1. INTRODUCTION

Test match cricket, the oldest form of international cricket, is arguably the pinnacle of the game for many traditionalists. The five-day, two innings format has stood the test of time, with 2,205 matches played up to June 2016 since the first official match in March 1877 (ESPN Cricinfo, 2015). This study focuses on the relationship between performance in Test matches and selection consistency over a 30-year period in relation to player management systems, known as either central (or player) contracts. The implementation of such contracts for international cricketers has been a major development in the management of the international game. Previous research focussing on England found that the implementation of this management structure was a key driver in improving on-field performance, which was the contracts' fundamental aim (Bullough, Ramchandani, Millar & Coleman, 2014). This approach to player management has been adopted in similar formats by all major Test nations as a model of best practice. This paper examines the model across all the major teams operating in this structure, to see whether the positive influence from central contracts found in England is replicated across international Test cricket following the widespread implementation of this approach. This analysis will add to what is known about the influence of central contracts in Test cricket. The paper has three aims: first, to understand the best practice model; second, to examine stability, in terms of consistency in team selection, across the established Test playing nations and to compare selection consistency with results in Test matches; and third, to investigate relationships between pre and post central management in each country with selection and performance.

1.1 Research context - international cricket and central contracts as a best practice model

Unlike many other sports which have a large number of countries participating, only ten teams compete in Test cricket at the elite level, i.e. have 'Test status' from the world governing body, the International Cricket Council (ICC, 2016). Those ten countries are; Australia, Bangladesh, England, India, New Zealand, Pakistan, South Africa, Sri Lanka, West Indies and Zimbabwe. Cricket also has a different domestic structure to other team sports, with players able to travel to

other countries outside of their own domestic season to play where summer occurs at a different time of year. Good examples include franchise competitions such as the Indian Premier League and the Australian Big Bash - both of which run annually and feature several overseas cricketers. As Test playing countries have different summers (i.e. seasons), elite/international players could potentially play cricket in every month of the year with no extended break (Steen, 2009). In recent decades, team administrators in international cricket have looked at this issue, specifically around methods of player management. This is with the aim to improve the performance of their national team, by contracting players centrally to the international team rather than a domestic club/state/province/island. Although the movement patterns of professional cricketers are not like professional footballers (for example, with large transfer fees and greater freedom of movement commonplace in the case of the latter), the role of contracts in cricket has developed, particularly on the international stage.

Previous research has outlined how a stable team environment created by management interventions in cricket can be directly linked to performance. Maintaining high performance levels are vital to achieving continued success as suggested by Saikia, Bhattacharjee and Lemmer (2012), who also surmised that prolonged team success in cricket is reliant on individual player performance output being consistently high. As with any professional team sport, selection in cricket can vary depending on a variety of factors, such as injury, form, opposition, tactical approach, playing environment and playing surface. However, cricket team managers/administrators can provide an organisational structure which aims to have a positive impact on selection consistency and results. Concerns have been raised in previous studies around the amount of cricket played by elite players, linked to player management and injury prevention (Batt, Gregory & Wallace, 2004). Rest and tailored training are clearly cited as important factors in player management, alongside better injury surveillance systems (Dennis, Farhat, Goumas & Orchard, 2003).

In the 1990s, with the game becoming more professional with increased commercial revenues in the game (Culture, Media and Sport Committee, 2006), international teams sought to create an elite environment with the management of player workloads at its forefront. It has been argued that a potential consequence of cricketers 'overplaying' is a negative influence on performance, due to factors such as a reduction in dedicated practice time and fatigue (John, Richardson and Selvey, 2004). The amount of time spent playing impacts upon the amount of time preparing for matches through training, conditioning and rest; hence the creation, development and implementation of management control through a central contract system. A central management system allows international coaches to spend more time working with a core group of players in a system designed for international managers, rather than domestic teams (clubs/states/provinces/islands), to control player workload. This was pioneered by the Australian Cricket Board (James, 2012), and as other countries have seen the benefits of the system, it has been adopted by all major Test nations, and thus identified as a best practice model to follow and replicate.

