ISSUES IN THE DESIGN OF THE ADULT EDUCATION AND TRAINING SURVEY

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1. Introduction

This paper considers issues associated with using the Canadian Adult Education and Training Survey (AETS) to study participation in, and the impacts of, public and private education and training courses and programs. It is based on our experience in using these data to conduct both types of analysis, the results of which we report in Hui and Smith (2002a,b).

Learning about adult education and training is important. While human capital accumulation in the form of college and university training or years of primary and secondary school is widely studied in economics, lack of good data has hampered careful study of the large amount of human capital accumulation that occurs after the end of high school or university. Human capital accumulation at all stages of life has important implications for economic growth as well as for earnings and status inequality later in life. In short, it is important to know how much human capital adults accumulate, what sorts of human capital they accumulate and where they obtain it, and what impacts, if any, it has on their earnings and employment.

The AETS aims to provide information on participation in adult education and training in Canada. It has also been utilized to estimate the impacts of such training on individual labor market outcomes. Based on our experience in trying to use the AETS to do such a study, and based on our reading of the broader literature on these topics, we feel the AETS has a number of limitations in this regard. This paper outlines these limitations, as well as our suggestions as to how the AETS can be redesigned to provide more useful information about adult education and training in Canada in the future.

The remainder of the paper consists of five sections. Section 2 describes the 1998 AETS, on which we focus, in more detail. Section 3 outlines issues in the AETS in regard to the measurement of training incidence and training duration. Section 4 outlines issues in the AETS in regard to a study of participation in public and private training. Section 5 outlines the many problems with the AETS in regard to using it for a study of the impacts of public and private training on labor market outcomes such as earnings or employment. Section 6 concludes.

2. Description of the AETS

The Adult Education and Training Survey (AETS) was first conducted in November 1990 by Statistics Canada with the cooperation and support of Human Resources Development Canada. The AETS was fielded again in 1992, 1994 and 1998. The main objective of all four surveys was to measure participation rates. Over the years, the AETS has evolved into a more detailed and comprehensive survey instrument, with greater emphases on profiling the role of the employer and on identifying barriers to training. In 1994, the AETS was modified to explore areas such as access to training, and in 1998, a few new questions on motivations and expectations were added.

The AETS is a supplement to the Labour Force Survey (LFS). The LFS employs a panel design whereby the entire monthly sample of dwellings consists of 6 panels, or rotation groups, of approximately equal size. Each of these panels is, by itself, representative of the entire LFS population (civilians aged 15 and over). All dwellings in a rotation group remain in the LFS sample for 6 consecutive months. In particular, for the 1998 AETS, five of the six rotation groups in the January 1998 LFS and March 1998

LFS (for Quebec only) are used in collecting information on training and education activities in 1997 of people over the age of 16. Since AETS is a supplement to LFS, labor force information for each respondent in 1998 is included in the data.

The AETS 1998 consists of five modules, denoted A to E. Module A includes basic questions devoted to education, training and labor market activity, such as "Did you receive any training or education in 1997?", "Did you work at any time during 1997?", "Did you have a job while taking any of this training?" and "Did your employer support any of this training?" If the respondent reports not participating in any training or education in 1997, then he or she skips Modules B, C, and D and jumps directly to Module E. In contrast, respondents who do report participating in any training or education in 1997 do complete Modules B, C and D prior to completing Module E.

Module B collects information about what the AETS defines as "training programs" – training or education leading toward a degree or certificate. Information on up to five such programs is collected from each respondent. Module B begins by asking whether the respondent was "taking training or education in 1997 towards an elementary or high school diploma, a registered apprenticeship certificate, a trade-vocational diploma or certificate, a college diploma or certificate, or a university degree, diploma, or certificate." If the respondent replies "yes" to any one of these, then he or she proceeds to complete the remainder of Module B. If not, the respondent moves directly on to Module C.

Similarly, Module C collects information on what the AETS defines as training courses – education or training related to work but not intended to lead to a certificate or degree. Module C begins by asking whether the training or education the respondent

reported participating in during 1997 was "given as courses, workshops, seminars or tutorials?" If the answer is yes, information on up to five courses is collected. If the answer is no, the respondent proceeds directly to Module D, which asks about any hobby, recreational or interest courses, personal development courses or any other training or education not included in Modules B and C.

