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Why Are Migrants Paid More?

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Abstract
In efficient global labour markets for very high wage workers one might expect wage differentials between migrant and domestic workers to reflect differences in labour productivity. However, using panel data on worker-firm matches in a single industry over a seven year period we find a substantial wage penalty for domestic workers which persists within firms and is only partially accounted for by individual labour productivity. We show that the differential partly reflects the superstar status of migrant workers. This superstar effect is also apparent in migrant effects on firm performance. But the wage differential also reflects domestic workers' preferences for working in their home region, an amenity for which they are prepared to take a compensating wage differential, or else are forced to accept in the face of employer monopsony power which does not affect migrant workers.

Keywords: wages; migration; superstars; productivity; compensating wage differentials; sports
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1. Introduction

Most studies of migrants' labour market fortunes find they suffer a wage penalty relative to "like" domestic workers. This penalty is particularly evident when migrant workers are unable to work in their original profession and when they lack host country skills, notably language skills. Some of these effects dissipate with assimilation, resulting in a reduction in the wage penalty over time (Dustmann and Fabri, 2003; Friedberg, 2000). Nevertheless, a wage penalty usually persists and this is often attributed to labour market discrimination due to employer preferences. One problem with these studies is that they are unable to quantify the contribution to this gap of labour productivity differentials across workers and over time because they lack individual-level labour productivity.

Another strand of the labour economics literature has recently emerged in response to the growth in wage inequality across individuals over time, particularly at the top end of the wage distribution. Whilst this literature shows a growth in the wage premia attached to educational qualifications, nearly all the growth in inequality is due to growth in residual dispersion, that is to say it occurs *within educational groups*, and so on (Barth et al., 2011). One factor driving the huge growth in the wages of top earners is employers' desire to capture rare talent capable of generating very substantial revenues. This has spawned a literature which seeks to explain the earnings of "superstars" in the market for CEO's (Malemendier and Tate, 2009), in high-tech industries such as software design (Andersson et al., 2009), and among occupations like rock stars (Krueger, 2005). We shed light on the labour market for very high wage earners by pulling together the literatures on migration and superstardom to explain why in global markets migrant workers are sometimes paid considerably more than domestic workers. We are able to do so with very rich panel micro-data containing information on nationality, individual-level time-varying labour productivity and firm performance.

Our empirical setting is professional football, a truly global labour market with superstar performers (Kleven et al., 2010; Lucifora and Simmons, 2003). We have panel data for all players in Italian football's Serie A (and for many in Serie B) for a seven year period through to 2008 which contains very rich data on individual players including their nationality and their labour productivity for each game which we aggregate to the season-level, together with players' annual salaries. The player data are linked to the football teams for which they play, allowing us to condition on team fixed effects and explore time-varying team fortunes. We estimate players' contributions to team wins and fan attendance at games which, in our data, are the key determinant of team revenues. We argue that the increase in team points and crowd attendance with the rise in the percentage of migrants in the team is a strong indicator of their superstar status.

We find a substantial wage penalty for domestic (Italian) players relative to their migrant counterparts. It persists within firms and is only partially accounted for by individual labour productivity. We show that the differential partly reflects the superstar status of migrant workers and domestic workers' preferences for working in their home region, an amenity for which they are prepared to take a compensating wage differential, or else are forced to accept in the face of employer monopsony power which does not affect migrant workers.

The remainder of the paper is set out as follows. Section Two reviews the previous literature on the wage effects of migration, on the one hand, and superstardom, on the other, including the only other paper we are aware of that looks at the wage effects of migration and

superstars at once. Section Three outlines our theoretical framework. Section Four presents our data and the institutional setting for the empirical analysis. Section Five outlines our empirical strategy. Section Six presents results and Section Seven concludes.

2. Previous Literature

The bulk of the literature on the impacts of immigration on either domestic or migrant workers is from the United States. Studies tend to find wage penalties for migrants, but there is evidence from the United States of wage convergence with assimilation (Lazear, 1999; Hu, 2000). The effect of migration on native workers' wages is hotly disputed. Using data from the United States, Canada and Mexico, Aydemir and Borjas (2007) and Borjas (2003, 2006) find that migration had a negative and significant impact on earnings of native workers, as predicted by a competitive model of the labour market. By contrast other studies, such as Card's (1990) study of the impact of the Mariel boatlift on Miami's wages and unemployment rates, find little or no labour market impact.

Elsewhere, using the United Kingdom Labour Force Survey (LFS) for 2000 to 2007, Clark and Drinkwater (2008) find migrants did worse than native born workers in terms of both employment rates and earnings. Using LFS and General Household Survey (GHS) data for 1973-2007 Manacorda et al. (2012) find immigration has a sizeable negative effect on existing immigrants' earnings but no significant effect on native workers' wages due to imperfect substitution. For the US, Ottaviano and Peri (2012) also find significant negative effects of immigration on previous immigrants using Census data. In contrast to others, they find only slightly negative effects of new immigration on native workers' wages in the short-run and positive effects in the long-run. For Italy - the setting for our study - Boeri *et al.* (2011) find that migrant workers have lower wages than similar native born workers and illegal immigrants suffer an even greater wage penalty. These studies use survey data which cover workers in different occupations with heterogeneous skills. Our paper focuses on a single occupation where skills (as opposed to ability) are fairly uniform.

Highly skilled migrants with good outside options may have strong bargaining power and may choose to locate where they can maximise earnings. Assuming free entry and lack of immigration controls, superstar workers in an industry are likely to be drawn to a country where this industry is best able to meet their pay demands. In the football industry in 2000, which is the context for this study, this was Italy (see below).

There is broad acceptance in the literature of Rosen's (1981: 845) definition of superstardom as a situation in which a "relatively small numbers of people earn enormous amounts of money and dominate the activities in which they engage". However, there exist two distinct theories about superstar formation and thus links between superstars and wages. The first is Rosen's (1981) which emphasises the role of talent: superstars arise where there is a convex relationship between the distribution of talent and the distribution of rewards such that "small differences in talent become magnified in large earnings differences" (Rosen, 1981: 846). Adler (1985), on the other hand, building on Stigler and Becker's (1977) theory of consumption capital, argues that superstardom is popularity and, as such, can arise in the absence of superior talent. He maintains that "stardom is a market device to economise on learning costs in activities where the more you know the more you enjoy. Thus stardom may be independent of the existence of a hierarchy of talent" (1981: 208-209).