The basic premise of a central contract system is to contract a small pool of players directly to their international team for one year. The international managers then have control over players' schedules rather than being effectively borrowed by countries from individual clubs (or equivalent) for international fixtures. The central contracts are worth more to players financially than what they receive from their domestic clubs, and are designed to increase training and dedicated time with coaches, focus on the international fixtures and reduce overall playing time. Such systems have evolved to include supplementary contracts for players playing internationally in the shorter formats of cricket (One Day Internationals and Twenty20).

The player management systems in place across Test cricket vary slightly depending on the approach and the length of time the system has been in place. As alluded to above, Australia was the first Test playing country to use a central contract system, which started in 1994.

Despite being the prime movers in this regard, the playing time by elite Australian cricketers at that time was already less than their English counterparts with Australia's 102 day season (in 1994) compared with England's 152 day season (Independent, 1996). South Africa was the second nation to follow this model (1995) with England introducing a central contract system from the start of the 2000 summer (Atherton, 2005). The other established Test nations - India, Pakistan, New Zealand, Sri Lanka, West Indies - have also introduced their own iterations of contract systems for international players at different times in the last two decades. Bangladesh, the relative newcomers to Test cricket and Zimbabwe (following their re-admission into Test cricket) also have their own versions of central contracts.

1.2 Contracts, stability and performance in cricket

The role of contracts in sport has been researched across many sports, for example in Major League Baseball (Maxcy & Hendricks, 1997; Barth, 2013), NBA Basketball (Stiroh, 2007), Association Football (Bruinshoofd & Ter Weel, 2003; Frick, 2007), and more widely related to commercial sponsorship deals and events. However, in cricket the area of contracts is less well researched, with only tenuous links made to player management in other studies, for example around injury surveillance (Orchard, 2013; Ranson, Hurley, Rugless, Mansingh, & Cole, 2013) and player workload (McNamara, Gabbett, Naughton, & Orchard, 2016). In cricket, the central/player contracts at international level are in addition to the (sometimes numerous) ones held with clubs including those of a short-term nature for franchise competitions such as the IPL.

This scenario is different from other sports where the club contract is the sole employment contract, and ordinarily runs for a number of years to protect the clubs' investment in a player. Maxcy & Hendricks (1997) suggest that, in baseball, long-term contracts did not influence player's performance, but did suggest that the issue of long-term contracts (and renewal) can detract from an employee's efficacy once income is secured by contract. In international cricket,

this scenario is much less likely, with shorter length contracts which also supersede club contracts in monetary value and playing priority. Furthermore, having central contracts for a smaller pool of players is more likely to produce greater selection stability as the financial outlay on 'wages' is from the international team budget, rather than borrowing 'assets' from domestic clubs. If international teams invest financial resources in players, and pay for elite coaches and support staff for such players, there is a higher chance of them using those players, rather than picking non-contracted players, where an additional charge from their domestic club is likely to be incurred. This investment from the international board then creates a more stable selection protocol because they, on the most part, select from the smaller group of contracted players.

Rumford (2011) suggested that cultivating a positive team atmosphere and culture may become problematic where players' earning power is dependent on the policies implemented by those managing player contracts. However, as the central contracts were designed for a smaller pool of players, rather than a squad of 30+ players similar to other team sports, and contracts are reviewed annually, the "problematic" scenario cited by Rumford is less likely in international cricket teams. This is particularly true when the system is designed to pick an elite team (with a small number of potential replacements) and cultivate a culture in an environment wholly dedicated to the Test match fixtures.

Research on Test match cricket is relatively limited, although one piece of previous research in cricket focussed on the England Test team looking specifically at the impact that the introduction of central contracts had on team selection and results (Bullough *et al.*, 2014). The study demonstrated that England had, following the implementation of a central contract system, begun to have a more consistent selection policy, which coincided with an upturn in performance (results). Additional qualitative interviews from Bullough *et al.*, conducted with international players, coaches and administrators, outlined that the more focussed approach

underpinning the new management system was a major influence on the improvements in team performance. The interviewees suggested that the short-term nature of player selection (and subsequent de-selection) which occurred in the period pre-central contracts was an area creating additional pressure on players to produce instant performance. The study also reported that some new players did not feel part of the international team, and that as a new player there was a culture that you may always be one game away from being discarded. However, the impact of central contracts across Test cricket is not known, and questions arise around whether the central contracts, as a best practice model, have had a similar impact in other countries. This gap in the research is examined here.