For each training program or course in Modules B, C, and D, the AETS collects information on a number of dimensions. These include characteristics of the course such as the field of study (and level of study in Module B), the location of the training, the training provider, the medium of instruction, the duration of the training, and whether the training was full or part time. They also include information about the financing of the training, such as whether or not the respondent worked during training, whether or not the respondent received any employer support for the training and, if so, what kind of supports were received, and who paid for the training. Finally, for each course the survey collects information on who suggested the training, the respondent's reasons for taking the training, the respondent's expectations regarding the training, whether or not the training was completed, and the respondent's view of the training's usefulness.

For all respondents, Module E collects general information on labor market behavior that supplements that available from the LFS. This includes information on job switching, along with the respondent's industry and occupation of employment, information about the respondent's employer (e.g., firm size), and the respondent's union status. It also collects information on the respondent's ethnic background and annual income for 1997.

In addition, for respondents who report not participating in education and training during 1997, Module E collects asks "was there any training or education that you NEEDED to take for job-related or career reasons but did not?" For respondents who answer yes to this question, the survey then collects information on why the respondent did not participate in the education or training he or she needed.

3. Measuring Education and Training

There is no question that measuring the receipt of training and education, other than formal schooling, poses great difficulties. There is also no question that the AETS 1998 tries valiantly to do so. It succeeds to the extent that it provides a much richer picture than other data sources of the type and extent of education and training received by Canadians after they finish their formal schooling. However, there remain a number of potential avenues for improvement, particularly if the AETS is to provide a foundation for more than just broad-brush descriptions of training and education activity.

Measuring Who Pays for Training and Education

A training program or course may be financed by several sources. For example, there are 58 training program participants in programs financed by more than one entity in the 1998 AETS public file. The analyst faces a difficult choice in classifying such participants, but classification is necessary in evaluating the effectiveness of different types of training providers. Classification can be based on a number of different criteria, such as the hierarchy of types utilized in Hui and Smith (2002a) or the relative amount of funding from each source. Not all reasonable classification schemes can be implemented

using the data presently available in the AETS; in modifying the AETS it would be useful to think about what information might be useful to classifying such multi-provider training

The AETS 1998 does not collect information on the relative amount (e.g., most, some, partial) of support from each source. This information would be helpful not only in assigning training types to the primary funding source but also in a study of participation. In making the participation decision, individuals consider not just the availability of funding sources but also how much of the total cost of training each funding source can provide.

Respondents will likely have a good idea of the price of adult education and training they purchase themselves, but they may not have a good idea of the price of training that is purchased for them. This problem can be partly overcome by collecting matched information on college tuition by province or, if there is within-province variation, by college and type of course or program. This information could be provided along with the AETS in a form that would allow easy matching. Such data would be of substantial independent interest. Statistics Canada apparently already collects this information, although we are not clear on the level of detail. However, their charge for it is sufficiently high that it serves to deter research use.

Another limitation of survey responses in terms of funding relates to adult education and training whose price to the recipient already reflects government subsidies, or which is paid for by others, including other government programs. The former case will hold for most college and university courses and programs in Canada; the latter case will occur when a government employment and training programs buys a spot for

someone in college or university program or in a proprietary school. In these cases, most respondents probably do not even realize they are being subsidized and, even if they do, they are unlikely to be able to provide a good estimate of the true social cost of the education and training they receive.

While the price faced by the recipient is the relevant quantity for an analysis of participation, as individuals presumably ignore social costs and benefits in their participation calculations, the relevant quantity in a social cost-benefit analysis of subsidies to adult education and training is the full social cost. Thus, it would be very helpful if information on federal and provincial subsidies could be collected and made available along with the AETS data in a way that would facilitate its use in cost-benefit calculations. Such data would be of broad general interest. It could be collected in house by HRDC or the creation of a public use data set could be contracted out to a consulting firm.

Measuring Government Training

The task of measuring participation in government employment and training programs has become substantially more difficult in recent years due to the devolution of these programs to the provinces. At the same time, devolution makes accurate measurement by the AETS even more important, as centralized statistics are no longer available.

Smith and Whalley (2002) present troubling evidence regarding how well typical survey questions capture participation in government employment and training programs for the disadvantaged. Their data come from the U.S. National Job Training Partnership

Act (JTPA) Study (NJS), an experimental evaluation of the JTPA program in the US. Their study compares administrative data on training receipt from the 16 JTPA training centers that participated in the NJS with self-reported information on training receipt from surveys administered to the experimental treatment group members around 18 months after random assignment. The JTPA program (now replaced by the Workforce Investment Act) was quite similar in terms of organization, clientele and types of services offered to the programs formerly operated by HRDC at Canada Employment Centres and now operated by the provinces. As a result, the results of the Smith and Whalley (2002) study have great relevance to the Canadian case under consideration here.

