Is the Decline in the Frequency of Draws in Test Match Cricket Detrimental to the Long Form of the Game?[#]

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Abstract

The frequency of draws in test cricket has declined noticeably in the last 15 years. This has been brought about by changes in the style of the 5-day game, coupled with several rule changes designed to extend time played. While many cricket fans (and administrators) believe this to be good for the game, the contradictory argument is forwarded here to balance the debate, based on the premise that too many Tests are finishing excessively early, and hence are predictable. Regression results indicate that rising run rates and rising average wickets per Test have some explanatory power over the frequency of draws, but the rule changes have also played a big part. This is one issue (of several) that administrators must address in order to ensure that the oldest and purest form of the game is able to continue to compete for consumer interest with shorter forms of the game in the future.

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1. Introduction and Previous Literature

When I was growing up watching cricket in the 1980s, while I was interested by Test Cricket, One-Day Internationals (ODIs) seemed to be a far more glamorous television option for a youngster who was also playing the game at junior level. In hindsight, maybe it was the then revolutionary Tri-Nations tournament format (which lasted right up until the summer of 2008 before its eventual demise) that also allowed Australian viewers to watch neutral games, that was responsible for much of its appeal to me. Alternatively, perhaps it was the day/night match format, or the coloured uniforms along with white match balls, or even the distinctive rules, such as the 30-metre circle and 15-over field-setting rules. Above all, one further alternative has to be considered for why ODIs appealed to me more so than Test Matches – that it was simply a shorter form of the game.[1]

Whatever it was, there was substantial evidence to suggest that Kerry Packer had developed an extremely successful business model for international cricket in Australia, which later flowed on to domestic-level and other countries. However, there is no doubt at the time that the game's purists were dismayed at the proliferation of ODIs at the relative expense of Tests – a worrying trend that they had possibly foreseen as early as the 'World Series' War of the mid-to-late-1970s. This proliferation was brought about mainly because the limited-overs format produced higher attendances and ratings, and thus (eventually) higher players' salaries, allowing the eventual transformation of cricket from a semi-professional sport to a fully-professional one.

[1] Maybe it was merely a perception at the time that Test Cricket was the form of the game associated with old men and the upper-class.

This trend has continued unabated since, as can be seen in table 1 and visually in figure 1 with the aid of a stylised dashed trendline, right up to (the World Cup year of) 2007. More recently, the invention and subsequent meteoric rise in popularity of the even shorter (so-called) 'Twenty20' form of the game will be even much more worrying for the purists going forward, especially with the huge amounts of money on offer. As my own have tastes matured since my childhood, I now find myself firmly in that camp, and proudly so, along with the elite players who themselves have always regard Test Matches as the ultimate form of the game. One of the many (arguably endearing) distinctions of Test Matches specifically is the possibility of a draw, whereby the match is not completed at the conclusion of the five days of scheduled play, though in ODIs and Twenty20 matches, there is the possibility of a 'no result' in rain-affected matches.

The primary purpose of this paper is to analyse the apparent decline of the frequency of draws in Test Match cricket over the last 15 years, and explore some possible reasons for it, some anecdotal, others empirical. This is an interesting problem in itself, although there are a few other appealing reasons for such a study. Firstly, given the extraordinary recent and projected future prosects of India, a country in which cricket is the biggest sport, cricket is experiencing a relative surge in its worldwide financial clout, relative to other sports. Secondly, cricket is a sport with arguably more idiosyncrasies involved (in terms of its rules, power structures, etc.) than any other fully-professional sport. Thirdly, and most importantly, the current and past volume of academic work on international cricket is disappointingly thin within the sports economics fraternity, a deficiency that this paper hopes to play a role in overcoming.

Despite the dearth of economics literature on cricket, a very nice ‘general’ commentary regarding recent economic influences on cricket can be found in Preston (2006). Meanwhile, Bhattacharya and Smyth (2003) undertake a classic-style estimation of demand for sport exercise for cricket matches in Australia, finding in favour of the prevalence of ‘match-specific’ factors (such as uncertainty of outcome) over more general economic factors (such as price and income) in determining demand. Much of the remaining work on cricket centres on team ratings and prediction, such as Allsop and Clarke (2004), as well as Brooks, Faff and Sokulsky (2002), whose ordered response model correctly predicted over 70 per cent of all within-sample Test Match results from 1994-1999 – a most impressive result considering the triumvirate of possible results.[2]

Other cricket contributions have tended to be quite specific and limited in scope. One such example includes Ringrose’s (2006) investigation into the effectiveness of the move towards neutral umpires in recent years by way of analysing leg before wicket (LBW) decisions. Another such example is Blackman and Chapman (2004), who estimate the additional revenue to the game from the ‘superstar’ effects arising from the presence of Donald Bradman in the Australian line-up.

The structure of the remainder of this paper is as follows: section 2 ensues by relating the changes that have been observed in cricket to changes in trends in the now highly-competitive sports industry, and how cricket’s decision-makers have responded. Section 3 then applies these ideas to the specific case of draws in Test Cricket, and the

[2] Ignoring, for practical reasons, the possibility of a tied match.

major factors surrounding the decline in the frequency of draws since the early 1990s. Following that, section 4 examines changes in the trends of the mechanics of the game (both at Test and ODI-level), to try and explain the story behind these broad trends, some of which have been noted previously by cricket commentators and writers. Ultimately, there is a link made back to the demand for sport via the 'uncertainty of outcome' hypothesis in section 5, as well as some thoughts on possible policy changes. Section 6 concludes with a brief summary.

2. Background on Competition between Sports

As an unapologetic purist, I have recently found myself ostracising Twenty20 as 'cricket for people who do not *really* like cricket', and referring to its supporters as 'those with short attention spans'. However, one has to analyse the reasons for Twenty20's popularity to understand why there is an explosive growth in the number of international matches being scheduled (see table 1 again). Once upon a time, sports administrators tended to view their own sport as having a substantial amount of monopoly power, owing to their belief that their sport was highly differentiated compared to other sports.

However, with the passage of time, as elite spot has become increasingly thought of as an 'entertainment product', these administrators have realised that they are, in essence, competing with other sports for much of the same market. Hence, they have done their utmost to reform their sports continually to recruit new and retain existing paying customers and the revenues that they produce, whether at-the-gate or through other forms, such as television ratings and even merchandise sales.[3]

Now, this is all completely rational behaviour, but changes in cricket have been made very rarely with purists in mind, since they are already a captive market, and it is therefore harder to extract extra marginal revenues from this cohort. Rather, these changes are made with the intention of attracting *new* people to the game from non-traditional cricket loving demographic groups – these are mainly the groups to which Twenty20 is targeted. Administrators and players cannot be blamed for 'riding the wave' of this surge in demand that the shortest form of the game has brought. However, it may be time to consider some possibilities to make Test Cricket more attractive and competitive (without compromising its integrity), so that this 130-year old institution can continue to survive well into the future. Such a shift in the demand curve for Test Cricket need not necessarily occur at the expense of ODIs.