The expansion of the world game, with the introduction of Twenty20 competitions at international and franchise level, has magnified the issue of player workload due to the increased number of competitions on the calendar, hence the focus on better player management systems. The basic premise behind any player contract is the creation of stability (Shropshire, 2011), where players can develop within a team; (ideally) remove some uncertainty about their short to medium term future and improve skills and performance (Krautmann & Oppenheimer, 2002; Bougheas & Downward, 2003). Contracts in modern day sport are an important part of securing the services of players to particular clubs/organisations, usually to 'protect assets'. As shown by Bullough *et al*., (2014), contracts have been successfully introduced to create stability in English cricket. Although contracts differ between sports, in cricket the culture of international teams in the modern era is to 'own' players, rather than the more traditional structure of 'borrowing' them for international fixtures.

James (2012) suggested that there were benefits for elite cricketers when they spend more time around the international team environment. Concentrated activity in an elite environment, spent with international coaches and focussing on preparation and training, were cited as key benefits of this approach. Interviews conducted by Bullough *et al.* (2014) outlined this change in

approach by team management in England was one of the positive outcomes from the central contract system, with players, coaches and administrators in agreement. Additional benefits to the players include having a managed workload, where there is a reduction in the number of domestic fixtures international players play (Greenfield & Osburn, 2010), and a greater frequency of planned rest periods around the international calendar (James, 2012). Team managers planning and controlling schedules were also cited as positive factors by Bullough *et al.* (2014). It can be argued that the player contract systems introduced across the Test playing nations all have a fundamental aim to focus on a smaller group of elite players, and therefore should create a more consistent approach towards team selection (Bal, Cooman, & Mol, 2013).

Another area of policy covered by contracts is placing restrictions on the amount of playing time. For example, centrally contracted England players were restricted to play a maximum of 105 days of cricket per annum (ECB, 2010). Players can be withdrawn from county/domestic/state/province matches by the international management, as demonstrated by the example from England's 1995-96 tour of South Africa where the South African players had a six-month respite from playing before the series, spending time preparing in training camps (ESPN Cricinfo, 1997). In that series fast bowlers Allan Donald and Shaun Pollock, were prevented from playing for their provincial teams between the second and third Test matches to ensure they remained in the best condition for the international fixture (ESPN Cricinfo, 1997).

The literature points to a more professional approach being applied to the international game, with player management systems designed to improve and prolong elite players' careers. The method outlines how this study quantifies this to understand the impact of player management systems.

2. METHODS

Match results and team sheets were gathered from Test matches contested over a 30 year period from January 1985 to January 2015, using the ESPN Cricinfo website (CricInfo, 2015). The team sheets were then put in chronological order to ascertain match-to-match changes in selection, and recorded with result, opposition, date and location. South Africa were the only nation with an incomplete set of 30 years' worth of fixtures following the boycott of South Africa's international sport teams due to apartheid, with international Test cricket not re-starting until the country was re-admitted to international sport in 1991 (Booth, 1992). Notwithstanding this anomaly, South Africa has contested 218 matches since 1992, which is only marginally less than other nations such as Sri Lanka (221), New Zealand (231) and Pakistan (236).

In this study, team stability and team performance are two key indicators. Team stability was measured in terms of the average number of changes per match in each sample period. The assessment of team performance was calculated using two methods: the win ratio (games won divided by games played); and, the average number of points per match, based on a scoring system which allocates two points for a win, one for a draw / tie and zero for a loss. The rationale for using both win ratio and score is that they demonstrate the best measurements of performance, both in terms of overall success (wins) and consistency (score). Team stability and performance scores were also compared pre and post the introduction of central contracts in each country to isolate the time periods where teams were using different management structures.