Two main findings stand out from their study. First, standard survey questions do a poor job of measuring the types of services typically provided under government employment and training programs. They find (see their Table 1) that around 44 percent of those who received some services according to administrative records did not self-report receiving any services on the follow-up survey in the NJS. This measurement error is not classical, but rather primarily consists of systematic undercounting of receipt of employment and training services. This has very important implications for attempts to use surveys to measure aggregate training receipt and also for attempts to use survey data to estimate the impact of government employment and training programs.

The second major finding in Smith and Whalley (2002) is that the under-reporting varies substantially by the type of employment and training service provided. In particular, they find that the probability that classroom training, consisting either of remedial basic education or occupational skills training, gets reported by those who receive it is substantially higher than that for other types of training. The types of

training that are poorly reported are job search assistance (which typically includes training in how to prepare a resume and how to interview with employers) and subsidized on-the-job training at private firms. Smith and Whalley (2002) conjecture that the former may not be salient because of the modest amount of time involved, while the latter may not be salient because it may not be clearly delimited from normal work activities.

What are the implications of the Smith and Whalley (2002) paper for the AETS? They are primarily that the AETS probably undercounts receipt of government employment and training services. As these services constitute a non-trivial fraction of all adult education and training, this is an important issue. It matters both for studies of participation and for studies of impact. In regard to impact studies, failure to measure participation means that participants will incorrectly be classified as non-participants, and then used, incorrectly, to construct counterfactuals. Put differently, comparison groups will be contaminated by persons who received training but did not report it. In addition to validating the AETS as described in the next section, experimentation with alternative question wordings for questions designed to measure these types of employment and training services would be a useful addition to the next round of the AETS. This design effort should take place in cooperation with the operators of public employment and training programs at the provincial level.

Measuring Private Training

Several important issues arise in attempting to get a better handle on training at private firms. These issues were discussed at some length at the AETS conference in Ottawa in 2000. They center around how to measure formal and informal on-the-job

training, where I distinguish these based on whether the training is planned in advance or occurs as a natural part of the process of individual workers attempting to complete the tasks assigned to them. As we are not experts on measuring this type of training, we merely raise the issues here, and note their potential importance. Some researchers have argued that a substantial fraction of the total stock of human capital (in the United States) comes from on-the-job training. The classic reference here is Mincer (1974).

Validating the AETS

Several types of validation studies could usefully be conducted in regard to the AETS. Such studies fill two roles. First, they would provide measures of the extent of both classical (random) and systematic measurement error in the AETS data. Knowing the extent of classical measurement error is important in interpreting estimates of the impact of training derived from the AETS, as such measurement error leads, in general, to bias towards zero in such estimates. Knowing the extent of systematic measurement error aids in interpreting aggregate statistics on training and education receipt based on the AETS.

One type of validation study, which applies primarily to government training and education, is to compare aggregate estimates of the type and extent of training based on the AETS with similar measures based on government statistics. In an era of devolution, such comparisons will have to be made at the provincial level. Given the necessity of relatively large sample sizes for these comparisons, they would most likely be based on the larger provinces, such as Ontario and Quebec. This type of validation study indicates

the extent of systematic measurement error; estimates of such measurement error can be used to adjust the aggregate statistics from the AETS.

A second type of validation study, which also applies primarily to government training and education, would link AETS survey information to individual administrative records from government training programs. This type of linkage allows for estimation of the extent of classical measurement error in the AETS data, as well as the study of measurement issues impossible to address in the aggregate statistics, such as the details of the timing and duration of the education and training. Such linkage would of course require a priori approval from the AETS sample members. Smith and Whalley's (2002) study, discussed above, provides an example of this type of validation study.

An alternative way to accomplish the same thing would be to administer the AETS to a random sample of participants in government education and training programs in particular provinces. In this case, the individuals are already in the administrative data, so it remains only to get them to agree to complete the survey. The one downside to surveying training participants is that no estimate of the extent of "false positives" – reports of government education and training receipt by persons who did not in fact receive it – is obtained. Both versions of this type of validation study rely heavily on the accuracy of the administrative records at the individual level; to the extent that this accuracy varies among provinces, those selected for this type of study should have the most accurate administrative records.

