Changes in Approach to Modelling Demand for Tertiary Education in Victoria - 1970's to 1990's

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1. Introduction

Since the beginning of the 1970's, much has changed in tertiary education in Victoria, namely, the types of institutions available, the support structure for students, the funding sources and mechanisms available to tertiary institutions and the sources of potential tertiary students. These changes coupled together with the fact that the tertiary education market now (and for the past ten years or so) has experienced excess demand, create problems for empirical modellers. Note that tertiary education as discussed here, excludes TAFE.

It is in the light of the changes mentioned above, that an outline of the relevant approaches to analysing the demand for tertiary education in Victoria is undertaken in this paper.

In sections below, the approaches used to model the demand for tertiary education are examined for the periods 1970-71 to 1981-82 and post 1982-83. The reason for the division of the time span for examination into these two blocks, is primarily due to the quite different circumstances of each with respect to the balance between the demand for, and the supply of, tertiary places.

Nicholls(1983)(1984) has demonstrated, using participation proportions of cohorts of the major segments of the tertiary market demanding tertiary education for the first time, together with surveys of potential tertiary students, that in Victoria it can be reasonably assumed that prior to around 1981-82, no excess demand existed for this "first time" category.

Additionally, Gibb(1979) in a study commissioned by the Tertiary Education Commission (TEC) finds no evidence of excess demand for the aggregate market throughout
Australia at that time. The TEC itself [TEC(1978)] confirms this suggestion.

For the period post 1981-82, there is ample evidence to suggest that (especially within Victoria) there is excess demand for tertiary education. The Australian Vice Chancellors Committee (AVCC) have provided quite conclusive evidence [AVCC(1992) in Appendix 1] to suggest that at least 6000 places were demanded but not supplied in Victoria in 1983. With the beginning of the Dawkins era (1988) 9500 students were denied entry to tertiary education and in 1991 approximately 16000 students were frustrated. These numbers pertain to undergraduate students only.

The above statistics are not all condemning of the Commonwealth Government, as they also reveal that during the period 1987 to 1991 there was an increase of some 36% in the number undertaking tertiary education in Australia.

Also during the period post 1982-83, significant changes occurred within the tertiary education system in Victoria (and indeed the rest of Australia). These included a substantial rise in the participation rates associated with Year 12 [Sweet(1988)], "increases" in the pass rates of Year 12 students, increases in youth unemployment rates, introduction of an Administrative Fee (later replaced by the Higher Education Contribution Scheme in 1989) heralding in the "Dawkins era" around 1987, the State Government's desire to increase tertiary participation rates, a marked increase in participation by sectors not hitherto major contributors to demand for tertiary education (e.g., mature age TAFE students - the beginnings of articulation [McBeach(1989)] and TAFE students in general via the Articulation schemes), overseas students and mature age students) together with the Commonwealth Government's failure to maintain real recurrent funding.

This latter point has placed considerable pressure on tertiary institutions to maintain as best they can the quality of education under the twin pressures of increasing numbers and diminishing real recurrent expenditure per student.

Additionally, even greater trauma has befallen the
tertiary education sector from around 1987 until the present, caused by the restructuring and implementation of the National Unified System (as distinct from the old Binary System). On the horizon is the massive change that will be wrought by the operation of full articulation (in part involving an altered TAFE sector).

2. Analysing the Demand for Tertiary Education - pre 1982-83

In this relatively straightforward time period in Victoria, there was no "demand for tertiary education models" established (based on the postulation and estimation of a functional relationship) until those undertaken by Nicholls(1983)(1984). This was primarily due to the belief that excess demand for tertiary education existed, together with the fact that available data relating to commencing students was not available prior to 1971 in a consistent (or usable) form that allowed causal demand analysis to be undertaken. Nicholls(1983) spent considerable time in preparing a data base that included the years 1971 to 1982.

