ECONOMIC RECORD

THE ECONOMIC SOCIETY OF AUSTRALIA

ECONOMIC RECORD, VOL. 89, NO. 285, JUNE, 2013, 255–270

Factors that Determine the Decline in University Student Enrolments in Economics in Australia: An Empirical Investigation*

JOHN MARANGOS
Department of Economics, University of Crete, Greece

VASILIKI FOURMOUZI
Department of Economics, University of Crete, Greece and Accounting Department, Technological Educational Institute of Crete, Greece

MINOAS KOUKOURITAKIS
Department of Economics, University of Crete, Greece

This study attempts to determine empirically the factors that influence enrolments in economics and business based on data from a panel of Australian universities. Using a two-equation dynamic reduced-form system, our results indicate the following: past year enrolments in a certain field of study have the highest impact on that field of study; in periods of recession enrolments favour economics; female enrolments favour business studies over economics; an increase in total enrolments has a small negative effect on economics enrolments; and finally, there is a positive impact of the eight leading Australian universities ('Group of Eight') on economics enrolments.

I Introduction

In the past 20 years, departments of economics across Australian universities experienced a reduction in student enrolments. Previous studies show evidence of this long-term decline, while they also identify an increase in business enrolments. However, these studies are based on survey data of university students regarding their perceptions of economics and business studies, or surveys of heads of economics departments. The aim of this study is to investigate empirically the factors that affect economics and business enrolments, using data drawn from a panel of Australian universities and macroeconomic variables that proxy the economic conditions of the Australian economy. To our knowledge, there are no empirical studies that relate the increasing unattractiveness of economics studies with the economic conditions in Australia.

In this study, we followed Skoorka and Condon (2003) and specified a reduced-form model to capture the factors that may be important in explaining the trends in economics and business enrolments.[1] We have not attempted to estimate a

*This study was funded by the Special Account for Research (ELKE – Project KA3051) of the University of Crete. The authors would like to thank Harry Bloch, Robert Dixon, Alex Millmow and Andreas Yannopoulos for their suggestions on an earlier version of the paper. The authors would also like to thank the editor of the journal Jeffrey Sheen and two anonymous referees for their constructive suggestions and helpful comments that improved the quality and the exposition of the paper. Of course, the usual caveat applies.

JEL classifications: C23, C51, I23

Correspondence: John Marangos, Department of Economics, University of Crete, University Campus, 74100 Rethymno, Greece. Email: marangosjohn@gmail.com

[1] Note that our reduced-form model cannot be interpreted as a demand model, because it assumes that the supply of enrolments by the universities remains constant to changes in macroeconomic conditions. However when macroeconomic conditions change, universities also respond and change the Australian Tertiary Admission Ranks (ATARs), which is the primary criterion for entry into most undergraduate-entry university programs in Australia.

doi: 10.1111/1475-4932.12038

structural model for enrolments in Australian Universities and to obtain structural effects, because this would require a full demand and supply model, for which we do not have available data. More specifically, our model allows us to obtain empirical evidence regarding: (i) the effects of labour market and macroeconomic conditions on economics and business enrolments; (ii) whether gender plays a role on enrolments in economics or business in each university; (iii) the way that changes in total enrolments in each Australian University affect the enrolments in economics and business-related studies; and (iv) whether the location of the university and the membership of a specific university in the coalition of leading Australian Universities ('Group of Eight') affects enrolments. To our knowledge, this is the first study that investigates empirically these factors. The empirical implications regarding economics enrolments can be used by administrators in the economics departments to devise appropriate policies and strategies for increasing enrolments.

This article is organised as follows. Section II provides a brief literature review, while Section III describes the data used in the empirical analysis. Section IV outlines the econometric model and reports the empirical results. Finally, the last section concludes and provides some policy implications.

II Literature Review

Using survey results from a questionnaire distributed to the heads of economics departments of Australian universities, Lewis and Norris (1997) showed that between 1991 and 1996: first year student enrolments in economics fell by 12 per cent nationally, total enrolments in economics degrees fell by 13.2 per cent and enrolments in honours level degrees in economics fell by 18 per cent from the peak year. Millmow (2004), using data provided by the Department of Education, Science and Training, continued on to reveal the unwelcoming situation for the economics profession. He demonstrates that undergraduate enrolments in economics fell by 10.15 per cent in 2001 in relation to the previous year (from 8,713 to 7,828), and by 5.76 per cent in 2002 (from 7,828 to 7,377).

Round and Shanahan (2010) use a 'narrow' definition for Australian economics degrees for commencing and honours students to explore enrolments in economics studies between 2001 and 2007. According to their findings, there was an upward trend of commencing students between 2001 and 2003 (increase by 10 per cent). However, this situation was later reversed as the number of commencing students in 2007 was almost the same as that of 2001. Also, as enrolments in economics did not follow the increase in total student enrolments over the 2001–2007 period, the share of economics enrolments fell from 1.20 per cent in 2001 to 1.13 per cent in 2007. These results are very close to those of Millmow (2009) that indicate that economics has steadily lost share in the Australian tertiary education market.

This decline in student enrolments in economics has been attributed to several factors. According to Alauddin and Butler (2004), the environment for teaching economics in Australian universities has undergone profound changes that have contributed to the decline in economics enrolments, such as the changing public policy goals, market expansion, internationalisation, working to study and an increasingly diverse clientele. For Round and Shanahan (2010), three reasons are prominent: a much stronger preference of students for business-related studies, a failure of academic economists to adjust their teaching methods, content and quality, and the increased accessibility of more (weaker) students to tertiary education in Australia preferring less rigorous subjects to economics. Alauddin and Valadkhani (2003) add to these reasons, the less than appropriate product for an increasingly diverse clientele and the use of less experienced teaching staff in lower undergraduate courses. Also, a variety of studies have identified that the reasons for the reduction in economics enrolments are that economics: is poorly perceived by potential students, has a declining public image, is a hard rigorous subject, has no clear link with securing a good job, is associated with anachronistic teaching methods and content and is of dubious quality (Lewis & Norris, 1997; Millmow, 1997, 2000; Alvey & Smith, 2000; Ashworth & Evans, 2000; Fournier & Sass, 2000; Maxwell, 2003; Freedman & Blair, 2009). In contrast, business degrees have become very popular. This rise of business studies is occurring at the expense of studies in economics, as students turn away from generalist degrees like economics to specialist degrees like business (Millmow, 1997). An attempt has been made by the economics profession to demystify the nature of economics, to update teaching methods and to highlight the complementarity of economics to business

studies to stop the decline in economics enrolments (Johnston *et al.*, 2000; Marangos, 2000, 2002a,b, 2003, 2006; Ward *et al.*, 2000, 2001; Marangos & Alley, 2007; Freedman & Blair, 2009).

An attempt to empirically explore the decline of economics enrolments in Australia is provided by the study of Alauddin and Valadkhani (2003). Specifically, these authors investigate the causes and implications of this decline via: (i) a literature review of studies on this subject matter and (ii) an empirical analysis using time series data from 1989 to 2000. In general, they conclude that instead of studying for a bachelor degree in economics, students prefer business courses. Nevertheless, their empirical analysis has a number of drawbacks. First, they use aggregate time-series data for the 1989–2000 period. This time span is very short and as the data are aggregate they cannot take into account factors related to the Australian Universities (e.g. state/territory in which a university is located, participation in the 'Group of Eight'). Second, they treat the enrolments in business studies as an exogenous variable, which is at least problematic. This variable may be endogenous and should be treated in the same way as enrolments in economics. Third, their analysis does not take into account the effects of macroeconomic variables, such as employment rates after graduation, economic expectations and business cycle, on the enrolments in economics or business-related studies.

