THE MISSING LINK -- DATA ON THE DEMAND SIDE OF LABOUR MARKETS
NO. 77

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April 1995

Aussi disponible en français

Abstract

Labour economists have developed elaborate theoretical models and conducted very advanced econometric analysis of the decision making of households. But this emphasis on the supply side of the labour market has not been matched by any corresponding degree of sophistication in empirical analysis of the demand side of the labour market. This has been due in part to the lack of appropriate data. This paper outlines why demand side data which outlines the behaviour of firms in the labour market is necessary for the advancement of labour market analysis. It also discusses the constraints which existing data collection methods impose on labour economics. The paper suggests types of data which might be collected, alternative methodologies for an establishment/worker survey, and discusses some of the theoretical and empirical difficulties that might be encountered in such an exercise.

1. Why do we need demand side data?

One of the reasons why better data on the demand side of labour markets is needed is because the supply side can explain so little of the variation in some labour market behaviours. Pencavel, for example, concludes his encyclopedic survey of the labour supply behaviour of men, with the remark "a great deal of research, much of it careful and some of it ingenious, has been undertaken on male labour supply during the past two decades. The vast proportion of that work ... indicates that the elasticity of hours of work with respect to wages is very small. In other words, the focus of most economists' research has been on behavioral responses that for men appear to be of a relatively small order of magnitude"[1] (1986:94).

Labour supply models have relatively low R^2 (between .1 and .25) -- i.e. much of the variation in annual hours of work is not explained by the models. The variation which is explained by labour supply models is largely due to the inclusion of a long list of control variables (such as region of residence or marital or union status). Because the wage elasticity is typically estimated to be 0.1 or less, the change in hours of work associated with a change in wages is small relative to the change in hours associated with other variables.[2]

By contrast, studies of the impact of labour demand constraints on hours of work have typically found such constraints to be highly important empirically (e.g. Dickens and Lundberg, 1993; Osberg and Phipps, 1993). But if people are willing to sell more hours, why are firms unwilling to buy at the going market wage rate? Would employers hire more workers at lower wage rates? Should policies to increase employment aim at increasing the incentives to individuals to supply labour or the incentives to firms to supply jobs? These questions are at the heart of the ongoing debate on social policy, but micro data on the behaviour of establishments is needed if they are to be resolved.

In the analysis of unemployment, a great deal of theoretical work has discussed the determination by individuals of their reservation wage, and many job-search models have been empirically estimated using data drawn from household surveys. Yet, as Devine and Kiefer (1991) note, since it is relatively rare for unemployed workers to actually reject job offers, "variation in unemployment durations appears to arise primarily from variation in the

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[1] In their companion survey of female labour supply, Killingsworth and Heckman (1986:196) note that recent work on female labour supply has reduced the mean estimate and has substantially increased the variance of the estimated wage elasticity of female labour supply. Osberg's (1986) survey echoed the conclusion of Nakamura and Nakamura (1981) that the wage elasticity of female labour supply is, when appropriate controls are made for the relative difficulty of obtaining employment, substantially similar to that of men. Osberg and Phipps (1993) present recent econometric estimates using Canadian data with the same conclusion.

[2] For example, in the 1986 LMAS, the standard deviation of annual male hours was 661 (see Osberg and Phipps, 1993). The effect of unionization, holding other things constant, was in 1986 a change of about 100 hours in annual labour supply (depending on specification between 92.9 and 109 hours). Although this variable has relatively little theoretical reason for inclusion in a labour supply function, the magnitude of its impact was approximately equal (at the point of means) to that of a 50% increase in hourly wages.

likelihood of receiving offers (1991:302)". However, there are very few studies which analyze the job offer process. The "bottom-line" of Devine and Kiefer is that "looking across studies, we have found evidence that the empirical (and theoretical) work on search would benefit from changes of emphasis. First, the evidence shows that we have perhaps overemphasized the setting of reservation wages as a research area. There are definite advances to be made in studying the process by which workers get offers (on the job or otherwise)" (1991:308).

As Barron et al (1985) and Roper (1988) have demonstrated, firms differ a lot in the search process they use, for different types of workers. One way to decrease the unemployment rate is to increase the efficiency of the worker/firm matching process. Minimization of "search" unemployment has long been one of the rationales underlying the funding of public employment agencies, such as Canada Employment Centres. However, if such public interventions are to realize their full potential, or if new interventions are to be effective, it would be useful to know why and how firms make their decisions about recruitment and search.

Supply side data cannot explain much of the variation in hours of labour supply and only a limited part of unemployment -- and there are also significant gaps in supply side explanations of pay determination. As Dickens and Lang (1992) note, supply-side theories of individual wage determination never have provided a very good explanation of why there are persistent differences in wage rates across industries and between small and large firms, in wage rates, even after controlling for all measurable personal characteristics. In a recent paper, Morissette, Myles and Picot (1993) ask "what is happening to earnings inequality in Canada?", and conclude that behind the increased inequality of the earnings distribution in Canada is an increasing polarization of the distribution of hours worked per year and a widening differential between young and old workers in hourly wages. To explain why the age/earnings differential is widening within occupations and within industries and why more workers are found at the extremes of the hours distribution (i.e. working very long or very short hours) one needs an explanation of why the pay determination and work allocation decisions of firms would have changed.