There were in existence however, "pragmatic statistical models" [see for example Karmel(1966), Partridge Report(1978), CIET(1979)] based on simple flow mechanisms, whose sole purpose was to assist in "educational planning" matters. These possibly have their origin in the modelling exercises of Stone(1965) in the United Kingdom.

The problem with all the "pragmatic statistical models" was that they were not capable of forecasting or explaining demand for tertiary education, only arriving at extrapolations of numbers of students in various categories in the tertiary education system together with completion numbers (again in various categories). These figures were arrived at by altering various growth, participation, and transition rates and then "running" the models and observing the impact. These models served a valuable need but did not attempt to determine the underlying cause of the demand for tertiary education or to forecast what that demand might be based on its determinants.

The "causal demand models" developed for Victoria by Nicholls(1983)(1984), (and relevant to the remainder of
Australia) were along the lines of the overseas studies typified by those undertaken by Handa and Skolnik (1975) and Galper and Dunn (1969).

These models were all based on a combination of Human Capital Theory and Consumption Approaches [Blaug (1976), Handa and Skolnik (1975)]. It should be noted that with the assumption of no excess demand, the demand relationships here can be estimated using a single equation approach.

As an example of this, Nicholls (1984) estimated the demand relationships for a wide number of commencing student categories. The two most relevant were for students who had successfully completed their Higher School Certificates (now VCE) and went on to demand tertiary education the next year, and a broader category which included all students who were demanding tertiary education for the first time (and therefore included students in first category). The first category was directly comparable with overseas studies.

The demand relationships were found to be:

\[
DTE_t = f(CONST_t, FEE_t, E_t, Y_t, U_{t-1}, \delta_t)
\]

where;

- \(DTE_t\) is the demand for tertiary education in year \(t\),
- \(CONST_t\) is the constant in year \(t\),
- \(FEE_t\) is a dummy variable (1 prior to 1974, else 0) reflecting whether tuition fees were charged or not in year \(t\),
- \(E_t\) represented the pool of eligibles (i.e., those who were able to demand tertiary education),
- \(Y_t\) is the real household disposable income,
- \(U_{t-1}\) is the youth unemployment rate in the previous year,
- \(\delta_t\) is the error term.

This relationship provided a valuable and meaningful insight into the determinants for the demand for tertiary education in Victoria, mostly consistent with overseas studies [Galper and Dunn (1969), Handa and Skolnik (1975)].

A fairly complicated Markov Chain model with variable transition probabilities was required and developed to assist in the forecasting of Eligibles for the model [see Nicholls (1982) for details].
The demand relationship in (1) above was estimated for full time, part time and total students as well as for Universities, Colleges of Advanced Education [CAE’s] (General) and CAE’s (predominantly Teacher Training Institutions) and Total Institutions.

The level of complexity associated with the structural model became worrisome for some of these categories. It should be noted also, that the similarity of results obtained in the above study with overseas studies gave additional support to the non-existence of surplus demand.

3. Analysing the Demand for Tertiary Education - post 1981-82

The number of structural changes that have occurred (and indeed are still occurring) in this time period, mitigate against straightforward modelling. The number of dummy variables required to account for the varying methods of charging fees alone reduces to dangerous (if not impossible) levels, the degrees of freedom associated with the model.

It is also doubtful as to whether the effects of the change to the National Unified System could be modelled, and when coupled with the conversion of (and amalgamations associated with) the CAE's primarily devoted to teacher training into CAE's per se, it is doubtful whether any meaningful model could be generated given the data available. With the above complexities to be modelled primarily using dummy variables, it is doubtful that the resultant level of multicollinearity could be properly dealt with. When this is coupled with the need to account for the fact that excess demand exists, the modelling becomes almost intractable. The latter point of excess demand means that in order to adequately model the demand for tertiary education in Victoria, one needs to simultaneously estimate two relationships, the demand and supply of tertiary education.