However, neither talent nor popularity alone are sufficient to generate superstar salaries. Both Rosen and Adler believe superstardom arises in businesses where there are highly skewed positive returns to talent associated with scale economies of joint consumption which allow relatively few sellers to service a large market. This is what Rosen (1981: 846) refers to as "one's personal market scale". Superstar salaries may be offered in professional football, a business which can leverage consumer preferences for superstar talent using media and marketing strategies which allow them to reach a very large market (Lucifora and Simmons, 2003). We might anticipate the large premium attached to top talent to diminish having conditioned on labour productivity but wages will also reflect competition for the scarce talent which can generate firm revenues via off-field activities such as merchandise selling. Franck and Nüesch (2012) present evidence linking footballers' wages in Germany to their popularity and talent. But they do not discuss the issue of migration.

The only paper we are aware of that tackles migration and superstardom is Kleven *et al* (2010). They show that top rate taxation affects the location of superstar professional footballers in Europe. Nevertheless, many continue to play in their home country. In a competitive market for talented workers, those choosing not to move may suffer a wage penalty because their preference to remain gives the employer some monopsony power in wage setting: there are few credible outside options if the preference for staying is strong. Also, a worker may be prepared to earn less by way of a compensating differential for the amenity derived from remaining local. In this paper we show that superstar and monopsony effects contribute to the wage gap between native and migrant footballers in Italy, and that migrants improve team performance and generate increased revenues through higher crowd attendance.

3. Theoretical Framework

In conventional theory the migration decision entails a comparison of the present value of the costs and benefits from movement (Boeri and Van Ours, 2008; Borjas, 2006). A worker migrates if:

$$(w_F - w_H)/w_H > Ci/[w_H(1 + i)T^e \quad (1)$$

where w_F and w_H are wages in the foreign and home countries respectively, C is a switching cost, T^e is the expected duration in the foreign country and i is a market interest rate. The theory predicts that migration is more likely the lower the costs of mobility, the younger the individual (since this yields a larger value of expected duration of residence abroad over which to recoup switching costs) and the greater the difference in wage offers between foreign and home countries. Wages in the foreign and home countries are assumed to be exogenous, competitively determined and known. We argue below that the assumption of competitively determined wages is not appropriate for highly skilled footballers with scarce ability and that a bargaining model is more appropriate.

The basic theory of migration can be extended to allow for self-selection of immigrants. Borjas (1987) suggests that Mexican workers immigrating to the United States are a non-random subset of the Mexican workforce. A similar feature may apply to migrant footballers. The self-selection extension to the simple migration condition shown by Borjas (1987) can be set out as follows. Log earnings in the home country are given by

$w_H = \mu_H + \varepsilon_H$ where $\varepsilon_H \sim N(0, \sigma_H^2)$ (2)

Log earnings in the foreign country are given by

$w_F = \mu_F + \varepsilon_F$ where $\varepsilon_F \sim N(0, \sigma_F^2)$ (3)

Define the following terms:
$\rho = \sigma_{HF}/\sigma_H\sigma_F$, the correlation between home and foreign country earnings, where σ_{HF} is $\text{cov}(\sigma_H, \sigma_F)$; $\upsilon = \varepsilon_F - \varepsilon_H$; $z = (\mu_H - \mu_F)/\sigma_\upsilon$, assuming without loss of generality that the cost of migration is zero.

The expected wage in the home country, for workers who choose to leave, is given by

$E(w_H|\text{Migration}) = \mu_H + \rho_{H\upsilon}\sigma_H IMR$ (4)

where *IMR* is the Inverse Mills Ratio, defined here as the conditional expectation of a standard normal random variable censored from the left at *z*. This is the expectation of ε conditional on $\varepsilon \geq z$. (4) can be rearranged to give

$E(w_H|\text{Migration}) = \mu_H + (\sigma_H\sigma_F/\sigma\upsilon)(\rho - (\sigma_H/\sigma_F))IMR$ (5)

The expected wage in the foreign country, conditional on migration is given by

$E(w_F|\text{Migration}) = \mu_F + (\sigma_H\sigma_F/\sigma\upsilon)(\sigma_H/\sigma_F) - \rho)IMR$ (6)

It follows that $(\sigma_F/\sigma_H) > 1$ and $\rho > (\sigma_H/\sigma_F)$ are necessary and sufficient conditions for immigrants to be positively selected from the home country distribution and also for these immigrants to be above the mean of the home country distribution. The first condition states that the worker has higher returns to skill in the foreign country than the home country. Given that revenues are higher in Italy compared to most leagues in sending countries this would seem to be a reasonable proposition, excepting the elite leagues such as Spain and England. The second condition proposes that the correlation between skills valued in the home and foreign country should be sufficiently high. Since footballers' skills are highly transferable this is again a reasonable condition to hold in our context. In summary, the best and most talented footballers leave their home countries for better opportunities, i.e. higher returns to skills, in the top five European leagues, which comprise England, France, Germany, Italy and Spain.

The migration models summarised above are silent on the question of how wages are finally determined. Most migration theory assumes that pay is competitively determined with the wage equal to marginal revenue product (MRP). In professional football, players bargain with potential employers (clubs) through their agents. Since there are relatively few top tier clubs and relatively few vacancies for player positions in team squads (there are just 5 top level leagues in Europe each with 18 to 20 clubs and there are roughly 25 first-team roster places for each club) the demand for specialist footballers capable of playing at the top level is small compared to regular occupations. Since the players' labour market is thin, it is reasonable to expect that player wages are determined through bilateral bargaining (McLaughlin, 1994; Leeds and Kowaleski, 2001; Solow and Krautmann, 2011).

In basic bargaining theory, where a player and team maximise a joint surplus of payoffs, an increase in outside options raises the bargained wage. In our context, a greater valuation of domestic football and off-field culture by the player will lead to an increase in the value of the outside option and will feed through the Nash bargaining solution into a higher wage. An increase in switching costs will have a similar result. From these two points we conjecture that, for given ability, non-Italian European Union players will receive higher wages than Italians and migrant non-EU players since they have lower switching costs and higher outside options including a greater valuation of domestic location. (The appendix provides further details of a simple bargaining model). Moreover, we observe migration where players with high ability are able to achieve their MRP, something that may only be accomplished by leaving their domestic setting for a larger-market league. Note also that domestic Italian players who choose not to move because of locational preferences are in effect conferring some monopsony power on Italian clubs and hence raising the bargaining power of these clubs.