The motivation for our study comes from the paper by Skoorka and Condon (2003), who explored the factors associated with changes in the number of conferred economics degrees in New Jersey. They used data from 20 New Jersey colleges and universities that conferred bachelor economics degrees during the 1979–2000 period. A regression model was specified with the following independent variables: business cycle, economic outlook, demographic variables (total number of bachelor degrees conferred), popularity of professional school (the majors in economics in preparation for postgraduate school), public or private institution, location of the economics department within a liberal arts or a business college, and two additional variables to control for wages and employment after graduation. Their findings reveal that trends in economics majors are mainly influenced by business cycle conditions, total number of bachelor degrees and the desire to attend postgraduate professional school. Specifically, they determined that the number of economics degrees awarded was related to business cycle conditions in the sophomore year (second year of study) and that the trend in economics degrees was pro-cyclical. Their findings are consistent with the hypothesis that more students have the opportunity to attend college during economic expansions than during economic contractions. Students are likely to be under considerable family pressure to work and financially support their families during economic contractions. In addition, the trend in economics degrees followed the trend in total bachelor degrees. As the total number of enrolments, and hence bachelor degrees, increase there appears to be a flow-on effect to economics degrees.

III Data

The data were drawn from a panel of 39 Australian universities that offer degrees in economics and/or business-related studies. All 39 universities are members of the Universities Australia (2011) (formerly Australian Vice Chancellors' Committee). The data on student enrolments per university per gender are annual, covering the period from 1991 to 2011, and were obtained from the Department of Education, Employment and Workplace Relations (DEEWR) and from the Department of Industry, Innovation Science, Research and Tertiary Education (DIISRTE) of Australia.

Our analysis focuses on the factors that may affect enrolments in either economics or business-related studies. To this end, we used an unbalanced panel of 30 universities, which offer degrees both in economics and in business-related studies. These universities are presented in the first panel of Table 1. The nine Universities which were removed from the data as they offer degrees only in business-related studies are presented in the second panel of Table 1. Several of the universities in our study are the result of amalgamations with other universities. As the original database included information on enrolments both before and after these amalgamations, the data were summed up appropriately to reflect the enrolments in the current status of the Australian universities. The names of the universities included in the study are those after the amalgamations. The latter are presented in column 2 of Table 1. The original database includes information on enrolments in various economics and business-related fields of study. Our economics enrolments and business enrolments variables were constructed by sum-

ming up the enrolments in various economics fields and in various business-related fields respectively.[2]

As far as the explanatory variables in our model are concerned, these include labour market variables, economic outlook and business cycle variables, total enrolments in each university by gender and university-specific dummies. In the case of the labour market, we obtained data on employment rates after graduation for economics and business-related studies degrees.[3] Specifically, we used bachelor degree graduates working full-time as a proportion of those available for full time employment, by aggregated field of education, reported from the Graduate Careers Australia (2013) (formerly Graduate Careers Council of Australia). The data are reported separately for accounting, business and economics graduates. Because the employment rates after graduation in accounting, business and economics were very close in each year, we calculated the weighted average of full-time employment rate of accounting, business and economics graduates. As weights, we used the ratios of the above three fields of study annual enrolments (accounting, business and economics) to the sum of these three fields of study annual enrolments.

To capture students' expectations about future economic conditions and the job opportunities ('economic outlook' variable), we used the Westpac–Melbourne Institute Consumer Sentiment Index as a proxy. This index was obtained by the Reserve Bank of Australia (2013). This index is published in a monthly frequency. Because we use annual data, we calculated the annual average of this index.

The business cycle variable per capita was used as a proxy for the economic conditions of Australia. Skoorka and Condon (2003) used real personal income less transfer payments as a proxy for the economic conditions. Following their methodology, we calculated the same variable for Australia by first subtracting the income support from the real net national disposable income and then dividing the result by the population of Australia. The subtraction of income support is justified by the fact that the real net national disposable income includes welfare payments amongst other things. Therefore, in a downturn, welfare payments would increase and wages and salaries would decrease, and if they moved roughly by the same amount, then the real net national disposable income would not change. This is avoided by subtracting the welfare payments from the disposable income. The real net national disposable income

[2] The data up to year 2000 were constructed using DEEWR's older *Field of Study Classification* (FSC), whereas the data from year 2001 onwards were constructed using DEEWR's *Field of Education Classification*, which is the component of the Australian Standard Classification of Education, replacing FSC. In particular, to construct the economics enrolments variable for the 1991–2000 period, we summed up the enrolments in the following minor fields of study: Economics-General; Agricultural Economics; Economic History; Economic Statistics/Econometrics; and Economics-Other. For the business enrolments variable, we summed up the enrolments in: Accounting; Administration and Management (not Agricultural Management or Rural Management); Banking and Finance; Business Data Processing; Business, Administration-General; Business, Administration-Other; Hotel and Hospitality Management; Industrial Relations; Marketing and Distribution; Personnel Management and Development; Public Administration; Valuation and Real Estate; and Business, Administration, Economics–General. The Business, Administration, Economics-General field of study was in effect only for the 1991–2000 period. Following the guidelines of DEEWR, this field of study was embodied in the business enrolments variable. For the 2001–2011 period, the economics enrolments variable was constructed by summing up the following detailed fields of education: Economics and Econometrics; Economics; and Econometrics. The business enrolments variable was constructed by summing up Management and Commerce; Accounting; Business and Management; Business Management; Human Resource Management; Organisation Management; Industrial Relations; International Business; Public and Health Care Administration; Project Management; Quality Management; Hospitality Management; Farm Management and Agribusiness; Tourism Management; Business and Management not elsewhere classified; Sales and Marketing; Real Estate; Marketing; Advertising; Public Relations; Sales and Marketing not elsewhere classified; Tourism; Banking, Finance and Related Fields; Banking and Finance; Insurance and Actuarial Studies; Investment and Securities; Banking, Finance and Related Fields not elsewhere classified; Other Management and Commerce; Purchasing, Warehousing and Distribution; Valuation; and Management and Commerce not elsewhere classified. Office Studies not elsewhere classified were excluded from the Business Enrolments variable.

[3] Due to multicollinearity, we could use either employment rates or salaries after graduation. We chose employment rates after graduation because data on salaries after graduation are not easily accessible.