The final type of validation study looks at education and training associated with a private firm. The model here is the Panel Study of Income Dynamics (PSID) validation study documented in, e.g., Duncan and Hill (1995) and Duncan and Mathiowetz (1985).

In that study, which was primarily concerned with the accuracy of self-reports of information related to rates of pay, hours of work, and fringe benefits, the PSID survey instrument was administered to a large number of workers at a single (large) private firm. The survey responses were then compared to information from the firm's payroll and benefit records. The PSID validation study yielded a wealth of useful information regarding measurement error in surveys. Barron, Berger and Black (1997) report on a similar exercise comparing survey responses to administrative records for training in small businesses.

A similar study would repeat the design but use the AETS rather than the PSID survey instrument. The firm or firms used should be selected carefully; there is not much value to selecting a firm that does relatively little of the types of training measured by the AETS. Indeed, it might be worthwhile to select two or three firms: perhaps a government bureau, a high-tech firm and an old economy unionized manufacturing concern. Detailed information on education and training for particular firms would also have substantive interest independently of its value for examining measurement issues. It would inform studies of inequality in education and training receipt within firms and of how the amount and type of education and training varies by position in the firm hierarchy and by other worker characteristics such as tenure at the firm and performance.

4. Studying Participation in Adult Education and Training

While the AETS presently does a reasonable job of measuring training incidence, as a tool for examining the determinants of training incidence several avenues for improvement remain. This section details several such avenues in turn. Our suggestions

consist mainly of additional types of information that would contribute to studies of training participation. Such information would also contribute indirectly to the quality of studies of the effect of adult education and training on labor market outcomes, as most commonly used econometric evaluation methods depend on knowledge of the process of participation (see, e.g., Heckman and Robb, 1985, and Heckman, LaLonde and Smith, 1999).

In our view, the most useful additional information that could be collected on the AETS would be information on the timing of training receipt within the year covered by the survey. At present, although the survey collects information on the duration of training, it does not ask when each course or program begins and ends. The only additional information that is provided is whether or not the course or program is still in progress at the time of the survey. This is useful, but far from enough to pin down a complete training and education timeline for the year covered by the survey.

Timing information is particularly useful for impact studies, so that outcomes can be related to time since the start of education or training episodes. Information on timing would also allow the study of sequences of adult education and training among those with more than one program or course in a year, as well as allowing an analysis of the extent to which respondents' undertake multiple courses or programs in parallel rather than in sequence.

An important complement to information on the timing of adult education and training receipt is information on the timing of labor market activity. At present, for persons who change jobs, there is no way in many cases to assign particular courses or programs to particular jobs. Doing so is important in determining the influence of factors

such as industry, occupation and job tenure on training incidence. Furthermore, for respondents not continuously employed, it is often impossible to determine with the available information whether a course or program took place during a period when the respondent was employed, not employed, or some combination of the two. Given that the opportunity costs of training not related to a particular job are likely to be much lower when the respondent is not employed, correctly aligning employments spells with training spells is important.

The literature on participation in government employment and training programs strongly indicates the importance of labor market dynamics at the level of quarters or months in determining participation. For example, Card and Sullivan (1988) find strong effects of employment at the quarter level on participation in the US Comprehensive Employment and Training Act program (the predecessor to JTPA). Similarly, Heckman and Smith (1999,2002) find strong effects of labor force status dynamics measured at the monthly level on participation in JTPA. In the former paper, the measure that proves the best predictor consists of the two most recent labor force statuses during the seven months up to and including the decision of whether or not to participate in the program. Heckman, Ichimura, Smith and Todd (1998) find that the use of this information in impact evaluation substantially reduces bias for adult males in JTPA relative to the experimental benchmark. This evidence further indicates the potential value of information on the timing of training and of labor market activity in the AETS for both studies of participation and studies of impacts.

Rather than substantially lengthening the AETS, an alternative that would address some or all of these concerns about timing would be to attach the AETS to the Survey of

Labour and Income Dynamics (SLID) instead of the LFS. The panel data collected in the SLID would provide much of the information on the timing of labor market activity that the literature finds of value. Combined with additional data collection on the AETS on the timing of training courses and programs, it would substantially improve the utility of the AETS for analyses of participation in, and the effects of, adult education and training.

Variables related to the family constitute another fruitful area for deeper data collection on the AETS. The AETS (or the LFS) presently collects information on marital status, spousal education and the number and ages of children. Two types of additional information would be helpful. The first is the timing of marital status changes. For example, we might expect that a recent divorce could lead to training for women who had been working primarily in the home (or it could even be that training might be undertaken in anticipation of a divorce). Heckman and Smith (2002) find differences in the probability of participation in JTPA as a function of time since divorce for some groups. Thus, a modest amount of marital history information would have value.