For the purpose of the analysis, the results for two Test nations were omitted (Zimbabwe and Bangladesh), although the games played against them remain in the analysis. The omissions were for four reasons. First, the number of games played by these two nations was considerably less than the others (97 by Zimbabwe and 88 by Bangladesh), compared to the next lowest - South Africa (218). The second reason was the schedule of the games played in the sample time

frame. Zimbabwe did not play a Test match between September 2005 and August 2011 due to the withdrawal of their Test status by the International Cricket Council and Bangladesh did not play a Test match until November 2000, which is 16 years into the sample time frame. Third is the relative performance of the two teams, recording only 18 wins between them, 11 of which occurring when playing each other. Fourth, there is some ambiguity about the existence and precise enforcement of central contracts in these countries, particularly Zimbabwe during the period where they did not have 'Test status'. Furthermore, most of the Test matches played by Zimbabwe in the time frame were prior to any central contracts whereas Bangladesh only played a few Test matches without their central contracts - so the pre and post comparison is limited for these countries when compared to the other eight. This combination meant there was little insight that could be offered by their results. Therefore, only the eight remaining Test nations were included.

In the next section, we first present and analyse country-specific descriptive data on performance and team stability. The correlation between these variables is subsequently examined. Thereafter we consider the performance and team stability of countries pre and post the introduction of central contracts.

3. RESULTS AND DISCUSSION

Between January 1985 and January 2015, there have been 1,135 Test matches played involving the eight nations included in the analysis. Overall, 34% of Test matches included in the sample time frame were won (therefore 34% were losses), and 31% were either drawn or tied (one tie, Australia versus India, September 1986). Interestingly, within the sample timeframe, the approach by teams to the way the game is played has arguably changed, where the proportion of matches drawn has decreased from an average of 40% between 1985 and 1999 to an average of 25% since 2000.

3.1 Individual teams

Table 1 gives an overview of games by country, including points, average score, player changes and average player changes. In the sample time frame, England has contested the most games (343), and South Africa the least (218), due to their re-admittance into international cricket in 1992, thus they played no games from 1985-1992. When looking at results over the 30-year period (1985-2015) there is a downward trend in the number of changes made across Test nations.

Table 1: Summary of performance 1985-2015 - about here

Table 1 highlights that, across 30 years, international Test match teams, on average, make almost two changes to team personnel per fixture (1.95) although this fluctuates per team with Pakistan (2.47) most likely to make changes and Australia (1.52) the least likely. When looking at individual teams, the range of the changes made in selection fluctuates as some teams are more likely to make more conservative changes rather than 'sweeping' changes. England, Australia and South Africa played one in five (20%) of their fixtures with the same team as the previous game, compared to one in ten (11%) for the other five nations. Indeed, 10% of Pakistan's fixtures have seen them make five or more changes to their team, something Australia and South Africa have done only once and on three occasions respectively. Only England (with 9% of their games seeing five or more changes) has a similarly high turnover of players, although this was over 104 more matches than Pakistan and 27 of the 32 occasions were pre-central contracts (1985-1999). This suggests that there have been slightly differing approaches to player selection between nations over the last 30 years. Pakistan in particular has had an increased tendency to make changes, averaging three changes per game in the four years prior to introducing central contracts (their highest turnover of players in the 30 year sample), a point discussed later.

Figure 1: Win ratio (WR %) versus average changes - about here

Figure 1 plots the average number of changes for each country (on the x axis) against their win ratio (on the y axis) for the time period 1985-2015. The relationship between these two variables is negative and fairly strong (r = -0.71), which implies that as a general rule of thumb fewer changes are linked with an increase in the proportion of matches that nations win. Australia and South Africa are the two stand-out nations in terms of performance and also team stability. Their overall win ratios are at least 12 percentage points more than next highest country (Pakistan), they are ranked first and second respectively for the lowest number of changes, and they are also two of the three nations (with India) to average fewer than two changes per game. Pakistan is the only one of the remaining six nations not clustered together due to the third highest win ratio but also the highest number of average changes.