TABLE 1
Australian Universities (as at the end of 2004)

University	Merging/Amalgamating Institutions	Date of new status	State/Territory
	Universities which offer degrees both in Economics and in Business-related studies		
Charles Darwin University	No mergers or amalgamations		Northern Territory
Charles Sturt University	Mitchell College of Advanced Education	July 1989	New South Wales
	Riverina-Murray Institute of Higher Education	July 1989	
Curtin University[a]	No mergers or amalgamations		Western Australia
Deakin University	Victoria College	January 1992	Victoria
	Warrnambool Institute of Advanced Education	August 1990	
James Cook University	No mergers or amalgamations		Queensland
La Trobe University	Bendigo College of Advanced Education	January 1991	Victoria
	The Wodonga Institute of Tertiary Education	January 1994	
Macquarie University	No mergers or amalgamations		New South Wales
Monash University	Chisholm Institute of Technology	July 1990	Victoria
	Gippsland Institute of Advanced Education	July 1990	
Murdoch University	No mergers or amalgamations		Western Australia
Queensland University of Technology	No mergers or amalgamations		Queensland
Royal Melbourne Institute of Technology	Phillip Institute of Technology	July 1992	Victoria
Southern Cross University	Northern Rivers College of Advanced Education	January 1994	New South Wales
Swinburne University of Technology	No mergers or amalgamations		Victoria
The Australian National University	No mergers or amalgamations		Australian Capital Territory
The Flinders University of South Australia	No mergers or amalgamations		South Australia
The University of Adelaide	Roseworthy Agricultural College	January 1991	South Australia
The University of Melbourne	No mergers or amalgamations		Victoria
The University of New England	No mergers or amalgamations		New South Wales
The University of New South Wales	No mergers or amalgamations		New South Wales
The University of Newcastle	Hunter Institute of Higher Education	November 1989	New South Wales
The University of Queensland	Queensland Agricultural College	January 1990	Queensland
The University of Sydney	No mergers or amalgamations		New South Wales
The University of Western Australia	No mergers or amalgamations		Western Australia
University of Canberra	No mergers or amalgamations		Australian Capital Territory
University of South Australia	South Australian Institute of Technology	January 1991	South Australia
University of Tasmania	Australian Maritime College	January 2008	Tasmania
	Tasmanian State Institute of Technology	January 1991	
University of Technology, Sydney	Kuring-gai College of Advanced Education	January 1990	New South Wales
University of Western Sydney	Hawkesbury Agricultural College	January 1989	New South Wales
	Macarthur Institute of Higher Education	October 1989	
	Nepean College of Advanced Education	January 1989	
University of Wollongong	No mergers or amalgamations		New South Wales
Victoria University[b]	Footscray Institute of Technology	July 1990	Victoria
	The Western Institute	July 1990	

Table 1
(continued)

University	Merging/Amalgamating Institutions	Date of new status	State/Territory
	Universities which offer degrees only in Business-related studies		
Australian Catholic University	Catholic College of Education, Sydney	January 1991	National
Bond University	No mergers or amalgamations		Queensland
Central Queensland University	No mergers or amalgamations		Queensland
Edith Cowan University	No mergers or amalgamations		Western Australia
Griffith University	Brisbane College of Advanced Education	January 1990	Queensland
	Gold Coast College of Advanced Education	July 1990	
The University of Notre Dame Australia	No mergers or amalgamations		Western Australia
University of Ballarat	No mergers or amalgamations		Victoria
University of Southern Queensland	No mergers or amalgamations		Queensland
University of the Sunshine Coast	No mergers or amalgamations		Queensland

Notes: [a]Known as Curtin University of Technology between 1986 and 2010. [b]Known as Victoria University of Technology between 1990 and 2005. *Source*: Universities Australia (formerly Australian Vice Chancellors' Committee), 2011. www2.uniaus.edu.au/documents/universities/AustralianHEMerges-Amalgamations.pdf.

was obtained from the Australian National Accounts of the Australian Bureau of Statistics. The income support was obtained from Bond and Wang (2001, table 4.1) for the period 1991–1999. For the period 2000–2011, we calculated the income support by following the same methodology of Bond and Wang (2001) and obtaining data from table 9.9 of the Statistical Yearbook of the Australian Bureau of Statistics. Next, to express income support in 2008 prices (in which real net national disposable income is expressed), we divided the income support by the GDP deflator. The latter was obtained from the Australian National Accounts of the Australian Bureau of Statistics. Also, data on the Australian population were obtained from the World Economic Outlook Database of the International Monetary Fund.[4] Finally, to (i) capture the long-term effects of the business cycle on economics and business enrolments and (ii) to handle the issue of stationarity, we applied a modified version of the Hodrick and Prescott (1997) (H–P) filter proposed by Kaiser and Maravall (1999). Their methodology is based on estimating optimal ARIMA forecasts and then implementing the H–P filter to the extended series. This modification deals with the inconsistency related to the poor performance of the standard H–P filter near the end of the sample (Baxter & King, 1999; Kaiser & Maravall, 1999; Mise *et al.*, 2005).

Regarding the variable for total enrolments in each university, it was constructed using data on annual enrolments in all fields of education offered by each university. These data were obtained from the DEEWR and DIISRTE of Australia. We also used a dummy variable to capture the effect of membership in the 'Group of Eight' (Go8). The latter is a coalition of leading Australian universities, intensive in research and comprehensive in general and professional education, and is comprised of the following universities: Monash University, The Australian National University, The University of Adelaide, The University of Melbourne, The University of New South Wales, The University of Queensland, The University of Sydney and The University of Western Australia. Finally, we used regional dummies to explore the potential

[4] The annual data for the economic outlook variable, the real net national disposable income and the income support have been calculated using the financial year in Australia that begins July the 1st of the previous year and ends June the 30th of the current year.

effect that the state or territory may have on the enrolments in the universities in our sample. In particular, we used dummies for the following states or territories: Australian Capital Territory, New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia.

The descriptive statistics of the data on enrolments in the 30 Australian universities and on the macroeconomic variables are presented in the first panel of Table 2. The second panel of Table 2 reports the correlation matrix of the variables of our model. As shown, the correlations among the independent variables are quite low, implying no evidence of multicollinearity problem in our model. Table 3 reports the descriptive statistics of the dummies included in the analysis. Figures 1–3 report the economics enrolments, business enrolments and total enrolments for our sample period. From these figures, one can observe that even though there is an increasing trend in total enrolments and business enrolments, such trend is not apparent in economics enrolments that are more volatile. Also, Figure 4 reports the two variables that will be used as dependent variables in our model (i.e. the share of economics enrolments over total enrolments and the share of business enrolments over total enrolments), along with the deviations from the trend of the business cycle variable as analysed above. In Figure 4, the share of business enrolments and the business cycle variable are measured in the left-hand side axis, whereas the share of economics enrolments is measured in the right-hand side axis. As shown, one cannot draw a clear-cut conclusion regarding the relationship between each of the share variables and the business cycle variable. The subsequent empirical investigation will provide clearer conclusions regarding the factors that affect economics and business enrolments in Australian universities.

IV Econometric Model and Empirical Results

The form of the empirical model that can be used for estimation is restricted by the data at hand.[5] The model that is chosen for the present analysis is a two-equation reduced-form system, for the share of economics enrolments and the share of business enrolments over total enrolments, and has the following form:

$$SE_{it} = \alpha_1 + \beta_{11}SE_{i,t-1} + \beta_{12}FTE_{t-1} + \beta_{13}ECOU_{t-1} + \beta_{14}BUCY_{t-1} + \beta_{15}EBF_{it} + + \beta_{16}PCTE_{it} + \beta_{17}Go8_i + \sum_{j=1}^{7}\gamma_{1j}D_{ji} + u_{1i} + \varepsilon_{1it}, \quad (1)$$

$$SB_{it} = \alpha_2 + \beta_{21}SB_{i,t-1} + \beta_{22}FTE_{t-1} + \beta_{23}ECOU_{t-1} + \beta_{24}BUCY_{t-1} + \beta_{25}EBF_{it} + + \beta_{26}PCTE_{it} + \beta_{27}Go8_i + \sum_{j=1}^{7}\gamma_{2j}D_{ji} + u_{2i} + \varepsilon_{2it}, \quad (2)$$

where i denotes universities, t denotes year, j denotes region, and SE_{it} and SB_{it} are the shares of economics enrolments and business enrolments over the total enrolments in each Australian university respectively. $SE_{i,t-1}$ and $SB_{i,t-1}$ are AR(1) terms that account for the presence of dynamics in enrolments. FTE_{t-1} stands for the full-time employment after graduation, $ECOU_{t-1}$ is the economic outlook variable, $BUCY_{t-1}$ stands for the modified business cycle variable, EBF_{it} stands for the share of female enrolments in economics and business, $PCTE_{it}$ is the percentage change of the total enrolments in each Australian university, $Go8_i$ represents the dummy variable for the coalition of leading Australian universities, and the D_{ji}'s are dummy variables for seven of eight Australian states and territories. Also, u_{1i} and u_{2i} are time invariant university-specific effects representing unobserved heterogeneity across universities, while ε_{1it} and ε_{2it} denote random disturbances.[6]

In general, the academic year in Australia begins in January or February for most universities. Also, enrolments are not fixed in the beginning of the academic year because there are a number of mid-year enrolments and students can change their field of study during the year.