The second type of family related information that we suggest obtaining consists of information related to the labor market behavior of other family members, particularly the spouse (if present), during the period of the decision to take training. At present, such information is available on the LFS, but only for the period after training. The motivation for collecting such information is that individuals with a spouse working may be able to take advantage of training opportunities in between jobs that single individuals, or individuals whose spouses were engaged in home production, could not. This information should include information on both timing of employment over the year and on hours worked and wages per hour. This information would allow for the examination

of the role of family labor market dynamics in determining adult education and training participation.

Heckman and Smith (2002) find that information in the form of program awareness plays a major role in determining participation in the JTPA program. Similar information on awareness of particular government employment and training programs could be collected on the AETS and would likely prove equally valuable in elucidating patterns of participation in Canada. In addition, when respondents indicate awareness of a program, they could also be asked whether or not they think they are eligible for it. Heckman and Smith (2002) find that many individuals do not know that they are eligible for JTPA even though they are; such perceptions may play a role in deterring participation in Canadian programs as well. Both the awareness and self-reported eligibility variables have obvious policy relevance for HRDC and for provincial governments providing employment and training services, in addition to their potential usefulness in broader analyses of participation in government training programs.

One final suggestion relates to sample definition. For some purposes, researchers will want to exclude adult education and training that includes the typical spell of college or university after high school. This traditional formal schooling represents a different phenomenon than training provided by firms or than government training for the unemployed, with different determinants and, most likely, different effects. The information in the AETS does not include student status in 1997. Given that the sample includes respondents ages 17 or above, full-time college or university students are also included in the sampling frame. The data include the variable from the 1998 LFS that measures student status at the time of the LFS interview. Even after excluding such

students, however, the sample may still contain fresh graduates of colleges and universities, as well as students taking a semester off in the spring of 1998. The latter group will be small but the former may not be. As such, it would be useful to collect on the AETS sufficient information to allow the exclusion of adult education and training that represents the tail end of the respondent's primary formal schooling.

5. Estimating the Impacts of Adult Education and Training

Six main issues arise in regard to estimating the impacts of adult education and training using the data from the AETS. The first two concern information on the timing and intensity of training. The third concerns the availability of additional outcome information in the period after the adult education and training whose receipt the AETS measures. The remaining three issues concern the collection of data that could be used to implement the three primary classes of econometric evaluation strategies: selection on observables, longitudinal (or panel) methods and methods that rely on instrumental variables or exclusion restrictions (which includes the much abused Heckman method). This section discusses each of these issues in turn.

Timing

The issues regarding timing are the same as in the participation suggestion. We mention them here again briefly only to highlight their importance. Clear data on the timing of training spells and of employment spells during the period covered by the data is crucial to the construction of reasonable impact analyses. Only with such data can the intervals between the beginning and ending of training and the time at which the labor market

outcome under consideration is measured be determined. Knowledge of these intervals is required to analyze the time path of impacts.

Training Intensity

Although the AETS collects some information on the intensity of adult education and training spells, this information could be somewhat improved. For programs, the survey collects information on the number of weeks the program was taken full time and the number of weeks it was taken part time, and the hours per week for each. This is fine coverage. In contrast, for courses, the survey asks if the course was ever taken for more than six hours per day. If yes, the number of such days is collected. Then, if the course was ever taken for less than six hours per day, the number of total hours on such days was collected. This is less precise, as information on courses that consume more than six hours per day is essentially top-coded at six hours. We suggest removing this top-coding and changing the survey so that the information it collects can be used to construct the total hours spent on each program and each course without any top-coding. Also, in the public use file, we suggest reporting a constructed interval measure of total hours, which is not presently done. This would greatly facilitate aggregation.

Longer Term Outcome Information

We often expect that training, particularly long-term formal training such as the training programs measured in the AETS, will have effects over a period of years rather than of months. At the end of a course, it may take weeks or months to find a new job, and then months or years to fully put the training to use. Unfortunately, the longest follow-up that

the AETS data will allow is 15 months, for training that ends in January of the year prior to the LFS interview to which the AETS is matched. Most of the training spells that end in the year prior to the LFS interview, and therefore are captured by the AETS as presently constructed, will have even shorter follow-up periods.