3. 'Sexy' Test Cricket

In the 1980s, Test Cricket was seen by a lot of people who were not really into it as being 'on the nose', owing to a few characteristics, one of which was the relatively high proportion of matches that finished in draws. Draws were often associated with negative, defensive play at the time, as tactics were often aimed at not losing the Test (especially away from home), as opposed to trying to win it. An annual time-series

[3] As an aside, I believe that the phenomenon of this growing competition also goes a long way towards explaining the proliferation of other match-entertainment and 'shameless gimmicks'. These items include gratuitous general promotion, fireworks displays, cheerleaders, celebrity national-anthem singers, domestic and national team nicknames, bonus point systems and bilateral-team pairing trophies (of which there are now 11 in Test Cricket, with the most recently instituted being the Warne-Muralitharan Trophy for Australia v Sri Lanka Test Series).

representation of the percentage of Test matches by calendar year that finished in draws over the period 1978-2007 is shown in figure 2.[4]

The second (bold) line is a trend estimated by applying the HP (Hodrick and Prescott, 1997) filter, which for any time series data can be obtained by solving the following optimisation problem

$$\min_{z} \sum_{t=1}^{T} (X_t - Z_t)^2 + \lambda \sum_{t=2}^{T-1} [(Z_{t+1} - Z_t) - (Z_t - Z_{t-1})]^2 \qquad (1)$$

where X_t is the actual value of the series; Z_t is the trend component; $X_t - Z_t$ is the resulting cyclical component; and λ is the smoothing parameter. In accordance with the suggestion of Prescott (1986), a value of 100 is used here for the smoothing parameter, λ, which is standard for annual data. Provided that the error terms are relatively small, the HP filter is an empirically optimal valid of estimating a 'smoothly varying' trend component of a time series, and is a most popular trending procedure in empirical economics.

However, the purpose of applying a HP filter for this annual series is not so much on technical grounds. Rather, the HP filter is applied and displayed in figure 2 merely to provide some idea of the underlying trend of the series for visual purposes. From this figure, as can be seen, roughly 45 per cent of all Tests played during the 1980s finished in draws – a level that even the purists would have admitted at the time required redressing.

[4] The Test between Australia and India in Adelaide, 28 January-3 February 1978 did not produce a result at the end of the fifth day; rather it went into a sixth day and produced a result. For the purposes of comparability in definition, it is counted as a draw here. Also, the 1986 tied test between India and Australia in Chennai (then Madras), is *not* counted as a draw, as a tie constitutes a completed match and hence a result.

The response by cricket's administrators, the International Cricket Council (ICC) in conjunction with the various national governing bodies of the small number of Test playing nations, was categorical. Rule changes were introduced progressively, designed to extend the total number of overs played in tests, including minimum over (per day) rules, making up for time lost due to rain or bad light, and even allowing the use of the available light towers at relevant grounds.

However, other forces were also at work simultaneously through the 1990s: the growing volume of ODIs was finally beginning to have a material effect on the way that Test Cricket was being played, insofar that tactics were becoming more attacking. This effect gathered even more pace from around 1995 when ODIs themselves became more attacking, with rising run rates in that form, eventually filtering through to Tests, a point that will be revisited later in section 4. However, admittedly there is a large number of other (albeit minor individually) minor factors that collectively play a role in determining the incidence of Test draws not considered here, such as the now standardised use of boundary ropes, improvements in grounds-keeping technology and maybe even climate change.

At any rate, these changes have, in essence slowly evolved Test cricket into something that slightly more resembles ODIs than used to be the case, in order to make it 'sexier'. Australia have been at the frontier of this trend, at one point having an incredible run of 48 consecutive tests between 1999 and 2003 without a draw, excluding 3 (consecutive) draws in a single Test Series against New Zealand in Australia (November-December 2001). As an aside, the 'sexy' movement has not lost pace, as recently there has even been talk about the possibility of night tests, a concept that would most certainty have been implemented by now had it not been for players' concerns over the peculiarities of the colour and movement in the air of the ball at night. In any event, the HP trendline in figure 2 suggests that the decline in Test draws may have finally plateaud, at just under 24 per cent.

Such a change in the proportion of matches ending in draws has also altered the mentality of the cricket-following public and the sports media that reports on the game. One such manifestation of this change was the apparent hype surrounding the Australian team that won 16 consecutive Tests (2005-2008). The final victory in that streak (v India in Sydney, January 2008) equalled the previous record (also set by Australia in 1999-2001), though with this victory, there was far less attention at the time given to their mostly contemporaneous *unbeaten* streak, which had extended to 22 matches with that win.

However, when one considers that a successive winning streak can be broken by pure virtue of bad luck if inclement weather prevails during a Test (often the case in Test venues such as Dunedin or Manchester), arguably far more importance should be placed on unbeaten streaks, as used to be the case, and is still most often the case in association football (soccer). Incidentally, while this unbeaten streak was Australia's longest in their Test history, it still fell short of the all-time record of 27, set by the mighty West Indies team of 1982-1984.[5]

[5] This fact seems to be ignored routinely in analysts' dialogues, when they attempt to compare and contrast these two great teams intertemporally.

4. Game Trends and Results

As a first step towards a formal time-series regression analysis, the approach taken here is to break the mechanics of the game of cricket down into its principal components: runs, balls and wickets. The purpose of this approach is to identify those factors that are more closely intertwined with the occurrence of draws, and also to tell the general story about changes to the style of cricket in the last generation. A description of the results arising from the formal regression analysis then follows. For the purposes of the following analysis, the sample begins slightly later than (that used in figures 1 and 2) in 1981, since the data on ODIs is somewhat thin until that point. All of the data was obtained or constructed from match data available from the CricInfo website at: http://www.cricinfo.com/

Since scoring rates have been mentioned in this paper hitherto, let us begin by examining figure 3, which plots run rates (per over) in both Tests and ODIs by calendar year. Starting with ODIs, there appears to have been a steady growth in run rates over time, as batters began to play an increasing volume of ODIs, eventually coming to terms with the limited-overs format. However, the greatest surge during the sample is the period from 1994-1998, since which there has been little further growth, implying that teams batting first now have to score better than 250 to give themselves a better than even-money chance of winning, whereas that figure was once more like 220. I attribute rising run rates in ODIs at that time much to the success of the tactics of the 1996 World Champion Sri Lankan team (especially hitting over the infield during the first 15 overs of their innings), and the promptness with which other teams adopted their style.

Analogously, run rates in Tests appears more to have cycled during the 1980s and 1990s, although from 2000, there is a clear structural break, as run rates have accelerated, which leads naturally to the question of the degree to which ODIs are responsible for this. The logic of higher ODI run rates causing Test run rates to increase makes perfect intuitive sense, and the correlation coefficient between contemporaneous run rates in the two forms of the game over the period from 1981-2007 is 0.70. However, a simple Granger-causality test (results not reported) shows that even with varying lags of 1-5 years, the null hypothesis that ODI run rates do not Granger-cause Test run rates could not be rejected under any circumstances, even at the 10 per cent level of significance. Nevertheless, if there is some real influence of some forms of cricket on others, then we would expect to see even higher run rates still in *both* Tests and ODIs in the future, as Twenty20 cricket becomes much more common.[6]

Observing higher run rates, the next logical step is to address the issue of whether this more expeditious scoring is associated with better batting over time, or rather if wickets are falling more often. To deal with this issue, figure 4 exhibits batting averages in both forms of the game.[7] When one ignores the seemingly statistical outlier of 1989, it is difficult to identify a clear overall trend in Test averages over time, though there is a very small decline throughout most of the 1990s. However, whether better fielding or the then growing prevalence of reverse-swing pioneered by the Pakistanis (or even something else) was responsible for this is unclear. What is clear is that batting has improved noticeably during the current decade, a result that is

[6] In the first 50 official Twenty20 international matches (up until end of 2007), the average run rate was 7.94 per over.

