

Does National Diversity Increase Team Performance? Evidence from a Sports Labor Market in India

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Preface

In this report, I present the results of research conducted as a part of Research Project entitled “Empirical analysis of the impact of organizational diversity of performance” during the Fiscal Year 2019. The main objective of this project was to empirically analyze the impact of national diversity on team performance.

As the movement of people is common these days, national diversity in the workforce is currently seen everywhere in the world. For example, CEOs of famous companies such as Apple, Google, and PepsiCo are foreign-born executives. Similarly, more than half of the IT professionals in the Silicon Valley in the US are born overseas. The trend towards national diversity seems to continue in the future due to numerous social issues and policy changes in various countries. For example, the Japanese government amended its policy towards accepting more migrant workers to work in Japan corresponding to the decline in the labor force population and labor shortage in various sectors. Furthermore, as the movement of people tends to increase due to various political and social upheavals such as; the refugee crisis in Myanmar and in the Middle East, civil wars and conflicts in Africa, diversity in the workforce will increase as these migrants assimilate into the society. It is, therefore, necessary to examine how such changes would affect the performance of an organization.

In order to conduct empirical research, this research analyzed the dataset from a sports labor market in India. I concentrated on sports industry as the sports statistics are much more detailed and accurate than typical microdata samples such as Census or various survey dataset. In particular, I empirically examined the impact of national diversity on team performance from Indian Premier League (IPL), the largest cricket league in the world. I concentrate on the sports of cricket as we have various kinds of performance as our outcome variable. In some performance, communication along with skill plays a vital role whereas in others communication is minimum. In this way, we can measure the mechanism behind difference in performance. Furthermore, I concentrate on IPL as all teams are governed by standardized rules of competition that could eliminate unobservable factors that would affect the power of the study.

Considering more than 1000 team level diversity and performance indicators, I tried to answer the following three questions. Does more diversity of a workforce increase team performance (intra-horizontal diversity)? Does a more diverse team succeed if it is competing against a less diverse team (inter-horizontal diversity)? Does a team perform better if the leader

is from majority group (vertical diversity)?

From the empirical analysis, I did not find any statistically significant relationship between intra-horizontal diversity and team performance. Performance is unaffected by the higher intra horizontal diversity of a team. However, I found a positive and statistically significant relationship between inter-team horizontal diversity and performance where communication is low. And finally, I found a negative and statistically significant relationship between vertical diversity and the overall performance of a team. The results suggest that performance is negatively affected by the vertical diversity of a team. Finally, I provide various important policy implications as well as limitations of this research.

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Executive Summary

As the movement of people is common these days, diversity in the workforce is currently seen everywhere in the world. It is difficult to find a successful organization without any diverse workforce based on nationality, ethnicity, religion and so on. Economics literature suggests that there are both negative and positive sides to diversity on performance of a team or organization as a whole. On the one hand, diversity invites a wide range of skills and innovation; it also creates communication costs and other friction in the organization. Previous studies have highlighted this positive and negative trade-off. However, less is known about whether a firm should diversify its workforce more once it starts diversifying. Furthermore, most research in the field of national diversity is focused on horizontal diversity within an organization or a team.

To contribute to the diversity literature in general and national diversity in particular, we study the impact of horizontal diversity (diversity at workers level) and vertical diversity (diversity at managers and higher level) on team performance and try to answer the following questions. Does more diversity of a workforce increase team performance (intra-horizontal diversity)? Does a more diverse team succeed if it is competing against a less diverse team (inter-horizontal diversity)? Does a team perform better if the leader is from majority group (vertical diversity)?

In order to conduct empirical research, we analyzed the dataset from a sports labor market in India. In particular, we empirically examined the impact of national diversity on team performance from Indian Premier League (IPL), the largest cricket league in the world. From our empirical analysis, we do not find any statistically significant relationship between intra-horizontal diversity and team performance. Performance is unaffected by the higher horizontal diversity of a team. However, we find a positive and statistically significant relationship between inter-team horizontal diversity and performance where communication is low. And finally, we find a negative and statistically significant relationship between vertical diversity and the overall performance of a team. Our results suggest that performance is negatively affected by the vertical diversity of a team. We provide various important policy implications as well as limitations of this research.

I. Introduction

Diversity in the workforce is currently seen everywhere in the world. It is hard to find a successful organization without any diverse workforce based on nationality, ethnicity, religion and so on. However, there are both negative and positive sides to diversity on performance of a team or organization as a whole. On the one hand, diversity invites a wide range of skills and innovation; it also creates communication costs and other friction in the organization. Previous studies have highlighted this positive and negative trade-off (Lazear 1999, Prat 2002). However, less is known about whether a firm should diversify its workforce more once it starts diversifying. In this paper, we try to answer the following three questions. (1) Does more diversity of a workforce increase team performance? (2) Does a more diverse team succeed if it is competing against a less diverse team? (3) Does a team perform better if the leader is from majority group?

Impact of diversity on performance has been vastly studied in the field of economics and psychology.¹ Diversity has been studied from various dimensions including gender, race, linguistic, nationality and so on. However, national diversity has been understudied in the diversity literature despite its practical importance (Hass and Nuesch 2012). Furthermore, most research in the field of national diversity is focused on horizontal diversity. The literature also faces a severe challenge of selection bias, as diverse firms are quite different from homogenous firms on several dimensions. For example, homogenous firms may have different prejudice or more discriminatory towards foreigners in comparison with diverse firms. Therefore, field experiment or natural experiment can provide a better result. Apfelbaum, Phillips, and Richeson (2014) provide an excellent literature review in this field.

In a field experiment, Hoogendoorn and Praag (2012) study undergraduate student who set up and manage real companies as a part of their curriculum. They find that moderate level of diversity has no effect on performance. However, if a majority of the team members are ethnically diverse, it has a positive impact on performance. Similarly, Lyons (2016) studies national diversity on performance in an online labor market. She finds that nationally diverse teams perform worse than homogenous teams due to difficulty in communicating with each other.

The literature that is closest to our research is by Hjort (2014) and Marx, Pons, and Suri (2015). Hjort (2014) studies diversity in a flower plant in Kenya and find a negative

¹ Apfelbaum, Phillips, and Richeson (2014) provides a good literature review of diversity in the field of psychology

relationship in both horizontal and vertical ethnic diversity on team production. He further finds that the negative effect was worsened after an ethnic violence after the 2007 election in Kenya. Similarly, Marx, Pons, and Suri (2015) study horizontal, vertical and external diversity in a field experiment of canvassing before Kenyan election in 2012. They find a negative relationship in horizontal ethnic diversity similar to Hjort (2014) but a positive relationship in vertical diversity and furthermore no relationship in external diversity on team production.