The simple one equation model postulated in (1) above is now replaced by a model such as:

\[ DTE_t = f_1(\text{CONST}_t, \text{FEE}_t, \text{E}_t, \text{Y}_t, \text{Ut}_t-1, \bar{\text{Ot}}) \]
STEt = f2( CONST2t, FEET, OTHERt, Ït)  \hspace{1cm} (2)

where;

STEt is the supply of tertiary places in year t,
OTHERt represents other factors (e.g., funding availabilities etc),
Êt is the error term.

All the other terms remain as defined in (1) above.

With the specification outlined in (2) above, estimation of the models could proceed under somewhat more ideal circumstances through using a Two Stage or Three Stage Least Squares approach.

It would seem that the comparatively simple modelling days of the pre 1982-83 period have well and truly passed, leaving the question as to what is the appropriate modelling tool for analysing and forecasting the demand for tertiary education in Victoria.

It is no wonder then, that there appears to be little if any evidence of any research (continuing or otherwise) involving the estimation, subsequent analysis and forecasting of the demand for tertiary education from a causal perspective.

It is true that the "pragmatic statistical models" have appeared again, notably the Australian Higher Education Model (AHEM) [developed in VPSEC(1992a)], which has displayed its importance in the general planning role in "higher education" in the "what if" type role. This genre of model has also the capacity, as indicated previously, to provide valuable projections of various categories of graduates contained within and emanating from the tertiary education system. A good example of this type of model is to be found in VPSEC(1992b), where Cullen and Smart apply the AHEM to provide a number of scenarios for examination.

The change in the structural aspects of the tertiary education "market" discussed above, together with the occurrence of excess demand (which together have enforced the change of modelling approach) have also given rise to the use, in a qualitative way, of models as outlined in (2) above, rather than the more detailed analysis based on the "single equation" demand function of overseas (and to a lesser extent past Australian) experience.
Gannicott(1992) puts forward a possible solution to clearing the excess demand for tertiary education in Australia, through linking the excess demand to fees paid through the HECS system. In arguing this case, a demand and supply model of the ilk suggested in (2) above is, quite correctly, used.

If one considers the "supply" side of the tertiary education market in Australia, there is some considerable doubt as to whether it can be considered comparable to its overseas counterparts, and therefore the question arises as to whether or not it can be modelled in a similar way (as suggested in (2) above). This aspect requires some additional work.

4.0 Where to from here?

There is surely an ongoing need to examine the driving factors behind the demand for tertiary education (indeed of higher education) in Victoria and Australia. While the "pragmatic statistics models" have validity and usefulness in their own right, they do not assist in analysis of the demand for tertiary (or higher) education per se.

The needs expressed above are highlighted by Gannicott(1992), in his use of a conceptual model postulated to allow the logical evaluation of a number of important issues and propositions. However, the conceptual model must not take on the mantle of an empirical model and be used to argue "numbers" and become an integral part of the planning function per se. This latter point should be borne in mind when reading Gannicott(1992).

The problem remains however, inasmuch as there appears to be no way that at this stage (due to the paucity of data and the inherent difficulty associated with the profusion of dummy variables) that an appropriate "econometric model" of the demand for tertiary education could be developed and estimated.

The need for such modelling does exist, otherwise how can adequate and timely planning be affected in tertiary education, an area that cannot be left to the vagaries of a "free market". Despite those who claim otherwise, tertiary education requires planning in order to allow socially equitable and appropriate entry to it.

However, as discussed above, there appears to be no way
around the technical difficulties or the lack of data, that would allow such modelling to be undertaken.

The path for the future must then lie down a limited form of "cross-sectional" modelling (surveying?) path rather than the longitudinal one. This means that the ability to forecast demand per se in a causal way will not be substantially enhanced, but a limited understanding of the current "drivers" behind the demand for tertiary education by category of potential student will become available and be able to be used in a limited way in planning contexts.

References


Australian Vice Chancellors Committee, "Surveys of Unmet Demand", Annual, Canberra, 1985 Onwards.