[5] Because we are working with 30 of the 39 universities, sample selection should be accounted for in our econometric specification. However, such a treatment would require additional university-specific exogenous variables.

[6] For identification reasons, the regional dummy of Western Australia and the share of male enrolments in economics and business were omitted. The combined effect of these omitted variables is captured by the intercept.

TABLE 2
Descriptive Statistics of Enrolments and Macroeconomic Variables

	Economics enrolments			Business enrolments			All fields enrolments					
	Males	Females	Total	Males	Females	Total	Males	Females	Total	ECOU	BUCY[a]	FTE (%)
1991	5,310	3,239	8,549	48,419	37,585	86,004	249,665	284,845	534,510	73.07	27.54	81.34
1992	5,078	3,174	8,252	48,629	39,703	88,332	260,566	298,815	559,381	86.17	26.82	72.75
1993	5,499	3,564	9,063	47,544	40,574	88,118	267,986	307,630	575,616	90.11	27.50	76.58
1994	5,125	3,155	8,280	47,133	41,348	88,481	271,987	313,448	585,435	108.15	28.06	78.99
1995	4,918	3,169	8,087	48,714	44,501	93,215	278,819	325,357	604,176	106.87	28.90	81.66
1996	4,838	3,285	8,123	52,917	50,945	103,862	289,872	344,222	634,094	106.13	29.87	81.38
1997	5,687	3,987	9,674	59,570	58,588	118,158	300,180	358,669	658,849	103.77	30.96	79.84
1998	5,711	3,874	9,585	61,947	63,777	125,724	304,374	367,479	671,853	102.28	32.18	80.83
1999	5,825	4,102	9,927	63,093	68,044	131,137	308,976	377,291	686,267	107.61	33.10	82.18
2000	5,205	3,541	8,746	63,179	69,229	132,408	311,370	384,114	695,484	105.88	34.51	85.51
2001	4,920	3,443	8,363	72,055	84,473	156,528	384,131	458,052	842,183	100.24	34.27	84.35
2002	4,734	3,212	7,946	74,818	89,260	164,078	408,633	487,988	896,621	108.63	35.50	80.89
2003	5,675	4,168	9,843	77,594	92,288	169,882	424,128	505,824	929,952	106.34	36.33	78.54
2004	4,831	3,205	8,036	82,266	94,943	177,209	431,557	513,420	944,977	114.96	37.72	81.32
2005	4,699	2,920	7,619	86,481	95,856	182,337	435,849	521,328	957,177	116.21	38.85	82.08
2006	4,909	2,939	7,848	91,526	99,110	190,636	444,911	539,150	984,061	106.16	40.28	83.47
2007	5,291	3,202	8,493	94,984	101,002	195,986	463,452	566,394	1,029,846	108.52	41.50	85.37
2008	5,609	3,337	8,946	98,069	104,328	202,397	477,252	588,843	1,066,095	103.07	43.02	85.38
2009	6,269	3,681	9,950	103,498	110,583	214,081	505,622	629,244	1,134,866	88.31	43.32	77.98
2010	6,922	4,093	11,015	106,258	113,611	219,869	529,926	662,731	1,192,657	114.66	42.95	75.56
2011	7,081	4,452	11,533	108,125	114,149	222,274	540,613	680,395	1,221,008	109.16	45.36	76.50
Mean	5,435.1	3,511.5	8,946.6	73,181.9	76,852.2	150,034.1	375,708.1	453,106.6	828,114.7	103.16	35.17	80.60
SD	666.2	439.8	1,062.5	21,239.9	27,119.1	48,103.7	97,091.9	127,538.4	224,522.9	10.55	5.99	3.42
Min	4,699	2,920	7,619	47,133	37,585	86,004	249,665	284,845	534,510	73.07	26.82	72.75
Max	7,081	4,452	11,533	108,125	114,149	222,274	540,613	680,395	1,221,008	116.21	45.36	85.51

Correlation matrix

	SE	SB	FTE	ECOU	BUCY	EBF	PCTE
SE	1.0000	—	—	—	—	—	—
SB	−0.3096	1.0000	—	—	—	—	—
FTE	−0.1626	0.0817	1.0000	—	—	—	—
ECOU	−0.1641	0.0822	0.3648	1.0000	—	—	—
BUCY	−0.1707	0.2354	0.2028	0.3253	1.0000	—	—
EBF	−0.4438	0.3685	0.2385	0.2345	0.2978	1.0000	—
PCTE	−0.0392	0.1240	−0.0113	−0.2291	0.0005	0.1296	1.0000

Notes: [a]The BUCY variable is expressed in thousands AUD and its descriptive statistics refer to data prior to the implementation of the modified H–P filter. SE is the share of economics enrolments to total enrolments, SB is the share of business enrolments to total enrolments, FTE is the full-time employment after graduation, ECOU is the economic outlook variable, BUCY is the business cycle variable, EBF is the share of females in economics and business and PCTE is the percentage change of the total enrolments in each Australian university.

TABLE 3
Descriptive Statistics of the Dummy Variables

Variable	Mean
Go8	0.27
ACT	0.07
NSW	0.33
NT	0.03
Qld	0.10
SA	0.10
Tas	0.03
ViC	0.23
WA	0.10

Notes: Go8, Group of Eight; ACT, Australian Capital Territory; NSW, New South Wales; NT, Northern Territory; Qld, Queensland; SA, South Australia; Tas, Tasmania; Vic, Victoria; WA, Western Australia.

However in all cases, students are familiar with the previous period's data regarding the macroeconomic situation and the labour market conditions of the Australian economy and are not aware of the current unpublished period's data. For these reasons, the economic outlook, business cycle and full-time employment variables are used in the model with one lag. Similarly, based on the previous period's data, university administrators may adjust their ATARs.

Prior to model estimation, we tested SE_{it} and SB_{it} for unit roots. We first applied the Levin, Lin and Chu (LLC) test for common unit roots (Levin *et al.*, 2002), and the Im, Pesaran and Shin (IPS) test for individual unit roots (Im *et al.*, 2003). Both tests belong to the 'first generation' panel unit root tests that assume cross-sectional independence, and test the null hypothesis of a unit root.

