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In Honor of David Card: Winner of the John Bates Clark Medal

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David Card is the 1995 recipient of the John Bates Clark Medal, which the American Economic Association awards every two years to an outstanding economist under the age of 40. David is an empiricist par excellence, who has generated important and, in some instances, controversial findings on major issues relating to the labor market and public policy. David has increased our knowledge of the economy and economics in areas ranging from the intertemporal life-cycle model to wage indexation clauses in collective bargaining contracts to the effects of school resources on earnings to the employment of minimum wage workers.

David obtained his B.A. from Queen's University in Canada and his Ph.D. from Princeton. Most of his professional career has been spent at Princeton, where he has helped make the Industrial Relations Section one of the leading research centers in empirical economics and a fountainhead of intellectual excitement. While David has taught in the United States and works on many issues relating to the American job market, he is a native Canadian who also analyses Canadian economic issues and often contrasts developments in the two economies.

If one unifying principle runs through David Card's work, it is a belief in the power of empirical economic science—in the ability to use statistics creatively to make inferences about how the economy operates. The best way to appreciate the skill with which David explores empirical evidence is to do one thing before you read one of his papers: take the topic he is investigating, and ask yourself how you

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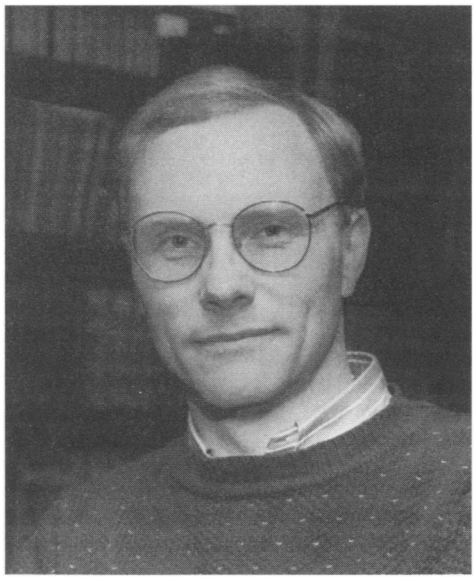
would go about providing evidence on it. Then look and see what he did. In many cases, you would not have thought of using the particular body of data in the way David has used it, though in retrospect it will seem obvious that this data is the right one for illuminating the issue and that David's treatment of it is just right.

David's work is characterized by innovative empirical scholarship of the highest quality. Modern computerized data sets contain hundreds or thousands or even hundreds of thousands of observations, so there is great scope to poke and probe interpretations in ways that were impossible in the not-so-distant past. David attacks such data with the appropriate battery of econometric artillery. He identifies new sources of exogenous variation in key variables and exploits this variation artfully. By finding a plausible source of unanticipated or exogenous change in economic incentives—a "natural experiment"—he obtains more convincing results than is possible from structural models that seek to parse supply and demand or other forms of behavior absent clear-cut unanticipated variation in variables and that offer little possibility to test the postulated structure. David reports his results in an objective manner that resembles a laboratory scientist reporting an experiment, giving the findings and the statistical or interpretative problems that he could not fully address. The weight and persuasiveness of the argument is in the evidence and in his artful treatment thereof, not in the rhetoric.

Because David's approach to economics is so data-based, and because he has an extraordinary ability to find and to analyze the appropriate data for particular problems, you probably would not want him to defend you in court if there were incriminating evidence against you. But you would want him to investigate the burglary of your home. The true empiricist is, after all, not a lawyer arguing skillfully for his client (or a particular model of reality), but a detective searching for and assessing evidence. The achievement of David (and his peers and students) is to have exploited modern computer-based technology to develop a micro-based empiricism that has more authority than earlier empirical work. As a leader and exemplar of this new empiricism, David has influenced both the approaches taken and topics studied. The issues David investigates lie at the heart of labor economics, but the new empiricism that he exemplifies applies to other areas of economics as well. That the profession has given the Clark Medal to an economist who believes first and foremost in the evidence shows how highly we value the difficult process of drawing inferences from data and how much we appreciate convincing empirical studies, even if some findings sometimes challenge our own strongly held beliefs.