In this paper we analyze horizontal and vertical diversity based on nationality on team performance. Our analysis is different from the earlier literature in various ways. First, we have various kinds of performance as our outcome variable. In some performance, communication along with skill plays a vital role whereas in others communication is minimum. In this way, we can measure the mechanism behind difference in productivity. Second, we considered a very competitive environment where contribution by each team member is important for team's success. Therefore, segregation or marginalization of the minority group is minimum as argued in Hoogendoorn and Praag (2012). Third, in contrast to the earlier literature that studies mostly low skilled workers, we analyzed horizontal and vertical diversity in a highly skilled labor market. We analyzed the dataset from a sports labor market in India.

There are various merits of considering sports labor market to study the impact of diversity on performance. First, doing research using sports dataset imitates labor market laboratory. Kahn (2000) stated that there is no research setting other than sports where we know the name, face and life history of every production worker and supervisor in the Industry. Second, all teams are governed by standardized rules of competition that eliminate unobservable factors that would affect the power of the study. Third, every team plays with the same number of players with a clear objective to win as many games as possible. Fourth, the sports statistics are much more detailed and accurate than typical microdata samples such as Census or the Current Population Survey.

First, we analyze the diversity at the horizontal level. We consider both intra-team and inter-team diversity on performance. We examine whether a less diverse team perform better than a more diverse team based on nationality. Furthermore, we analyze whether a team competing with a similar diverse team perform better than competing with a different diverse team. Second, we look at the diversity at the vertical level (hierarchical). We examine whether team performance is enhanced when the leader (captain in our case) is from the majority group.

We measure the performance of a team in three ways. First, we consider the run scored

by a team in a match. Along with skill, communication between the batsmen batting together is crucial while scoring runs in cricket. Second, we look at the number of wickets taken by a team in a match. Individual skill is more important for taking wickets (primarily by the bowler). Finally, we look at whether a team wins or loses a match. Both batting and bowling are essential for a team to win a match. Therefore, both communication and individual skill is necessary for winning.

We summarize the main findings as follows. First, we do not find any statistically significant relationship between intra-horizontal diversity and team performance. Performance is unaffected by the higher horizontal diversity of a team. However, we find a positive and statistically significant relationship between inter-team horizontal diversity and performance where communication is low (taking wickets).

Second, we find a negative and statistically significant relationship between vertical diversity and the overall performance of a team (winning the match). Our results suggest that performance is negatively affected by the vertical diversity of a team. We find that a team in which the captain is from the minority group (foreign captain) wins fewer matches (9-10 percent) in comparison with a team where the captain is from the majority group (Indian captain). Furthermore, a team takes fewer wickets (0.35-0.45 fewer wickets) when the captain is from the minority group. It is likely due to the facilitation of communication of captain with bowler and other players as the captain is present in the field while bowling stage. The result is consistent with our other findings where we find that there is no statistically significant relationship between vertical diversity of a team and the run scored where communication between batsman and captain is minimum.

We contribute to the existing literature on team diversity in various ways. First, most literature compares homogenous teams with diverse teams. However, less is known about whether a firm should diversify its workforce more once it starts diversifying. We contribute to the limited literature that tries to understand the intensity of diversification on performance. As firms are more diversifying their workforce these days, our results can provide valuable information about the impact of intensity of diversification. Second, we contribute to the literature that tries to measure various kinds of performance where communication along with personal skill is essential in some domain and communication is minimal in other domain. We can precisely measure whether the communication costs outweigh innovation and skill. And finally, we contribute to the literature that tries to examine diversity from various dimensions. In our analysis, we examined intra-horizontal, inter-horizontal and vertical diversity on team

performance.

The rest of the paper is organized as follows. Section II presents a preliminary introduction to cricket and the IPL. Section III describes the measurement of team diversity and performance. Section IV presents the empirical model and description of our datasets. Section V analyzes the main results. Section VI describes the identification of our setting in detail. Section VII reports the robustness of our findings, and finally, section VIII concludes.

II. Introduction to Cricket and the Indian Premier League (IPL)

Cricket is a bat and ball game started in England and spread all over the world during the British Empire. In general, cricket is played in three formats. Test Cricket is the longest format, which can be played over five days. One Day International cricket (ODI cricket) format lasts for 8-9 hours where each team plays for a maximum of 50 overs.² Twenty-twenty (T20) is the shortest format of cricket introduced recently in the 2000s. It is played for 3-4 hours, and each team plays a maximum of 20 overs. The Indian Premier League (IPL) is played in T20 cricket format.

Cricket is played between two teams constituting eleven players each. There are two stages of playing cricket: the ‘batting stage’ where a team score runs by batting and the ‘bowling stage’ where the team bowls and tries to restrict the run scored by the opposite team.³ The preference to bat or bowl is decided through a coin toss where the winning captain chooses whether their team will bat or bowl first.

In general, cricket is similar to baseball and the desired skills needed are quite similar as well. In T20 cricket format, the desired skill required for a batsman (similar to a batter) is to score as many runs as possible with high strike rate. A bowler similar to a pitcher in baseball needs to take as many wickets (outs in baseball) as possible by giving minimum runs. All the fielding members during the bowling stage try to restrict the opposite batsmen in scoring runs.

The role of a captain is critical in cricket. The captain mostly selects the players to play a game. In bowling stage, the captain selects the bowler to bowl the next six deliveries every time.⁴ He also sets the fielding position of every player and communicates with the bowler and fielders continuously. In batting stage, the captain selects the batting order in which each player

² One over constitute six consecutive fair ball throws (deliveries).

³ ‘Bowling stage’ is otherwise known as ‘fielding stage’ as well. We use the term ‘bowling stage’ every time a team bowls for simplicity in understanding.

⁴ Unlike baseball where the pitcher can continuously pitch for a long time, a bowler in cricket can bowl a maximum of six balls continuously. The captain has to select a different player to bowl the next six balls.

will bat. However, the communication between batsman and the captain is minimum as the captain is not present in the field every time. Overall, the communication between captain and players is maximum during bowling stage and minimum during batting stage.