In short, many years of investment in gathering data on the labour market behaviour of individuals and households has yielded important insights -- it is important, for example, to know that the wage elasticity of labour supply is rather small -- but a great deal remains to be known about the impact of the labour demand decisions of firms on such key issues as labour supply, unemployment and relative pay.

At the macro level, a popular explanation of the fluctuations of aggregate unemployment in the 1980's has been the hypothesis that technology shocks, of varying intensity, have created a need for labour reallocation. The sectoral shifts argument that aggregate unemployment simply represents the search time necessary for labour reallocation carries a strong policy implication. If the business cycle is, in fact, driven by real shocks, Keynesian counter cyclical macroeconomic policy may be inappropriate. However, despite the importance of the issue, the debate on sectoral shifts has had to rely on the interpretation

of gross flows in the labour market. At basis, the technology shocks argument depends upon a hypothesis concerning <u>employer</u> behaviour which has not been (but could be) directly examined with microdata.

More generally, to what extent is aggregate unemployment actually due to a "mismatch" between the skills possessed by workers and the skills demanded by employers? How might such structural unemployment be reduced? Good answers to such questions can only come from a comparison of the demands for skills by employers, with data on the qualifications of potential workers. In order to know whether there is, in aggregate, a skills shortage or a job shortage, one needs a survey of firms to reveal whether aggregate demand for particular skills at a point in time exceeds or falls short of aggregate supply, (and it would be useful to be able to disaggregate national totals by region). Since Statistics Canada has developed longitudinal data bases (e.g. the LMAS) which track the work history of respondents, researchers can ascertain the occupational roles which the unemployed have, in the past, been able to fill. Existing data sources can therefore provide useful information on the potential supply of skills, but there is little reliable information on the demand for skills. Although there are many fine gradations of skill within broad occupational categories, it would still be useful (for those who allocate training funds) to know whether, for example, the number of unemployed ex-welders exceeds the unmet needs of employers for welders.[3]

Moreover, if lack of training really is the problem, one also needs to go further to understand why such training has not occurred. Although surveys of firms' training expenditures have enabled the debate on the adequacy of employer based training to begin (see Betcherman [1992], and Kapsalis [1993]), in order to know whether it is in fact true that employers are discouraged from training expenditures by the "poaching" of trained employees by competitors, one needs to have a link between firm-based data on training expenditures and worker data on earnings and labour market mobility.

Assessment of many microeconomic policies also requires data on the demand side of labour markets. Although there is a voluminous literature on the incentives which unemployment insurance schemes establish to the changed labour market behaviour of individuals and households (for a recent survey, see Atkinson and Micklewright [1991]), the literature on the impacts of unemployment insurance on firm behaviour is almost non-existent by comparison.[4]

However, the structure of UI creates incentives for firms, as well as for workers. Canadian unemployment insurance does not "experience rate" the premiums of employers to reflect the unemployment insurance claims of a firm's ex-workers (the cost of the unemployment the firm has generated) - and there is a large theoretical literature which argues that this represents an implicit subsidy to layoffs. As well, in Canada employer

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[3] An issue which cannot be addressed using only the fraction of vacancies listed at CEC's - see Osberg (1993).

[4] The limited literature which exists on the impact of "experience rating" of unemployment insurance premiums has relied almost entirely on aggregate data (e.g. on comparing lay-off rates across states).

contributions to unemployment insurance are not payable on the earnings of any employees working less than 15 hours per week, hence there is a "spike" in the cost of labour, since the 16th hour worked triggers the payment of UI premiums on all hours of employment. The UI financial incentive to layoff workers or to split hours of weekly employment into several non-qualifying part-time jobs is disconcerting. It seems perverse that a policy such as UI (whose rationale is the reduction of income insecurity) should create incentives to increased marginality of employment. Although theory can tell us that the experience rating of unemployment insurance premiums, or the unemployment insurance "spike" in the marginal cost of labour, should affect employer decision-making somewhat, theory alone cannot tell us the size of the impact. Data on employer behaviour are needed if we are to know whether these effects are large and significant or not worth worrying about -- it is the size of the impact which is relevant for policy purposes.

In general, the last decade has seen a relative shift of employment to smaller establishments and the increasing use of contingent, short-term and part-time labour contracts. These trends have created significant social policy costs for government. As a group, small firms are implicitly subsidized through the unemployment insurance system,[5] and receive explicitly favourable treatment under the tax system. Such favourable treatment probably stems, in part, from the perception that the small business sector is being successful in creating employment -- but before public policy tilts further towards a "small is beautiful" perspective, it is important to know whether the growth of small business sector employment reflects underlying technological imperatives, or simply represents the choice of a tax subsidized managerial strategy, with significant associated social policy subsidies.

Businesses often have a choice, to hire workers directly as employees, or to operate indirectly, via franchisees or subcontractors. A managerial choice to operate indirectly appears in aggregate statistics as a slowing of large firm growth and an expansion of the small business sector. Firms may, for example, sub-contract some of their operations instead of performing them "in-house" and, if their sub-contractors are dependent on the firm's continued business, there may be little change in effective control.