However, it might be appropriate to assume cross-sectional correlation in our panel. The reason is that if macroeconomic conditions or the institutional framework of tertiary education in Australia change, the effects on enrolments will probably be similar for all universities. The 'first generation' panel unit root tests cannot exploit the additional information that arises from the above co-movement. This is an important issue because if we apply 'first generation' panel unit root tests to series that are characterised by cross-sectional dependencies, this will lead to size distortions and low power (O'Connell, 1998; Banerjee *et al.*, 2000; Strauss & Yigit, 2003). For the above reasons, we second applied the Choi (2006) panel unit root test, which belongs to the 'second generation' panel unit root tests and assumes cross-sectional dependence. The test statistics for the latter test are shown in the following:

$$P_m = -1/\sqrt{N}\sum_{i=1}^{N}[\ln(p_i)+1], \qquad (3)$$

$$Z = 1/\sqrt{N}\sum_{i=1}^{N}\Phi^{-1}(p_i), \qquad (4)$$

$$L^* = 1/\sqrt{\pi^2 N/3}\sum_{i=1}^{N}\ln[p_i/(1-p_i)], \qquad (5)$$

where N is the number of universities, p_i is the asymptotic P-value of the Dickey–Fuller GLS test for university i and $\Phi(\cdot)$ is the standard normal cumulative distribution function. Under the null hypothesis of a unit root, these three statistics converge to a standardised normal law when T and N tend to infinity. In all the above tests, the number of lags was selected using the Schwarz Information Criterion. The results for the LLC and IPS tests are presented in Table 4, whereas those of the Choi test are presented in Table 5.[7] Both tables indicate rejection of the unit root hypothesis for both the SE_{it} and SB_{it}, either at the 5 or at the 10 per cent level of significance.

Our dynamic panel data model was estimated using the Generalised Method of Moments (GMM) estimator of Arellano and Bond (1991) for dynamic panel data models, and the White robust coefficient covariance estimator (White, 1980; Arellano, 1987) to take into account heteroscedasticity and contemporaneous correlation between universities.[8] The Arellano and Bond (1991) procedure transforms the variables into first differences and, therefore, discards the constant term, the time-invariant university-specific effects, and other time-invariant variables that appear in the model. The parameter estimates of the constant term and the university-specific dummies can be obtained via the methodology proposed by Hausman and Taylor (1981). This methodology consists of forming the residuals (in levels and not in first differences) from the first step estimation of the model, taking their time

[7] The authors are grateful to Professor In Choi for kindly providing the Gauss codes for the panel unit root tests estimations.

[8] The model estimations were performed using the econometric software EViews 7.0. (IHS Global Inc., Irvine, CA, USA)

FIGURE 1
Enrolments in Economics

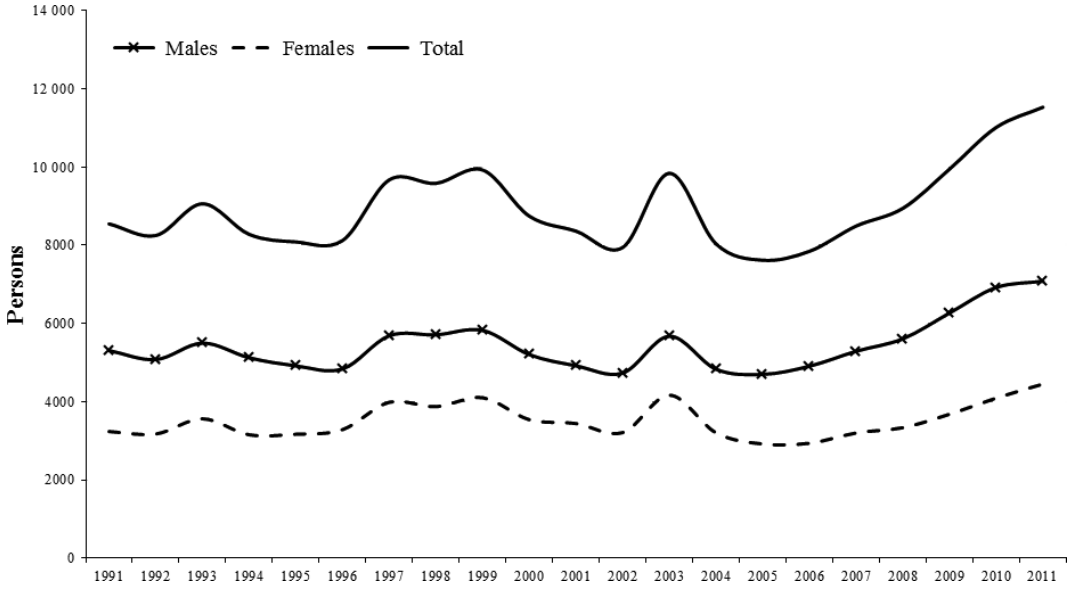
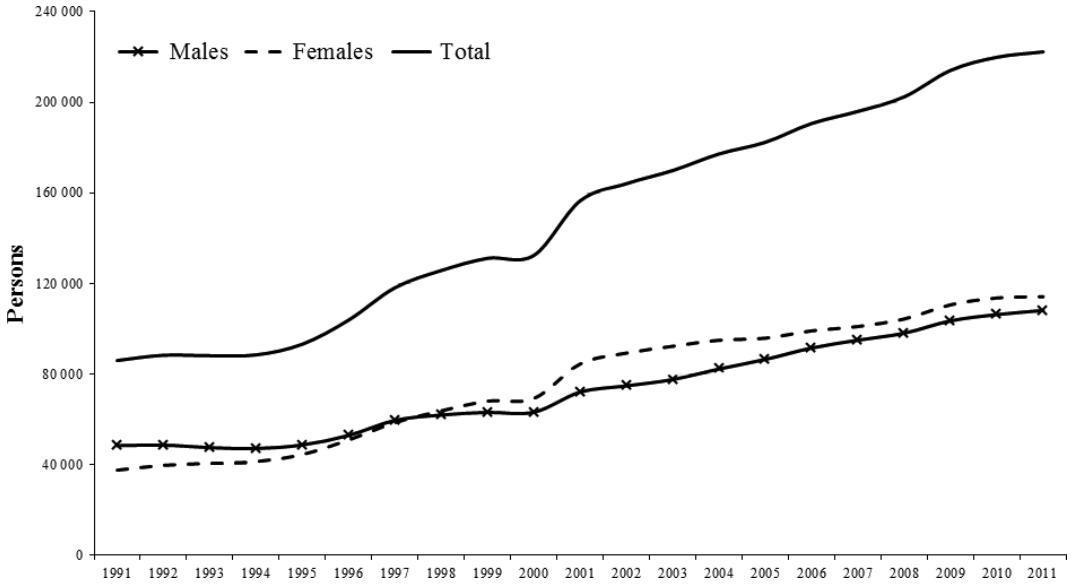


FIGURE 2
Enrolments in Business



averages and then regressing the latter, using an IV estimator, on the omitted constant term and the university-specific dummies.