Cricket is the most popular sports in India. The enormous success of inaugural T20 world cup in 2007 led to the evolution of first official professional cricket league in India. The IPL brand is a multibillion-dollar industry even if it started in 2008 and played only for one and half months in a year. The viewership is also enormous. For example, 185.7 million viewers watched the first three matches in the 2017 IPL season. Eight teams participate in the league at present spreading all over India.⁵ All the teams are based in major Indian cities.

III. Measurement of Team Diversity and Performance

Both Indian and foreign players play together in the IPL. Therefore, each team recruits both Indian and foreign players. Players from 11 different countries have played in the IPL as of 2015 season (8th edition). Foreign players also differ by ethnicity and language. For example, all New Zealand players playing in the IPL are ethnically white, whereas almost all West Indies players are ethnically black. Similarly, players from Sri Lanka speak a different language than players from Bangladesh or Pakistan.

In the IPL, a team can play a maximum up to four foreign players among their eleven-team members while playing a match. Therefore, players from a maximum of 5 different countries can play together in a team at a time. We consider the players from different countries playing in a match for a team as our measurement of teams' horizontal diversity. Horizontal diversity in the IPL varies from 2 to 5 countries. As the majority of players playing for a team in the IPL are Indian players, we consider a foreign player acting as captain as a measure of teams' vertical diversity.

We have three outcome variables to observe the performance of a team. First, we consider the run scored by a team in a match. Along with skill, communication between the batsman batting together is very important while scoring run in cricket. We consider a higher run scored in a match as a positive outcome for a team's performance. Second, we look at the number of wickets taken by a team in a match. Individual skill, especially by the bowler, is

⁵ IPL started with eight teams, and in 2011 two more teams were added. One of the added teams (Kochi) was terminated after 1 season because of breach of the agreement. The other added team (Pune) withdrew after the 2013 season over financial differences with the board of Control of Cricket in India (BCCI).

essential for taking wickets. We consider higher wicket taken in a match as a positive outcome for a team's performance. Finally, we look at whether a team wins or loses a match. Both scoring runs and taking wickets are important for a team to win a match. So, both communication and individual skill is necessary for winning. Here we consider winning as a positive outcome of a team's performance.

IV. Empirical Model and Summary Statistics

We estimate the following simple econometric model to evaluate the impact of team diversity on performance.

$$Y_{imt} = \beta_1 + \beta_2 D_{imt} + \beta_3 H_{imt} + \beta_4 O_{imt} + \beta_5 I_{imt} + \beta_6 T_{mt} + \beta_7 YR_{im} + \gamma X'_{imt} + u_{imt} \quad (1)$$

In the above model the term Y_{imt} refers to various outcome variables to observe performance (Run, Wicket or Win) of team i in match m at time t . The term D_{imt} includes various diversity indicator of team i in match m at time t based on our variable of interest. The term H_{imt} , O_{imt} , and I_{imt} include home stadium fixed effect; opposition team fixed effect and innings fixed effect respectively.⁶ Furthermore, the term T_{mt} and YR_{im} include team and year fixed effects respectively. Additionally, the term X'_{imt} includes a set of other controls that may affect the outcome variable. Moreover, finally, the term u_{imt} is the time-variant stochastic error term. The standard errors are clustered at team and year level.

Our data set comprises of teams who played matches from 2008-2015 edition of the IPL. Information and statistics of all the players have been referenced from the IPL official website (www.iplt20.com) and www.espnricinfo.com. We present the summary statistics in Table 1.

As we can observe, there is a wide variation in our outcome variable especially run scored and wicket taken in an innings. Unlike in baseball where the number of outs is generally higher than the number of runs scored, it is quite the opposite in the case of cricket. In cricket, a team can score as many runs as possible by facing a maximum of 120 fare balls during batting stage. However, a team can take a maximum of 10 wickets to finish an innings during bowling stage. As it is easy to score runs than taking wickets, the number of runs scored in an innings

⁶ There are two innings in cricket quite similar to 9 innings (in general) in baseball. The batting side in the first innings bowls in the second innings and vice versa.

is way higher than the number of wickets taken.

We also observe a wide variation among players from different countries playing in a match for a team. For example, at least one Australian player played for a team is 76 percent whereas the same for Zimbabwe is 0.4 percent. The main reason explaining this difference is mostly due to the difference in international ranking of a national team. For example, Australia and South Africa national teams are consistently among the strongest teams in international cricket in general, and on the other hand, the Netherlands and Zimbabwe national teams are fairly weak.

V. Main Results

We begin to present our main results considering the impact of horizontal diversity on team performance. We here examine both intra-horizontal and inter-horizontal diversity. Then we present the results considering the impact of vertical diversity on team performance.

A. Horizontal Diversity

A.I Intra Horizontal Diversity

We present the results of the impact of intra-horizontal diversity on team performance in Tables 2-4. In Table 2 we consider run scored by a team in a match as our outcome variable. In Table 3 we consider wicket taken by a team in a match as our outcome variable and finally, in Table 4, we consider whether a team wins or loses a match as our outcome variable. We present the results in Column 1 to 6 in each table by including various control variables in our model. The variable of interest in our model is the number of countries from which players are playing in a team in a specific match (Country from now on). As can be seen, the coefficient estimate of the country variable is not statistically significant without any controls in Column 1. The statistical insignificance does not change as we include various fixed effects and other control variables in Column 2-6. Overall, these results show that intra horizontal diversity has no statistically significant effect on team performance.

A.II Inter Horizontal diversity

We present the results of inter-horizontal diversity on team performance in Tables 5–7. In Table 5, we consider run scored by a team in a match as our outcome variable. In Table 6, we consider wicket taken by a team in a match as our outcome variable, and furthermore, in Table

7, we consider whether a team wins or loses a match as our outcome variable. We present the results in column 1 to 6 in each table by including various fixed effects and control variables in our model. The variable of interest in our model is the difference in players' nationality (Country difference from now on) while two teams are playing against each other. For example, if team A has players from three countries and team B has players from five countries playing against each other in a specific match, the country difference variable takes minus two in the case of team A, and takes two in the case of team B.

From Column 1 in Table 5, we do not see any statistically different relationship between inter horizontal diversity and the total run scored by a team. The coefficient estimate is statistically insignificant even after including various fixed effects and other controls in Columns 2-6. However, in Table 6 we find a positive and statistically significant relationship between inter-horizontal diversity and total wicket taken by a team in a specific match. The coefficient estimate of the country difference variable in Table 6 is robust and statistically significant after including various fixed effects and other control variables in our model in Columns 2-6. Finally, in Table 7 we do not find any statistically significant relationship between inter-horizontal diversity and the probability of winning a specific match. The coefficient estimate of country difference is still statistically insignificant after including various control variables and fixed effects in our model in Columns 2-6.