[7] This measure is calculated simply as total runs divided by total wickets in a calendar year. Therefore, this also counts ‘extras’ or ‘sundries’, which would typically not be counted when calculating an individual batter’s average.

consistent with figure 3. The trend in improved batting averages in ODIs, however, is reasonably obvious, notwithstanding the overall fluctuation of the series, but the change is more modest compared to that implied in figure 3.

The other side to the story described thus far is the frequency with which wickets fall. To this end, strike rates (average balls per wicket) are shown in figure 5. Here the story is very similar for both Tests and ODIs (the correlation coefficient is 0.56), insofar that there is a lot of noise in the series with no clear trend until about 1994, when in both forms of the game, strike rates fall immediately and significantly, and remain at the lower levels thereafter. Given the structural nature of the change and that it has occurred in both forms of the game, one is inclined to forward the introduction of the third (video) umpire as a primary reason for the increase in frequency of dismissals (especially in the case of run outs and stumpings). This is particularly so in light of the previous umpiring edict of giving any benefit of doubt to the batter. However, it is difficult to tell to what extent this fall in strike rates is also attributable to possible growing impatience of faster-scoring batters over time.

While the figures discussed thus far reveal much, we have not yet addressed the overall-game dimension. Figure 6 charts the average number of balls bowled in a match. The more interesting story here is for ODIs, however, it must be noted initially that the figures produced for ODIs in figure 6 are unreliable until 1987.[8] Nevertheless, from that point onward, we see a steady decline in the number of balls bowled. This result is actually consistent with the riskier batting in recent years that

[8] The reason for this is that numerous ODIs early in the sample were not the now-standard 50 over per-side matches until then. For example, the matches in the 1983 World Cup (60) as well as matches in Pakistan (40) and Sri Lanka (45) were not changed to 50 over-matches until about 1986. Even thereafter, matches in England were 55 overs per side right up until 1995.

has come with faster run rates. We now observe more teams 'going for broke', especially in the second session of a match, meaning that irrespective of whether or not the risky strategy works, more matches (sadly in my opinion) are finishing earlier on in terms of overs bowled.[9] One factor behind this is that teams have become increasingly astute over time tactically at utilising all their wickets (when viewed as 'resources' in the spirit of the run-rate adjustment methodology of Duckworth and Lewis, 1998). This result may also be being driven by anecdotal evidence that pitches have become steadily quicker. For Tests, once the outlier of 1989 is ignored, it is otherwise challenging to identify a clear long-term trend, though it is arguable that there has been a slight decline towards the end of the sample, perhaps due in part to the increase in the number of Tests involving Bangladesh and Zimbabwe.

Finally, in terms of average number of wickets falling per match, it is seen in figure 7 that for ODIs, the long-term trend has indeed been upward throughout most of the sample, despite tailing-off in recent years. This story is consistent with the Duckworth-Lewis resources-style story mentioned previously. For Tests, the trend has also been upwards generally, with some variability in the series, although here, the role of declarations is also important, which have (again anecdotally) become more attacking in recent years.[10] Thus, there may be some downward bias in this series in the latter years.

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[9] The introduction of 'bonus points' in ODI tournaments has accentuated this apparent problem.

[10] The traditional tactics were those whereby the (attacking) team batting third, for instance, would take their opponents out of the game totally prior to declaring, and then set attacking fields. This involved declaring later in the match and (*ceteris paribus*) less wickets down. In recent years, the trend has been towards captains backing themselves in by declaring earlier, thereby giving their opponents a small chance of victory, but with more overs remaining in the match to bowl them out.

The following description outlines the modelling process for the time-series ordinary least squares regression analysis of the data described already. For the purposes of the narrative of the results, we examine individual coefficient estimates and the *F*-test for joint significance, as well as goodness-of-fit, diagnostic and model evaluation results. In terms of goodness-of-fit, the unadjusted coefficient of determination, R^2 and its adjusted counterpart $\overline{R}^2$; as well as the standard error of the equation, $\tilde{\sigma}$, are reported. In association with these tests, the following diagnostic tests are also stated: the residual tests are the Breusch and Godfrey (1981) test for first- and second-order serial correlation, which is an *F*-statistic, *SC*; the Jarque and Bera (1980) test for normality, which follows a $\chi^2(2)$ distribution, *NO*; and the Breusch and Pagan (1979) and Godfrey (1978) test for heteroscedasticity, which is an *F*-statistic as well, *HE*. Structural stability of the model is accounted for by the Ramsey (1970) RESET test for functional form with one fitted term, which is also an *F*-statistic, *FF*. Finally, a comparison of overall model validity can be attained by looking at the Akaike (1973 and 1977) information criterion, *AIC*; and the Schwarz (1978) Bayesian criterion, *BIC*. All of these tests are standard in *Econometric Views 6*.

In determining the optimal model for the data, a general-to-specific methodology is employed, as there is no real way of knowing *a priori* precisely which variables have the most explanatory power. The precise version of the model that is estimated to begin with is a most general version that contains all variables in the form

$$TD_t = \alpha + \beta RR_t + \gamma AV_t + \delta SR_t + \theta BM_t + \kappa WM_t + \varepsilon_t \qquad (2)$$

where TD_t is the proportion of Test Matches finishing in a draw in year *t*, while AV is the batting average in Tests, SR is the corresponding bowling strike rate, BM is the average balls per match, WM is the average wickets per match, and ε_t is a white noise error term. The model is estimated over the full sample from 1978-2007.

The results of the regression corresponding to equation (2) are reported in table 2. The model is valid, insofar that it passes all of the residual tests, meaning that it is not misspecified, further, it is also structurally stable. However, neither the intercept nor any of the regressors are significant, yet the *F*-test for joint significance of the variables is easily significant, even at the 1 per cent level. From this is it obvious that multicollinearity is a problem. This result is unsurprising, as these variables are linear combinations of metrics that are overlapping in some of these variables. Since R^2 is quite high, some explanatory variables can be eliminated easily.

To decide exactly which variables to exclude, a correlation coefficient matrix is constructed in the form of table 3. In dealing with multicollinearity, we look for explanatory variables that are not very highly correlated with TD, though highly correlated with the other explanatory variables. A quick glance at table 3 reveals that AV particularly fits this description, while BM also fails to justify its presence. Hence, the regression is re-estimated without these two variables, leaving the representation as follows

$$TD_t = \alpha + \beta RR_t + \delta SR_t + \kappa WM_t + \nu_t \qquad (3)$$

The estimates of this model are also displayed in table 2. The results are quite pleasing overall, with satisfying goodness-of-fit, as well as passing all of the diagnostic tests, and the model evaluation tests indicating a noticeable improvement on equation (2). All of the coefficient estimates are now significant apart from κ, however, δ is not the sign that we would expect – lower bowling strike rates should mean less draws.

To improve the model further WM is dropped from the regression. This leaves the following model

$$TD_t = \alpha + \beta RR_t + \delta SR_t + \omega_t \qquad (4)$$

On this occasion, although the intercept is insignificant, both of the remaining coefficients are significant, and κ is now positive as expected. However, the fit of the model has declined, and the model evaluation results demonstrate an overall deterioration of the model compared to equation (3).