Table 6 reports the empirical results for two alternative specifications of the model. Columns 2 and 3 of this table present the results of Model 1

FIGURE 3
Total Enrolments

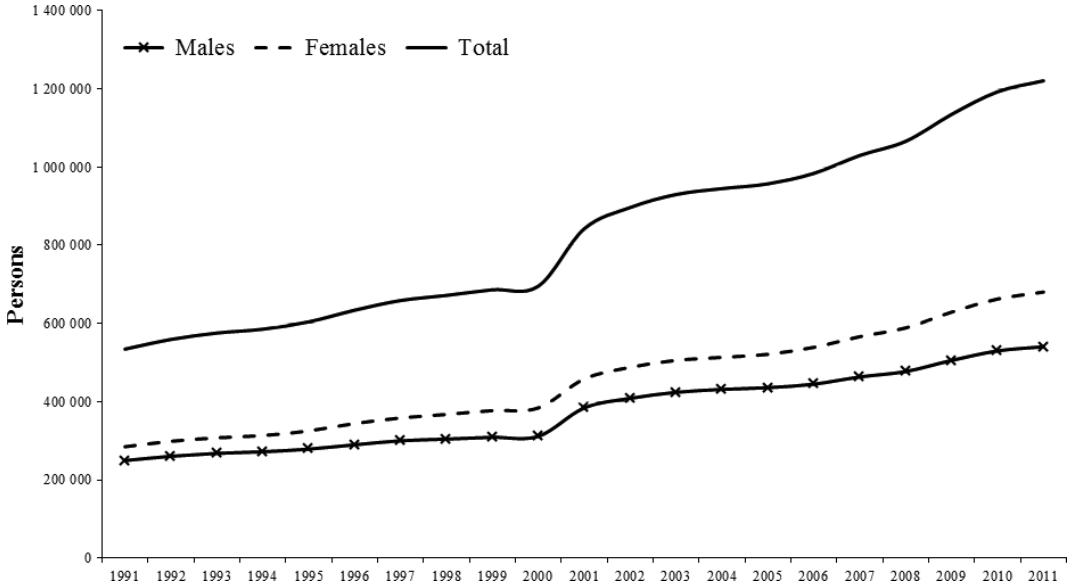


FIGURE 4
Shares in Total Enrolments and Business Cycle Variable

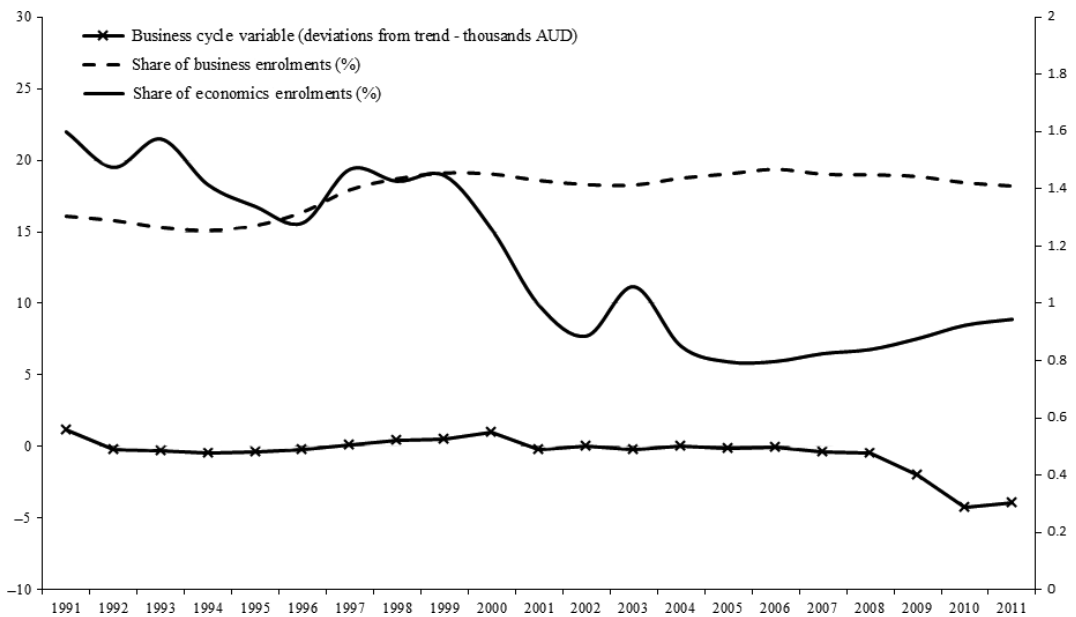


TABLE 4
Panel Unit Root Tests with Cross-Sectional Independence

	LLC test		IPS test	
Variable	Constant	Constant and trend	Constant	Constant and trend
SE_{it}	−10.459* (0.000)	−12.789* (0.000)	−5.229* (0.000)	−4.804* (0.002)
SB_{it}	−4.702* (0.000)	−2.586* (0.005)	−3.345* (0.000)	−1.694* (0.045)

Notes: *Denotes rejection of the unit root hypothesis at the 5% level of significance.
The LLC test assumes common unit root process. The IPS test assumes individual unit root process. *P*-values are in parentheses.

TABLE 5
Choi (2006) Panel Unit Root Test with Cross-Sectional Dependence

	Constant			Constant and trend		
Variable	P_m	Z	L*	P_m	Z	L*
SE_{it}	1.583* (0.057)	−2.047** (0.020)	−2.009** (0.022)	1.428* (0.076)	−1.399* (0.081)	−1.541* (0.062)
SB_{it}	1.299* (0.097)	−1.868** (0.031)	−1.799** (0.036)	1.288* (0.098)	−1.673** (0.047)	−1.624* (0.053)

Notes: The P_m test is the modified inverse chi-square test, the *Z* test is the inverse normal test, and the *L** test is the modified logit test. All tests have standard normal distributions as $N \to \infty$. *P*-values are in parentheses. ** (*) denotes rejection of the unit root hypothesis at the 5% (10%) level of significance.

and indicate that most coefficients are statistically significant. The parameter estimates of the business cycle variable and the share of female enrolments in economics and business, in the business enrolments equation, the Go8 and the regional dummy variables were found to be statistically insignificant. Columns 4 and 5 of Table 6 report the results of an alternative specification (Model 2), in which all regional dummies have been removed. In Model 2, most estimated coefficients are statistically significant, except for those of the business cycle variable and the percentage change in total enrolments in the business enrolments equation.

Because the Arellano and Bond (1991) GMM methodology uses instruments in the estimation, we need to test if the over-identifying restrictions are valid. For this reason, we estimated the *J*-statistic developed by Hansen (1982), which is the product of the minimised value of the objective function and the number of observations.[9] Under the null hypothesis that the instruments are orthogonal to the error term, the *J*-statistic has a $\chi^2_{(m-n)}$ distribution, where *m* is the instrument rank and *n* is the number of the GMM estimated coefficients. Rejection of the null hypothesis indicates that one or more of the instruments is correlated with the error term. The results for the Hansen's *J*-statistic are reported in the second panel of Table 6. As shown, the above null hypothesis cannot be rejected at the 5 per cent level of significance for each equation in both models, implying validity of our estimates. Finally, to choose between the two models, we performed a joint *F*-test under the null hypothesis that all coefficients of the regional dummies are zero. As shown in the second panel of Table 6, this null hypothesis cannot be rejected for each equation. Based on these results, Model 2 will be used in the subsequent analysis. The non-rejection of the above null hypothesis indicates that the state/territory in which each University is located does not affect enrolments in economics or business.

Table 6 reports that the presence of dynamics is strong, as indicated by the large magnitude and statistically significant estimated parameters β_{11} and β_{21}. Also, the negative sign of the estimated parameter β_{12} and the positive sign of the estimated parameter β_{22} indicate that when full-

[9] Note that the *J*-statistic is identically zero for any exactly identified equation, while it is positive for an overidentified equation.