Case studies (e.g. Osberg, Wien and Grude, 1994) suggest that some firms are also shifting to an employment structure in which a core group of employees receives secure, full-time employment while a group of contingent workers are hired on a short-term or part-time basis to meet production peaks. This shift to a "just-in-time" labour strategy can create very significant costs for the social welfare system as contingent workers attempt to access unemployment insurance or social assistance during off-peak periods. Canadian governments therefore need to understand the combination of technological and institutional imperatives which are driving this shift in the institutional structure of employment.[6] As

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[5] Firms with less than 5 employees have a benefit to premium ratio of 2.6 compared to a benefit/premium ratio of 0.44 for firms over 5000 in size (Karagiannis, 1993).

[6] In particular, whether the shift to greater employment instability is being partly driven by the absence of experience rating in Canadian U.I.

Morrisette, Myles and Picot (1993) noted, increased inequality in hours of work explains much of the increase in earnings inequality observed in Canada in the 1980's, but that change in hours inequality cannot be explained from the supply side.

More generally, both governments and firms are interested in knowing what kinds of employment strategies actually "work", in the sense of enabling firms to survive and to grow in sales, profit and employment. Case studies represent a type of qualitative evidence on firm behaviour and its consequences. However, although case studies can be evocative and highly informative, generalizations from them are invariably highly suspect. Case study information is inevitably limited by problems of representativeness, limited sample size and the non-quantitative nature of data and analysis. For example, although there are an abundance of case study descriptions of a new managerial paradigm of corporate de-layering and "employee empowerment", both business and government would like to know how quantitatively important this tendency is. What are its implications for the economy as a whole? For social policy reasons, government decision makers are very interested in what happens over time to the individuals affected by such managerial choices. However, both governments and firms are also interested in what happens, over time, to the firms which adopt changed employment structures -- and to answer this class of question, quantitative evidence on the changes in firm employment structure, and subsequent outcomes, is clearly needed.

2. Empirical labour economics and the supply side

There are many articles in empirical labour economics devoted to such topics as analysis of the search behaviour of unemployed individuals, the labour supply decisions of workers or the human capital investment decisions of individual students. However, there are very few empirical articles which analyze the vacancy filling behaviour of firms, the decision of firms to offer jobs with specific hours of work or the employer's reasons underlying industrial or firm size wage differentials. Why does empirical labour economics emphasize so heavily the supply side of labour markets (the decisions of individuals and households) rather than the demand side of labour markets?

A major part of the reason why empirical labour economists examine the particular set of issues which they do is because these are the issues than can be examined, with available data. As Devine and Kiefer (1991:300) have noted, "the content and quality of available data have clearly influenced the course taken by empirical research in the search framework ... The most common type of data set consists of individual worker interview data, either in a cross section or a panel format."

Theorists in labour economics do not have quite the same constraints as empiricists, but they do try to explain existing stylized facts about labour market behaviour and to generate new testable hypotheses. Because both the existence of "stylized facts" and the testability of new hypotheses depend on the type of data collected by statistical agencies, they share the same supply side emphasis.

Labour market data in Canada typically come from a survey of households, drawn from a sample of residences. Historically, it was the Census which provided periodic snapshots of the labour market from a count of the population and much labour data are a direct descendent. In the Census, the sampling rate is relatively high (hopefully 100% in short form, 20% in long form data), while the Labour Force Survey uses a stratified probability sample, and other surveys (such as Labour Market Activity Survey or the Survey of Consumer Finance) are often based on the LFS sample.

However, in all these instances, the source of survey information is the individual respondent, who can be expected to know their personal characteristics and the characteristics of their household. Individual workers can only be expected to give reliable information on broad employer characteristics, such as industry, approximate establishment size or location of employment. Employer behaviours (e.g. hiring strategies) can only be indirectly (at most) inferred (e.g. through respondents' perceptions of the constraints they personally encountered during job search). Hypotheses concerning aspects of firm behaviour such as the impact of technological change, or the capital intensity of production, on employee earnings or employment stability are not testable at all, since household surveys cannot supply the requisite data. The focus of research, therefore, inevitably shifts to the set of hypotheses which are testable. To some extent, available research tends to frame the terms of public policy discussion. Hence, informed debate, policy design and implementation have a tendency to mimic the biases of data collection.

Surveys of establishments underlie GNP accounting, input-output analysis and industrial production statistics, among other things. However, micro data on establishments is rarely available to researchers and the information on the labour force associated with establishments is invariably highly aggregated (e.g. total payroll or total employment). Even relatively broad disaggregations of labour force characteristics by establishment would be very useful for some purposes (e.g. the fraction of the labour force with university degrees or the relative wages and percentage of total employment of full-time and part-time employees) but it would be far preferable to have microdata on employees which is matched to the micro characteristics of individual employers. With matched micro data on employer and employee characteristics, it is possible to recreate any desired aggregation of employee characteristics at a given workplace, and to examine the implications of alternative structures of employee characteristics.

3. What questions?

Existing research based on matched worker/establishment data is rather limited, since very few such surveys have been done, but the research which has been done does represent a starting point for consideration of the potentials of demand side labour data.[7] A general lesson from the development of large new data sets (such as the Labour Market Activity Survey) is that the public release of such data attracts the interest of researchers who see potential uses for the data which the developers did not necessarily foresee.