The above results conclude that inter-horizontal diversity has a positive impact on team performance where communication is low. However, it has no effect on performance where communication is high. These results are consistent with the theory of diversity: diversity brings a wide range of skills and innovation to a team and organization. However, it also creates communication costs. The positive impact of the wide range of skills and innovation due to the diversity of a team is compensated by the negative effect of communication costs in jobs where communication is important.

B. Vertical Diversity

We present the results of vertical diversity on team performance in Tables 8-10. In Table 8 we consider run scored by a team in a match as our outcome variable. In Table 9 we consider wicket taken by a team in a match as our outcome variable and furthermore in Table 10 we consider whether a team win or lose a match as our outcome variable. We present the results in Columns 1-6 in each table by including various fixed effects and control variables in our

model. The variable of interest in our model is the captain variable that takes 1 if the captain of a team playing a specific match is a foreign player or 0 otherwise.

In Table 8, we do not find any statistically significant relationship between vertical diversity and number of runs scored by a team in a specific match. The result is consistent even after including various fixed effects and other control variables in our model in Columns 2-6 in Table 8. However, in Tables 9 and 10, we find a negative and statistically significant relationship between vertical diversity and the number of wickets taken by a team in a match and the probability of winning a match. Our findings show that scoring runs are not affected by whether the captain is foreigner or Indian. As the communication between players scoring runs and captain is minimum, the captains' characteristics have no effects on the total run scored in a match. The above interpretation is consistent in the case of performances where communication between captain and players is high, as we find a negative and statistically significant relationship between wicket taken in a match and the captain being a foreigner. Finally, in Table 10, we find that, the overall performance (win or lose) is negatively affected by the vertical diversity of a team. Overall, our findings suggest that, the team is likely to get 0.35-0.46 fewer wickets and wins 9-10 percentage points fewer matches on average if the team's captain is from a foreign country (minority group).

VI. Identification

The approach used here is one that assumes selection of players to a team is random. In other words, it assumes that the team owners do not consider players country of origin while hiring a player. However, there could be various potential concerns to this strong assumption outlined above. We address the issue in our identification in detail in this section.

Endogeneity is a severe issue in the case of non-experimental research. A simple correlation between performance and the national diversity of a team may be misleading. For example, rich teams in soccer like Real Madrid and Manchester United can hire many talented star players from all over the world and thereby win the game. This is one of the few drawbacks in sports literature. However, there are several merits of considering IPL for our analysis.

The first merit of IPL is the unique method of hiring players. Almost all the players in the IPL are hired through annual second price English auctions. The IPL organizing committee selects the players who are ready to play and invite all teams to an annual auction every year. Therefore, all teams have equal access to any information on players registering into the auction

process. The merit of the second price auction is that the willing-to-pay for a team to a player is revealed, or that the truth-telling for bidding is the dominant strategy for a team. Additionally, each team recruit players from the same pool. Therefore, personal bargaining is not involved while hiring players as the wage of a player is determined in a competitive bidding process. Initially, players are contracted for one year, and their contract can be extended up to 3 years. Each team has absolute power to hire and fire players every year. Furthermore, there is a hard salary cap on hiring players in the IPL quite similar to some other leagues. A team could not recruit many star players, as the budget to spend on hiring players is fixed and is same for every team. The auction process of hiring players combined with hard salary cap makes a good competitive balance among the teams in the IPL. For example, as of 2015 season, seven out of eight existing teams have played the final in the IPL.⁷

Usually, players are not assigned randomly to each team as they recruit players from the auction process. For example, there could be a concern that team owners may like certain players thereby self-selecting them to their teams. This could be a challenge to our identification strategy due to the endogeneity issue. However, we show the following reasons to support our identification. First, unlike other sports leagues, a personal bargain is minimum in hiring players in the IPL as players are mostly hired from an auction, which takes place every year. Second, each team has absolute power to hire and fire players every year in the IPL. Furthermore, every three years, each team has to fire almost all players from their team and form a new team by hiring players from the auction. So, a typical player has the experience of playing for multiple teams. To show the evidence, we present the average number of teams a player played in the IPL until 2015 season in Table 11. As we can see from Table 11, a typical player in the IPL, have played for 1.48 teams on average. Additionally, if a player has played at least four seasons (likely to be fired and hired again due to the rule of the IPL), he is likely to have played for more than two teams on average. Moreover, finally, only seven players have played all the eight seasons and for a single team, out of which there are only two are foreign players. There is additional evidence showing that hiring and firing are widespread in the IPL, especially among foreign players. As can be seen from Table 11, out of total 208 foreign players that are recruited by the IPL teams, less than half of them (99 players) have played for three seasons. These findings additionally suggest that majority players are not self-selected to

⁷ Along with eight existing teams, two new teams were formed in 2011. One of the teams was dismantled after one season and, the other team was dismantled after three seasons. We will check the robustness of our findings excluding these two newly formed teams in robustness section.

a specific team.

Although players are not self-selected to a team, there could also be a concern that team owners might self-select players from specific countries. For example, if a team owner has a personal preference towards a specific country, he/she might recruit more players from that country by ignoring players from other countries irrespective of performance and experience. In the following paragraphs we provide various checks to address this issue.

First, we consider the number of countries from which each team is recruiting players to play in the IPL every year. We present the graph in Figure 1. Then we consider the average number of countries from which each team is playing players in a match in the IPL every year. We present the graph in Figure 2. As can be seen from Figures 1 and 2, there is a wide variation between teams recruiting and playing players in the IPL. Overall, we do not find any common trend specifying that teams are self-selecting their players. However, as can be seen, team KKR and team KXIP are showing a bit of common trend.⁸ On average, team KKR is more likely to recruit and play players from a higher number of countries whereas; team KXIP is more likely to recruit and play players from a smaller number of countries. In the robustness section, we will present the results excluding these two teams to check the robustness of our findings.