TABLE 6
Australian Education Model Parameter Estimates, Tests and Diagnostics

Variable	Model 1		Model 2	
	SE_{it}	SB_{it}	SE_{it}	SB_{it}
$SE_{it\text{-}1}$	0.5935** (0.0027)	—	0.5888** (0.0030)	—
$SB_{it\text{-}1}$	—	0.7860** (0.0413)	—	0.7236** (0.0434)
$FTE_{t\text{-}1}$	−0.0042** (0.0010)	0.0428** (0.0126)	−0.0026** (0.0011)	0.0555** (0.0120)
$ECOU_{t\text{-}1}$	−0.0006** (0.0002)	0.0297** (0.0045)	−0.0004* (0.0002)	0.0276** (0.0047)
$BUCY_{t\text{-}1}$	−0.0146** (0.0026)	0.0340 (0.0730)	−0.0154** (0.0029)	0.0529 (0.0753)
EBF_{it}	−0.0365** (0.0020)	0.0367 (0.269)	−0.0373** (0.0022)	0.0474* (0.0264)
$PCTE_{it}$	−0.0046** (0.0007)	0.0080* (0.0044)	−0.0054** (0.0008)	0.0037 (0.0046)
Intercept	0.0301 (0.0863)	0.0277 (0.1143)	0.0015 (0.0190)	0.0346 (0.0407)
$Go8_i$	−0.0392 (0.0618)	−0.1098 (0.0818)	0.1121* (0.0647)	−0.0888* (0.0459)
ACT_i	0.0135 (0.1330)	0.0774 (0.1761)	—	—
NSW_i	−0.0070 (0.0959)	0.0763 (0.1271)	—	—
NT_i	−0.0071 (0.1689)	−0.2845 (0.2237)	—	—
Qld_i	−0.0018 (0.1186)	−0.0153 (0.1570)	—	—
SA_i	0.0003 (0.1186)	−0.0729 (0.1570)	—	—
Tas_i	−0.0092 (0.1689)	−0.0452 (0.2237)	—	—
Vic_i	0.0582 (0.1002)	0.0270 (0.1328)	—	—
Tests and diagnostics of the dynamic panel GMM estimation				
J-statistic	23.9686	27.7208	23.9478	27.6818
Instrument rank	30	30	30	30
F-statistic (df 7, 21)	0.1399 (0.994)	0.6399 (0.718)	—	—
No. of observations	531	531	531	531

Notes: All numbers in parentheses are standard errors. The *J*-statistic, or Hansen statistic, tests the validity of the over-identifying restrictions and is distributed as $\chi^2_{(m-n)}$, where m is the instrument rank and n is the number of the GMM estimated coefficients ($\chi^2_{(24)} = 36.42$ at the 5% significance level). The *F*-statistic is for the null hypothesis that the coefficients of the regional dummies are zero and df denotes degrees of freedom. The values reported for the *F*-statistic are the test statistics, while the respective *P*-values are in parentheses. ** (*) denotes statistical significance at the 5% (10%) level of significance. Go8, Group of Eight; ACT, Australia Capital Territory; NSW, New South Wales; NT, Northern Territory; Qld, Queensland; SA, South Australia; Tas, Tasmania; Vic, Victoria; WA, Western Australia.

time employment after graduation increases, there is a small negative effect on the share of economics enrolments and a small positive effect on the share of business enrolments. The estimated coefficients of economic outlook (β_{13} and β_{23}) are small in magnitude and affect negatively the share of economics enrolments and positively the share of business enrolments. This means that if the anticipated economic conditions are positive, enrolments favour business studies over economics. Regarding the parameter estimates of business cycle (β_{14} and β_{24}), there seems to be a negative effect on the share of economics enrolments, indicating that if the expectations about future economic conditions are positive and the Australian economy expands, economics enrolments fall. In contrast, the statistical insignificance of the parameter β_{24} indicates that the current economic conditions have no effect on the share of business enrolments.[10] In general, the above results contradict those of Skoorka and Condon (2003), who stated that the trend in economics degrees in the USA was pro-cyclical. This different result may be attributed to the different countries under consideration and the different time span of the data.

[10] We have also estimated Models 1 and 2 using contemporaneous values for the economic outlook, business cycle and full-time employment variables. The estimated coefficients of these variables are statistically insignificant for the business enrolments equation and statistically significant at the 10% level for the economics enrolments equation. These results are not presented in the article but are available upon request.

Regarding the effect of students' gender on enrolments in economics and business-related studies, the negative sign of the estimated parameter β_{15} and the positive sign of the estimated parameter β_{25} indicate that when the share of female enrolments in economics and business taken together increases, economics enrolments fall and business enrolments increase. Therefore, female enrolments favour business studies over economics. In contrast, as indicated by the signs and the statistical significance of the estimated parameters β_{16} and β_{26}, when total enrolments in each Australian university increase, there is a small negative effect on economics and no effect at all on business enrolments. The latter finding suggests that the trend in economics enrolments is opposite to the trend in total enrolments. A reason for this could be that as more students enrol the quality drops off, combined with the fact that economics is difficult to study making it rather unattractive to marginal students.[11]

Finally, the positive sign of the estimated parameter β_{17} and the negative sign of β_{27} indicate that membership in the eight leading Australian Universities has a positive effect on the share of students that enrol in economics. This result may be attributed to the long tradition and influence of economics within these universities and the high credentials of the staff in their economics departments, because students probably have the perception that economics is a more demanding and less standardised discipline than business, and therefore, it needs more accomplished researchers to teach it.

V Concluding Remarks

The reduced-form specification model that we employed in this study provides some insights regarding the downward trend in economics enrolments. Our study contributes to the literature as it is the first that investigates the determinants of economics and business enrolments in Australia, using university-specific data, along with macroeconomic variables and appropriate econometric techniques. Using our empirical results, one can derive important policy implications that could assist in increasing economics enrolments.

[11] We have tried to include interaction effects in our model, such as EBF×ECOU, EBF×BUCY, PCTE×ECOU and PCTE×BUCY. In all cases the estimated parameters were statistically insignificant. These results are not presented here but are available upon request.

Our results indicate that female enrolments favour business studies over economics. As Millmow and Bookallil (2006) point out, this effect is influenced by employment opportunities, while the male dominance of the profession is perceived as lack of employment opportunities. To demystify the male dominance of the profession and attract female students to economics, appropriate strategies could be designed to encourage females into teaching economics, include gender into economic analysis, offer courses in Feminist Economics and stress the contribution of women economists to the profession.

Our evidence also shows that in periods of recession (i.e. decrease in employment after graduation, negative economic outlook and declining economic growth) economics enrolments increase. In contrast, when employment after graduation increases and there are positive anticipated economic conditions, enrolments in business-related studies rise. Perhaps, economics enrolments increase during the times of financial crises and negative forecasts about future economic conditions because students want to understand why the economy is producing these negative outcomes, such as limited job opportunities, and what should be done to rectify it.

For example, the Great Depression led a whole generation of young people into studying economics, especially in the UK and the USA, and even in Australia (Maxwell, 2003; Millmow & Tuck, 2011). Besides the effects of the Great Depression that led to a quarter of the population being unemployed, the public's perception was that more economists would make the world a better place. Also, during the stagflation in the 1970s economics was elevated again to the centre stage. The current generation of economics instructors were tempted to study economics at this time, probably because of the global concern with stagflation (Millmow & Tuck, 2011).

The current global financial crisis might prove to have the same positive impact as the Great Depression in the 1930s and the stagflation in the 1970s, into educating a new generation of economists. Due to the current crisis, job opportunities in the UK, the USA, Ireland and the Mediterranean countries are tight. One could expect to see renewed interest amongst students in economics in these countries, driven by a combination of curiosity and fear for the future (Freedman & Blair, 2009). However, because the current crisis has affected the above countries in a more painful

way than Australia, Australian students' interest has not been stimulated by what was happening overseas (Millmow & Tuck, 2011). Therefore, a fruitful strategy from the Australian instructors in economics could be the presentation and teaching of the consequences of the global financial crisis, based on the problems and concerns of the Australian economy.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

DATA S1 *Datasets and codes.*

REFERENCES

Alauddin, M. and Butler, J.E. (2004), 'Teaching Economics in a Changing University Environment', *International Journal of Social Economics*, **31**, 706–20.