Issues and Findings

Recognizing that some economists are not as deeply interested in the labor market issues on which David works as they should be, and that others are more into developing theories of how the world works than putting those theories to tests (you don't know what fun you are missing!), I provide a tour of what David has done on a variety of topics. This will include works specifically cited in the citation



David E. Card

of the Clark Medal award—like his 1990 paper on real wages and employment determination under collective bargaining contracts [16], and his work on the minimum wage—as well as other studies that could easily have been cited as well.

Table 1 chronologically summarizes David's papers. As is conventional for papers of this sort in this journal, all citations to Card's work will be by number to the works listed in Table 1. It will become apparent that papers of the same topic often attack a question from different vantage points and with different data. If this produces qualitatively different results, David so reports. There is no theological "defending the faith" or protecting some Holy Grail economic model, whatever that may be, in this body of work.

Intertemporal Labor Supply

The study of intertemporal labor supply analyzes how individuals allocate their time over the life cycle in response to pecuniary incentives. To many economists, this theory offers an attractive explanation of a host of labor supply phenomenon, including cross-section or cohort changes in time worked with age, the secular trend toward less time worked, and life-cycle changes in hours worked. Perhaps the most controversial claim about this theory is that it offers a useful framework for explaining movements of aggregate unemployment over the business cycle.

Whatever one's priors about the relevance of intertemporal labor supply theory to observable behavior, the appropriate way to address the theory is through evidence. David's first published paper [1] (joint with Orley Ashenfelter) examined the intertemporal labor supply model with time series data and concluded that the

theory did not adequately explain changes in person-hours worked over the business cycle. In work with John Abowd [9; 12], David found that changes in earnings and hours among individuals was similarly related in several micro data sets and gave a modestly more favorable report on the life-cycle model.

David's 1994 assessment of the status of empirical work on intertemporal supply [29] draws on and updates his earlier studies and the work of other economists who have explored the life-cycle model. In this and other papers that "test theory," David explicates a simple version of the theory focused on its empirical implications, then presents some facts that the theory should readily explain, and goes on to explore the more complex and subtle relations in the data that the theory suggests. In particular, this deeper level of exploration enters the world of empirical detail, not your father's world of "stylized facts."

Looking at hours worked in a cross-section, David notes that between the ages 30 and 50, wage profiles rise greatly for college graduates but not for less-educated workers. Assuming similar taste parameters by education, these differences in wage patterns should have produced a rising profile of hours worked for college graduates relative to high school graduates. But hours profiles are similar. This does not "disprove" (whatever that may mean) the life-cycle model but surely shows its limitations; or as David [29] puts it: "To explain these data with a simple life-cycle model requires a fairly elaborate set of taste parameters."

David further notes that more-educated groups of workers and those in high-paying occupations work more over their lifetime than other workers, which raises questions about the conventional view that income effects due to higher lifetime wages explain the secular drop in time worked. With respect to cyclical changes in employment, the usual assumption is that lifetime income or wealth is constant and that individuals respond to changes in wages via substitution effects. Since real wages change little over the business cycle, the life-cycle model needs high elasticities of intertemporal substitution to account for the cyclical variability in employment. David uses estimated intertemporal elasticities to show that while the life-cycle model worked well during the 1975–1987 period, it did not do so in earlier periods, and he points out that because real wages declined for many workers in 1975–1987, there may have been important unexamined wealth effects in that period as well as intertemporal substitution. Turning to individuals, David notes that hours worked vary far too much among individuals to be explained by estimated intertemporal substitution elasticities and that "as it stands, the life-cycle model provides essentially no insight into the year-to-year variation in individual variations."