4. Data and Institutional Setting

The institutional setting is Italian professional football. This is organised into two divisions. Currently, there are 20 teams in Serie A, the top division, and 22 teams in Serie B. Prior to the 2004-05 season there were 18 teams in Serie A and 22 teams in Serie B. Each season three teams are relegated from Serie A and replaced by another three promoted teams from Serie B. Clubs hire players and there is no limit to squad size, which typically varies from 25 to 40 players, excluding youth players. Player contracts are typically of two to five years in duration with various contingency clauses and options to renew (or leave). Players holding passports of a European Union country are free to move into and out of Italian clubs following the Bosman ruling of 1995 imposed by the European Court of Justice. The number of non-EU players that can be hired by a given club is subject to immigration controls which in Italy have varied considerably.[1] In our data set, the percentage of Italian born players varies between 2000 and 2008 between 69% and 74%, which is somewhat higher than native shares in other European football leagues, especially England and Germany (Frick, 2007). This may reflect Italians' preference to remain resident in Italy and the financial problems faced by Italian football in the early 2000s which may have limited the ability of Italian clubs to attract the best players from abroad (see below). However, the most famous and most successful clubs are much more reliant on migrants than other clubs. Over our sample period, the team with the most migrant players was Inter Milan: only 30% of their players were Italian while 56% came from outside the EU.

Baroncelli and Lago (2006) note the growth in the size of the market for football in Italy in the period of the 1990s through to the beginning of our data. The growth in potential revenues and the value of superstars in capturing market share meant very substantial wage growth at the top of the market for professional footballers in Italy. However, in our sample period, the market went into reverse, with reduced club and league revenues. The correlation between club revenues from sales of broadcast rights and club payrolls is almost unity (Buraimo *et al*, 2006). It is clear that in Italian football the reduction in league broadcast

[1] Although the quotas varied over the period of our study, the percentage of non-European migrants in our sample has remained constant over time at between 21% and 23%. Furthermore, it seems clubs are able to borrow from other clubs' quotas such that the quotas are not binding on big clubs (http://en.wikipedia.org/wiki/Serie_A#Non-EU_players).

revenues in our sample period created downward pressure on team payrolls and player salaries.

Italians have a strong preference for remaining in Italy as opposed to living abroad to play football. Furthermore, a high percentage of young Italian men in general continue to live at home - the percentage is similar to other Catholic Mediterranean countries but much higher than among Northern Europeans and Americans, for example. What is more, a high percentage of young Italian men continue to live and work in the area of their birth. One implication of this is the lack of mobility of Italian workers between high-unemployment to low-unemployment regions. Boeri and van Ours (2008) show that the intra-regional mobility that does occur in Italy is dominated by the net migration of foreign workers rather than native workers. There is evidence that this lack of mobility of native workers partly reflects parental preferences to have their children co-resident (Manacorda and Moretti, 2006). This amenity which many Italians prize gives some bargaining power to employers who, aware of the limitations on players' outside options, may set lower wages than might be the case for "like" migrant players who are more likely to exercise their outside options if they do not receive satisfactory wage offers in Italy.[2] Thus, it is plausible that part of any wage penalty suffered by domestic workers is due to their desire to remain close to their place of birth. We construct a dummy variable identifying Italians playing for a football club within 200km of their birth place. Nineteen percent of Italians in our sample were "local" on this criterion (11 percent of the sample).

Our full data set consists of 914 professional footballers playing for 38 clubs in Italy's Serie A and Serie B over the seven seasons from 2000 to 2007. The unbalanced panel data contain 2,601 player-year observations. Having dropped players with missing data our estimation sample consists of 906 players playing for 34 clubs which contains 2,488 player-year observations.

We have three dependent variables: players' wages and attendance at football matches and team points.[3] The wage variable we use is basic salary before tax and also before bonuses and excluding image rights and endorsement deals. These are actual gross salaries as reported in Italian newspapers and annuals: *Corriere dello Sport Stadio* (2001), *Il Messaggero* (2002), *La Pagelle di Paolo Ziliani* (2004-05), *Gazzetta dello Sport* (2007).[4] Salary studies in European football typically use expert valuations such as those supplied by *Kicker* magazine for the German Bundesliga (Franck and Nüesch, 2011, 2012; Frick, 2007). These valuations tend to conflate player salary with transfer fees. To the extent that clubs capture some of the rents that accrue from transfers of players, these valuations are likely to be biased upwards. Moreover, market valuations may be differentially related to nationality than salaries which makes inference from valuation models suspect. Kernel densities presented in Figure 1 show that Italian domestic worker wages are fairly normally distributed, although the distribution does have a thick right-hand tail. But this tail is thicker in the case of migrants.

[2] In the bargaining model set out in the appendix this is equivalent to a negative value of V_i. Some players are willing to accept payment below their outside option in order to express their domestic preferences for remaining close to their families.

[3] For a subset of clubs we also have gate revenues from match-day ticket sales and season tickets, although not other sources of revenue. We do not use revenue in our analysis but it is highly correlated with attendance (correlation coefficient is 0.96).

[4] Salary data were interpolated for 2003 and 2006. However, results presented are robust to the exclusion of these two years.

Distinguishing EU and non-EU migrants the EU migrant curve lies above and to the right of that for non-EU migrants.

Rosen's (1981) theory of superstars suggests that they are most likely to be players in the right hand tail of the wage distribution in Figure 1. Arbitrarily defining a superstar as someone who earns more than 10 million euros we find that this identifies six players with nationality and number of seasons in the data set in parentheses: Gabriel Batistuta (Argentina, 2), Alessandro del Piero (Italy, 2), Kaka (Brazil, 2), Alvaro Recoba (Uruguay, 2), Francesco Totti (Italy, 7) and Christian Vieri[5] (Italy, 2). Of these superstars, Francesco Totti is categorised as local. Our second dependent variable is log seasonal crowd attendances and our third dependent variable is team points.[6]

5. Empirical Strategy

Our most general wage model is:

(1) *Log real salary = f(age, age squared, experience, player productivity, team fixed effects, season dummies, nationality dummies*)

Player productivity is a vector of performance measures all assessed by season unless stated otherwise, specifically: career goals in Serie A, career goals in Serie B, appearances in Serie A, appearances in Serie B, minutes played and minutes squared, lost balls, recovered balls, season goals in Serie A, goalkeeper saves, goal assists, shots on target , successful passes, tackles, fast breaks, footballer of the year award, World Cup selection and European championship selection.[7] In some estimations we use team characteristics rather than team fixed effects. These comprise lagged attendance per game in a given season and league points divided by the maximum possible. All right-hand side variables are measured for the season prior to the salary dependent variable.

