000 | | | | |
| **6** | Any Yellow | -0.007 | 0.076*** | 0.018* | -0.016* | -0.012 | 1.000 | | | |
| **7** | Expelled | 0.012 | 0.013 | 0.003 | -0.003 | -0.017* | 0.100*** | 1.000 | | |
| **8** | Substituted | 0.025*** | 0.241*** | -0.067*** | -0.051*** | 0.052*** | -0.041*** | -0.042*** | 1.000 | |
| **9** | Touches | -0.016* | 0.551*** | 0.163*** | 0.313*** | -0.023** | 0.057*** | -0.014* | -0.166*** | 1.000 |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows the mean, standard deviation and correlations of the main variables included in the analysis in Table 8. Because we only have event-data from WhoScored for all leagues and seasons 2009/10-2019/20, we display the descriptive statistics for this subset of the database.

## Appendix V: Measuring Integration

As described in the main text, we calculated integration as 1 - modularity, where the modularity of a football club's collaboration patterns based on the module structure of the passing network generated during each club-match. While there are different algorithms to identify modules within a collaboration network, we follow recent advances in network science and used the infomap algorithm (Rosvall et al. 2014). Prior to using the infomap algorithm, we created a "memory network." This differs from a typical "memoryless" network, in which the nodes would be the 11 players on the field and the links would be the passes among them. In a memory network, the nodes are player dyads (as many as 110 nodes because a player might pass to any one of his ten teammates) and the links are passes between dyads. A memoryless representation of a network ignores an important feature of the flow between nodes: where the flow comes from determines where the flow goes next. A memory network considers this important feature of the network dynamic. See Rosvall et al. (2014) for details. We then implemented the infomap algorithm to identify modules within the memory passing network for each club-match. Next, we calculated the modularity of the optimal module partition identified by the algorithm. To obtain the integration of the clubs' passing network, we substract modularity from 1.

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