As an alternative to equation (4), we restore WM to the model, this time excluding SR instead. There is also an intuitive appeal for this alteration – RR is a function of runs and balls whereas WM is a function of wickets and matches, thereby circumventing any overlap between the linear combinations of the remaining variables (whereas RR and SR have balls a common denominator). At this point, we are left with a model taking the following form

$$TD_t = \alpha + \beta RR_t + \kappa WM_t + \xi_t \qquad (5)$$

By referring once again to table 2, we see that both coefficient estimates are significantly negative (the intercept term is also significant), as would be expected. That is to say that the trends of increasing Test run rates and an increasing number of wickets falling in a match have both had a significant influence on Test draws becoming less frequent.

As a final variation of the baseline model we now have, we replace RR in equation (5) with its ODI counterpart, $ODIRR$, over the period 1978-2007. This is implemented as a further way of testing the possible impact of the increasing volume of the one-day game (and its own propensity to have become more attacking in recent years) on the way Test Matches are being played. From this, we have

$$TD_t = \alpha + \kappa WM_t + \tau ODIRR + \zeta_t \quad (6)$$

The results in the right-hand column of table 2 reveal that the model surpasses even equation (5). This is according to the model evaluation statistics, as well as the improved fit, reduced standard errors on the coefficient estimates, consistent with $ODIRR$ being more strongly (negatively) with TD than RR, as seen in table 3. One has to be cautious about making any strong inferences about this result, however.

While equation (6) also passes the *FF* test, the possibility of a structural break in 1994 was also considered, for the possibility that higher strike rates arising from the introduction of the third umpire had a significant impact as a stand-alone event. However, a simple Chow (1960) breakpoint test reveals that for equations (4), (5) and (6), the test statistic estimates are 1.71, 2.01 and 0.74 respectively, all of which are insignificant at the 5 per cent level. One final variant on the models discussed here was considered – that of the inclusion of a (one-period) lagged dependent variable as an independent variable, to allow for the possibility of persistence in TD. The variable proved to be insignificant wherever it was included, however, and in some cases dragged other coefficient estimates into insignificant territory.

In summary, caution must be exercised at the OLS figures outlined in table 2 that seem to suggest that run rates and the numbers of falling wickets are alone driving the results. As cricket followers are well aware, dozens of factors (many of them negligible individually) are at work in determining the incidence of Test draws, though such a match-by-match model accounting for all these factors would be prohibitively complex. Rather, the chosen approach here has been a parsimonious model that actually looked at broad, aggregate and longer-run factors.

5. 'Uncertainty of Outcome' and Possible Policy Changes

The implications of these results have a material effect on the demand for Test Cricket. In sports economics, the much discussed 'uncertainty of outcome' hypothesis, which can be traced back as far as Rottenberg (1956), suggests that fans want to see an even contest. Not that they want to see their team lose, rather they want to know that there is *some chance* that their team will lose. Hence, we should observe higher levels of demand for Test Cricket when there is some uncertainty as to the result. Unfortunately, in recent years, the underperformance of Test minnows Bangladesh and the once-reasonably competitive Zimbabwe, along with the serial dominance of Australia, have produced a higher number of one-sided contests.

The sports economics literature is abundant with research papers testing the 'uncertainty of outcome' hypothesis, mainly in reference to team league sports, with the majority of work finding favourable evidence of its existence. With cricket's many endearing idiosyncrasies, it is a pity that such work on cricket is so scarce, though Hyndes and Smith (1994) is a notable exception, looking at uncertainty of outcome in the framework of within a Test match on one hand versus within the Test series on the other hand.

With little change to average total innings scores in Tests, but with more overs in each day and faster run-rates, the consequence has been a larger number of tests being completed within four days, and a larger proportional increase still in those finishing within three days. The obviousness of this problem can be seen by looking at figure 8, which displays the percentage of all Test matches that finish early. The rising frequency of Tests finishing within four days and within three days is easily discernable from a quick 'eyeball'.[11] Furthermore, the HP trend (not shown in figure 8) of the frequency of Tests finishing within four days rises over the 1981-2007 sample from 19.0 per cent to 40.8 per cent, while the analogous figure for Tests finishing within three days is even much more dramatic, rising from 2.5 from 15.3 per cent.

The problem with this trend is two-fold: firstly, in business terms there is the obvious significant lost attendance and television revenues from the Test not going five days as scheduled. Secondly, in purely cricketing terms, the vast majority of Tests that finish so early are inherently highly predictable – that is to say, the contest is one-sided from early on in the game. In fact, you have to go back to the 2005 Ashes Series (England v Australia) to find the most recent (as at February 2008, the time of writing) Test that finished within four days with a winning margin of less than four wickets or 40 runs. In fact, that series produced two such Tests (the 2nd and 4th, both won by England), the former of which concluded before lunch on the fourth day, however such instances are far too rare. Meanwhile, out of 18 innings-plus victories in the 109 Tests since the beginning of the same series, 10 were concluded within three days. Furthermore, in Tests that go well into the fifth day where one team is

[11] The number of days counted in a Test does *not* include rest days, once common in Tests a generation ago, but phased out over time until the last occasion, West Indies v India, Bridgetown, 28 March 1997.

dominating, there is still an uncertainty of outcome prevailing by virtue of the other team attempting to 'hang on' for the draw. Unlike the 1980s, very few draws look to be certain draws at the end of the fourth day (i.e. boring contests).

While it is not being suggested that the optimal probability of a draw should be close to 0.5, as it was throughout much of the 1980s, perhaps it would be nice to see a figure somewhat higher than what we observe today. One school of thought suggests that the ideal scenario is one in which both teams (ignoring home advantage) each have a one-third chance of winning the match, while there is a one-third chance of a draw.

Nevertheless, one option available to the ICC that I would favour personally is to adjust the existing 15-over rule, introduced in the 1990s, extending the six hours of play by up to an extra 30 minutes if 90 overs have not been bowled.[12] The rule was introduced initially to prevent teams from bowling slow over rates deliberately. However, the rule has actually done more to merely extend the day's play (essentially compressing the timeline of the match) rather than lifting over rates, as drinks breaks, injuries, etc., mean that a team can easily fall below 15-overs an hour even when trying to maintain the over rate (third-umpire decision delays do not help, either). Furthermore, the rule exacerbates the tendency of wickets falling more often just prior to stumps, as light deteriorates and batters often become overly cautious.