One example of this is Reilly's (1994) use of the General Segmentation Survey to examine the importance of gender segregation in jobs, within and between establishments. The identification of the gender and pay rate of worker respondents is a very standard questionnaire item in surveys of workers, which has often been used in analysis of gender discrimination by occupation or industry. Matched worker/establishment data enable one to identify the pay rates of males and females at the same establishment and the degree of segregation in their pay and job duties which allows for the examination of gender discrimination within establishments. One can argue that this issue is of greater direct policy relevance to job equity than the analysis of pay differentials by occupation or industry which are possible with worker data drawn from household surveys.

"Standard" questions on worker characteristics can have novel implications when the answers to such questions can be grouped by establishment of employment. However, when both establishments and workers are interviewed, one does not have to be content with building up (for example) the workplace specific returns to job experience by the examination of the pay rates of individual employees. One can also ask employers whether they follow a policy of structuring jobs in job ladders, or whether they have similar personnel policies for all groups of workers. (As already noted, explanation of rising dispersion in hours of work and increasing age/earnings differentials depends on how and why employer strategies changed in the 1980's.) In the General Segmentation Survey data, Osberg (1986) found that the presence of a structured job hierarchy was only important for pay determination in some industries. Reilly (1993) combined the analysis of worker-level data on pay determination with the establishment-level responses to questions on computer usage to analyze the impact of technological innovation on workers' pay.

The major focus of the General Segmentation Survey was inter-establishment variation in instability in employment and labour market segmentation. Establishment-level responses to questions on variability in sales and output were used by Osberg et al (1986a) to predict the probability and duration of the individual unemployment of workers from those establishments, over and above that explicable by their personal characteristics. The role of workplace training in individual unemployment experience, labour market mobility and subsequent earnings was also examined in Osberg et al (1986c).

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[7] The Norwegian data (Matsekaasa 1990) is recent, not widely known and not widely available. The General Segmentation Survey (Apostle, Clairmont and Osberg, 1980) has been around longer but has a relatively small establishment sample size (118) and is drawn from a single regional labour market.

A major advantage of matching worker and firm responses on training is that one can begin to track the importance of the <u>distribution</u> and <u>type</u> of training effort. Establishment-level responses on aggregate training expenditures can be matched to average worker perceptions of training effort, <u>and</u> as well the crucial issue of <u>which</u> workers receive training can be examined. It is important, for example, to know whether favourable tax treatment for aggregate training expenditures would produce greater training of low-skill workers, and their escape from a cycle of intermittent employment/social assistance, <u>or</u> whether the training induced by such a tax subsidy would be concentrated on the "core" group of highly skilled permanent employees. If subsequent labour market experience in job mobility, pay and unemployment is followed up in a panel survey, one can examine the extent to which trainees benefit from training.

As already noted, there is a dearth of information on the worker search strategies of firms.[8] The General Segmentation Survey collected some data on this, but much more needs to be done -- in particular, an establishment survey could usefully ask for the number and duration of vacancies, search strategy used (why has use of Canada Employment Centres declined?) and wage rate of employees hired. Comparison with the characteristics of ongoing employees will be useful in determining just where in the hierarchy of jobs mobility actually occurs, and why.

Capital stock data collected at the establishment level is far closer to what economists would like to use to estimate production functions than the aggregate industrial data now used to analyze productivity trends. At the establishment level, respondents can distinguish market value, book value and replacement cost of capital stock and can identify the vintage of capital equipment in use. By aggregating the education, reported on-the-job training and experience reported by employees of the same establishment, one can also estimate the "human capital" in use in production.[9] Matched establishment/worker data has enormous potential for the analysis of productivity trends.

It is not just in the area of productivity measurement that aggregation is an important problem for economics. Although, for example, there may be more employment in an industry when average wages are lower, this increase in employment could have occurred because many establishments hired more workers when the wage fell, <u>or</u> because new establishments entered the industry.

Appendix 1 presents a numerical example of how a misleading macro relationship can be inferred from the aggregation of micro firm behaviour. If individual workplaces typically make marginal additions to their work force to equate the wage with the marginal

[8] See Barron and Bishop (1985), Barren Bishop & Dunkleberg (1985) and Roper (1988).

[9] The General Segmentation Survey also attempted, through explicit establishment-level questions, to identify the elasticity of capital/labour substitutability in production -- but this cannot be classified as a success, probably because of the hypothetical nature of the question used. Other failures include the question attempting to estimate economies of scale, and the questionnaire items on the price elasticity of demand and the relative pay policy of the employer (virtually all employers placed themselves in the "top ten percent".)

product of labour, then one solution to high unemployment is to reduce the downward wage rigidity at individual establishments which now keeps them from additional hiring. Some policy analysts would, therefore, emphasize reductions in the minimum wage or reforms to industrial relations legislation to reduce trade union bargaining power. Downward wage rigidity at individual workplaces is not, however, nearly as important an issue if it is the entry of new establishments or the hiring of additional shifts of workers as product demand increases which increases total employment levels -- if this is the case, the most effective policies to reduce unemployment would be those which increase the birth rate of new establishments or the demand facing individual firms. The correct interpretation of the micro processes which underlie macro aggregate data is important both for microeconomic and macroeconomic policy -- the resolution of alternative interpretations of macro aggregates necessarily requires data which can test these hypotheses at the level of the establishment.

