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RESEARCH METHODOLOGY NOTES

CONTINGENT REPAYMENT STUDENT FINANCE:
THE PROBLEM OF NON-PARTICIPANTS IN THE LABOUR FORCE

BY GAIL C. A. COOK AND DAVID A. A. STAGER

In a recent article in this journal, Dresch and Goldberg added to the previous empirical analyses of income-contingent student loan plans.¹ Dresch and Goldberg argue that specification of the parameter values for the maximum repayment period, the interest rate charged the student and the repayment tax rate, together with the expected incomes of the student participants and the interest rate at which the program is funded, is sufficient to determine the financial viability of a contingent repayment student loan plan.

We missed a discussion of a significant problem raised in other analyses of contingent-repayment loan plans. This is that individuals with a low probability of labour force participation—notably married women—will have a low probability of complete repayment. The treatment of such persons in the analysis has important implications for the financing of student loan plans. To the extent that some borrowers do not participate in the labour force and therefore make no repayments, the contractual conditions to other borrowers must be more stringent.

To avoid these more severe borrowing and repayment conditions, some repayment, based on imputed incomes, would be required of persons not in the labour force. Alteration of such a basic feature of the plan entails a major policy decision on the appropriateness of requiring repayments from non-participants. The financial implications of alternative decisions on this question can be obtained using a simulation of the scheme.² The results displayed in Table 1 emphasize the sensitivity of the financial viability of the loan plans, measured by the internal rate of return (r), to alternative imputed income levels.

At a 7.5 percent tax rate on gross income, imputing \$1,000 income to persons not participating in the labour force, requires an annual payment of only \$75. But by imputing an income of \$1,000, the financial viability of the loan fund is improved by two percentage points in the internal rate of return. This improvement diminishes with increasing levels of imputed income.

¹ S. P. Dresch and R. D. Goldberg, "Variable Term Loans for Higher Education—Analytics and Empirics," *Annals of Economic and Social Measurement*, Vol. 1, No. 1 (January 1972) pp. 59-92.

Previous analyses were presented in Karl Shell *et al.*, "The Educational Opportunity Bank: An Economic Analysis of a Contingent Repayment Loan for Higher Education", *National Tax Journal*, Vol. XXI, No. 1 (March 1968) and in Gail Cook and David Stager, *Student Financial Assistance Programs* (Toronto: Institute for Policy Analysis, University of Toronto, 1969) and their article, "Student Aid: A Proposal and Its Implications", *Canadian Tax Journal*, Vol. XIX, No. 6 (November-December 1971). Karl Shell added to his analysis in "Notes on the Educational Opportunity Bank", *National Tax Journal*, Vol. XXIII, No. 2 (June 1970).

² Canadian data were used in the simulation, but the basic similarity of these and American data suggests that the results can be generalized to the United States. The parameter values were: maximum repayment period = 30 years; interest rate charged the student = 10%; and a repayment tax rate of 7.5%.

TABLE I
Internal Rate of Return (r) by Imputed Income (\bar{w})
on which Non-Participants in the Labour Force
make Annual Repayments

\bar{w} (\$)	r (%)
0	5.1
1000	7.1
2000	8.2
3000	8.7
4000	8.9
5000	9.1

The above results assume a uniform imputed income for all persons not participating in the labour force, but variations among sub-categories of the non-participants may be desired. Karl Shell *et al.* proposed the following treatment for married women where husband and wife had both borrowed from the fund:³

$$P^h = r^h Y^h$$

$$P^w = r^w Y^w \quad \text{if } W^w \geq \bar{W}$$

$$P^w = r^w Y^w + r^w \left(\frac{\bar{W} - W^w}{\bar{W}} \right) Y^h \quad \text{if } W^w < \bar{W}$$

where

P^h = repayment of husband	Y^h = total income of husband
P^w = repayment of wife	Y^w = total income of wife
r^h = total repayment rate charged to husband	W^w = wage and salary income of the wife
r^w = total repayment rate charged to wife	\bar{W} = some average of women's wage and salary income

A married woman who earned less than the average wage and salary income for women would pay on her earned income plus a proportion of her husband's income. That proportion would decline as the wife's wage and salary income approached the average for all women. In the extreme case, a woman with zero earned income would pay at her tax rate on her husband's entire income.