The bottom line is a negative report on the ability of the life-cycle labor supply model to shed light on many of the empirical issues that it addresses. One possible response to the failure of the model to pass muster would be to throw one's hands in the air: economics is too tough; theory is too complex; and the data are too imperfect for us to truly test anything, so perhaps we should back off from the evidence and pursue some other research strategy, like calibrating simulations to stylized facts. Another response might be to cheer the inconsistencies between the

Table 1
Books and Papers

Books

B1. *Small Differences that Matter: Labor Markets and Income Maintenance in Canada and the United States* (edited with Richard B. Freeman). Chicago: University of Chicago Press, 1993.

B2. *Myth and Measurement: The New Economics of the Minimum Wage* (with Alan B. Krueger). Princeton: Princeton University Press, 1995.

Papers

1. "Time Series Representation of Economic Variables and Alternative Models of the Labour Market" (with Orley Ashenfelter), *Review of Economic Studies,* September 1982, *49*:5, 761–81.
2. "Cost of Living Escalators in Major Union Contracts," *Industrial and Labor Relations Review,* October 1983, *37,* 34–48.
3. "Microeconomic Models of Wage Indexation," *Proceedings of the 37th Annual Meeting of the Industrial Relations Research Association,* December 1984, 404–12.
4. "Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs" (with Orley Ashenfelter), *Review of Economics and Statistics,* November 1985, *67,* 648–60.
5. "An Empirical Model of Wage Indexation Provisions in Union Contracts," *Journal of Political Economy,* June 1986, *94,* S144–75.
6. "Why Have Unemployment Rates in Canada and the United States Diverged?" (with Orley Ashenfelter), *Economica,* Supplement 1986, *53,* S171–95.
7. "The Impact of Deregulation on the Employment and Wages of Airline Mechanics," *Industrial and Labor Relations Review,* July 1986, *39,* 527–38.
8. "Efficient Contracts with Costly Adjustment: Short Run Employment Determination for Airline Mechanics," *American Economic Review,* December 1986, *76,* 1045–71.
9. "Intertemporal Labor Supply and Long Term Employment Contracts" (with John Abowd), *American Economic Review,* March 1987, *77,* 50–68.
10. "Longitudinal Analysis of Strike Activity," *Journal of Labor Economics,* April 1988, *6,* 147–76.
11. "Measuring the Effect of Subsidized Training Programs on Movements In and Out of Employment" (with Daniel Sullivan), *Econometrica,* May 1988, *56,* 497–530.
12. "On the Covariance Structure of Earnings and Hours Changes" (with John Abowd), *Econometrica,* March 1989, *57,* 411–45.
13. "The Impact of the Mariel Boatlift on the Miami Labor Market," *Industrial and Labor Relations Review,* January 1990, *43,* 245–57.
14. "Strikes and Bargaining: A Survey of the Recent Empirical Literature," *American Economic Review,* May 1990, *80,* 410–15.
15. "Strikes and Wages: A Test of an Asymmetric Information Model," *Quarterly Journal of Economics,* August 1990, *105,* 625–59.
16. "Unexpected Inflation, Real Wages, and Employment Determination in Union Contracts," *American Economic Review,* September 1990, *80,* 669–88.
17. "Labor Supply with a Minimum Hours Threshold," *Carnegie Rochester Conference on Public Policy,* Autumn 1990, *33,* 137–68.
18. "Minimum Wages and the Teenage Labor Market: A Case Study of California, 1987–89," *Proceedings of the 43rd Annual Meeting of the Industrial Relations Research Association,* December 1990, 234–42.
19. "The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives" (with Joseph Altonji). In Abowd, John, and Richard B. Freeman, eds., *Immigration, Trade and Labor.* Chicago: University of Chicago Press, 1991, pp. 201–34.
20. "Immigration and Wages: Evidence from the 1980s" (with Kristin Butcher), *American Economic Review,* May 1991, *81,* 292–96.
21. "Recent Trends in Insured and Uninsured Unemployment: Is There an Explanation?" (with Rebecca Blank), *Quarterly Journal of Economics,* November 1991, *106,* 1157–89.
22. "School Quality and Black-White Relative Earnings: A Direct Assessment" (with Alan Krueger), *Quarterly Journal of Economics,* February 1992, *107,* 151–200.
23. "Does School Quality Matter: Returns to Education and the Characteristics of Public Schools in the United States" (with Alan Krueger), *Journal of Political Economy,* February 1992, *100,* 1–40.