To test this assertion, I looked at over rates in the 97 Tests played between October 2005 and February 2008, and selected only those Tests with no rain or bad light

[12] Other rule changes have played a more subtle role, such as altering the new-ball rule from 85 to 80 overs.

delays, nor an innings change on the *first* day (in theory, 90 overs should be bowled on these days according to the rules). A total of 39 Tests met this criteria, but 90 overs were bowled on just 20 (virtually half) of these (first day) occasions, even with the extra 30 minutes, and on only *one* occasion was more overs (91 on that occasion) bowled within six hours. The average overs bowled on the first day in the other 19 Tests was 86.4, providing some evidence that the 15-over rule is far less effective than would be other possible rules to prevent teams from slowing the game down deliberately. Such rules could alternatively take the form of some financial penalty, the likes of which have been used previously in ODIs, though the ICC has stated repeatedly that they are loathe to introducing such penalties.[13]

In essence, perhaps 14 overs (84 per day) would be a more realistic *minimum* target over rate. This is especially the case when one considers the viewer, whether at the ground or at home, who has been watching cricket all day and has really had enough, yet they feel incapable of ceasing to watch until stumps is called officially.[14]

6. Conclusion

This study has sought to provide an insight into changing trends in Test Cricket, looking from numerous angles. These angles include the rationalisation that occurred following the game's most tumultuous period (the 'World Series War'), as well as growing competition between sports, the proliferation of different formats of the same

[13] The overall average overs bowled for the whole sample of 39 Tests was 88.3. When a wicket fell during the final over, resulting in the immediate conclusion of play on that day, the number of overs was rounded up to the next integer in calculating these averages, since in theory the over would have been completed in the absence of the fall of that wicket.

[14] A second (and admittedly less radical) rule change I would recommend is to award sixes *only* for shots that clear the actual fence, rather than merely the boundary rope. This would circumvent the diminishing value of sixes, since they are now much easier to score (if Adam Gilchrist had to clear the fence, would his career tally of 100 sixes still be greater than Vivian Richards' tally of 84)? In any event, since boundary ropes were supposedly made standard *purely* for reasons of player safety (*not* just to increase run rates), then there should be no reason for cricket administrators to disagree.

sport, and the effect that all this has had on the original form of the game of cricket, both in terms of scheduling and playing style. One of the major already-established observations that this study reinforces is the reforms made (rule changes and otherwise) to Test Cricket to reduce the incidence of draws – which are frequently associated with unattractive cricket – in order to broaden its appeal to sports consumers.

This analysis leads to one playing the role of devil's advocate in arguing that the frequency of Test Match draws has fallen too far in the last 15 years, ironically taking a fair degree of interest out of Test Cricket. The basis for this argument is that many Tests that finish substantially early are too one-sided and that the option of one team playing for a draw during the fifth and final day can maintain interest in the Test for longer. It is not being suggested that the ideal Test Cricket match is one in which a draw is the result, but most Tests that finish with a result in the final session of the fifth day are highly absorbing Test matches, and under the current status quo, there are not enough Tests going into the fifth day. As an example, my all-time favourite memory of Test Cricket from an Australian perspective is actually *just* managing to hold out for a draw against New Zealand *at home*, December 1987 in Melbourne.

Given the recent development of competitive forces to the game's orthodoxy arising from the Indian Champions League (ICL) consortium, and the official response by the Cricket Control Board of India of the formation of the Indian Premier League (IPL), the issues of the relative decline of Tests are critical to the ICC. This is especially the case as Test Cricket will find it continually more difficult to fight for survival in the increasingly crowded match calendar against shorter forms of the game.

Table 1: Number of ICC-Sanctioned Cricket Matches by Type, 1978-2007
(Not Counting Cancelled or Abandoned Matches)

Calendar Year	Tests	ODIs	Twenty20
1978	27	10	
1979	28	26	
1980	25	21	
1981	23	28	
1982	28	33	
1983	30	66	
1984	34	51	
1985	26	65	
1986	30	62	
1987	25	74	
1988	24	61	
1989	21	55	
1990	26	61	
1991	21	39	
1992	26	89	
1993	36	82	
1994	38	98	
1995	40	60	
1996	28	127	
1997	44	115	
1998	45	108	
1999	43	154	
2000	46	131	
2001	55	120	
2002	54	145	
2003	44	147	
2004	51	128	
2005	49	107	3
2006	46	160	9
2007	31	191	38

Source: http://www.cricinfo.com/

Table 2: OLS Regression Results

	Equation (2)	Equation (3)	Equation (4)	Equation (5)	Equation (6)
α	-243.31 (538.20)	201.38* (80.65)	31.08 (42.22)	253.86* (35.12)	255.18* (32.11)
β	32.17 (133.04)	-19.95* (7.8814)	-16.36* (5.3578)	-22.01* (7.2817)	
γ	-5.0187 (12.27)				
δ	7.1962 (8.1880)	-4.3224* (1.5077)	1.1980* (0.3881)		
θ	-0.1527 (0.0654)				
κ	5.8268 (16.84)	0.3642 (0.5028)		-5.0568* (1.1059)	-4.6500* (1.0480)
τ					-17.30* (4.5131)
F	7.45*	12.83*	16.13*	19.32*	24.37*
R^2	0.6083	0.5968	0.5444	0.5887	0.6435
$\overline{R}^2$	0.5266	0.5503	0.5106	0.5582	0.6171
$\tilde{\sigma}$	8.22	8.01	8.36	7.94	7.39
SC	1.80	2.35	0.43	1.93	0.48
NO	0.04	0.20	2.98	0.83	0.48
HE	1.29	2.21	0.17	0.57	2.62
FF	1.99	1.07	0.10	1.30	0.04
AIC	7.23	7.12	7.18	7.08	6.93
BIC	7.51	7.31	7.32	7.22	7.07

*Significant at the five per cent level. Figures in parentheses are standard errors.

Table 3: Correlation Matrix of Time-Series Variables

	TD	*RR*	*AV*	*SR*	*BM*	*WM*	*ODIRR*
TD	1.0000	-0.5065	0.1917	0.7330	0.3063	-0.7065	-0.5861
RR	-0.5065	1.0000	0.5531	-0.4047	-0.3284	0.2673	0.6974
AV	0.1917	0.5531	1.0000	0.5366	0.3063	-0.4304	0.2234
SR	0.7330	-0.4047	0.5366	1.0000	0.6610	-0.7498	-0.4504
BM	0.3063	-0.3284	0.3063	0.6610	1.0000	-0.0018	-0.2788
WM	-0.7065	0.2673	-0.4304	-0.7498	-0.0018	1.0000	0.3781
ODIRR	-0.5861	0.6974	0.2234	-0.4504	-0.2788	0.3781	1.0000

Figure 1: All Matches Played by Type (100% Stacked)