The Shell proposal required a wife to consider the financial consequences of not being employed in terms of her husband's income, rather than her own forgone income.

An alternative proposal would reduce the strong incentive to enter the labour force, implicit in the Shell proposal. This would relate payments of wives not in the labour force to the average wage and salary income of her age/education class,

³ Karl Shell *et al.*, *loc. cit.*

rather than to her husband's income:

$$\begin{aligned} P^w &= r^w Y^w && \text{if } W^w \geq \bar{W} \\ P^w &= r^w Y^w && \text{if } W^w < \bar{W} \text{ and proof of full-time job} \\ P^w &= r^w \{ Y^w + (\bar{W} - W^w) \} && \text{if } W^w < \bar{W} \text{ and no proof of full-time job} \end{aligned}$$

The wife's repayment is based on her own income if it exceeds the average income of women in her age/education category who are employed full-time, or if her income falls short of that average but she has proof of a full-time job. Should she have no proof of a full-time job, her payments would be based on that average income. This provides a minimum repayment related to a woman's earning opportunities as defined by her age and education.⁴

These two proposals are illustrative of several alternative arrangements which could be devised for calculating repayments based on the forgone income of non-participants in the labour force. Each of these will have varying effects on work incentives and the progressivity of repayments. A major concern in contingent repayment loan plans, however, should be with whether or not payments are required from non-participants in the labour force and the implications of this decision in terms of the financial viability of the plans.

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⁴ We are indebted to John Bossons for his helpful discussion of this problem and proposal.

REPLY

BY STEPHEN P. DRESCH

Cook-Stager are concerned with the implications of non-participants in the labor force for the design of income contingent loans. They do not criticize our approach, but raise one (of many) problems encountered in its implementation. Our purpose was to develop the nature of the general interrelationships embodied in an income contingent loan of the VTL type. One dimension is that of projected borrower incomes. Obviously, each of the elements relevant to a VTL encompasses a wide range of alternatives, several of which were indicated in the paper. It is certainly true that break-even programs will be highly sensitive to alternatives in the dimension of the income base: income must be defined; any definition is in some sense arbitrary; and different definitions will have different implications for other parameters of the program. But, whatever the definition of income, the general shapes of the trade-offs between various parameters, e.g., between tax rates and student interest rates, will be basically as we have described them.

There was a fundamental reason (apart from space constraints) for our failure to explore the implications of alternative income base definitions: *any change in income base can be expected to have systematic effects on the self-selection of borrowers and on borrower behavior, e.g., labor force participation*. It is not that we considered this problem unimportant; on the contrary, we considered it *too important* for the casual treatment which others have given it and which we would have been forced to give it. These issues have been more extensively considered in a recent paper prepared for the Carnegie Commission by Robert Hartman, "Financing the Opportunity to Enter the 'Educated Labor Market'" (Brookings Institution, 1972, multith), to which we refer the interested reader.

National Bureau of Economic Research

OCCUPATIONAL CODING

BY PAUL TAUBMAN

Social scientists study occupational mobility to determine among other things how flexible a society and an economic system are and/or to measure the importance of particular types of job experience on earnings.¹ Because of data limitations, studies of occupational mobility are generally based on the respondent's report of current job and recalled information on his (or father's) occupation in an earlier period. Two messy problems that arise with such studies are the assignment of occupation from the job descriptions and the accuracy of recalled information. About the only information available on these topics is contained in Census studies [2, 3, 4] based on remuneration surveys, matched records from several different surveys or reanalysis of say the 1950 occupation responses on the basis of 1960 classification rules. However, the analysis in the later instance was restricted to those categories in which changes were known to have been made.