3.2 The relative influence of contracts

Previous research into the stability that central contracts brought to team selection for England (Bullough *et al*., 2014) outlined that there were positive differences over time in one country. Correlation analysis was conducted on all eight nations in the sample to examine the nature of the relationship between team stability (average number of changes) and performance (win ratio and average score) for each country. The correlation coefficients are shown in Figure 2.

Figure 2 Correlation between average changes and performance (win ratio and average score) - about here

The key finding from Figure 2 is that for most countries, there are moderate to strong negative correlations between the average number of changes and both performance indicators. In other words, greater team stability (fewer changes) is associated with better performance. In the case of India and Pakistan, performance appears to improve as the number of changes increase;

however, this relationship is weak. These findings suggest that selection consistency, which has been an area of focus for international team managers, has produced generally favourable results.

As outlined earlier, all eight nations use a broadly similar approach to player management. Table 2 presents a comparison between the fixtures contested prior to the introduction of central contracts with those played afterwards to assess the impact on each country.

Table 2 Performance pre and post central control of contracts - about here

Six of the eight teams have seen an improvement in their win ratio post the introduction of their version of a central contract system, which coincides with a decrease in their propensity to make changes to their team line-up. Across the whole sample, pre central contracts teams made 2.15 changes on average, compared to 1.84 afterwards, which is a clear indicator of increased stability in player selection. Although the decreasing number of draws in modern Test match cricket is one factor behind the improved win ratios for six of the eight countries, a stronger indicator is the change in average points in relation to more stable selection, as shown in Figure 3.

Figure 3 Pre and post contracts - selection changes and average points - about here

Figure 3 indicates that the implementation of player contracts, and the subsequent increase in player selection stability that evidently follows, has had the largest impact on the performance of the England Test team compared with the other seven nations. Statistical analysis (using Z scores) highlighted that three countries (England, Australia and India) had a significant improvement in the proportion of games won ($p < 0.05$), which is an important finding as England and Australia had the lowest number of team changes following the introduction of

their central contracts. New Zealand and Sri Lanka saw improvements in their win ratios but these were not statistically significant. South Africa's win ratio also improved (by 21 percentage points), although their low baseline number of pre-contact fixtures meant that this was not a statistically significant improvement. New Zealand was the only one of the six teams with an increase in win ratio that did not also have an increase in their average score. This was largely due to a greater proportion of their games concluding with a positive result (30% of games drawn post contracts compared to 42% before).

Pakistan and West Indies are the only teams where performance has declined post-contracts on both indicators. However, the nature of their situations has seen other influencing factors, for example the contracts for players representing the West Indies has been accompanied by protracted negotiations and player strikes, leading to abandonments of series due to player payment issues (ESPN Cricinfo, 2014). This suggests the West Indies Board have not implemented them in a way that other nations have. Pakistan is the other international team with a reduced average score since player contracts were introduced, although there have been no "home series" in Pakistan since March 2009 due to security concerns, with the United Arab Emirates (Dubai, Abu Dhabi and Sharjah) hosting Pakistan's home fixtures (Menon, 2015).

Pakistan and West Indies, who both saw a decrease in win ratio post-contracts, had varied results. Pakistan's relative decrease in performance coincided with much greater team selection stability. Although this decrease was not statistically significant, their current circumstances mean they are playing their home games outside Pakistan, which may have a bearing on their team selection policy and results. The West Indies saw a decrease in win ratio alongside an increase in the average number of selection changes, and this was a statistically significant decrease ($p < 0.05$). This finding is opposite to the teams showing improvement, but further demonstrates the relationship between selection strategy and results. It also adds weight to the

theory that stability of selection through a structured system can be positive over the longer term, but from the counter viewpoint, in that selection instability can have a negative effect.

Although central contracts may not provide the competitive advantage they originally did for the early adopters, the data suggests that the way they are designed, implemented and managed can have a positive impact on team performance. When comparing pre and post central management control by individual team, the positive gains appear to be evident in the first 20 to 30 matches. Five nations performed better in the ten games immediately after the introduction compared to the ten games immediately prior, and two matched their average score; only Sri Lanka saw worse results.