Another concern in our non-experimental setting could be that although teams do not self-select in recruiting players from multiple countries, the number of players each team recruits from each country might differ. To address this, we present the best four foreign countries from which most foreign players are recruited. In Figures 3, 4, 5 and 6 we present the number of players each team has recruited from Australia, South Africa, Sri Lanka and West Indies respectively. As can be verified from these figures, there is a wide variation in teams recruiting players from a specific country. In general, we do not see any common trend for a team recruiting from Australia and Sri Lanka. However, we find a common trend for team DD recruiting from South Africa (constantly 4 players for last five years) and team KXIP recruiting from West Indies (constantly no players for last five years). We check the robustness of our findings by excluding these two teams in robustness section.

VII. Robustness Check

In this section we check the robustness of our main findings considering the limitations

⁸ There is only one player from the Netherlands who is playing in the IPL and, the player is recruited by the team KKR. This might be the reason for showing a higher number of countries in Figure 1 and 2.

discussed in identification section. We present the findings of intra-horizontal, inter-horizontal and vertical diversity on team performance in Tables 12, 13, and 14 respectively. Models 1-3 present the results excluding the two newly formed teams. Furthermore, models 4-6 present the results excluding the team KKR and KXIP. Moreover, finally, models 7-9 present the results excluding the team KXIP and DD due to the common trend in recruiting players from specific countries. As we can see, the results in table 12, 13, and 14 are overall similar to our main findings.

VIII. Discussion and Conclusion

Diversity in the workforce is becoming common these days. As economic theories suggest both negative and positive sides to diversity on performance of a team or organization, it is important to understand the trade-offs. In this paper, we examined the impact of national diversity on team performance considering a novel dataset from the sports industry in India. We tried to answer the following three questions. Does more diversity of a workforce increase team performance (intra-horizontal diversity)? Does a more diverse team succeed if it is competing against a less diverse team (inter-horizontal diversity)? Does a team perform better if the leader is from the majority group (vertical diversity)?

Our analysis did not find any statistically significant relationship between intra-horizontal diversity and team performance. Performance is unaffected by the higher horizontal diversity of a team. However, we found a positive and statistically significant relationship between inter-team horizontal diversity and performance where communication is low. Furthermore, we found a negative and statistically significant relationship between vertical diversity and team performance. We found that a team in which the captain is from majority group wins more matches in comparison with a team where the captain is from a minority group. Additionally, we also found that a team takes more wickets when the captain is from the majority group. It is likely due to the facilitation of communication of captain with bowler and other players as the captain is present in the field while bowling stage. This is consistent with our other results as we found that there is no relationship between vertical diversity of a team and the run scored where communication between batsman and captain is minimum.

The results presented here have important practical implications. Our results suggest that more diversification does not hurt the performance of a team. Rather, a more diverse team may perform better when it is competing with a less diverse team especially in jobs where the communication is minimum. Our findings further suggest that manager of a team should be

appointed from the majority group especially when the communication among team members is high.

It is also important to show some limitations of our analysis. First, our identification strategy might be questioned. Although we find that endogeneity in team formation is not severe and we presented our results with various specifications, there is still a possibility that each team may be strategically choosing players and acting accordingly, which we cannot observe. This is one of the major limitations of non-experimental analysis. Second, we analyzed the impact of diversity on performance in sports labor market; therefore, our external validity might be limited. Future research in this field could address these limitations.

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Table 1: Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Win	1028	0.500	0.500	0	1
Run scored	1028	151.814	30.269	44	263
Wicket taken	1028	5.867	2.499	0	10
No of countries	1028	3.932	0.730	2	5
Captain (Foreign)	1028	0.391	0.488	0	1
Country difference (Own - Opposite)	1028	0.000	1.002	-3	3
Innings (first)	1028	0.502	0.500	0	1
Home stadium	1028	0.396	0.489	0	1
Australia	1028	0.757	0.429	0	1
South Africa	1028	0.720	0.449	0	1
Sri Lanka	1028	0.440	0.497	0	1
West Indies	1028	0.417	0.493	0	1
New Zealand	1028	0.302	0.459	0	1
England	1028	0.156	0.363	0	1
Pakistan	1028	0.075	0.263	0	1
Bangladesh	1028	0.034	0.181	0	1
Netherlands	1028	0.028	0.166	0	1
Zimbabwe	1028	0.004	0.062	0	1
Decision by D/L method	1028	0.018	0.135	0	1
Match tied and decision made in the super over	1028	0.010	0.098	0	1

Table 2: Intra horizontal diversity (Run)

	(1)	(2)	(3)	(4)	(5)	(6)
	Run	Run	Run	Run	Run	Run
No of countries	1.148 (1.340)	0.732 (1.325)	2.250 (1.452)	-1.699 (2.477)	-1.801 (2.488)	-2.112 (2.404)
Innings		12.85*** (1.836)	12.80*** (1.887)	12.83*** (1.914)	13.05*** (1.921)	12.87*** (1.862)
Home stadium		3.847* (2.083)	3.242 (2.051)	3.154 (2.108)	3.085 (2.094)	2.918 (2.021)
_cons	147.2*** (5.599)	140.9*** (5.441)	142.6*** (6.157)	148.4*** (6.441)	149.1*** (7.082)	152.2*** (6.899)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.000	0.054	0.102	0.112	0.127	0.152
Chi ²	0.734	57.17	915.0	1730.1	2322.2	1973.6
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 3: Intra horizontal diversity (Wicket)

	(1)	(2)	(3)	(4)	(5)	(6)
	Wicket	Wicket	Wicket	Wicket	Wicket	Wicket
No of countries	0.090 (0.107)	0.096 (0.107)	0.079 (0.134)	0.061 (0.238)	0.090 (0.243)	0.076 (0.243)
Innings		-0.354** (0.172)	-0.400** (0.173)	-0.386** (0.178)	-0.400** (0.179)	-0.409** (0.181)
Home stadium		0.062 (0.164)	0.107 (0.170)	0.104 (0.173)	0.103 (0.173)	0.098 (0.169)
_cons	5.509*** (0.420)	5.641*** (0.424)	6.159*** (0.550)	6.132*** (0.631)	5.405*** (0.629)	5.565*** (0.630)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.001	0.006	0.021	0.037	0.055	0.068
Chi ²	0.716	4.987	284.800	584.900	1127.100	1221.100
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 4: Intra horizontal diversity (Win)

