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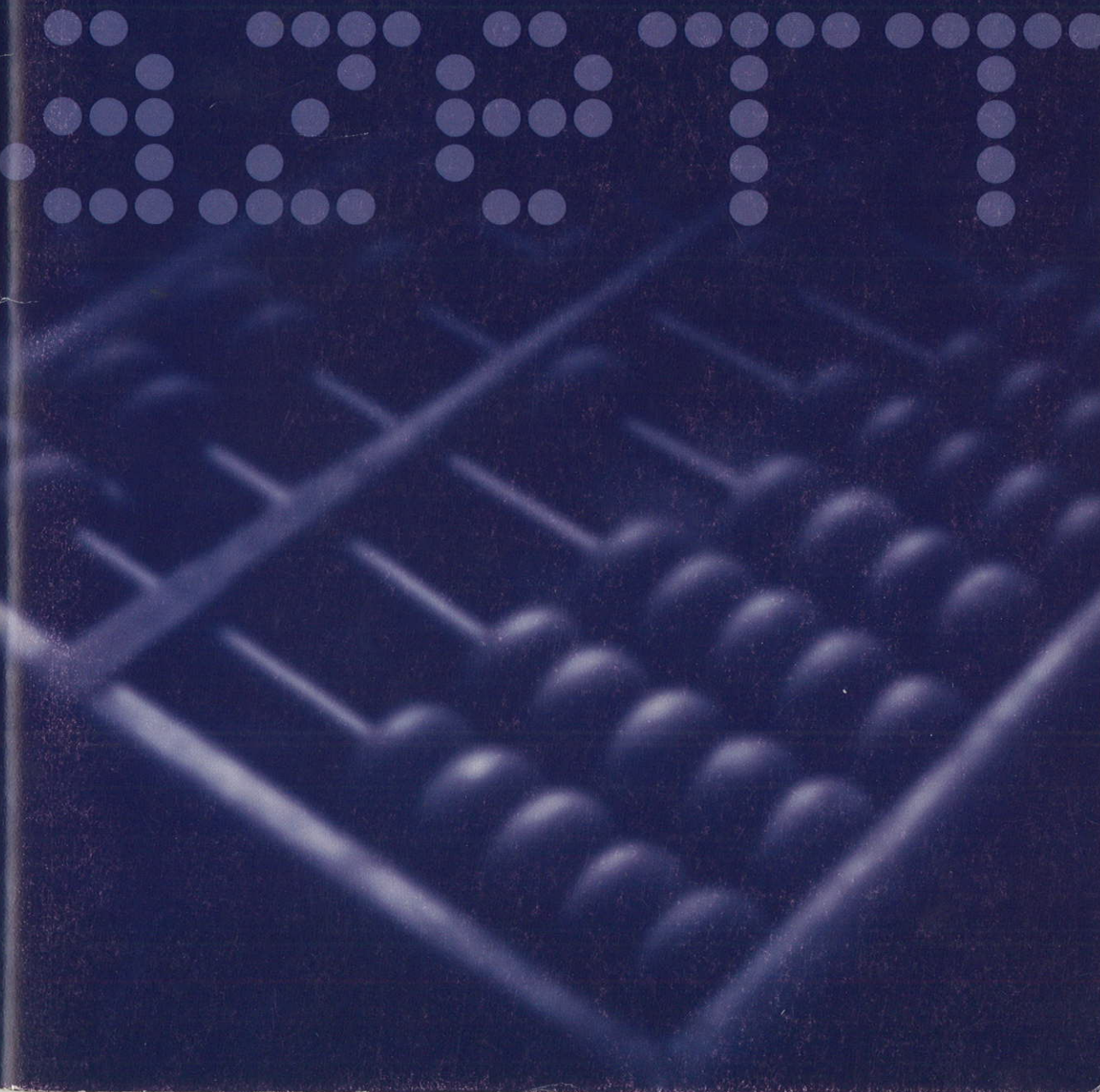
gazette

The Australian Mathematical Society



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Jan de Gier and S. Ole Warnaar (Editors)
Maaike Wienk (Assistant Editor)
Department of Mathematics and Statistics
The University of Melbourne
VIC 3010
Australia

E-mail: gazette@austms.org.au
Web: http://www.austms.org.au/Gazette
Tel: +61-(0)3-834-49682
Fax: +61-(0)3-834-44599

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Deadlines for submissions to Volumes 33(1) and 33(2) of the *Gazette* are 14 February and 11 April 2005.

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A Continuous Time Model for Election Timing

D. Lesmono, E.J. Tonkes, and K. Burrage

Abstract

We consider a continuous time model for election timing in a Majoritarian Parliamentary System where the government maintains a constitutional right to call an early election. Our model is based on the two-party-preferred data that measure the popularity of the government and the opposition over time. We describe the poll process by a Stochastic Differential Equation (SDE) and use a martingale approach to derive a Partial Differential Equation (PDE) for the government's expected remaining life in office. A comparison is made between a three-year and a four-year maximum term and we also provide the exercise boundary for calling an election. Impacts on changes in parameters in the SDE, the probability of winning the election and maximum terms on the call exercise boundaries are discussed and analysed. An application of our model to the Australian Federal Election for House of Representatives is also given.

1 Introduction

In Majoritarian Parliamentary Systems such as in Australia, United Kingdom, or New Zealand, Prime Ministers have the discretion to call an early election. This discretion may give governments an advantage to remain in power by calling elections at the most favourable time, especially when their popularity is high. In those countries, governments' and oppositions'popularity are determined by poll data. Both governments and oppositions are very concerned about these data and when they are behind in the poll, they will try through their policies to improve their popularity in the next poll. This decision to call an election at the most favourable time is interesting to model from a mathematical point of view. Mathematical techniques such as the optimal stopping problem, dynamic programming, game theory, stochastic and partial differential equations have been used to describe and analyse this problem.

Smith [8] modelled optimal election timing by considering the government's competency and outcomes. Voters gain information about the government's competency via its outcomes and then they can judge whether or not the government is competent. The decision to call an election is based on the difference in the expected utility between calling and not calling an election given the government's competency and voter beliefs about this competency. His analysis also included political business cycles where the government can manipulate economic instruments to its favour and the role of the opposition's campaign.

Kayser [6] considered election timing as a finite horizon optimal stopping problem to model the government's decision explicitly. The government's decision at each time is to maximize the utility of office holding by considering an option to call an election. He used the term *surfing* to indicate the ability of the government to time the election and *manipulation* to indicate where the government manipulates its policies for its advantage. He found that changes in factors such as government's competency, utility, discount factor and maximum terms will impact on the degree of *surfing* and *manipulation*.