In one sense, the establishment/worker data sets that already exist can be seen as pilot projects for a larger national sample. The experience of the General Segmentation Survey indicates that it is possible to gather demand side labour data of a type which are important for analysis of aggregation problems in labour demand and productivity measurement, pay determination, technical change at the workplace, the need for (and employer supply of) workplace training, demand instability and unemployment, discrimination, etc. However, given the structural and institutional changes of recent years, one would also want demand side labour data gathered in the 1990's to focus on issues that were not identified as being of comparable importance in the 1970's.

Segmentation theorists of the 1970's, for example, tended to emphasize the qualitative differences between workplaces. There was an expectation that employer size and industry explained a great deal of the inter-establishment variation in "work worlds" (see Apostle, Clairmont and Osberg [1980]). In the 1990's, however, there is increasing concern with the growth of "non-standard employment" and the creation, within establishments, of important qualitative distinctions between the terms and conditions of employment of permanent and contingent workers. In worker interviews, it is now much more important than it used to be to ascertain the extent to which such contingent workers can combine employment with a number of employers into annual earnings packages. It is also important to follow them over time to see if they graduate into full-time employment or remain trapped in a cycle of short-term employment and transfer dependency. It is important to match establishment data with such worker histories, since policy makers would like to know the extent to which such a labour force strategy decision is being driven by perverse taxation and regulation policies or by emerging technological imperatives.

Case study literature (e.g. Osberg, Wien and Grude, 1994) has described qualitatively new employment strategies in the 1990's which revolve around the "de-layering" of corporate hierarchies, the structuring of work roles into multi-skilled/multi-tasked work teams and a new emphasis on decentralization of decision-making and employee "empowerment". The quantitative importance of these trends and their implications for public policy remain unclear. Presumably, demand side labour data gathered in the 1990's would attempt to identify observable indicators of such management strategies so that subsequent analysis can assess their implications for pay determination, employment stability, etc.

4. Methodologies for demand side labour data

4.1 Two-stage sampling

Those attempts which have been made to obtain information on the demand side of labour markets have typically begun by drawing a sample of establishments from a sampling frame of employers. Employer representatives are then asked to respond to a questionnaire, and their co-operation is solicited in obtaining worker interviews. At this stage, research strategies diverge.

The British Workplace Industrial Relations Survey (described in Millward, 1993) and the very similar Australian Workplace Industrial Relations Survey (see Gilson, 1993) adopted a "key informants" approach. In the Australian study, questionnaires were completed by the most senior manager at the workplace, the manager at the workplace most responsible for the day-to-day running of employee relations, the most senior delegate of the union with the most members at the workplace and a second union delegate from another union with members at the workplace. The British researchers specified three primary respondents: the senior manager at the establishment who deals with industrial or employee relations and the senior representatives or shop stewards of the largest manual and the largest non-manual negotiating group. In this approach, key informants can be reasonably asked about broad features of workplace organization[10] but they cannot be expected to know much detail about the earnings, work experience or family characteristics of other workers.

The alternative approach is to draw a stratified random sample of establishments from a sampling frame of all employers, interview management representatives at the workplace and obtain a list of employees, from which a sample of worker interviewees is drawn.[11] Drawing a sample of workers from the employee lists of a sample of establishments creates an exact match between the employer and the employee (at one point in time). In the General Segmentation Survey,[12] an initial sample of 700 private sector establishments received the employer interview and a sub-sample (stratified by size and industrial category) of 119 establishments was quota sampled with replacement to ensure representativeness along the major dimensions of size and industry.

Within establishments, individual workers were selected from employee lists with a probability inversely proportional to establishment size -- hence the ultimate sampling weight of an individual worker respondent is the inverse of the relative frequency of establishments of a particular size range in a particular industrial category, multiplied by the worker's

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[10] Osberg, Wien and Grude (1994) used key informants at a relatively small sample of Nova Scotia firms. It was notable that worker and management informants sometimes had quite different perceptions of factual issues.

[11] The Norwegian study of organizations -- see Mastekaasa (1990) followed this methodology.

[12] For a methodological discussion, see Apostle, Clairmont and Osberg (1980).

probability of selection within that establishment. Figure 1 presents a schematic of the data set to illustrate the fact that establishment information from the employer questionnaire and interviewer codes was supplemented by Dun and Bradstreet financial information on the firm and CALURA/Financial Post information on the corporate enterprise (if any) of which the firm is a part. The 1,513 worker respondents provided information on other household members (if any) in 1979 and a follow-up survey in 1981 obtained longitudinal data on 1,163 workers and their households.

4.2 Secondary data matching

In order to reconstruct the employment structure of individual firms from micro data on the work experience and personal characteristics of individual employees, one needs to have a sample size at each establishment large enough to be representative. Residence-based surveys (such as the Labour Force Survey) which have small overall sampling probabilities obviously cannot do this, since very few multiple respondents employed by the same firm will actually be sampled. However, administrative data sources or census surveys necessarily contain data on a large proportion of the population at individual establishments, because they sample large proportions of the total population. The 1996 census, for example, will be a 20% sample of households and will ask for, among other things, the name, address and industry of employers. If those employer identifers were used to match the responses of individuals to existing establishment data (such as that from CALURA) or a special purpose survey of employers, the result would be a data set with micro data on employer characteristics, matched to micro data on a 20% sample of their employees.