Table 1—continued

24. "Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage," *Industrial and Labor Relations Review,* October 1992, *46,* 22–37.
25. "Do Minimum Wages Reduce Employment? A Case Study of California, 1987–89," *Industrial and Labor Relations Review,* October 1992, *46,* 38–54.
26. "A Comparative Analysis of Unemployment in the United States and Canada" (with W. Craig Riddell). In Card, David, and Richard B. Freeman, eds., *Small Differences that Matter: Labor Markets and Income Maintenance in Canada and the United States.* Chicago: University of Chicago Press, 1993, pp. 149–89.
27. "Trends in Relative Black-White Earnings Revisited" (with Alan Krueger), *American Economic Review,* May 1993, *83*:2, 85–91.
28. "Poverty, Income Distribution, and Growth: Are They Still Connected?" (with Rebecca Blank), *Brookings Papers on Economic Activity,* Fall 1993, *2,* 285–325.
29. "Intertemporal Labor Supply: An Assessment." In Sims, Christopher, ed., *Advances in Econometrics, Sixth World Congress.* New York: Cambridge University Press, 1994, pp. 49–78.
30. "Small Differences that Matter: Canada Versus the United States" (with Richard B. Freeman). In Freeman, Richard B., ed., *Working Under Different Rules.* New York: Russell Sage Foundation, 1994, pp. 693–95.
31. "Unemployment Insurance Taxes and the Cyclical Properties of Employment and Unemployment" (with Phillip Levine), *Journal of Public Economics,* January 1994, *53,* 1–29.
32. "An Evaluation of Recent Evidence on the Employment Effects of Minimum and Subminimum Wages" (with Lawrence F. Katz and Alan B. Krueger), *Industrial and Labor Relations Review,* April 1994, *47*:3, 487–96.
33. "Changing Wage Structure and Black-White Wage Differentials" (with Thomas Lemieux), *American Economic Review,* May 1994, *84,* 29–33.
34. "Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania" (with Alan Krueger), *American Economic Review,* September 1994, *84,* 772–93.
35. "Using Geographic Variation in College Proximity to Estimate the Return to Schooling." In Christofides, L. N., E. K. Grant, and R. Swidinsky, eds., *Aspects of Labour Market Behavior: Essays in Honour of John Vanderkamp.* Toronto: University of Toronto Press, 1995, pp. 201–22.
36. "The Economic Return to School Quality: A Partial Survey" (with Alan Krueger). In Baumol, William, and William E. Becker, eds., *Assessing Educational Practices: The Contribution of Economics.* Cambridge, Mass.: Massachusetts Institute of Technology Press, 1995, pp. 161–83.
37. "Earnings, Schooling, and Ability Revisited," *Research in Labor Economics,* 1995, *14,* 23–48.
38. "Bargaining Power, Strike Durations, and Wage Outcomes: An Analysis of Strikes in the 1880s" (with Craig Olson), *Journal of Labor Economics,* January 1995, *13,* 32–61.
39. "Unemployment in Canada and the United States: A Further Analysis" (with W. Craig Riddell). Princeton University Industrial Relations Section Working Paper No. 352, November 1995.
40. "Labor Market Effects of School Quality: Theory and Evidence" (with Alan B. Krueger). In Burtless, Gary, ed., *Does Money Matter? The Link Between Schools, Student Achievement and Adult Success.* Washington, D.C.: Brookings Institution, 1996, pp. 97–140.
41. "Changes in the Relative Structure of Wages and Employment: A Comparison of the United States, Canada, and France" (with Francis Kramarz and Thomas Lemieux). NBER Working Paper No. 5487, March 1, 1996.
42. "Does Inflation Grease the Wheels of the Labor Market?" (with Dean Hyslop). NBER Working Paper No. 5538, April 1, 1996.
43. "The Effect of Unions on the Structure of Wages: A Longitudinal Analysis," *Econometrica,* July 1996, *64,* 957–79.
44. "Is Workers' Compensation Covering Uninsured Medical Costs? Evidence from the 'Monday Effect' " (with Brian P. McCall), *Industrial and Labor Relations Review,* July 1996, *49,* 690–706.
45. "Deregulation and Labor Earnings in the Airline Industry." NBER Working Paper No. 5687, July 1, 1996.
46. "Do Financial Incentives Encourage Welfare Recipients to Work? Evidence from a Randomized Evaluation of the Self-Sufficiency Project" (with Philip K. Robins). NBER Working Paper No. 5701, August 1996.
47. "School Resources and Student Outcomes: An Overview of the Literature and New Evidence from North and South Carolina" (with Alan B. Krueger), *Journal of Economic Perspectives,* Fall 1996, *10*:4, 31–50.
48. "Wage Dispersion, Returns to Skill, and Black-White Wage Differentials" (with Thomas Lemieux), *Journal of Econometrics,* October 1996, *74,* 319–61.