Models are estimated by OLS in sequence: first with just nationality dummy variables, then demographics, then productivity, then team time-varying covariates and finally with team fixed effects. Standard errors are clustered to account for non-independence of player observations across seasons. We also interact nationality dummies with number of seasons experience in Italy to capture potential assimilation effects.

Following OLS estimation, we run Oaxaca-Blinder decompositions to check for differences in returns to observable and unobserved characteristics, by nationality group. In this exercise, we divide the wage gap between Italians and non-Italians into a part that is explained by wage determinants (player Xs, productivity etc.) and a part that cannot be explained by these differences. We do this with and without productivity and also with and without team fixed

[5] Vieri was actually born in Australia but he is a naturalised Italian. We use current nationality throughout the paper.
[6] Scaling by maximum points is required since divisional size changes in 2004/05.
[7] Studies of footballer salaries typically rely on appearances, goals scored and sometimes assists (final passes leading to a goal) as performance measures (Frick, 2007, 2011; Lucifora and Simmons, 2003). Such measures underweight the performances of midfielders and defenders and totally ignore performances of goalkeepers. Franck and Nüesch (2012) are unusual in applying a richer set of performance measures, although still not as rich as the data available to us.

effects. Following Jann (2008) we use the pooled option which averages effects across the two groups (the pooled model contains a group membership dummy).

We test sensitivity of results to the inclusion of squared productivity terms. If Rosen (1981) is correct that the returns to talent are convex in the case of superstars, their introduction may soak up some of the superstar effects which might otherwise be attributable to migrants.

Wage premia for nationality characteristics may reflect compensating wage differentials. Specifically, Italian players may prefer to stay in Italy and accept lower pay to express this preference. There may be a further penalty among Italians for remaining close to their place of birth. To check this we create a proxy variable, *local*, to register cases of players who perform for teams close to their birthplace, and we put this in the wage regressions alongside the Italian dummy to distinguish local and non-local Italian players.

Wage premia for migrants may vary through the salary distribution. For instance, if differences are associated with the superstar concentration among migrant workers we would expect a larger migrant differential at the top of the wage distribution. We therefore run quantile regressions at the twenty-fifth, median, seventy-fifth and ninetieth percentiles. We repeat the wage decomposition on quantiles of the wage distribution.

Finally, we collapse our data set into team level variables and run OLS models for club attendances and club points won to explore the effects of changes in the percentage migrant, changes in the quality of labour (as measured by predicted wages aggregated to club level) and wage residuals - which may be positive or negative and thus capture some of the "superstar" effects or discrimination effects discussed above. The team attendance model is as follows:

(2) *Log team attendance* = g(*predicted salary, residual salary, team points, year, nationality, team fixed effects*)

where predicted salary is mean predicted log salary for players at the club based on first stage regression of individual earnings as a function of variables similar to those entering the model in (1) above. We run the model on Italians only and recover out-of-sample predictions for migrants' salaries and residuals.[8] The models include labour productivity and productivity squared terms and club fixed effects. Residual salary is the residuals from the same earnings equation aggregated to club means. Predicted salary is then a proxy for explained quality of team rosters while residual salary represents an unexplained salary component of team playing quality. Points are scaled by the maximum possible in a given season and represent team attainment.

We use the same two-stage methodology to isolate the association between changes in migrant share and changes in team points. The team points model is identical to equation (2) except that team points becomes the left-hand side variable. Any positive migrant effect on team points is consistent with the idea that migrants are picking up otherwise unobservable differences in worker productivity, as per Rosen's superstars model, while migrant effects on attendance, conditional on team success, are consistent with Adler's theory of superstardom based on worker popularity irrespective of productivity.

[8] We also ran these first stage wage regressions for all workers with and without nationality dummies. Results are insensitive to the method used.

6. Results

When nationality is entered into a model alongside season dummies, domestic Italian players suffer a wage penalty of almost 40% relative to non-European migrants, and more than double that relative to European migrants (Table 1, row 1). These wage penalties increase when accounting for personal characteristics such as age, footedness, playing position and number of seasons playing professional football in Italy (row 2). The nationality effects change dramatically with the inclusion of individual player performance measures in row 3. These measures soak up a considerable amount of the variance in footballers' wages such that the R-squared rises from 0.36 to 0.61 with their addition. They also account for a substantial part of the wage penalty experienced by domestic Italian football players. Nevertheless, a sizeable wage penalty remains with Italians earning roughly one-third less than "like" players with similar on-field productivity.[9] It is also notable that, once labour productivity is introduced the gap between non-Italians becomes small and statistically non-significant, suggesting that most of the wage premium enjoyed by European migrants over non-European migrants is accounted for by their superior on-field performance. Row 4 introduces the club's ability to pay captured in terms of the division it plays in, its success on the field (points), and crowd attendances. These are important, increasing the model's R-squared to 0.74. The club's ability to pay also accounts for some of the wage penalty suffered by Italian players. Nevertheless, they are still paid around one-fifth less than "like" European migrants and 14% less than non-European migrants. (The wage difference between European and non-European migrants is statistically insignificant). The picture is similar if we replace clubs' ability to pay with club fixed effects in row 5, thus indicating that the Italian domestic player wage penalty in Italian professional football is also apparent within clubs.[10]

We sought to identify any effects of migrant assimilation by adding an interaction term to Model 4 for total seasons playing professional football in Italy with nationality. The interaction term was not statistically significant, as one might have anticipated given the ease with which professional footballer skills are general and transferable across countries.[11]

If some of the migrant premium is related to convex returns to talent, as predicted in Rosen's superstar model, some of this might be picked up through the introduction of squared productivity terms in rows 6 to 8. The squared terms are always jointly statistically significant and they increase the total variance in wages accounted for by the model, albeit modestly. They also reduce the size of the migrant premium, especially for EU migrants. However, a large migrant premium is still evident and the individual squared terms are usually negatively rather than positively signed, suggesting concave rather than convex returns to talent.

[9] Some of the productivity we attribute to individuals may, in fact, be productivity spillovers from co-workers. We partial some of this effect out in sensitivity analyses using the mean time to end of contract among the player's co-workers. Like Berri and Krautmann (2006) we find player productivity rises as contract expiry approaches, so the average time to contract expiry among co-workers helps filter out some of this productivity spillover. Our results are not sensitive to the inclusion of this variable.