	(1)	(2)	(3)	(4)	(5)	(6)
	Win	Win	Win	Win	Win	Win
No of countries	0.024 (0.025)	0.024 (0.025)	0.021 (0.029)	0.010 (0.051)	0.014 (0.051)	0.015 (0.051)
Innings		-0.0797** (0.032)	-0.0899*** (0.031)	-0.0888*** (0.032)	-0.0958*** (0.033)	-0.0958*** (0.033)
Home stadium		0.104*** (0.039)	0.111*** (0.041)	0.110*** (0.041)	0.107*** (0.041)	0.106*** (0.041)
_cons	0.405*** (0.098)	0.401*** (0.100)	0.513*** (0.119)	0.501*** (0.135)	0.399*** (0.148)	0.396*** (0.148)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.001	0.015	0.044	0.058	0.079	0.079
Chi ²	0.887	12.860	483.100	472.200	888.900	860.900
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 5: Inter horizontal diversity (Run)

	(1)	(2)	(3)	(4)	(5)	(6)
	Run	Run	Run	Run	Run	Run
Country difference	0.808 (1.010)	0.597 (1.024)	1.038 (0.952)	0.256 (1.332)	-1.675 (1.490)	-1.417 (1.468)
Innings		12.83*** (1.856)	12.80*** (1.913)	12.83*** (1.927)	13.06*** (1.906)	12.90*** (1.851)
Home stadium		3.849* (2.079)	3.246 (2.046)	3.157 (2.107)	3.078 (2.102)	2.915 (2.029)
_cons	151.7*** (1.192)	143.8*** (1.557)	151.6*** (2.764)	147.4*** (6.724)	142.5*** (8.097)	146.0*** (7.782)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.000	0.054	0.101	0.112	0.128	0.153
Chi ²	0.641	65.890	866.000	1838.200	2497.600	1930.900
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 6: Inter horizontal diversity (Wicket)

	(1)	(2)	(3)	(4)	(5)	(6)
	Wicket	Wicket	Wicket	Wicket	Wicket	Wicket
Country difference	0.210*** (0.078)	0.215*** (0.078)	0.227*** (0.087)	0.317*** (0.113)	0.291** (0.146)	0.303** (0.149)
Innings		-0.362** (0.172)	-0.406** (0.172)	-0.393** (0.178)	-0.404** (0.178)	-0.413** (0.179)
Home stadium		0.063 (0.164)	0.108 (0.169)	0.105 (0.173)	0.102 (0.172)	0.095 (0.168)
_cons	5.864*** (0.081)	6.021*** (0.108)	6.417*** (0.287)	7.028*** (0.545)	6.346*** (0.613)	6.535*** (0.633)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.007	0.012	0.027	0.045	0.060	0.073
Chi ²	7.304	10.980	311.600	673.000	1362.000	1618.600
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 7: Inter horizontal diversity (Win)

	(1)	(2)	(3)	(4)	(5)	(6)
	Win	Win	Win	Win	Win	Win
Country difference	0.025 (0.016)	0.026* (0.016)	0.025 (0.018)	0.028 (0.022)	0.024 (0.025)	0.024 (0.025)
Innings		-0.080** (0.031)	-0.090*** (0.031)	-0.089*** (0.032)	-0.096*** (0.033)	-0.097*** (0.033)
Home stadium		0.105*** (0.039)	0.111*** (0.041)	0.110*** (0.041)	0.106*** (0.041)	0.106*** (0.041)
_cons	0.498*** (0.018)	0.497*** (0.024)	0.592*** (0.057)	0.584*** (0.119)	0.483*** (0.128)	0.482*** (0.127)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.003	0.017	0.046	0.059	0.080	0.080
Chi ²	2.471	14.230	443.300	479.700	897.500	846.500
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 8: Vertical diversity (Run)

	(1)	(2)	(3)	(4)	(5)	(6)
	Run	Run	Run	Run	Run	Run
Captain	-1.250 (2.487)	-1.166 (2.416)	0.244 (2.234)	1.283 (2.146)	1.402 (2.130)	0.469 (2.110)
Innings		12.86*** (1.832)	12.83*** (1.902)	12.83*** (1.907)	13.05*** (1.916)	12.86*** (1.855)
Home stadium		3.846* (2.076)	3.232 (2.056)	3.156 (2.111)	3.090 (2.098)	2.940 (2.027)
_cons	151.0*** (2.109)	143.1*** (2.384)	152.2*** (3.934)	146.3*** (4.478)	146.9*** (5.440)	148.0*** (5.432)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.001	0.055	0.100	0.112	0.127	0.152
Chi ²	0.253	54.020	829.700	1620.000	2207.000	2879.000
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01 Standard errors are clustered at team and year level						

Table 9: Vertical diversity (Wicket)

	(1)	(2)	(3)	(4)	(5)	(6)
	Wicket	Wicket	Wicket	Wicket	Wicket	Wicket
Captain	-0.367** (0.157)	-0.371** (0.158)	-0.458** (0.195)	-0.360** (0.175)	-0.351** (0.179)	-0.403** (0.164)
Innings		-0.353** (0.171)	-0.406** (0.172)	-0.391** (0.178)	-0.405** (0.178)	-0.415** (0.180)
Home stadium		0.054 (0.164)	0.109 (0.168)	0.108 (0.172)	0.107 (0.171)	0.102 (0.167)
_cons	5.642*** (0.134)	5.796*** (0.146)	5.953*** (0.373)	5.806*** (0.434)	5.154*** (0.421)	5.221*** (0.410)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.005	0.010	0.025	0.039	0.058	0.071
Chi ²	5.470	8.920	272.200	513.900	958.500	983.400
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01						
Standard errors are clustered at team and year level						

Table 10: Vertical diversity (Win)

	(1)	(2)	(3)	(4)	(5)	(6)
	Win	Win	Win	Win	Win	Win
Captain	-0.101*** (0.0359)	-0.102*** (0.0362)	-0.0969** (0.0424)	-0.0959** (0.0393)	-0.0941** (0.0400)	-0.0923** (0.0396)
Innings		-0.0798** (0.0315)	-0.0911*** (0.0311)	-0.0902*** (0.0323)	-0.0975*** (0.0326)	-0.0974*** (0.0325)
Home stadium		0.103*** (0.0391)	0.112*** (0.0406)	0.111*** (0.0409)	0.107*** (0.0409)	0.107*** (0.0409)
_cons	0.437*** (0.0314)	0.436*** (0.0363)	0.487*** (0.0801)	0.401*** (0.0902)	0.311*** (0.0978)	0.312*** (0.0977)
Team FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Opposition FE	No	No	No	No	Yes	Yes
Other controls	No	No	No	No	No	Yes
R ²	0.0095	0.0237	0.0483	0.0617	0.0827	0.0829
Chi ²	7.932	20.98	263.4	345.4	655.0	654.7
N	1028	1028	1028	1028	1028	1028
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01						
Standard errors are clustered at team and year level						