The competitive advantage levered, in terms of average points, in the early stages after implementation (i.e. the first 20 games after central contracts compared with the 20 games before central contracts) was +0.15, and this reduced to +0.05 (40 v 40) and +0.06 (60 v 60). This suggests that the benefits to, what should be, a more consistent team selection is seen in the early stages after adoption. With current schedules showing that 20 Test matches covers around 18 months, this would suggest that the added value of central contracts is in the more immediate term. The three countries that were the early adopters of central contracts (Australia, South Africa and England) have been the three countries that, when comparing their own performance, had gained the greatest competitive advantage from central contracts. However, as all eight leading nations have now followed a similar path, and six of the eight have seen improvements in results post-contracts, the initial competitive advantage has arguably dissipated somewhat. However, it could be argued that Test nations have become more professional in the last 10-15 years under their central management system with the creation of dedicated elite performance support teams (coaches, analysts, medical support, media relations etc.) to complement the central system. Indeed, this was established firmly in the case of England by Bullough *et al.*

(2014) as greater investment is being made into the players and the environment in which they operate. This in turn has reduced the gap between international teams.

4. CONCLUSION

World cricket has seen significant changes to its calendar and these have influenced the priorities of players and member associations more rapidly in the last decade than any other. There are arguably differences in priorities between players within the same national squad depending on their contractual status. However, the international Test match calendar is providing ever more Test match fixtures, and this format continues to hold its position at the pinnacle of the international game.

The analysis indicates that Test teams have found a model of best practice for the management of elite international players in the modern era, although there are subtle differences between nations in the way these are implemented. The question pertaining to the analysis is the extent that the central contract system was the sole (or significant) trigger for improved performance. There are other factors which could be argued influence performance. However, the findings presented demonstrate that there is a relationship between greater selection consistency and results over time, in terms of both win ratio and average score, as evidenced by six of the eight international teams in the sample. This further vindicates the findings from the Bullough *et al.* (2014) study. Central contract systems which have been adopted (in some form) by all the major Test playing nations appear to be the best practice available, if managed well. Some of the contractual issues encountered by the West Indian team in the last decade have negatively affected their team stability and results. With senior players removed from the team and subsequently reinstated, this has created instability in selection consistency.

A central contract system can provide a structure in which selection stability is prioritised in the first instance, producing a clear indication of the likely team selection from the management.

This environment then appears to have associated benefits, particularly in the short-term, in terms of results. It could be argued that if one nation improves performance, then another must regress, which raises a question whether one system is failing. The reduction in the number of drawn games and arguably a closer competitive balance between the eight nations as teams have become more focussed through central control are factors to consider. The data presented allows the argument to be made that the implementation of central contracts as a best practice model has been a beneficial addition to nations' performance in Test matches, amongst other variables.

In terms of implications for team managers/administrators, coaches and selectors, clearly it is not a case of simply retaining the same players if they win a fixture, as each game requires a different approach depending on the venue, the conditions of the pitch, the overhead conditions as well as injury, form and opposition. However, there are benefits for managers in ensuring that the elite environment through the central contract system is designed to meet the needs of the players, and implemented in a similar manner. In addition, effort to ensure the identification and selection of players for their first foray into Test cricket is well-managed with a long-term strategic focus is important. This system is designed to allow players, once identified and selected, and where possible and appropriate, to be retained for a period of time to ensure they are embedded into the elite system and not discarded after one or two matches. This was identified by former players in England as happening too frequently in the game and was one of the reasons creating increased pressure and uncertainty pre-central contracts (Bullough *et al*, 2014).

It appears that this is an area where significant improvements had been made from a management perspective, which has contributed to improved performance. As Maxcy and Hendricks (1997) suggested in the context of baseball, long-term contracts were not an influence on performance, but the issue of long-term contracts (and contract renewal) can impact a players' efficacy once their income is secured. The nature of central contracts, as one

year deals reviewed on the basis of performance, creates a structure which can help to reduce some of the negative repercussions. Contract renewal is much more regular than in many other team sports, where 3-7 year contracts are more commonplace. This suggests that the design of shorter contracts in Test cricket have created a bespoke management system that suits this environment.