[10] The EU migrant/non-EU migrant distinction captures the key distinction within the migrant group. Further investigations revealed no substantial, statistically significant differences between migrants from particular countries.

[11] Further tests revealed no significant migrant wage penalty attached to the first season in Italian football. Among non-EU migrants there was a statistically significant wage premium associated with years' experience playing in European leagues prior to Italian football equivalent to around 9-10% for each additional year in Europe. The introduction of this variable reduced the non-EU migrant premium from 13% to 10%, a figure which remained statistically significant.

Having established that domestic workers suffer a sizeable wage penalty relative to migrants, and that differences between migrants are not statistically significant having conditioned on individual performance, we explore possible reasons for the wage penalty or "gap" between domestic and migrant workers. We begin with a decomposition of the wage "gap" into a part which can be "explained" by observable characteristics and a part that remains "unexplained" by these differences, as is standard in the gender wage gap literature, for example. However, unlike this literature, we possess detailed information on individual workers' performance over time. This is usually lacking in the literature such that differences in time-varying labour productivity appear as part of the "unexplained" wage gap. Here we establish the sensitivity of the decomposition to the exclusion and inclusion of these individual labour productivity controls.

An OLS log earnings equation with only a dummy variable identifying domestic workers reveals a wage penalty of 0.48 log points (61%). Model 1, which accounts for personal and team characteristics together with year dummies, accounts for just over two-fifths of this gap. The replacement of club characteristics by club fixed effects makes little difference (Model 4). However, equivalent models which also account for time-varying individual on-field performance account for much more of the gap (Models 2 and 5). The introduction of productivity squared terms increases the explained variance still further, by around 6-7 percentage points (Models 3 and 6). It is apparent, therefore, that a large part of the gap in earnings between domestic and migrant football players is attributable to differences in labour productivity and that these productivity effects are non-linear. Migrant players have higher labour productivity, on average, which, once accounted for, reduces the otherwise unexplained gap between the earnings of Italians and their non-Italian counterparts. Nevertheless, a sizeable unexplained wage gap of around one-quarter remains even after we account for club fixed effects and individual labour productivity. The size of this unexplained gap is notable because our estimation sample is composed of fairly homogeneous workers, namely professional football players, and we control for individual labour productivity fairly comprehensively, something that is not usually possible with available data.[12]

The "unexplained" component in the wage gap is often interpreted as evidence of discrimination in the gender and racial wage gap literatures, the assumption being that there are aspects of the labour market that permit employers to indulge their preferences for particular types of worker because labour market frictions make it difficult for workers to earn their marginal product. However, as Altonji and Blank (1999: 3156) point out, labeling the unexplained component as the share of the gap due to discrimination is misleading because it ignores the fact that discrimination may also affect group differences on observable X's which underlie the "explained" component of the gap and because the "unexplained" gap may reflect unobserved differences in productivity and tastes. This seems particularly likely in our case since, in contrast to most studies, it is the indigenous workers who are paid a lower wage than the migrants. We therefore turn to two other potential explanations for the gap. First we consider whether the gap is consistent with a greater concentration of superstars among the migrants. Second we assess whether domestic workers accept a compensating differential for the amenity they derive from working in their home region.

[12] By way of comparison a recent meta-analysis of studies indicates that the average Oaxaca-Blinder residual gender wage gap is a little over 20% (Weichselbaumer and Winter-Ebmer, 2005).

We begin to examine the possibility that the wage differential between domestic and migrant workers is driven by superstardom among the migrant players by running quantile regression estimates.[13] If superstardom plays a role in explaining the differences in mean earnings presented above one would expect the differences to be most pronounced among high earners. There is some evidence to support this proposition in Table 3 which compares the earnings differentials for EU migrants and non-EU migrants with those of domestic Italian workers at the 25th, 50th, 75th and 90th percentiles of the wage distribution.

Panel A runs quantile regression estimates using the same model specification as that presented in Model 4 in Table 1. It conditions on personal characteristics, season dummies, individual performance and club covariates. The R-squared values indicate that the model does a good job in accounting for the variance in earnings across the wage distribution. There is no statistically significant difference in the earnings of migrant and domestic workers in the bottom quartile of the earnings distribution. However, there is a substantial and statistically significant wage penalty for domestic workers in the top half of the earnings distribution, one that rises as we move up the distribution. Among workers at the 90th percentile, non-EU migrants earn 23% more than "like" Italians, while EU migrants earn 42% more than "like" Italians. The fact that large earnings differentials exist at median earnings suggests that superstardom is not the sole factor explaining the wage penalty for domestic workers, but the size of the differentials at the top of the wage distribution does suggest that superstardom is one factor.

Panel B replaces the club covariates with club fixed effects resulting in a modest improvement in model fit at all points in the wage distribution. The results for these within-club estimates are qualitatively similar to those in Panel A, but they differ in two key respects. First, there is evidence of a statistically significant wage penalty for domestic workers relative to migrant workers in the lowest quartile of the wage distribution. Second, although the migrant-native wage differential is larger at the 90^{th} percentile than it is at the 25^{th} percentile, there is no monotonic increase in the size of the differential as we move up the earnings distribution. If one compares the migrant premium across the two models, the addition of club fixed effects tilts the premium such that it is higher in the lower half of the wage distribution and lower in the top half of the wage distribution. Thus, although the wage penalty facing domestic workers at the 90th percentile is still large relative to both EU and non-EU migrants, the evidence on superstar effects within clubs is a little less compelling.

We decompose the quantile wage distribution to examine the size of the "unexplained" wage gap between migrants and natives at different parts of the wage distribution and the role played by labour productivity controls in closing the gap.[14] We find the introduction of individual performance covariates substantially reduces the "unexplained" component throughout the wage distribution. Thus the introduction of individual performance (the equivalent of moving from Model (4) to Model (5) in Table 2) results in the "unexplained" component falling from 32% to 12% at the 25th percentile and from 62% to 47% at the 90th percentile. Second, the proportion of the migrant wage gap that is not accounted for by worker and club characteristics tends to rise as one goes up the wage distribution, irrespective

[13] Investigating superstar effects with quantile regression is now standard in the economics literature. See for example, Hamilton (2000) on entrepreneurs and Franck and Nüesch (2012) for an application to German football.

[14] We use Blaise Melly's RQDECO programme in Stata (Melly, 2006) which is numerically equivalent to Machado and Mata's (2005) method where the number of simulations in Machado and Mata goes to infinity. Full results are available on request.

of whether one conditions on labour productivity. This is consistent with superstar effects arising from unobserved labour productivity differentials or a popularity premium.