Table 11: Average number of teams played by a player in the IPL

Seasons played	All Players		Only foreign players	
	No of players	Mean Teams played	No of players	Mean Teams played
No restriction	541	1.490	208	1.481
At least 2	373	1.710	131	1.763
At least 3	280	1.886	99	1.939
At least 4	218	2.032	77	2.065
At least 5	169	2.160	57	2.193
At least 6	115	2.287	38	2.289
At least 7	72	2.389	21	2.190
	Only 7 players have played all the seasons and for one team		Only 2 players have played all the seasons and for one team	

Table 12: Robustness check: Intra horizontal diversity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Exclude newly formed teams			Exclude KKR and KXIP			Exclude KXIP and DD		
	Win	Run	Wicket	Win	Run	Wicket	Win	Run	Wicket
No of countries	0.0108 (0.0533)	-2.288 (2.570)	0.132 (0.243)	0.0449 (0.0596)	-0.0677 (2.805)	0.0189 (0.298)	0.0229 (0.0736)	1.751 (3.395)	0.174 (0.344)
Innings	-0.0967*** (0.0324)	13.00*** (1.942)	-0.378** (0.187)	-0.0863** (0.0417)	13.17*** (2.005)	-0.433* (0.223)	-0.0677* (0.0400)	12.36*** (2.060)	-0.294 (0.206)
Home stadium	0.103** (0.0466)	3.157 (2.136)	0.0574 (0.196)	0.104* (0.0532)	2.344 (2.281)	0.167 (0.227)	0.0768 (0.0479)	3.224 (2.412)	0.124 (0.218)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	969	969	969	787	787	787	790	790	790

Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01
Standard errors are clustered at team and year level

Table 13: Robustness check: Inter horizontal diversity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Exclude newly formed teams			Exclude KKR and KXIP			Exclude KXIP and DD		
	Win	Run	Wicket	Win	Run	Wicket	Win	Run	Wicket
Country difference	0.0258 (0.0266)	-1.404 (1.550)	0.255 (0.155)	0.0418 (0.0277)	-2.767* (1.657)	0.425*** (0.165)	0.0337 (0.0290)	-1.277 (1.640)	0.289 (0.182)
Innings	-0.0980*** (0.0323)	13.07*** (1.934)	-0.387** (0.185)	-0.0851** (0.0414)	13.09*** (1.963)	-0.421* (0.219)	-0.0689* (0.0400)	12.40*** (2.068)	-0.305 (0.205)
Home stadium	0.102** (0.0463)	3.091 (2.142)	0.0577 (0.195)	0.106** (0.0529)	2.256 (2.304)	0.180 (0.229)	0.0790* (0.0476)	3.163 (2.419)	0.140 (0.219)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	969	969	969	787	787	787	790	790	790

Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01
Standard errors are clustered at team and year level

Table 14: Robustness check: Vertical diversity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Exclude newly formed teams			Exclude KKR and KXIP			Exclude KXIP and DD		
	Win	Run	Wicket	Win	Run	Wicket	Win	Run	Wicket
Captain	-0.0932** (0.0432)	0.493 (2.276)	-0.408** (0.175)	-0.0829 (0.0533)	-1.031 (2.053)	-0.614*** (0.209)	-0.0864** (0.0438)	-2.126 (2.591)	-0.356** (0.170)
Innings	-0.0981*** (0.0323)	12.99*** (1.932)	-0.382** (0.186)	-0.0891** (0.0421)	13.14*** (2.010)	-0.449** (0.225)	-0.0704* (0.0403)	12.34*** (2.062)	-0.306 (0.207)
Home stadium	0.0986** (0.0465)	3.159 (2.144)	0.0441 (0.195)	0.103* (0.0531)	2.330 (2.287)	0.159 (0.227)	0.0751 (0.0475)	3.172 (2.412)	0.119 (0.217)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	969	969	969	787	787	787	790	790	790

Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01
Standard errors are clustered at team and year level

Figure1: Number of countries from which each team is recruiting players to play in the IPL

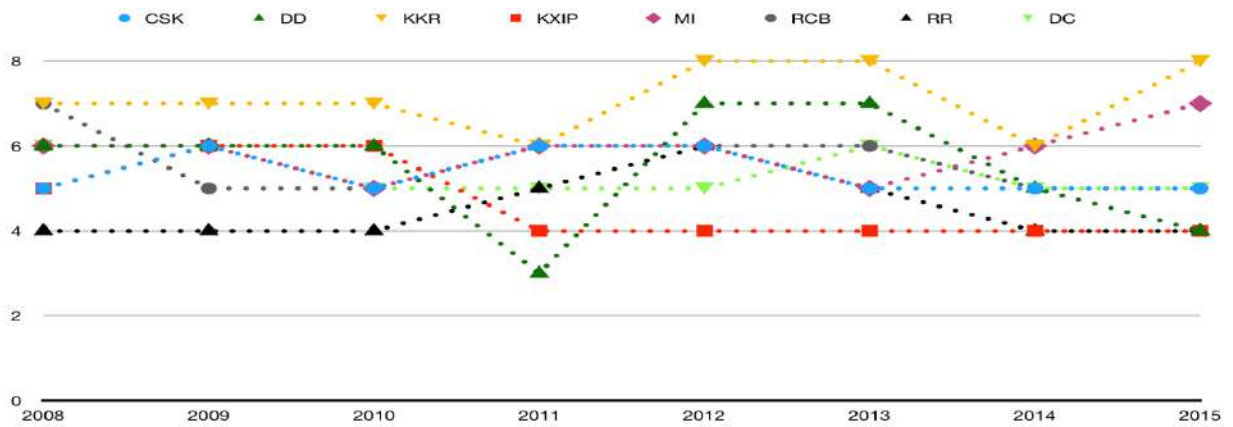


Figure2: Average number of countries from which each team is playing players in a match