This is particularly unfortunate given how little we know about the long-term impacts of either public or private training. In the context of government training programs, we really only have three data points – three programs with credible long-term impact estimates. These are U.S. National Supported Work Demonstration, in Couch (1992), the U.S. Job Training Partnership Act (JTPA), in Gilby, LaLonde, Smith and Whalley (2002), and the California Greater Avenues to Independence Program (GAIN) in Hotz, Imbens and Klerman (2000). The insights they offer are tantalizing, yet none is Canadian and only one, the JTPA evaluation, really corresponds to programs provided currently or in the past in Canada.

The AETS could become a tool for estimating long-term impacts if it were matched to ex post administrative data as they became available, say from T4 records. Obviously, this would require the ex ante permission of the respondents and would require a reasonably high rate of agreement (over 80 percent) to be useful. We recommend that such permission be collected for future versions of the AETS.

Observing the Unobservables

The most common econometric evaluation method assumes what Heckman and Robb (1985) call "selection on observables." This assumption holds that, conditional on some set of observed variables, participation in training is unrelated to outcomes in the

absence of training. To see how this works, consider the following example. Suppose that persons with more years of schooling participate more in training than persons with fewer years of schooling. Suppose further, as the data suggest, that persons with more years of training earn more than persons with fewer years of schooling, even in the absence of training. However, suppose finally that conditional on years of schooling, individuals choose to take training for reasons unrelated to their expected outcome in the absence of training. Under these assumptions, there is selection into training based on education, but conditioning on education in estimating the impact of training will remove the resulting selection bias in the estimates.

There are two standard ways to implement selection on observables, through regression and through matching. These methods are discussed in standard sources such as Heckman, LaLonde and Smith (1999) and, more briefly, in our comparison paper, Hui and Smith (2002b). The issue here is whether or not the AETS currently includes a sufficiently rich set of observable characteristics to make estimates based on the selection on observables assumption plausible. What is wanted is data on variables that affect both participation in adult education and training and outcomes in the absence of training. Our estimates in Hui and Smith (2002b) suggest that the AETS currently does not cover enough of the key variables in this class to remove the selection bias in estimates obtained using regression methods or matching methods. We now offer suggestions of two types of variable that would help to fill this void.

The first type of variable it would be useful to collect is more detailed information on existing educational qualifications. This includes the major subject for persons with college or university degrees or diplomas. It also includes any other types of vocational

qualifications earned. These variables clearly affect both participation in training (through their effect on occupation and industry, as well as through other channels), as well as affecting labor market outcomes in the absence of further training.

The second type of variable it would be useful to collect is some measure of ability. A number of major cross-sectional and panel data sets in the U.S. include measures of ability, usually in the form of some sort of test score. For example, the U.S. National Longitudinal Survey of Youth administered the Armed Services Vocational Aptitude Battery, the test used by the U.S. Armed Forces for admission and allocation purposes, to (almost) all its respondents. Even a short (10 or 20 question) IQ scale would substantially increase the value of the data, without burdening the respondent at the level of a full achievement test.

Longitudinal data on outcomes

The second common class of econometric evaluation methods attempts to take account of selection on unobservables, in situations where the data lack the richness to make an assumption of selection on observables compelling. Most longitudinal methods assume that the unobservables determining selection remain constant over time, so that, using data including repeated observations on labor market outcomes, they can be differenced out.

Obviously, using these methods requires repeated information on labor market outcomes, such as employment and earnings. Although outcomes measured before and after training are partial substitutes in implementing longitudinal estimators, at least one period of outcome data prior to participation is required. Ideally, each outcome should be

measured in the same way (i.e., from the same administrative data source or with the same survey question) at each time period. While two time periods suffice to identify some versions of the longitudinal evaluation estimator, additional periods allow for more sophisticated versions to be applied, such as the random growth estimator, as well as producing more precise estimates and allowing for some specification testing along the lines of Moffitt (1991) or Heckman and Hotz (1989). The easiest way to include such data with the AETS would be to obtain permission from AETS respondents (a cash bonus in return never hurts) to match their survey data to administrative records. Although administrative data are not a panacea (see, e.g., Hotz and Scholz, 2002), they do not suffer from the recall bias problems that plague attempts to assemble panel data based on retrospective questions about labor market outcomes (see the discussion in Bound, 2001).