model and the facts: rational maximizing models are too simple to fit a world of heterogenous individuals subject to diverse social influences and changing tastes: perhaps we should back off from using the model and pursue some other strategy, like exploring the psychology of behavior in greater depth.

David follows neither of these directions. He suggests two roads to pursue in illuminating labor supply issues: to examine the possibility that short-run real wage changes alter anticipated lifetime profiles (and thus have income effects as well as substitution effects), and, more radically, to reconsider the notion that hours are determined by the individuals independent of employer demand conditions. My guess is that David prefers the latter approach, but he does not shortchange the former: the empiricist's approach is to give a fair shake to alternative plausible possibilities even if they do not accord with one's own predilections.

Collective Bargaining

Although union density has fallen in the United States in the past 30 or so years, much can be learned about economic behavior from analyzing the outcomes of collective bargaining. Moreover, union density has remained roughly constant in Canada, so that collective bargaining remains a central mode of establishing pay and employment in that economy.

David's first paper on collective contracts examined cost-of-living escalators in Canadian union contracts [2]. He characterized the often complex COLA clauses in terms of a single statistic, the marginal elasticity of the contract wage rate to increases in prices, and he found wide differences in these elasticities by industry. He then found that this marginal elasticity was higher in industries whose prices are more closely linked to inflation [5].

The most important paper in this line of work, however, takes an entirely different tack. This is David's 1990 paper on employment determination in union contracts, referred to earlier. Here [16], he exploited the incomplete indexation of contracts across bargaining pairs to estimate the effect on employment of an exogenous shock in real wages due to inflation. Note the twist in the research strategy: you start off trying to explain the pattern of indexation, find that incomplete indexation differs among bargaining pairs, which implies that inflation has different effects on real wages in different union contracts, then shift focus to exploit the unanticipated change in real wages due to inflation to learn something about the labor demand curve. An ordinary least squares regression of the change in employment on the change in real wage in contracts gives slight and rarely significant coefficients. But an instrumental variable estimate based on the unanticipated change in real wages due to inflation has an elasticity of -.40 to -.60.

In 1978, the United States deregulated its airline industry, which provided an opportunity to learn how collective bargaining responds to an erosion in the market power of firms and unions. David studied the employment and wages of airline employees, particularly mechanics, in the wake of deregulation. Some economists may find it strange to focus on such a small group of workers rather than studying the forces that affect employment and wages in the economy writ large. But the

micro-empiricists' view is that there is much to be learned in the small: analyzing how markets for well-defined groups react to exogenous shocks—be they hamburger flippers in New Jersey, airline mechanics at United, residents in Miami, or California teenagers (to pick some of the groups David has examined)—can illuminate how the economy operates. If economists cannot provide insights into such well-defined economic situations, we are in grave trouble.