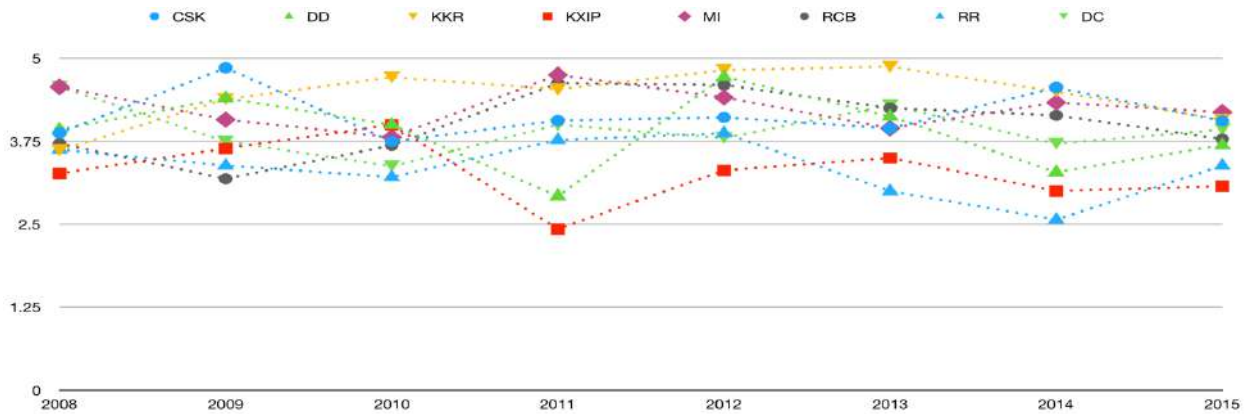


Figure 3: Number of players form Australia

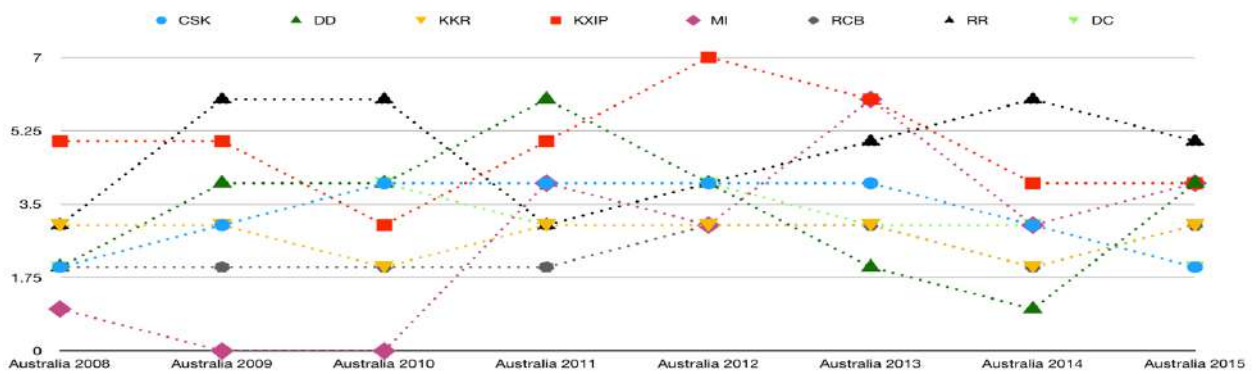


Figure 4: Number of players form South Africa

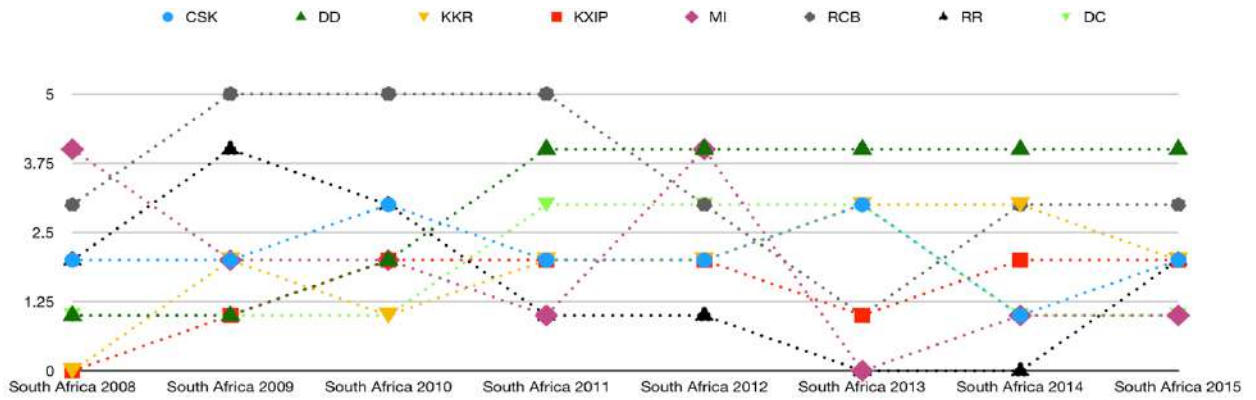


Figure 5: Number of players form West Indies

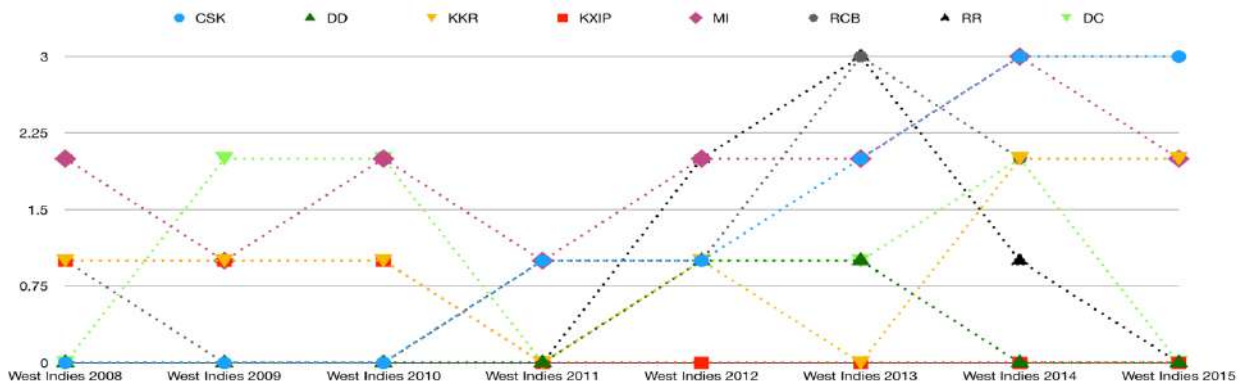


Figure 6: Number of players form Sri Lanka