Instruments

The final major class of econometric evaluation estimators that analysts use to estimate the labor market effects of employment and training programs contains methods that rely on an instrument or exclusion restriction (hereafter just "instrument"). These methods aim to take account of selection on unobservables, in situations where the data do not make selection on observables a plausible assumption. Put simply, an instrument is a variable that affects participation in adult education and training but does not affect labor market outcomes, other than through its effect on participation. Instruments are notoriously hard to come by, but plausible instruments can sometimes be obtained through clever data collection or by matching information to the data based on the respondent's location.

In terms of data collection, for example, the AETS could collect information on employed respondents on whether or not their employer offers a training subsidy and, if so, what sort of subsidy is offered. Because this variable represents an opportunity – in formal terms it affects the price of training – it can be used as an instrument. It complements the information already collected on actual receipt of training paid for in whole or in part by employers.

In terms of matching data from other sources, we offer two examples. One example is the distance to the nearest provider for particular types of training. In this scheme, whoever produces the AETS would use their data on the location of each respondent to calculate the distance, either in kilometers or in some measure of travel time, to the nearest provider, such as a community college. The idea is that distance affects the cost of taking adult education and training but otherwise has no effect on labor market outcomes. Card (1995) uses this strategy with distance to colleges and universities in order to estimate the returns to additional years of schooling.

Another potential instrument consists of policy variables at the local or provincial level. These include training subsidies (or mandates, like that in Quebec), as well as the tuition levels at local colleges and universities (and perhaps major proprietary schools). Again, the intuition is that prices and subsidies will affect training incidence (this being precisely what they are designed to do) but not otherwise have an effect on labor market outcomes.

6. Conclusions

The AETS as presently constituted does a reasonable job of measuring the basic patterns

of adult employment and training participation in Canada. Using these data, and number of analysts, including ourselves in Hui and Smith (2002a), have analyzed the determinants of participation in a multivariate framework. In Hui and Smith (2002b) we also attempt to use the AETS 1998 data to study the impacts of adult education and training participation on individual employment and earnings.

This paper details our recommendations for changes in the AETS based on our experience in utilizing it in these two studies. As our recommendations make plain, we view them as improvements at the margin in regard to the use of AETS for studies of participation, but as very basic reforms in regard to the use of the AETS as a tool for studies of the impact of adult education and training. Our findings in Hui and Smith (2002b) lead us to conclude that the AETS presently lacks critical features required to produce credible impact estimates.

The following recommendations refer to changes in the AETS that would improve its usefulness for studies of both participation in adult education and training and of the labor market impacts of adult education and training:

- Collect detailed data on the timing of training started or completed during the reference period of the AETS.
- Collect detailed data on the timing of employment during the reference period of the AETS.
- Test alternative question wordings for public employment and training programs. Such wordings may need to be province-specific and should be developed in cooperation with provincial authorities.

- Conduct validation studies of the AETS data on participation. This could include comparing aggregation measures to aggregate statistics on public training provision. It could also include matching survey responses to public or private (firm) administrative data at the individual level.
- Collect information on plausible instrumental variables. These include provincial tuitions for public colleges and universities as well as provincial training subsidies or taxes. It also includes variables such as distance to the nearest college or private training provider.

The following recommendations refer to changes in the AETS that would primarily improve its utility as a tool for studying participation in adult education and training:

- Collect enough information on enrollment in schooling to allow the complete exclusion of persons still finishing their initial formal schooling.
- Collection information on respondent awareness and self-reported eligibility for various government programs. Such questions will likely need to be province-specific in an environment of devolution and so should be developed in cooperation with provincial authorities.
- Collect information on the relative financial contributions of different sources when respondents report that their training was paid for from multiple sources.

Finally, the following recommendations refer to changes in the AETS that would primarily improve its utility as a tool for studying the labor market impacts of adult education and training:

- Collect better data on training intensity. This includes finer hours measures for training courses and some measure of usual hours per day for training programs.
- Collect data on additional observable variables that affect both participation and labor market outcomes in the absence of participation. Two important examples are more detailed information on existing educational qualifications and some sort of "ability" measure or test score.
- Match the survey data to long-term administrative data on labor market outcomes as it becomes available, subject to respondent permission. This would allow the estimation of long-term impacts of training. Such impacts are important to a complete benefit-cost analysis of public training and are largely absent from the existing literature, especially in Canada.
- Collect panel data on labor market outcomes in period prior to the main AETS reference period. This would allow the implementation of longitudinal evaluation estimators. The outcomes should be measured consistently across periods. The data could be based on respondent recall (in which case it should not go back too far) or be matched from administrative records (assuming respondent permission).
- Collect and provide with the AETS data on the social cost (or at least the direct cost in terms of government funds) of publicly provided adult education and training. Such information is a critical input into social cost-benefit analyses of Canada's substantial expenditures on adult education and training. HRDC or contractors working with it are probably best situated to provide this information.

