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**PRODUCTION AND EFFICIENCY: THE
CASE OF THE AUSTRALIAN RUGBY
LEAGUE**

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Abstract

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CASE OF THE AUSTRALIAN RUGBY
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What matters in the “production” of a game of rugby league? This analysis finds that several game-specific inputs (such as successful goal-kicking percentage, inherent team strength, and momentum of results) in the generation of a game outcome are statistically significantly different from zero at the 10% level or lower. This study also looks closely at measures of productive efficiency, including stochastic frontier modelling and data envelopment analysis (DEA). Panel data from the 1995, 1996 and 1998 National Rugby League (NRL) regular seasons are used to formulate average production functions and stochastic production frontier models and their respective measures of efficiency. It is found that many Sydney-based teams performed relatively more efficiently when compared to non-Sydney teams in 1998. There also appears to be evidence of a “weaker teams bringing the stronger teams down to their level” effect due to differences in point-scoring efficiency and game outcome efficiency in 1998.

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INTRODUCTION

"Technical efficiency concerns the physical relationships between inputs and outputs. Many decision-makers are regularly faced with decisions about what combinations of inputs to use or develop in order to attain the most desirable output. Such decisions about the 'best' use of inputs, often aiming at maximum output, are concerned with a quest for technical efficiency."

Gratton and Taylor (1985) p.136.

Rugby League is one of Australia's (and New Zealand's) most popular sports. In recent times, the game has undergone significant structural changes with the emergence of Super League in 1996 (see Chapter Two for details). There is presently a proposal under consideration by the NRL to rationalise the competition from the present 20-team format to a 14-team competition in 2000.

Rationalisation of the NRL is partly based on performance, and the one central objective in the operation of a rugby league club is performance on the field. Good performances on the field attract spectators, improve gate revenue, and attract sponsorship.

The NRL has a criteria document that it will use to rationalise the competition in 2000. Included in this criteria document are categories by which teams can be ranked, such as attendance, financial viability, sponsorship revenues, and on-field performance.

This study is an economic investigation into production and efficiency in the Australian Rugby League (ARL) and National Rugby League (NRL) in Australia.

It will examine the efficiency, in terms of production, of all teams in the ARL/NRL competition(s) through use of individual game data.

Production can be defined in one of two ways: (a) as the points scored by a team, or (b) as the generation of game outcomes. Production efficiency thus is the measurement of how efficiently (or inefficiently) a team performs relative to the 'best' (or potential) outcome that can be achieved given the inputs into the production process.

The purpose of this study is to examine in close detail the determinants of team performance on the field and from these to calculate measures of efficiency. Ranking of teams by on-field efficiency measures may add another dimension to the analysis of proposed changes in the competition.

Rugby League is a sport that generates millions of dollars in revenue, and like so many other sports, analysis of the fundamentals of the game can only be beneficial to players, coaches and administrators alike. Analyses can be undertaken to examine the links between each critical area within a football club – from on-field performance to crowd attendance, to sponsorship revenues, and similarly important measures of efficiency.

1.1 Objectives

The objectives for this study are:

1. To determine and quantify the determinants of performance.
2. To measure the relative importance of these determinants.
3. To analyse production efficiency, and
4. To determine implications for individual team management, as well as overall League administration.

Using individual game data, several regression models will be estimated, and results presented. Different ways of modelling such data will be examined, and the most suitable model(s) will be determined.

There are a number of different models that can be estimated (see Chapter 2 for details) and as a result a variety of different results to examine. One area of debate is how one can tell which is the 'best' model. To make this choice, we need criteria. One criterion is to compare results with actual outcomes to see which models are the most accurate estimators of performance. Another way is to observe the predictive power of respective models. These criteria are discussed in further detail in Chapters 4 and 5.

The third objective encompasses the major work involved in this thesis – the analysis of production and calculation of efficiency estimates. A number of alternative approaches will be examined in order to develop a comprehensive treatment of efficiency. These are discussed in Chapter 2.

This research will use publicly available information and seeks to determine how this information can help in explaining the outcomes of matches in rugby league. In Chapter 3 we develop a model to explain the outcome of rugby league games. The results of this model are presented in Chapter 4. Both the determinants of performance and the extent to which they impact on game outcomes are of interest in this study. As identified in Borland and Lye (1992), the more unpredictable a game is, the greater is the positive impact on attendance. With attendance being a major factor in the NRL's criteria for excluding teams from the 2000 competition, the identification of contributing factors to performance is of particular importance to various club officials and League management.