Alauddin, M. and Valadkhani, M. (2003), 'Causes and Implications of the Decline of the Economics Majors: A Focus on Australia', *Journal of Economic and Social Policy*, **7**, 68–90.

Alvey, J. and Smith, L. (2000), 'Perceptions of the Causes of Recent Declines in Enrolments in Economics Studies in Antipodean Universities', *Journal of Economic and Social Policy*, **4**, 1–13.

Arellano, M. (1987), 'Computing Robust Standard Errors for Within-groups Estimators', *Oxford Bulletin of Economics and Statistics*, **49**, 431–4.

Arellano, M. and Bond, S. (1991), 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, **58**, 277–97.

Ashworth, J. and Evans, L. (2000), 'Economists are Grading Students Away From the Subject', *Educational Studies*, **26**, 475–87.

Banerjee, A., Marcellino, M. and Osbat, C. (2000), 'Some Cautions on the Use of Panel Methods for Integrated Series of Macro-economic Data', Working Paper 170, Innocenzo Gasparini Institute for Economic Research, Bocconi University.

Baxter, M. and King, R. (1999), 'Measuring Business Cycles: Approximate Band-pass Filters for Economic Time Series', *Review of Economics and Statistics*, **81**, 575–93.

Bond, K. and Wang, J. (2001), 'Income Support and Related Statistics: A 10-year Compendium, 1989-1999', Department of Family and Community Services, Occasional Paper No.1, Australia.

Choi, I. (2006), 'Combination Unit Root Tests for Cross-sectionally Correlated Panels', in Corbae D., Durlauf S.N. and Hansen B.E. (eds), *Econometric Theory and Practice: Frontiers of Analysis and Applied Research: Essays in Honour of Peter C.B. Phillips*, Cambridge University Press, New York; 311–33.

Fournier, G.M. and Sass, T.R. (2000), 'Take My Course, Please: The Effects of the Principles Experience on Student Curriculum Choice', *Journal of Economic Education*, **31**, 323–39.

Freedman, C. and Blair, A. (2009), 'Silver Linings: Teaching Economics in Times of Crises', *Australasian Journal of Economics Education*, **6**, 1–20.

Graduate Careers Australia (2013), GradFiles 1999–2012. Available from: http://www.graduatecareers.com.au/Research/ResearchReports/GradFiles/index.htm.

Hansen, L.P. (1982), 'Large Sample Properties of Generalized Method of Moments Estimators', *Econometrica*, **50**, 1029–54.

Hausman, J.A. and Taylor, W.E. (1981), 'Panel Data and Unobservable Individual Effects', *Econometrica*, **49**, 1377–98.

Hodrick, R.J. and Prescott, E.C. (1997), 'Postwar US Business Cycles: An Empirical Investigation', *Journal of Money, Credit and Banking*, **29**, 1–16.

Im, K.S., Pesaran, M.H. and Shin, Y. (2003), 'Testing for Unit Roots in Heterogeneous Panels', *Journal of Econometrics*, **115**, 53–74.

Johnston, C.G., James, R.H., Lye, J.N. and McDonald, I.M. (2000), 'An Evaluation of Collaborative Problem Solving for Learning Economics', *Journal of Economic Education*, **31**, 13–29.

Kaiser, R. and Maravall, A. (1999), 'Estimation of the Business Cycle: A Modified Hodrick-Prescott Filter', *Spanish Economic Review*, **1**, 175–206.

Levin, A., Lin, C.F. and Chu, C.-S.J. (2002), 'Unit Root Tests in Panel Data: Asymptotic and Finite-sample Properties', *Journal of Econometrics*, **108**, 1–24.

Lewis, P. and Norris, K. (1997), 'Recent Changes in Economics Enrolments', *Economic Papers*, **16**, 1–13.

Marangos, J. (2000), 'The Effectiveness of Collaborative Problem-Solving Tutorials in Introductory Microeconomics', *Economic Papers*, **19**, 33–41.

Marangos, J. (2002a), 'How University Students Were Planning To Study Introductory Microeconomics? Were Their Study Plans Realized?', *Economic Papers*, **21**, 45–60.

Marangos, J. (2002b), 'A Survey of the Value University Students Place on Economics', *Economic Papers*, **21**, 80–93.

Marangos, J. (2003), 'The Effectiveness of Concept Maps In Introductory Microeconomics', *Economic Papers*, **22**, 74–82.

Marangos, J. (2006), 'Changing Students' Perception of Economics by Facilitating Their Transition to University', *International Journal of Learning and Change*, **1**, 329–44.

Marangos, J. and Alley, S. (2007), 'Effectiveness of Concept Maps in Economics: Evidence from Australia and USA', *Learning and Individual Differences Journal of Psychology and Education*, **17**, 193–9.

Maxwell, P. (2003), 'The Rise and Fall (?) of Economics in Australian Universities', *Economic Papers*, **22**, 79–92.

Millmow, A. (1997), 'To Eke Out of Marginal Existence: Economics in Business Schools', *Economic Papers*, **16**, 88–95.
Millmow, A. (2000), 'The State We're In: University Economics 1989/1999', *Economic Papers*, **19**, 43–51.
Millmow, A. (2004), 'A Brief Note on Australian Economics Degree Enrolments in the 21st Century', *Economic Papers*, **23**, 211–2.
Millmow, A. (2009), 'The Boom We Didn't Really Have: Australian Economics Degree Enrolments, 1990–2007', *Economic Papers*, **28**, 56–62.
Millmow, A. and Bookallil, C. (2006), 'Girls and Economics: An Unlikely Coupling?', *Economics Papers*, **25**, 221–34.
Millmow, A. and Tuck, J. (2011), 'Did the Global Financial Crisis Have any Impact on Economics Degree Enrolments?', *Economic Papers*, **30**, 557–67.
Mise, E., Kim, T. and Newbold, P. (2005), 'On Suboptimality of the Hodrick-Prescott Filter at Time-series Endpoints', *Journal of Macroeconomics*, **27**, 53–67.
O'Connell, P.G.J. (1998), 'The Overvaluation of Purchasing Power Parity', *Journal of International Economics*, **44**, 1–19.
Reserve Bank of Australia (2013), Statistics. Available from: http://www.rba.gov.au/statistics/index.html
Round, D.K. and Shanahan, M.P. (2010), 'The Economics Degree in Australia: Down or Not Out?', *Journal of Economic Education*, **41**, 425–35.
Skoorka, B.M. and Condon, C.M. (2003), 'Trends in U.S. Economics Majors: Why the Decline in the 1990s?', *Atlantic Economic Journal*, **31**, 195–204.
Strauss, J. and Yigit, T. (2003), 'Shortfalls of Panel Unit Root Testing', *Economics Letters*, **81**, 309–13.
Universities Australia (2011). Available from: http://www.universitiesaustralia.edu.au
Ward, I., Crosling, G. and Marangos, J. (2000), 'Encouraging Positive Perceptions of Economics: The Effectiveness of the Orientation Tutorial', *Economic Papers*, **19**, 76–86.
Ward, I., Crosling, G. and Marangos, J. (2001), 'The Effectiveness of the Orientation Tutorial: Some Further Results', *Economic Papers*, **20**, 85–8.
White, H. (1980), 'A Heteroskedasticity-Consistent Covariance Matrix and a Direct Test for Heteroskedasticity', *Econometrica*, **48**, 817–38.