It is widely understood in statistical analysis that correlation does not imply causation, in that correlation between two variables does not necessarily infer that one variable causes the other. However, the qualitative interviews in the study by Bullough *et al*. (2014) provided strong indications that the central system in England was the catalyst for the upturn in performance in the years following their introduction. The results herein outline a similar relationship (i.e. an upturn in results in the period following the introduction of a central system for six of the eight Test nations - see Table 2), therefore it could be inferred that the central system is the at least part of the causal mechanism. The competitive advantage of central contracts for each team appears largely to be in the two years following their introduction, rather than acting as a panacea to success as all major cricket playing nations now having them in place. For Test cricket in the future, a stable environment which is designed and set-up by team management should remain a vital part of the elite management system in cricket. In the future, the efficacy of the environment is important, ensuring that strong management principles underpin the governance of Test teams.

One area the analysis in this research does not cover is the nature of the selection change, i.e. were changes to the team personnel by selection choice or circumstance, e.g., weather conditions, injury, a performance related decision, forced circumstances such as player retirements or a tactical decision. It also does not take into account other variables which may be of interest when analysing performance, such as player age, injuries, travel distances or rest, although clearly some of those variables will be taken into account when allocating central

contracts. For example, selectors may choose to play two spin bowlers on a dry pitch on the sub-continent in the last match of an away series, which may be compared with the next fixture, where five pace bowlers are selected in the first game of a home series in wholly different conditions, where the playing environment is perhaps more suited to a different bowling attack. This level of detail was not included in the database, and it was therefore not possible to use. It does, however, present an area for future research in this area in order to isolate the effects of certain variables of interest, and thus further expand this under-researched area of Test match cricket.

5. REFERENCES

Atherton, M., 2005. *Triumph of the Poms; England expects to win the Ashes what's going on?* [online]. The Spectator. Available from http://www.spectator.co.uk/comic/triumph-of-the-poms/ [Accessed February 4 2015]

Bal, M. Cooman, R. and Mol, S. 2013. Dynamics of psychological contracts with work engagement and turnover intention: The influence of organizational tenure. *European Journal of Work and Organizational Psychology*, 22 (1), 107-122.

Barth, D., 2013. *Estimating Effort Shirking with Endogenous Contract Lengths*. Hamilton College Working Paper, unnumbered, 2013.

Batt, M. Gregory, P. & Wallace, W., 2004. Is risk of fast bowling injury in cricketers greatest in those who bowl most? A cohort of young English Fast Bowlers. *British Journal of Sports Medicine*, 20, 125-128.

Booth, D., 1992. Accommodating Race to play the Game: South Africa's Readmission to International Sport. *Sporting Traditions*, 8 (2), 182-209.

Bougheas, S, & Downward, P., 2003. The Economics of Professional Sports Leagues: Some insights on the reform of Transfer Markets. *Journal of Sport Economics*, 4 (2), 87-107.

Bruinshoofd, A. & Ter Weel, B., 2003. Manager to go? Performance dips reconsidered with evidence from Dutch football. *European Journal of Operational Research*, 148 (2), 233-246.

Bullough, S. Millar, R. Ramchandani, G., & Coleman, R., 2014. The effect of central contracts on the stability and performance of the England Test cricket team. *RICYDE. Revista Internacional de Ciencias del Deporte*, 10 (35), 4-15.

Culture, Media and Sport Committee., 2006. Broadcasting Rights for Cricket: Ashes to Ashes - the Death Knell for Live Test Match Cricket on Free-to-air TV?; First Report of Session 2005-06. *Great Britain: Parliament: House of Commons: Culture, Media and Sport Committee*.

Dennis, R., Farhart, R., Goumas., C & Orchard, J., 2003. Bowling workload and the risk of injury in elite cricket fast bowlers. *Journal of Science and Medicine in Sport*, 6 (3), 359-367.