5. Problems and pitfalls in demand side labour data

5.1 "Who" is the "employer"?

Economic production occurs when labour and capital are combined with raw materials at a particular work site, and our legal system requires that some legal personality controls the physical assets in place at that work site.[13] The "employer" is easy to define when each firm controls only one work site and when the firm is not in turn controlled by any other firm. In this case, the firm and the establishment are coincident. It is the "establishment," defined as "a group of people at a single workplace under common management authority" which, in economic terms, is the "point of production" and in sociological terms is the "work setting" for individual employees.

Defining "the employer" becomes more problematic when a firm owns a number of establishments and when firms can be owned, or controlled, by other firms. Although the firm may be the legal personality, or employer of record, the "corporate enterprise", or unit

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[13] Usually the employer owns the assets at a particular work site, but since it is possible to lease land and capital equipment, "control" is the key issue.

within which common management authority can be exercised, is really of greater analytic interest. Firms which control a pyramid of other firms (either through majority or minority share ownership or through licensing or franchise agreements) constitute a unit of common management authority within which capital, labour and production activities can be reallocated. It is often an internal management decision whether to operate a number of dispersed work sites as plants or divisions within a single firm, to create operating subsidiaries of a parent company or to license franchisees or engage subcontractors of the parent company.

From an analytical point of view, the legal "firm" is not a particularly interesting unit of analysis. The establishment is the point of production at which labour is employed and the technology of production is implemented. The corporate enterprise is the locus of common management decision-making authority. For many practical purposes, the establishment will be the most useful operational definition of "the employer" since technological or managerial shifts in the nature of production must find their expression at some particular worksites -- yet one will not really understand the process of structural change in employment without some match to the corporate enterprise.[14]

For some classes of workers (e.g. those employed through temporary help agencies, or by labour contractors), the point of production remains the establishment, but terms and conditions of employment depend crucially on the indirectness of their legal relationship to the establishment of employment. Definition of "the employer" can also be particularly problematic for many of the "self-employed". Some "self-employed" workers are paid either on an hourly or piecework or contract basis, and are more accurately viewed as disentitled wage labour than as independent business people. These categories of employment may be organized on a contract basis in order to avoid promises of future employment or the payment of fringe benefits. Nevertheless, such jobs deserve to be considered as part of the employment of the establishment at which work occurs -- but distinguishing the reality of self-employment or contract workers requires some probing on the degree of work autonomy experienced and the number of buyers of self-employment services.

5.2   Who Speaks for the Employer?

In a small business, the same person will be the Chief Executive Officer, Personnel Manager and Production Manager, and will be able to answer all manner of questions on the firm's operations. In larger firms where these are separate functions, there may be no single

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[14] For example, individual McDonald's franchises are owner-operated small businesses (some franchisees run several establishments) but the degree of centralized control and the development of industry-specific technology by the franchiser is legendary. Description and analysis of the economy at a point in time can proceed quite well on an establishment basis, but it will not be possible to understand technical change in the industry if each franchise is thought of as a stand-alone establishment. In the General Segmentation Survey, data matching was used to link establishments to firms and associated corporate enterprises - clearly Statistics Canada has an enormous advantage over academic researchers in this respect.

respondent who is optimal for all types of questions on firm decision making.[15] In very large firms or corporate enterprises, it may not be immediately obvious to an outsider who is the best person to answer a given question.

Although the issue is theoretically important and may be of greater difficulty for the corporate head offices of large corporate enterprises, my own experience is that management respondents at the establishment level know each other quite well and are often quite willing to cooperate.[16] Although a telephone or mail back survey runs substantial risks of non-response due to whatever immediate crisis occupies a manager's day, in a face-to-face interview, a call is usually made to "someone down the hall" if a line of questioning is more relevant for some other operational function.

5.3 Survey Administration

Some readers of Figure 1 may have noted that the 1,513 worker interviews in the General Segmentation Survey have been divided into 1,463 plus 50. This represents a practical example of the importance of mobility. Between the time when worker lists were obtained from firms and the time our telephone interviewers could reach individual worker respondents, 50 people had left their original employer. A list of employees provides an exact match between workers and firms, but only at an instant in time, since the constant mobility of workers creates an ever changing population at individual firms.[17]

A second practical difficulty in firm surveys is the high rate of birth and death of small businesses. Some establishments also have a constantly moving or "diffuse" work site (e.g., firms in construction or the taxi business). Some firms aggregate their record keeping on employees over a number of establishments.[18]

Administrative records (e.g. from Workmen's Compensation Boards) can help to maintain the completeness of a sampling frame of establishments. However between the

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[15] One can note that the same problem is present in household surveys, since husbands, wives and children have different perceptions and different sets of information.

[16] In practice, people who declare themselves to be very busy often end up talking for hours - my hunch is that many executives actually have very few sympathetic listeners interested in their decision making problems. However, this does underline the need to select interviewers whom corporate types will talk to.