In the development and application of a cohesive and logical model, this study will incorporate a number of characteristics derived from other studies in this area and will model the "production" process in the game of Rugby League as well as generating measures of efficiency.

1.2 Background: Rugby League

This section presents a brief background to the sport of Rugby League, its inception in Australia, the present situation, and plans for the future.

1.2.1 The Origins Of Rugby League

On the 29th of August 1895, the sport of rugby league was conceived. In Huddersfield, Yorkshire, 21 rugby union teams from the north of England elected to resign from the Rugby Football Union (RFU) and form their own Northern Rugby Union, with its own constitution. The major objective was to compensate players for loss of earnings incurred when playing rugby, or in other words, to pay players for playing the game. This step was the advent of professionalism. The London-based RFU objected to this, but the lure of compensation for playing proved too attractive for players in the industrial north of England.

The Northern Rugby Union revolutionised the rules of the game of rugby to make it more attractive for paying spectators. Included among these initial radical moves were the removal of the lineout, and the rationalisation of the scoring system to make try-scoring the more attractive option (over goal-kicking). In 1906, the number of players per side was reduced to thirteen, with the two flank-forward positions being sacrificed in a bid to make the game more open. The final piece of the plan was the restructuring of the ruck and maul situation after a tackle was made and replacing this with the 'play-the-ball', a two man 'scrum'. The game of rugby league had become visibly separate from rugby union.

1.2.2 Rugby League In Australia

"Born of struggle and discontent in Sydney's suburbs, league has always been seen as the "people's game" and the "working man's game". Loyalties to the game, its pioneers, its fundamental ethics (of an egalitarian game available to

all people from all classes of society) have always been deep-rooted – and especially so in the old, traditional Sydney clubs” (Heads 1995, p.6)

Rugby League was born in Australia in January 1908. In August 1907, three pioneering Northern Union (as it was then known) matches were played at the Agricultural Ground (Sydney Showground) between an Australian team and the New Zealand All Golds. Like in England, rugby union was very much the local rugby game. These three matches sparked a movement in the suburbs of Sydney to form individual clubs and to establish a ‘breakaway’ Northern Union competition. In 1908, the Glebe, Newtown, South Sydney, Eastern Suburbs, North Sydney, Balmain, Western Suburbs, Newcastle and Cumberland clubs participated in the inaugural New South Wales Rugby League Premiership.

From these humble beginnings, the New South Wales Rugby League (NSWRL) Premiership – now the Australian Rugby League (ARL) – Premiership has continued over the past ninety years, with a number of clubs entering and exiting the competition during this time. Of the original nine clubs in 1908, five remain: South Sydney, North Sydney, Eastern Suburbs (presently Sydney City), Western Suburbs and Balmain.

The key decades in recent history were the 1980s and the 1990s. In 1982, Illawarra and Canberra joined the 11-team competition. In 1988, in what was considered at the time to be the League’s most ambitious move, teams from Brisbane, the Gold Coast and Newcastle were invited to enter the competition, making for a 16-team premiership. This move coupled with aggressive marketing and a successful sponsorship arrangement with Winfield created enormous interest, as well as generating huge international exposure.

In 1995, the Australian Rugby League embarked on its most significant move and accepted entries in the ARL premiership from Auckland, North Queensland, South Queensland and Perth (Western Reds), which enlarged the competition to 20 teams.

1.2.3 The Clubs

The following is the list of clubs and the years of participation in the NSWRL/ARL premiership:

TABLE 1.1: Participating Clubs in the NSWRL Premiership 1908-1998

Present Clubs		Year Entered	
	Adelaide ^α	1998	
	Auckland	1995	
	Balmain	1908	
	Brisbane	1988	
	Canberra	1982	
	Canterbury-Bankstown	1935	
	Cronulla-Sutherland	1967	
	Gold Coast	1988	
	Illawarra	1982	
	Manly-Warringah	1947	
	Melbourne	1998	
	Newcastle ^β	1988	
	North Queensland	1995	
	North Sydney	1908	
	Parramatta	1947	
	Penrith	1967	
	St George	1921	
	South Sydney	1908	
	Sydney City (Eastern Suburbs)	1908	
	Western Suburbs	1908	
Defunct Clubs	Year Entered	Last Season	
	Annandale	1910	1920
	Cumberland	1908	1908
	Glebe	1908	1929
	Newcastle	1908	1909
	Newtown	1908	1983
	South Queensland	1995	1997
	University	1920	1937
	Western Reds (Perth) ^ζ	1995	1996

Source: The Australian Rugby League Yearbook 1997

^α Adelaide was a Super League expansion club in 1997 – its first (and last) NRL season was 1998.