ECB., 2010. *Grounds to Play, ECB Strategic Plan 2010-2013* [online]. The ECB. Available from http://static.ecb.co.uk/files/grounds-to-play-11040.pdf [Accessed February 4 2015]

ESPN CricInfo., 1997. *England in South Africa, 1995-96* [online]. Available from: http://www.espncricinfo.com/wisdenalmanack/content/story/153526.html [Accessed February 4, 2015].

ESPN CricInfo., 2013. *Allow England players time for IPL* [online]. Available from: http://www.espncricinfo.com/england/content/story/678355.html [Accessed February 4 2015].

ESPN Cricinfo., 2014. *West Indies pull out of India tour* [online]. Available from: http://www.espncricinfo.com/india-v-west-indies-2014-15/content/story/789919.html [Accessed March 5 2015].

ESPN Cricinfo., 2015. *Stats Guru.* [online]. Available from: http://www.espncricinfo.com/ci/content/current/stats/index.html [Accessed February 4 2015].

Frick, B., 2007. The football players' labor market: empirical evidence from the major European leagues. *Scottish Journal of Political Economy*, 54 (3), 422-446.

Greenfield, S. and Osburn, G., 2010. Regulating sport: finding a role for the law? *Sport in Society: Cultures, Commerce, Media, Politics*, 13 (2), 367-379.

Independent., 1996. *Acfield advocates rest for top players* [online]. Available from: http://www.independent.co.uk/sport/acfield-advocates-rest-for-top-players-1307684.html [Accessed February 28 2015]

International Cricket Council. 2016. *ICC Rankings* [online]. Available from: http://www.icc-cricket.com/team-rankings/test [Accessed October 31 2016]

James, S., 2012. *The Plan: How Fletcher and Flower have transformed English Cricket*. Random House.

John, E, Richardson, D., & Selvey, M., 2004. Excess fare: some players have had enough, others can't get enough. Emma John investigates the hot issue of burn out. *Wisden Cricketer*, 1 (4), 46-50.

Krautmann, A, & Oppenheimer, M. 2002. Contract Length and the Return to Performance in Major League Baseball. *Journal of Sports Economics,* 3 (1), 6-17.

Maxcy, J. G. W Hendricks 1997. Do long-term contracts influence performance in Major League Baseball? *Advances in the economics of sport*: *Volume 2,* pp. 157-176.

McNamara, D. J., Gabbett, T. J., Naughton, G., & Orchard, J. W. 2016. How submarine and guided missile technology can help reduce injury and improve performance in cricket fast bowlers. *British Journal of Sports Medicine*, bjsports-2015.

Menon, S. 2015. Wisden India Almanack 2015. Bloomsbury India.

Orchard, J. W. 2013. Injury surveillance in cricket. *British Journal Sport Medicine,* 2013 (47), 605–6.

Ranson, C. Hurley, R. Rugless, L. Mansingh, A. Cole, J. 2011. International cricket injury surveillance: a report of five teams competing in the ICC Cricket World Cup, *British Journal Sport Medicine,* 2013 (47), 637–43.

Rumford, C. 2011. Twenty20, global disembedding, and the rise of the 'portfolio player'. *Sport in Society: Cultures, Commerce, Media, Politics*, 14 (10), 1358-1363.

Saikia, H., Bhattacharjee, D,. & Lemmer, H. H. 2012. Predicting the Performance of Bowlers in IPL: An Application of Artificial Neural Network. *International Journal of Performance Analysis in Sport,* 12, 75-89.

Shropshire, K. 2011. *The Business of Sports. 2nd Edition*, Jones and Bartlett Publishers.

Steen, R. 2009. Burning down the house. *Sport in Society: Cultures, Commerce, Media, Politics, Special Issue, Cricket: International and Interdisciplinary Approaches,* 12 (4-5), 670-680.

Stiroh, K. J. 2007. Playing for Keeps: Pay and Performance in the NBA. *Economic Inquiry*, 45 (1), 145-161.

Stoddart, B. 2011. Game for hire: Twenty20 and the new cricket mercenary. *Sport in Society*, 14 (10), 1421-1427.