[17] In surveys drawn from a sampling frame of residences, such as the Labour Force Survey, geographic mobility creates a similar turnover of the inhabitants of particular residences. In each monthly wave of the Labour Force Survey, the inhabitants of a particular residence are interviewed, whoever they might be, but one cannot proceed analogously in demand side labour data, since the practical reality of a "job" does not have the same concreteness as a residence.

[18] Millward (1993) notes as well that in a substantial minority of British organizations, there are separate payroll arrangements for different categories of employees, creating different data units for weekly paid manual employees, white collar staff or senior management. I have not observed this complication in Canadian data.

selection of the sampling frame and any initial contact with employers, some sample attrition will occur, particularly among small business. If the research strategy is to rely on worker lists obtained from employers as a sample frame for subsequent worker interviews, further attrition in the employee sample can be expected. A central statistical agency, such as Statistics Canada, has a degree of access to administrative records which is unavailable to individual academic researchers. However, for both types of researchers, the turnover of firms and the mobility of workers complicates considerably the sampling strategy for worker/firm matching.

5.4 Trade-offs in sample design

Given the available budget, there is an inevitable trade-off between the number of establishments and the number of workers at each establishment to be sampled. The use of a key informant research strategy (as in the U.K. or Australian Workplace Industrial Relations Surveys) can be seen as a limiting case in which several thousand establishments recovered, but only three or four respondents reply on behalf of each establishment.[19] For these surveys, the primary focus is the inter-establishment variation in industrial relations practices, and the presumption is that workplace industrial relations practices are characteristics of the workplace as a whole, and key informants can/will accurately report on them.

If, however, primary research interest lies in such issues as the use of technology by workers and the need for or pay-off to training, or analysis of the determinants of a core worker/contingent worker employment strategy, within establishment, variation becomes crucial to measure. For analysis of these issues, there is no option but to sacrifice some of the establishment sample size in order to maintain an adequate sampling rate of employees (in practice, the interview cost per employer, if done face to face, is much greater than the per interview cost of telephone surveys of workers).

A second major potential trade-off concerns confidentiality/data release and the specificity of financial information requested. In my own surveys of employers in 1979/81 and 1990/92, I found that we obtained excellent co-operation from employers, who were willing to discuss in some detail qualitative dimensions of labour market strategies. Respondents were willing to provide quantitative information on physical aspects of production (e.g. employment variability, capital stock, etc.) but we stayed away from asking for detailed sales numbers for profit and loss accounts, based on our perception that such financial data would be too sensitive to release.[20] Even if establishments were able and willing to provide financial accounting information, such data clearly increases the

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[19] The Australian Workplace Industrial Relations Survey had 2,353 responses from establishments and three or four respondents per establishment -- the British Workplace Industrial Relations Survey achieved just over 2,000 establishments in each of 1980, 1984 and 1990 -- with two or three respondents at each establishments.

[20] In 1979/81, we counted, instead, on obtaining financial information via the Dun and Bradstreet credit reference service -- a largely unsuccessful strategy, given the great unevenness of this data base.

confidentiality problems association with the public release of any matched employer/employee micro data set variant.

6. Conclusion

This paper is not alone in emphasizing the importance of demand side labour data for empirical labour economics and public policy formation (see also Hamermesh, 1990, 1994). The high quality and large volume of research results on the supply side behaviour of individuals has yielded important insights -- but these research results have also established the limits of what one can hope to explain, using data drawn only from the supply side of the labour market. Ultimately, it is demand <u>and</u> supply which determine the outcomes of market processes. Effective analysis of these processes requires information on <u>both</u> sides of the labour market.

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Appendix I
Aggregation and the Micro-economics of the Demand Side

As an example of the importance, for analysis and policy, of understanding the microeconomics of the demand side, consider the following example of the relationship between the average industry wage and employment. A macro economist who saw a time series of data on employment and wages such as that of Table 1 might well consider this to be an example of how variation in wage rates trace out the demand curve for labour.[21]

Estimating an equation of the general form of equation 1 with this data produces the estimated relationship summarized in equation 2.

[1] $\text{EMPLOYMENT} = b_o + b_1 (\text{WAGE}) + \Sigma_1$

[2] $\text{EMPLOYMENT} = 5345.1 - 309.65 (\text{WAGE})$
                           (71.52)   (5.31)

$R^2 = 0.9801$

N = 56   (standard error in parentheses)

Most (98%) of the variation in the data is explained by variation in the wage, and the wage paid is highly statistically significant (a t statistic of 58.3) and empirically large -- at the point of means, the wage elasticity of demand estimated from Table 1 is -3.54.

Since the most of the variation in employment is explained by movements in the average wage, and the estimated elasticity implies a change of 1% in wages cost induces a 3.5% change in employment levels, policy makers might well use econometric results such as those of equation 2 in thinking about appropriate policies to deal with unemployment. If the wage elasticity of labour demand is high, firms will generate more employment if governments cut indirect labour costs, such as unemployment insurance premiums or workers compensation contributions. In the 1994 Canadian budget, the federal government decided to forego 500 million dollars in annual unemployment insurance contributions, and justified that taxation decision by the assertion that indirect labour costs are the "silent killer of jobs" and that reducing unemployment insurance contributions by 0.3% of insurable earnings will create employment.[22]

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[21] To keep the example simple, we assume the supply side of the market to be fixed -- hence variations in employment are directly mirrored in unemployment.