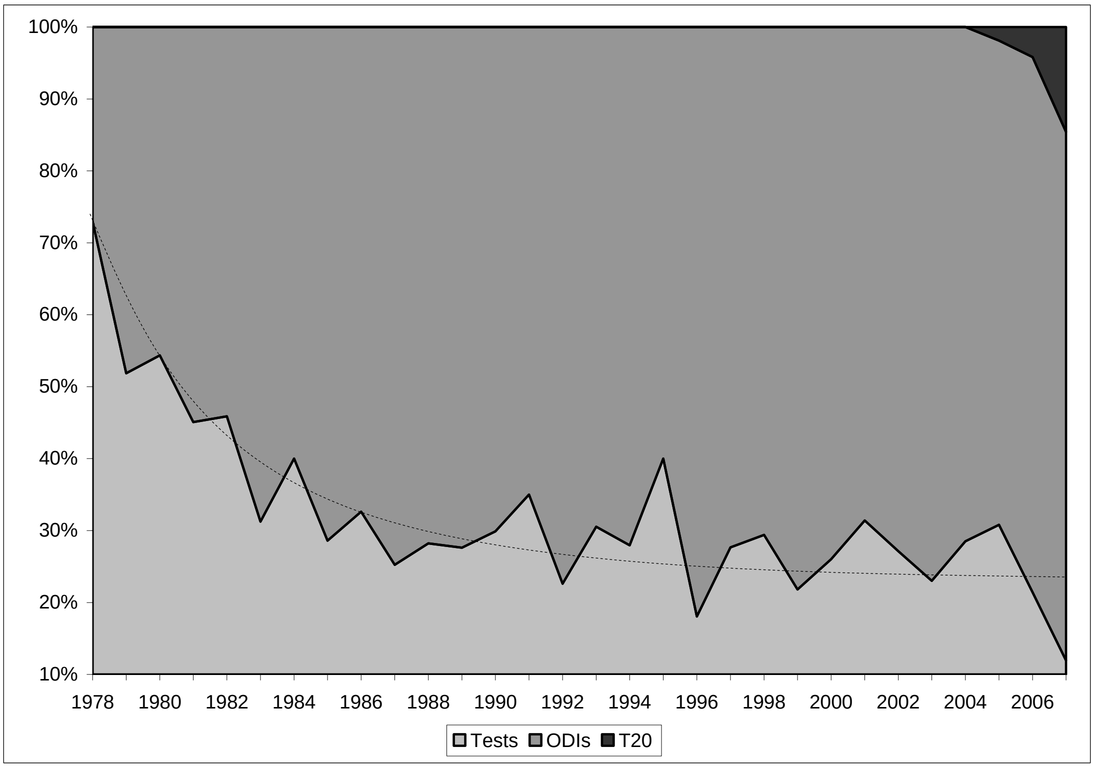


Figure 2: Percentage of All Test Matches Played Finishing in a Draw (Thin Line) and HP Trend (Bold Line)

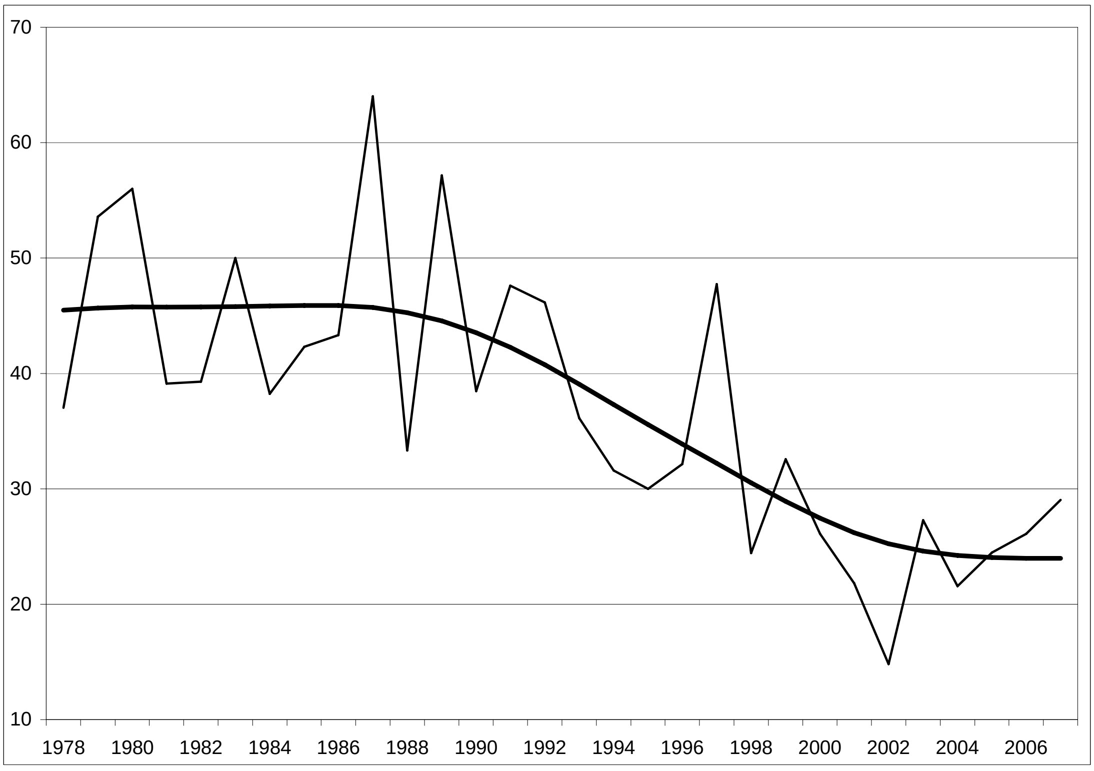


Figure 3: Run Rates Per Over in All Test (Bold Line, LHS) and ODI (Thin Line, RHS) Matches by Calendar Year, 1981-2007

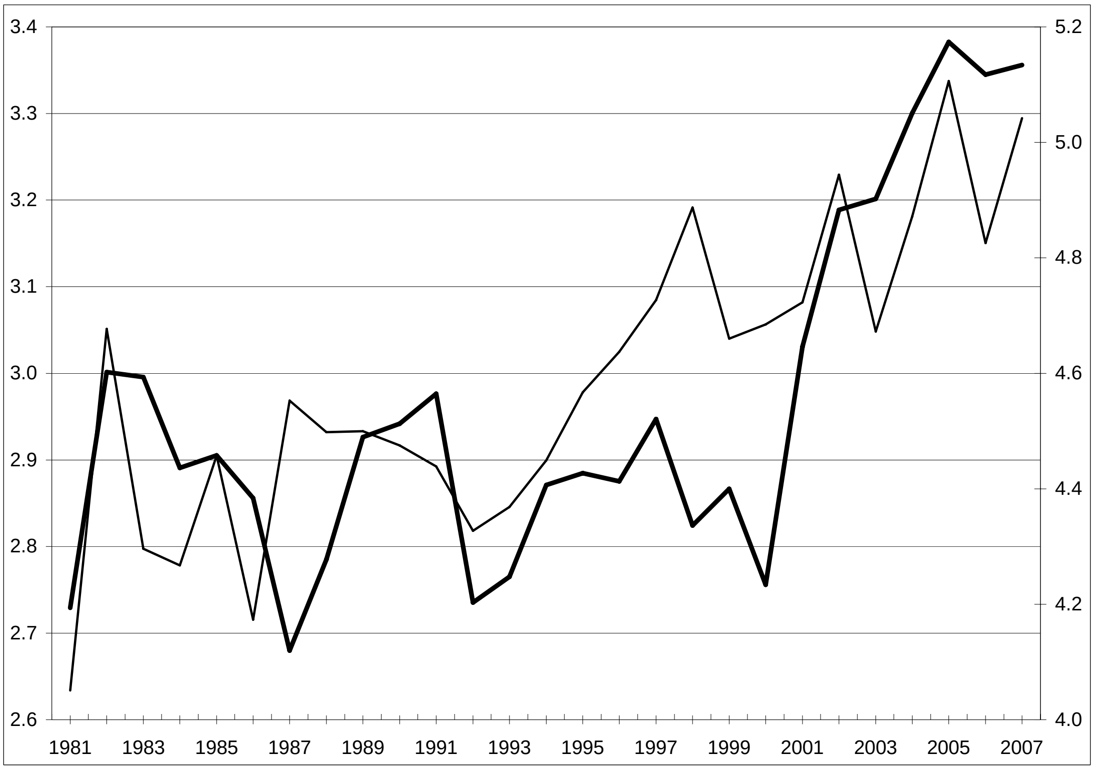


Figure 4: Batting Averages in All Test (Bold Line, LHS) and ODI (Thin Line, RHS) Matches by Calendar Year, 1981-2007