If migrant superstars' wage premium reflects popularity, as Adler contends, one would expect an increase in the percentage of non-Italians to increase attendance at football matches, even having conditioned on team success. To see if this is the case Table 4 runs panel club fixed effects models estimating log crowd attendance. In addition to a continuous time trend and team points the models control for the mean of the residuals from a first stage wage regression and the mean predicted salary for workers based on the same model. Model (1) indicates that an increase in the proportion of club players who are Italian is associated with a decline in crowd attendance at that club's games. The effect is robust to the inclusion of worker quality as captured by predicted salary, which is itself positive and statistically significant, and wage residuals (Models (2) and (3)). Models (4) to (6) show that it is an increase in the percentage of EU migrants that is behind increased attendance when the percentage Italian falls.[15] An increase of one standard deviation in the percentage of EU migrants results in an increase of just under 1% in crowd attendance.[16] The findings are consistent with the proposition that migrants are able to command a wage premium through their popularity with fans, although the effect is confined to EU migrants.

If migrant superstar wages reflect productivity, as Rosen might have contended, we would expect team success to vary with the proportion migrants in the team. Table 5 uses the same methodology as the attendance models to estimate panel club fixed effects models for team points, the best indicator of on-field team performance. An increase in the proportion of Italians playing for the club reduces team points, a finding which is robust to the inclusion of predicted salaries and residuals (Models (2) and (3)). The positive effect of increasing the proportion of migrants on team points is apparent for both EU migrants and non-EU migrants. An increase of one standard deviation in the proportion of Italians results in a reduction of 1% in a team's points ratio.[17] The fact that increases in the share of non-EU migrants improve team performance but not crowd attendance might be explained by customers' discrimination on the grounds of skin colour.[18]

Finally we return to individual-level wage equations to test the proposition that part of the wage penalty facing domestic workers compared with "like" migrants is related to Italians' preference for staying at home. In Table 6 we distinguish between Italian workers who play for a club that is at least 200km from their place of birth and those who are at clubs within 200km of their birth place. We call the latter "locals". Italian locals do not seem to suffer a wage penalty relative to non-local Italians until one controls for club covariates, whereupon a 13% wage penalty emerges. The effect is robust to the replacement of club covariates with club dummies so that the effect persists having accounted for fixed unobservable characteristics of the employer. It would therefore appear that part of the wage penalty

[15] The results are robust to the exclusion of clubs who appear fewer than three times in our panel. As might be expected, there is no significant difference between the share of Italian locals and non-locals on the team. Results are available on request.

[16] Coefficient of 1.4 multiplied by standard deviation of 0.06 in the percentage EU migrants equals 0.084.

[17] The elasticity is obtained by multiplying the Italian coefficient of 0.58 by 0.18 which is the standard deviation in the proportion of Italians. The effect is robust to the inclusion of other controls such as total payroll and a gini coefficient for wage inequality in the team. It is also robust to use of all teams, regardless of the number of times they appear in the panel, although the estimates for non-EU migrants are less precisely estimated and significant at a 90 percent confidence level.

[18] For other evidence on customer racial discrimination in sports viewing see Kanazawa and Funk (2001).

domestic workers face is due to their preference for staying at home which gives the employer some bargaining power which it does not have over other workers.

7. Conclusions

In efficient global labour markets for very high wage workers one might expect wage differentials between migrant and domestic workers to reflect differences in labour productivity. However, using panel data on all worker-firm matches in a single industry over a seven year period we find a substantial and robust wage penalty for domestic workers which persists within firms and is only partially accounted for by individual labour productivity. This is despite the fact that our set of productivity measures is much richer than those in most empirical studies of wages, including other European football salary studies published so far (Frick, 2011).

We find evidence consistent with the premium reflecting migrant superstar status. This superstar status is apparent in the growing wage premium for migrants as one goes up the earnings distribution. The fact that changes in the proportion migrant are positively associated with team points, even controlling for club fixed effects and labour quality as measured by predicted wages and residuals, is consistent with migrant share picking up superstar talent which helps teams perform better than if they were replaced by domestic players. This is the sort of productivity-based superstardom which Rosen describes. However, the fact that crowd attendances rise and fall with the proportion migrant in the team, having controlled for team fixed effects, labour quality and team points, is suggestive of an effect akin to Adler's popularity-based superstardom. The evidence therefore suggests that migrant footballers in Italy may possess both greater talent and greater popularity in keeping with both the Rosen and Adler definitions of superstardom.

Domestic workers' preferences for working in their home region generate a compensating wage differential which is apparent when one distinguishes between "local" and other domestic players. The former have the lowest wages of all suggesting they receive lower wages in return for this amenity, perhaps because employers have monopsony power over these players which does not affect migrant workers. This monopsony power may affect all domestic players' wages since, by signalling a desire to remain in their home country, they limit the bargaining power they might derive from pointing to credible outside options. If this was all that was going on, however, we would not expect to see the differential rise further up the earnings distribution and we would not expect to see migrant effects on team fortunes nor club attendances.

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Figure 1: Kernel Densities for Log Real Annual Net Wages, Italian and non-Italian Players