Bibliography

Barron, John, Mark Berger and Dan Black. 1997. "How Well Do We Measure Training?" *Journal of Labor Economics*. 15(3, Part 1): 507-528.

Bound, John. 2001. "Measurement Error in Survey Data." In James Heckman and Edward Leamer, eds., *Handbook of Econometrics, Volume 5*. Amsterdam: North-Holland, 3705-3843.

Card, David. 1995. "Using Geographic Variation in College Proximity to Estimate the Return to Schooling." In Lous Christofides, Kenneth Grant and Robert Swidinsky, eds. *Aspects of Labour Market Behavior: Essays in Honor of John Vanderkamp*. Toronto: University of Toronto Press, 201-222.

Card, David and Daniel Sullivan. 1988. "Measuring the Effects of CETA Particpation on Movements In and Out of Employment." *Econometrica*. 56(3): 497-530.

Couch, Kenneth. 1992. "New Evidence on the Long-Term Effects of Employment Training Programs." *Journal of Labor Economics*. 10(4): 380-388.

Duncan, Greg and Daniel Hill. 1985. "An Investigation of the Extent and Consequences of Measurement Error in Labor Economic Survey Data." *Journal of Labor Economics*. 3(4): 508-532.

Duncan, Greg and Nancy Mathiowetz. 1985. *A Validation Study of Economic Survey Data*. Ann Arbor: University of Michigan Survey Research Center.

Gilby, Elaine, Robert LaLonde, Jeffrey Smith and Alexander Whalley. 2002. "The Long-Term Impacts of Employment and Training Programs: Evidence from JTPA." Unpublished Manuscript, University of Maryland.

Heckman, James and V. Joseph Hotz. 1989. "Choosing Among Alternative Methods for Estimating the Impact of Social Programs: The Case of Manpower Training." *Journal of the American Statistical Association*. 84(408): 862-874.

Heckman, James, Hidehiko Ichimura, Petra Todd and Jeffrey Smith. 1998. "Characterizing Selection Bias Using Experimental Data." *Econometrica*. 66(5): 1017-1098.

Heckman, James, Robert LaLonde and Jeffrey Smith. 1999. "The Economics and Econometrics of Active Labor Market Programs." In Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics, Volume 3A*. Amsterdam: North-Holland, 1865-2097.

Heckman, James and Richard Robb. 1985. "Alternative Methods for Evaluating the Impact of Interventions." In James Heckman and Burton Singer, eds., *Longitudinal*

Analysis of Labor Market Data. Cambridge: Cambridge University Press for Econometric Society Monograph Series, 156-246.

Heckman, James and Jeffrey Smith. 1999. "The Pre-Programme Dip and the Determinants of Participation in a Social Programme: Implications for Simple Programme Evaluation Strategies." *Economic Journal*. 109(457): 313-348.

Heckman, James and Jeffrey Smith. 2002. "The Determinants of Participation in a Social Program: Evidence from the Job Training Partnership Act." Unpublished manuscript, University of Maryland.

Hotz, V. Joseph, Guido Imbens and Jacob Klerman. 2000. "The Long-Term Gains from GAIN: A Re-Analysis of the Impacts of the California GAIN Program." NBER Working Paper No. 8007.

Hotz, V. Joseph and John Karl Scholz. 2002. "Measuring Employent and Income Outcomes for Low Income Populations with Administrative and Survey Data." In National Research Council, *Studies of Welfare Populations: Data Collection and Research Issues*. Washington, DC: National Academy Press, 275-315.

Hui, Shek-Wai, and Jeffrey Smith. 2002a. "Participation in Adult Education and Training in Canada: Evidence from the 1998 AETS." Unpublished manuscript, University of Maryland.

Hui, Shek-Wai and Jeffrey Smith. 2002b. "The Labor Market Impacts of Adult Education and Training." Unpublished manuscript, University of Maryland.

Moffitt, Robert. 1991. "Program Evaluation with Nonexperimental Data." *Evaluation Review*. 15(3): 291-314.

Mincer, Jacob. 1974. *Schooling, Experience and Earnings*. New York: Columbia University Press for NBER.

Smith, Jeffrey and Alexander Whalley. 2002. "How Well Do We Measure Public Job Training?" Unpublished manuscript, University of Maryland.