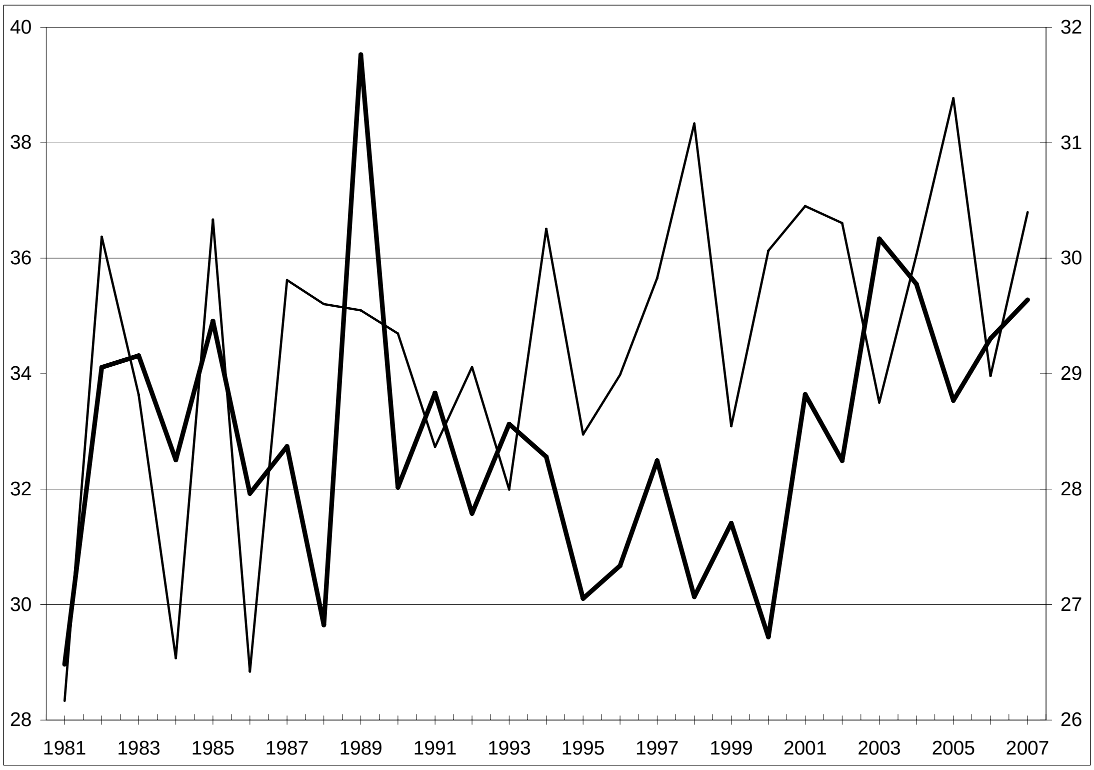


Figure 5: Strike Rates in All Test (Bold Line, LHS) and ODI (Thin Line, RHS) Matches by Calendar Year, 1981-2007

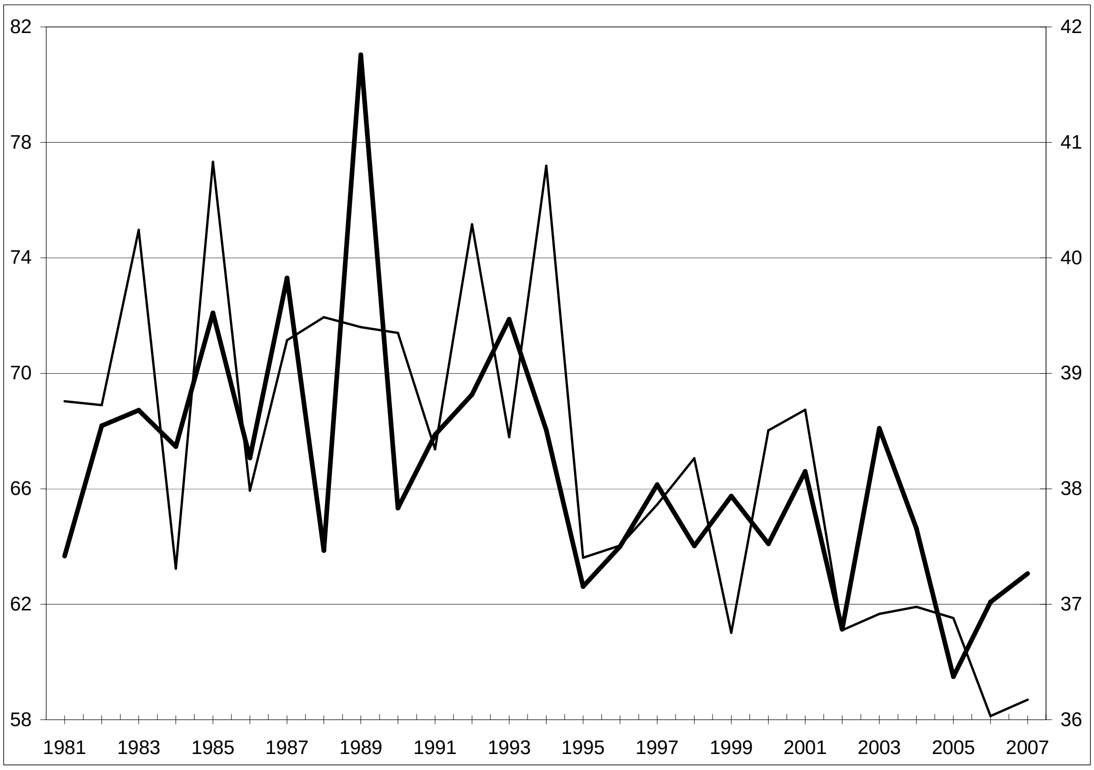


Figure 6: Average Balls Bowled in All Test (Bold Line, LHS) and ODI (Thin Line, RHS) Matches by Calendar Year, 1981-2007

