A dynamic microsimulation approach to simulating the impact of the labour force on issues relating to the ageing population

A thesis submitted in fulfilment of a Doctor of Philosophy Degree

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Abstract

Accelerated population ageing is expected to create severe fiscal pressures for governments. With 12 Commonwealth agencies as research partners, NATSEM is currently constructing the Australian Population and Policy Simulation Model (APPSIM), a dynamic microsimulation model, to simulate our likely social and economic futures and the future distributional impact of policy changes. The APPSIM model takes the 2001 Census one per cent sample file as its base data and then ages the individuals within the sample, year by year, to 2051.

Labour force participation will become an increasingly important issue as the population ages. People who are employed pay taxes and claim less social security, improving the budget balance and making more funds available for Australia’s increasing health care, pensions and aged care needs. Promoting labour force participation has been suggested by Treasury and the Productivity Commission as a means of reducing future fiscal pressures caused by the ageing population.

Simulating the labour force first requires a solid understanding of labour force participation patterns in Australia; their historical context; legislation and social conditions that guided labour force participation; and how these patterns are expected to change in the future. Given the microsimulation nature of APPSIM, it is also important to understand the process undertaken at the individual level to decide on whether to work and if so, when and how much.

This thesis begins by reviewing the literature on Australian labour force patterns and international examples of dynamic microsimulation models. It explains in some detail the development of the labour force module for APPSIM, including modelling methods used, the use of separate equations to model different groups and labour force processes and the explanatory variables considered. It then validates the model by comparing its outcomes to external benchmarks.

Finally, the usefulness of the module is demonstrated by assessing the impact of three policy scenarios on labour force participation: increasing Year 12 and university attainment, increasing the labour force participation of single mothers with school-age
children, and reducing the incidence and impact of disability among workers aged 45-64. These policy scenarios demonstrate that higher educational attainment will result in higher savings in the future, but the gains will take decades to appear. Increasing the labour force participation of single mothers has less of an impact on overall superannuation savings, but the impact is focused on people who would have had very low levels of superannuation. Reducing the incidence and impact of disability improves superannuation balances as people are able to work for longer, and has the most immediate impact on superannuation savings. These simulations illustrate the fact that policies targeted towards people who are likely to have lower superannuation balances can be of great benefit.

Future research in this area could be targeted towards a more detailed model of the labour force. As detailed longitudinal data becomes more widely available and computer power increases, there is the potential to simulate behavioural response to changes in take-home income and a wider range of explanatory factors in labour force participation.
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This thesis uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the author and should not be attributed to either FaHCSIA or the Melbourne Institute.

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ABSTRACT

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Except where clearly acknowledged in footnotes, quotations and the bibliography, I certify that I am the sole author of the thesis submitted today entitled –

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I further certify that to the best of my knowledge the thesis contains no material previously published or written by another person except where due reference is made in the text of the thesis.

The material in the thesis has not been the basis of an award of any other degree or diploma except where due reference is made in the text of the thesis.

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Ma/gia Keen

Signature of Candidate

Ann Harding

Signature of chair of the supervisory panel

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Aims of this research

This research first aims to discuss current labour force behaviour in Australia. Its second aim is to project labour force participation patterns into the future. Finally, it seeks to measure the impact of improving labour force participation on mitigating the impacts of the ageing population.

To determine whether a future government policy is likely to reduce the future fiscal gap by increasing labour force participation, a model is needed that will:

- Show the distributive effect of change (i.e. the effect of the change on classes of individuals, rather than the total macroeconomic effect); and

- Estimate the effects of these changes in labour supply over time upon key economic and social indicators, so that the cumulative effect of individual labour supply changes on, for example, future superannuation accumulation, can be measured.

At present, there is no model capable of fulfilling these functions for Australia. The Melbourne Institute Tax and Transfer Simulator (MITTS) developed by the Melbourne Institute abstracts from the effects of time, showing the effects of labour supply changes after behavioural responses are simulated immediately, rather than looking at the cumulative impact over many years (Creedy, et al. 2003). Models developed by the Australian Treasury to estimate the impact of labour force participation changes include cell-based models and typical taxpayer models, but these do not model how the specific circumstances of an individual’s life course can affect the burden they impose in retirement (Treasury 2007).

Synopsis of thesis

Chapter 1 begins by introducing some of the issues involved in modelling labour supply and outlines the reasons for why a new method of modelling the labour force in Australia is needed. Chapter 2 of thesis begins by summarising past, current and projected labour force participation patterns in Australia, reviews the literature on
factors that affect labour force participation in Australia, and compares these patterns to other countries. Chapter 3 reviews the literature on dynamic microsimulation modelling and summarises the features of a number of international models. It then gives a broad overview of APPSIM, a new dynamic microsimulation model under development at the National Centre for Social and Economic Modelling at the University of Canberra.

Chapter 4 explains in detail the modelling process used in building the labour force module in APPSIM and justifies the methodology used in its development. Chapter 5 discusses the validation of the labour force module, comparing model outputs to external cross-sectional and longitudinal benchmarks.

Chapters 6, 7 and 8 describe applications of the labour force module within APPSIM, demonstrating how APPSIM can be used to simulate how three different policy or social changes affect labour force participation and, in turn, how these affect issues relating to the ageing of the population, such as superannuation accumulation and retirement self-sufficiency. Chapter 9 summarises and concludes.

PART I: LABOUR SUPPLY IN AUSTRALIA

Chapter 1. Introduction

Labour lies at the core of every socioeconomic system. In the most primitive societies labour is used to source or create means of survival and improvement of life; in developed societies people sell their labour for a wage, which is used to buy immediate needs and wants, or saved to satisfy future needs and wants. In addition to this, it can provide purpose to life and an important means of social interaction. However, for various reasons, many people choose not to participate in the labour force. As in other industrialised countries, this may create difficulties in the future for Australia as the population ages.