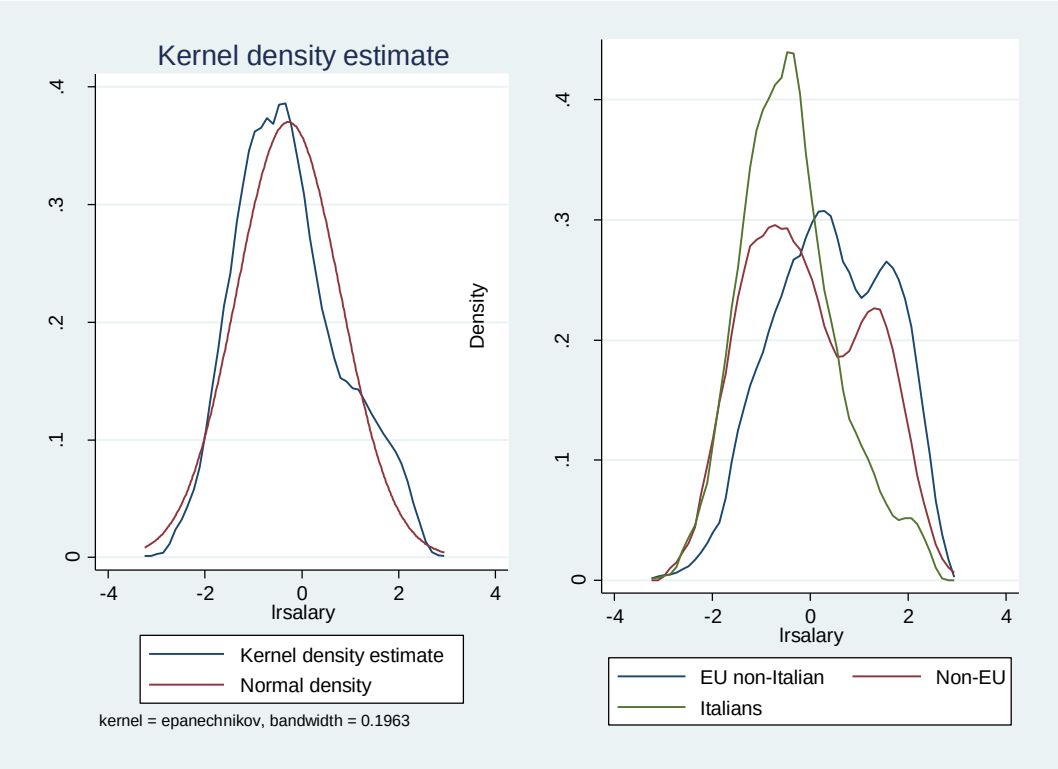

Table 1: OLS Log Wage Regressions

Model	*Non-EU*	*EU non-Italian*	R^2
(1) Nationality + year dummies	0.361 (3.58)	0.821 (5.28)	0.087
(2) As (1) + player characteristics	0.656 (7.10)	0.973 (6.71)	0.357
(3) As (2) + time-varying individual performance	0.318 (4.69)	0.344 (2.89)	0.614
(4) As (3) + club time-varying variables	0.130 (2.63)	0.230 (2.51)	0.738
(5) As (3) + club fixed effects	0.135 (2.82)	0.246 (3.12)	0.766
(6) As (3) + performance squared	0.266 (4.13)	0.235 (2.00)	0.635
(7) As (4) + performance squared	0.109 (2.26)	0.170 (1.87)	0.746
(8) As (5) + performance squared	0.110 (2.37)	0.186 (2.36)	0.773

Notes:
(1) N=2,488, 906 players over 7 seasons. 34 club dummies for club fixed effects model.
(2) t-statistics in parentheses.
(3) All models contain 7 dummies for season. Player characteristics are: age, age squared, footedness (3 dummies), position (4 dummies), total N seasons played in Italy. Player performance variables (all for season prior to wage measurement unless stated) are: total appearances in Serie A, total appearances in Serie B, minutes played in season, minutes played in season squared, total goals scored in Series A and B, total goals in current season, N 'assists' for a goal, N successful passes made, N times lost ball to opposition, N times recovered ball from opposition, N goalkeeper saves, N total shots, N shots on target, N tackles made, N times Italian Footballer of the Year in career, N World Cup appearances in career, N European Championship appearances in career. Club characteristics are: points in a season (expressed as a ratio relative to other clubs to account for variance in N clubs in the league), team in Serie A or B, lagged crowd attendance.

Table 2: Oaxaca-Blinder Decomposition of Domestic-Migrant Wage Gap

Model	*Explained*	*Unexplained*	*% unexplained*
(1) Player and club characteristics + years	0.204 (2.80)	0.273 (4.82)	57.2
(2) As (1) + individual performance	0.326 (4.17)	0.151 (3.22)	31.7
(3) As (2) + performance squared	0.355 (4.46)	0.121 (2.68)	25.4
(4) Player characteristics + years + club fixed effects	0.223 (2.92)	0.253 (4.66)	53.0
(5) As (4) + individual performance	0.318 (3.97)	0.159 (3.66)	33.3
(6) As (5) + performance squared	0.351 (4.29)	0.126 (2.99)	26.4

Notes:
(1) See Table 1 notes for sample and control variables.
(2) t-statistics in parentheses.
(3) Following Jann (2008) the decomposition is based on coefficients from a pooled model over both domestic and migrant workers and incorporates a dummy variable identifying domestic workers.

Table 3: Log Wage Quantile Regressions

Percentiles	*0.25*	*0.50*	*0.75*	*0.90*
Panel A: model with club covariates				
Non-EU	0.016 (0.36)	0.095 (2.40)	0.182 (3.69)	0.204 (2.35)
EU non-Italian	0.058 (0.77)	0.262 (4.22)	0.288 (4.68)	0.349 (3.52)
R^2	0.48	0.52	0.55	0.55
Panel B: model with club fixed effects				
Non-EU	0.095 (2.19)	0.111 (2.83)	0.136 (3.20)	0.137 (1.86)
EU non-Italian	0.215 (2.98)	0.286 (4.76)	0.221 (3.72)	0.286 (3.12)
R^2	0.51	0.55	0.59	0.59

Notes:
(1) See Table 1 notes for sample and control variables. The club covariate models are identical to Model 7 in Table 1 and the club fixed effects models are identical to Model 8 in Table 1.
(2) t-statistics in parentheses, based on bootstrapped standard errors with 200 replications.
(3) The reference category for nationality is Italians.

Table 4: Log Crowd Attendance Models

	(1) M1	(2) M2	(3) M3	(4) M4	(5) M5	(6) M6
Italian	-0.463	-0.449	-0.450			
	-2.18	-1.97	-1.99			
Points ratio	0.231	0.202	0.201	0.197	0.160	0.158
	1.43	1.47	1.46	1.33	1.30	1.28
Year	-0.071	-0.066	-0.065	-0.070	-0.064	-0.064
	-5.81	-5.44	-5.44	-5.79	-5.52	-5.54
Predicted salary		0.142	0.130		0.156	0.144
		2.39	2.28		2.79	2.70
Residuals			0.111			0.117
			1.31			1.40
EU non-Italian				1.233	1.354	1.367
				2.78	2.85	2.92
Non-EU				0.255	0.193	0.188
				1.03	0.75	0.71
Constant	3.417	3.468	3.456	2.976	3.052	3.040
	14.60	14.69	14.78	19.16	26.56	26.15
Adj R-sq	0.924	0.930	0.930	0.927	0.934	0.935

Notes:

(1) Club fixed effects models estimating log crowd attendance over the season. N=121 club-season observations based on 30 clubs in Models (1) and (2). N drops to 23 clubs and 112 club-season observations in Models (3) and (4) when we confine analysis to clubs appearing at least 3 times in the panel. Four clubs drop out of this analysis due to missing data on attendance.