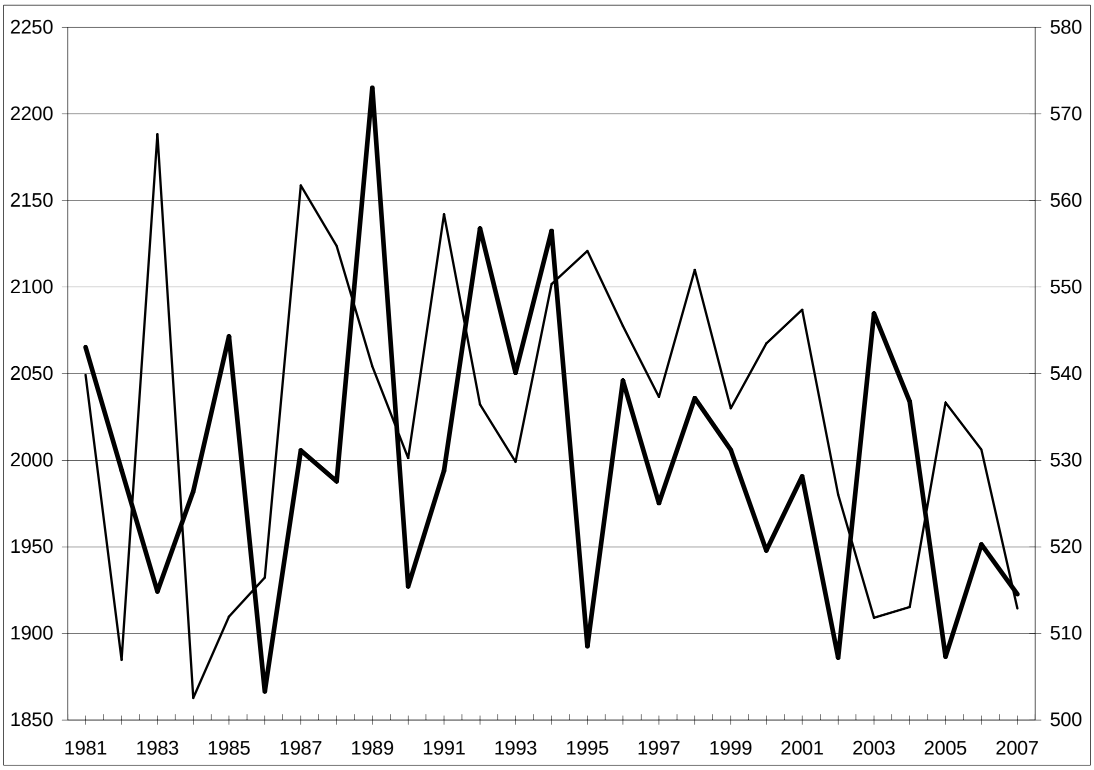


Figure 7: Average Wickets Fallen in All Test (Bold Line, LHS) and ODI (Thin Line, RHS) Matches by Calendar Year, 1981-2007

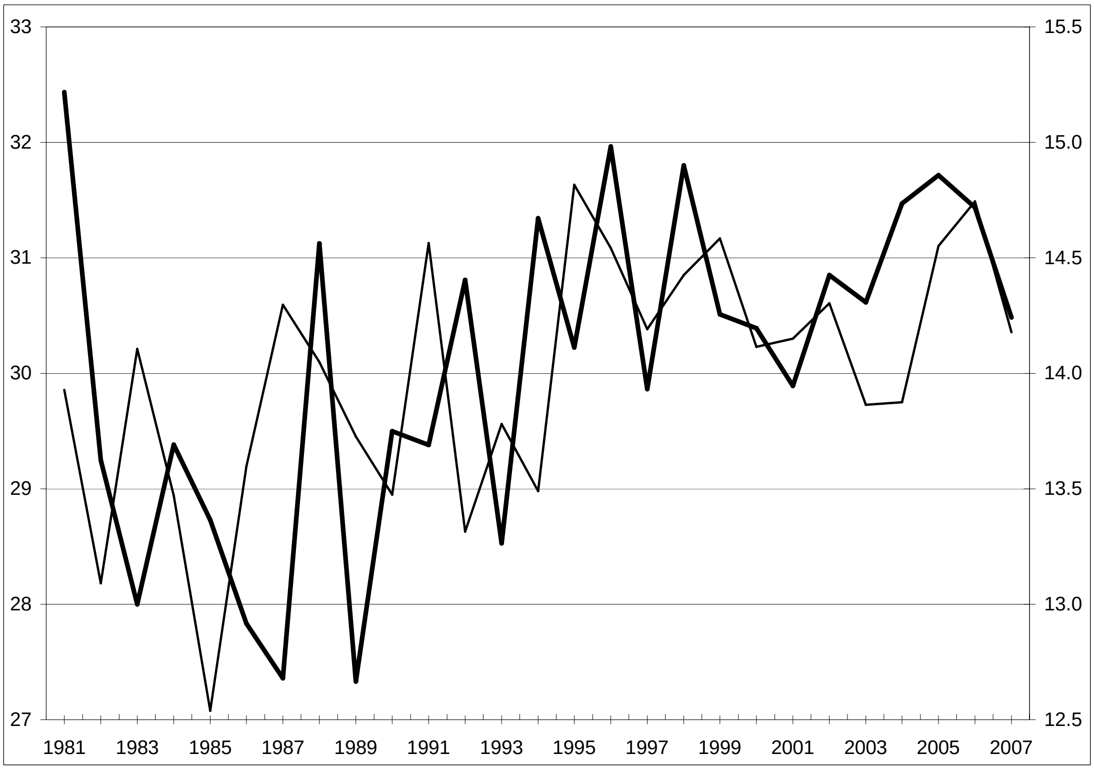
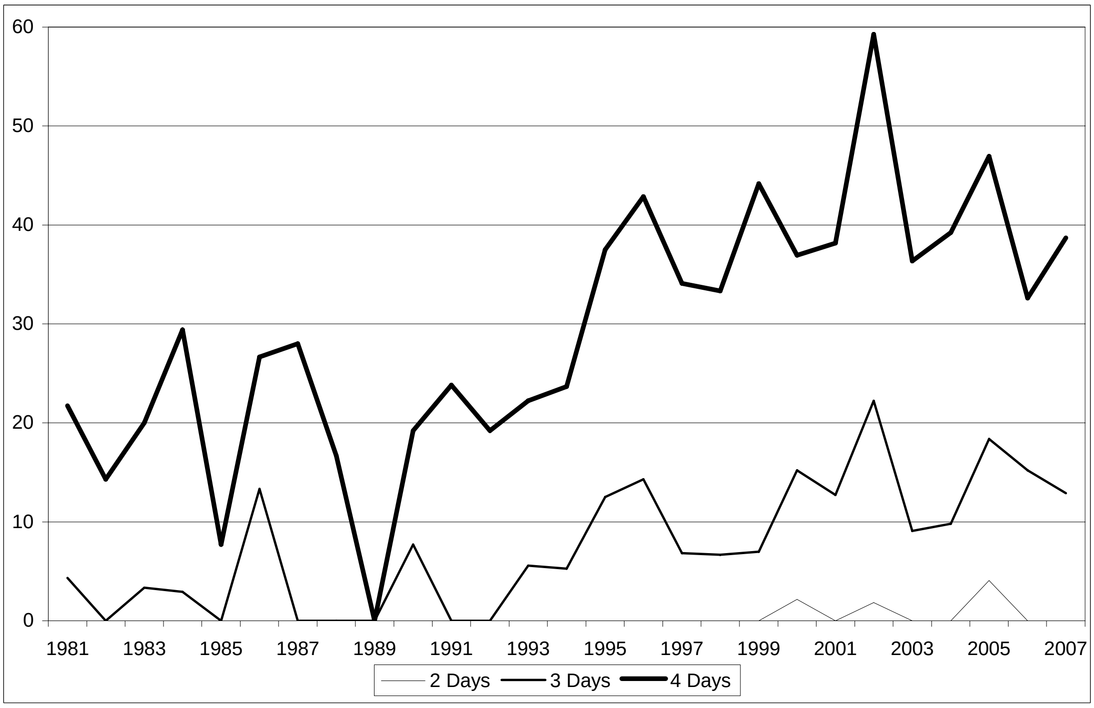


Figure 8: Percentage of All Test Matches Played Finishing Inside *x* Days



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