Using the NBER-TH sample, this note attempts to shed some light on the coding error arising from the use of one rather than another coding or assignment system, the usefulness of recalled occupational histories and the advantages of asking for and coding job descriptions rather than asking respondents to check the box that best describes their occupation. These results will be of interest to people who use the occupational information in the NBER-TH and even in other samples. In addition the results have some relevance to the design and processing of future samples.

CONCLUSIONS

Before getting the reader bogged down in detailed comparisons, I will state my conclusions and what I think are the implications for the design and processing of future samples. First, if broad occupational groupings are all the investigator requires, reasonably accurate data can be obtained by having respondents check the appropriate item from a list. Incidentally, these responses do not indicate that individuals inflate their status position. Since such a list can be precoded, this procedure saves time and money. The list, however, might have to be broadened somewhat from the one used in this study to allow for more professional sub-categories. Also, separate questions on being self employed and number of people supervised could be added.

Second, the information on recalled estimates when combined with the mobility tables suggests that differences in coding rules and in coders can lead to relatively large differences in the distribution of the processed outcomes; but memory recall on job histories is not a serious problem. This observation raises the question, which we cannot answer, of whether it would be possible to use a precoded occupation list for different dates when obtaining an occupation history.

¹ See Blau and Duncan [1], Sewell, Haller, and Portes [5], Wolfe and Smith [8] on the first use and Taubman and Wales [6] on the second.

This also suggests that to help achieve comparability between different samples, time periods and studies, it would be useful for various data collectors to use the same detailed coding system.

Finally, it is important to note that the people in this sample are all at least high school graduates and have at least an average IQ. The memory recall and accuracy of check off systems might vary by education and IQ. Also, because of their IQ and education, people in this sample are not distributed over occupations the same as the population as a whole.

NBER-TH SAMPLE

The NBER-TH sample is a rich and rather unusual body of data. For a complete description of the sample see Taubman-Wales [6] but for our purposes the crucial elements are the following. In 1955 Thorndike and Hagen [7] undertook a study of the usefulness of some seventeen tests that measure various types of skills in predicting the post World War II vocational success of air force veterans. A crucial ingredient of their study was the assignment of the respondent to one of 125 occupations on the basis of detailed job descriptions he supplied. As is evident from reading their book, a great deal of expertise and attention to detail went into the assignment process. The results of these codings will be referred to as TH.

In 1969 the NBER conducted another survey of these men, collecting among other things a job history, from which the NBER has also carefully and meticulously assigned 9 major and 102 minor occupational codes. In the history nearly everyone reported a current occupation, which will be denoted NBER69.² But since details were sparse for earlier years an occupation code was assigned only for a period in which a job (not necessarily an occupation) change occurred or in which the reported interval on a particular job covered the period.³ One such span of years was 1953-57 for which responses are available for some 1,800 people. We will denote this coding as NBER37. In addition, in 1969 the respondents were asked to check off one of 13 broad categories that best described their current job (as well as separate columns for their father and father-in-law).⁴ The information contained in the 13 broad categories will be denoted as OWN.

THE CODING PROCESS

A coding process is the implementation of a set of rules to transform or classify responses to questions into one of several mutually exclusive categories.

Ideally, we would like to be able to answer the following questions. First, would the coding rules, R , be the same for two or more researchers? That is, would R^1 equal $R^2 \dots R^N$ where the superscripts are individual researchers? Second, when individuals are asked to recall information, do they recall correctly and do they report it in the same way so that a given R would transform it to the same

² Most questionnaires were answered in 1969, but about 15 percent were answered in 1970.

³ If the period is 1953-57, and the person was on one job from 1950-56 and changed jobs in 1957, the 1957 job was included.

⁴ The actual questions are given in the appendix.