[22] According to media reports of the House of Commons debates, the Minister asserted that 40,000 jobs would be created by keeping UI premiums at 3% of insurable earnings, rather than raising them to 3.3%.

Table 1

Time	Number of Workers	Average Industrial Wage ($) per hour
1	1050.0	13.81
2	1150.0	13.48
3	1300.0	13.07
4	1400.0	12.86
5	1250.0	13.20
6	1200.0	13.33
7	900.0	14.44
8	1050.0	13.81
9	1150.0	13.48
10	1300.0	13.07
11	1400.0	12.86
12	1250.0	13.20
13	1200.0	13.33
14	900.0	14.44
15	1050.0	13.81
16	1150.0	13.48
17	1300.0	13.07
18	1400.0	12.86
19	1250.0	13.20
20	1200.0	13.33
21	900.0	14.44
22	1050.0	13.81
23	1150.0	13.48
24	1300.0	13.07
25	1400.0	12.86
26	1250.0	13.20
27	1200.0	13.33
28	900.0	14.44
29	1050.0	13.81
30	1150.0	13.47
31	1300.0	13.07
32	1400.0	12.86
33	1250.0	13.20
34	1200.0	13.33
35	900.0	14.44
36	1050.0	13.81
37	1150.0	13.48
38	1300.0	13.07
39	1400.0	12.86
40	1250.0	13.20
41	1200.0	13.33
42	900.0	14.44
43	1050.0	13.81
44	1150.0	13.48
45	1300.0	13.07
46	1400.0	12.86
47	1250.0	13.20
48	1200.0	13.33
49	900.0	14.44
50	1050.0	13.81
51	1150.0	13.48
52	1300.0	13.07
53	1400.0	12.86
54	1250.0	13.20
55	1200.0	13.33
56	900.0	14.44

However, one might ask "given all of the other uncertainties of business, how many employers will actually be motivated to add workers in response to a 0.3% change in direct labour costs"?[23]

Since Table 1 is a made-up example, it is known that the true process underlying these aggregate numbers is based on a typical factory adding workers in shifts. The true micro-economics underlying this macro data is that each of 10 identical employers has 40 workers involved in administration, sales, product design etc., earning $20 per hour and 50 workers per shift employed in direct production at $10 per hour. [To make the example easy, it is assumed all employees work full-time]. The employment level and average wage cost of each establishment are described in Table 2. Table 1 was produced by assuming that 10 establishments in the market increase production in response to variations in product demand. Over time, aggregate employment changes are varying proportions of establishments add a second shift. (e.g. employment is 1,050 when three plants are on double shift operation while 7 are working single shifts, while 5 plants working double shifts and 5 working single shifts produces total employment of 1,150. Since the marginal workers being hired earn less than average workers' salaries, adding shifts of lower paid workers reduces the average wage paid in the industry -- in this example from $13.81 to $13.48 per hour).

TABLE 2

| Establishment | | | Average | |
Level	Labour Demand	Wage Bill	Employment	Hourly Wage
One Shift	40 @ $20 per hour	800		
Operation	50 @ $10 per hour	500		
	Total	**1,300**	**90**	**14.44**
Two Shifts	40 @ $20 per hour	800		
Operation	100 @ $ 10 per hour	1,000		
	Total	**1,800**	**140**	**12.85**

The microeconomics underlying Table 2 are that factories simply add shifts of workers when product demand warrants -- the demand for labour is directly derived from demand in product markets. The microeconomics underlying Table 1 is, therefore, a world in which the wage elasticity of labour demand at the firm level is 0. It follows, therefore, that the employment effect of decreasing indirect labour costs is also 0.

The aggregate data of Table 1 and the aggregate employment/wage relationship of equation 2 could also be generated by a number of identical firms all of whom made marginal changes to their employment levels in response to marginal changes in wages paid.[24] The point to emphasize is that one cannot, with aggregate

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[23] More precisely, the budget announced a 0.3% decline in labour costs for employees earning less than maximum insurable earnings -- the decline in unit labour costs for employees earning in excess of maximum insurable earnings is (maximum insurable earnings/actual earnings x 0.3%). Since maximum insurable earnings is reset each year at the previous year's average wage, the actual cut in average labour costs is approximately 0.15%.

[24] This is not the process that actually generated the numbers contained in Table 1, but if 10 firms all hired identical workers and their marginal product of labour schedule was $MP_L = 17.26 - .03225\ L$, one would get about the same aggregate numbers as Table 1.

macro data on industry performance, distinguish that hypothesis from the microeconomics of employment creation as summarized in Table 2 -- but the policy implications of the two scenarios are <u>very</u> different. If employers just add shifts of (lower-paid) workers when demand warrants, there is <u>no</u> gain in increased employment to cutting indirect labour costs. The government of Canada has demonstrated its willingness to spend $500 million in foregone tax revenue, on the basis of a presumption about the wage elasticity of labour demand -- perhaps it would be useful to spend some fraction of that amount on examining the underlying microeconomics of firm behaviour.