^β A team representing the Newcastle and Hunter district competed in the NSWRL premiership in 1908 and 1909, and withdrew in 1910 to form their own competition.

^ζ The Western Reds participated in Super League in 1997 before becoming defunct. Their last ARL premiership year was 1996.

The research in this study will include game outcomes involving all twenty teams involved in the 1998 premiership, as well as the now-defunct clubs South

Queensland and the Western Reds, who participated in the ARL competition in 1995 and 1996.

1.2.4 Super League

“These sorts of intangibles [loyalties] were always going to present high hurdles to be jumped for any corporate raider eyeing the flash new ‘90s game of Rugby League as a potential target” (Heads 1995, p.6)

In 1995, as a result of increased commercialisation and the success of the Australian Rugby League, a rival organisation emerged – Super League. The emergence of Super League had dramatic implications for the game of Rugby League. In 1995, legal action barred Super League from starting a competition in 1996. Numerous ‘loyal’ ARL clubs elected to break ties with the establishment and go with the ‘rebel’ competition in a move reminiscent of the founding of Rugby League in Australia. This caused numerous standoffs and heated arguments between the two factions, which ultimately resulted in the cancellation of six first-round matches of the 1996 ARL season, after Super League-aligned clubs refused to play. Later that year, the ARL decided against including Super League-aligned players in the Australian national side.¹

In 1997, Super League was legally cleared to run a competition. Two competitions were run side by side for the first time – the ARL’s Optus Cup with eleven teams, and Super League’s Telstra Cup with ten teams. Through the events of 1997, damage was done to the game that is still visible today. Spectators, disillusioned by the divide in ‘their game’, left Rugby League in droves. As a result, both sides could see that two competitions were just not working. In December 1997 a peace deal was negotiated which would see a return to a combined twenty-team competition run by a combination of the ARL and Super League administration. This was the birth of the National Rugby

¹ In 1995, Super League-aligned players were not selected for ARL State of Origin representative teams, or the national side. In 1996, Super League players were eligible for selection in State of Origin, but were passed over for selection in the national side.

League (NRL), the game's governing body today. In 1998, the new NRL competition kicked off, hoping to heal the pain that the game of Rugby League had suffered over the previous three years.

1.2.5 The NRL – Plans For The Future

One key component of the peace deal brokered in late 1997-early 1998 was the controversial 'criteria document', released in mid-May 1998. This document is designed to reduce the number of teams in the NRL competition from twenty to fourteen by the year 2000. A number of stringent conditions have to be met in areas including playing venues, sponsorship, gate receipts, crowd figures for both home and away matches, and other income sources.²

Already, numerous clubs have publicly voiced opinions on the realistic (and increasingly necessary) possibility of merging with other clubs to ensure survival in a rationalised competition. South Sydney, Balmain, Illawarra, St. George, Cronulla, Gold Coast, Penrith, Parramatta, Western Suburbs, Canterbury, Sydney City and Adelaide have all acknowledged that mergers will be inevitable in order to guarantee survival post-2000. Indeed, at the time of writing, six of these clubs had voluntarily (or involuntarily) taken steps for this process, with Illawarra and St George merging, Adelaide and the Gold Coast not fielding teams in the 1999 premiership, and Balmain and Western Suburbs merging in mid-1999.

1.3 Summary

Taking into consideration the criteria required for survival beyond 2000, the underlying implication for all teams, either directly or indirectly, is that "winning matters". A winning team generates greater crowd support that in turn increases gate receipts and aids in financial viability. Winning teams become more marketable which has the effect of increasing sponsorship revenues. Winning is the rock on which foundations for survival in an elite competition can be built.

Measures of efficiency can be used to rank teams in terms of their winning ability and actual performance. In the following chapters, production and efficiency measures will be formulated, estimated and discussed in detail.

1.4 Thesis Outline

In Chapter 2, literature surrounding this topic is discussed. Methodology is outlined and explained in Chapter 3. Results of empirical analyses of determinants of production and construction of efficiency measures as well as discussion of these results are presented in Chapter 4. Chapter 5 outlines the stochastic frontier procedure adopted to model production, and the results are presented and discussed. The results of efficiency are reported and discussed in Chapter 6 and the study is concluded in Chapter 7.

² From report "Merger moves heat up" at <http://www.tvone.co.nz/sports/stories/21May1023.html>