(2) Predicted salary is mean predicted log salary for players at the club based on first stage regression of individual earnings as a function of all variables entering Model (8) in Table 1 (personal, season dummies, time-varying labour productivity, productivity squared and team fixed effects). Residual is residuals from same earnings equation aggregated to club mean.

(3) t-stats in parentheses.

Table 5: Points Ratio Models

	(1) M1	(2) M2	(3) M3	(4) M4	(5) M5	(6) M6
Italian	-0.581	-0.575	-0.575			
	-3.13	-3.01	-3.00			
Years	-0.004	-0.003	-0.003	-0.004	-0.002	-0.002
	-0.48	-0.28	-0.28	-0.42	-0.21	-0.21
Predicted salary		0.041	0.040		0.044	0.044
		0.86	0.87		0.93	0.94
Residuals			0.004			0.005
			0.05			0.07
EU non-Italian				0.912	0.937	0.938
				2.26	2.28	2.26
Non-EU				0.509	0.491	0.490
				2.33	2.15	2.15
Constant	1.299	1.304	1.304	0.711	0.724	0.723
	9.58	9.17	9.17	10.28	11.04	10.56
Adj. R-squared	0.664	0.663	0.659	0.666	0.666	0.662

Notes:
(1) Club fixed effects models estimating points ratio over the season. N=112 club-season observations based on 23 clubs appearing at least 3 times in the panel. Four clubs drop out of this analysis due to missing data on attendance.
(2) Predicted salary is mean predicted log salary for players at the club based on first stage regression of individual earnings as a function of all variables entering Model (8) in Table 1 (personal, season dummies, time-varying labour productivity, productivity squared and team fixed effects). Residual is residuals from same earnings equation aggregated to club mean.
(3) t-stats in parentheses.

Table 6: OLS Log Wage Regressions

Model	*Italian locals*	*Non-EU*	*EU non-Italian*	R^2
(1) Nationality + year dummies	-0.038 (0.25)	0.335 (3.52)	0.815 (5.24)	0.087
(2) As (1) + player characteristics	0.059 (0.55)	0.666 (7.09)	0.984 (6.75)	0.357
(3) As (2) + time-varying individual performance	-0.071 (1.12)	0.304 (4.41)	0.329 (2.75)	0.615
(4) As (3) + club time-varying variables	-0.119 (2.77)	0.106 (2.13)	0.205 (2.22)	0.739
(5) As (3) + club fixed effects	-0.104 (2.38)	0.116 (2.38)	0.226 (2.83)	0.767

Notes:
(1) Reference category for nationality is Italians playing at clubs at least 200 kilometres distant from where they were born. See Table 1 notes for sample sizes and remaining control variables.
(2) t-statistics in parentheses

Appendix

Our model is drawn from Solow and Krautmann (2011). Let

MRP_i denote marginal revenue product of player i,
MRP_R denote marginal revenue product of a replacement player,
AS_i denote alternative salary (outside offer) of player i,
S_R denote salary of replacement player,
C_i denote moving costs if player i moves to new location,
V_i denote player i's incremental value of current location over new location
S_i* denote player i's negotiated salary (to be determined).

Note that V_i could be negative if player i prefers new location to current location. The team's outside option is $MRP_R - S_R$. The player's outside option is $AS_i - C_i$.

So the total value if NO agreement can be reached is $MPR_R - S_R + AS_i - C_i$.

Total value if agreement IS reached is $MRP_i + V_i$. Negotiated salary (as yet undetermined) splits this into what the player receives $((\Delta MRP_i + S_R + AS_i - V_i - C_i))$, and what team receives $(MRP_i - S_i^*)$.

The gain from reaching agreement is then $(MRP_i + V_i) - (MRP_R - S_R + AS_i - C_i)$, which can be rewritten as $\Delta MRP_i + S_R - AS_i + V_i + C_i$. Obviously, the parameters must be such that this is positive. Note that $V_i + C_i$ enter positively because if agreement can be reached, the player enjoys the incremental value of his current location and avoids the cost of moving.

Assuming initially for convenience that the team and player have equal bargaining power parameters, then solving the Nash Bargaining Problem involves finding the value of S_i^* that maximizes the symmetric product of each party's gain over its outside option:

$$\text{Max } \{(S_i^* + V_i) - (AS_i - C_i)\} \{(MRP_i - S_i^*) - (MRP_R - S_R)\}$$

$$= - S_i^{*2} + S_i^* (\Delta MRP_i + S_R + AS_i - V_i - C_i) + \text{a term that doesn't involve } S_i^*.$$

Taking the first-order condition and solving for S_i^* yields

$$S_i^* = 0.5 (\Delta MRP_i + S_R + AS_i - V_i - C_i).$$

If bargaining powers of the two parties are asymmetric so the player's bargaining power parameter is β while the team's bargaining power parameter is $1 - \beta$, then the solution to the bargained salary is

$$S_i^* = \beta(\Delta MRP_i + S_R) + (1 - \beta) (AS_i - V_i - C_i).$$

So, regardless of whether bargaining powers are symmetric or asymmetric, the higher are moving costs or the player's incremental valuation of his current location, the lower is his negotiated salary, as we would expect. Clearly, the greater is the club's bargaining power (so β is smaller) the lower is the bargained wage, ceteris paribus.

Applying this model to migration of footballers there are two cases to consider. First, there are Italian players who stay in Italy. These players have a positive value of C + V and are

able to strike a bargain with a club. Local Italians who stay close to their place of birth have a higher value of V than Italian players who are willing to move around the country. The local Italians experience a wage penalty relative non-local Italians.

Second, there are foreign players. These players fail to strike a bargain in their home country so V is sufficiently negative for the conditions for a bargaining solution not to hold. Note that for this occupation, moving costs can be argued to be quite small e.g. the host club can take care of relocation expenses. If the bargain breaks down in the source country, then the player considers a move along the lines of equation (1) in the text. If the conditions for a viable move are met then the player considers a bargain to be struck in the host country. At this point the revealed preference for movement has already been expressed and the value of V can be taken to be zero. For given productivity, the lower value of V for a migrant player generates a higher wage for a foreign player compared to a domestic Italian player. This differential is then reinforced by the Borjas (1987) self-selection property identified in section 3 of the main text.

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