David's first airline employees paper [7] tracked the wages and employment of mechanics at nine different trunk lines from 1966 to 1985. He found declines in the employment of mechanics at the major trunk lines consonant with the decline in their company's share of industry output, but found only modest declines in the wages of mechanics. In a second paper [8] examining the timing between the change in output and employment and relation between employment changes and wage changes, he found little evidence for an efficient contract model (in which wages at a firm have no effect on employment) or for a standard labor demand curve and reported, "The covariation of employment and wages in this data remains largely unexplained." The most recent paper in this area [45] used microdata from the 1980 and 1990 Censuses of Population, union contract data and displaced worker surveys to see how deregulation affected the labor earnings of various groups of airline workers, including mechanics. The results show that airline employees, union as well as nonunion, earned about 10 percent above market rates when the industry was regulated, which disappeared with deregulation. Most economists would expect a drop in the relative pay of organized workers with a loss of market power, but not a fall in the pay of nonorganized groups. The similarity in the relative wage decline across groups after deregulation is consistent with a rent-sharing view of the industrial wage structure in which large industry pay differentials are due in part to profitable sectors or firms rewarding employees for reasons that remain unclear in standard models.

Strikes

If workers and firms have identical information about the world, they should have the same expectations about the outcome of a strike, obviating the need to strike. Strikes would then show little or no pattern and be caused largely by random error. But in fact strikes show patterns that cry out for explanation, implying that some form of imperfect information or irrationality is a necessary ingredient for an explanation. David's first work in this area [10] adds to the strike puzzle. He confirmed a strong seasonal effect in strikes between the same bargaining pairs—strikes are more likely in the summer and fall than in the winter and spring—which raises the question of why negotiators schedule expirations in months where the strike probability is high.

He found other characteristics of contracts that also affect strikes: time since the last negotiation and limited reopening clauses. He documented that short strikes increase the probability of future strikes, while long strikes reduce the probability of future strikes. One interpretation of this is that unions are more likely to win short strikes, while long strikes are more often disastrous for them, altering

worker perceptions of the value of strikes. In a 1995 paper [38], David and Craig Olson exploited the fact that in the 1880s the Bureau of Labor Statistics denoted winners and losers in strikes to show that in fact unions won significant wage gains or hours cuts after short strikes but suffered losses in long strikes.

Efforts to explain the observed patterns in strikes focus on asymmetric information models that assume the firm knows its own profitability but that the union does not. In such models, the strike is a way for the union to obtain information about profitability and thus win a share of an uncertain surplus. David's 1990 paper on strikes and wages [15] tests this theory by examining changes in wages and in the probability of strikes using Canadian collective bargaining contract and strike data. As in his other "test theory" papers, David develops the theory in ways that highlight testable implications: in this case, that the expected profitability in a sector raises wages and reduces the chance of a strike; that better employment opportunities for workers raise wages and the chance of a strike; and that longer strikes are associated with lower wage settlements. By looking at how changes in industry prices or area unemployment (which presumably underlie expected profitability and employment opportunities) affect wages and strikes together, David gives a more complete test of theory than if he had focused on a single outcome variable. In addition, he examines changes in wages or strike probabilities for specific bargaining pairs, thereby differencing out any permanent wage or strike effect for a particular firm-union pair. This eliminates the danger that any observed empirical relation reflects heterogeneity in the underlying population. He finds that unemployment lowers pay and reduces strike probabilities and that higher industry prices raise pay, as expected, but also that higher prices are associated with more rather than fewer strikes; and that strike incidence and duration are connected to wages in ways inconsistent with the theory. Since the notion that increased surpluses (measured by increased industry prices) should lead to fewer strikes is common to any joint-cost model of strikes, finding the opposite makes it clear that our best strike models fall short in an important way. David suggests that a model that assumes asymmetries in information on both sides of the bargaining table might better fit the evidence.

Unemployment

There are several ways to investigate unemployment, ranging from abstract theory about whether it does or does not "really" exist to time series analyses of "natural" rates to studies of the characteristics of the unemployed. David has focused on a particular fact about unemployment rates—the increase in rates in Canada relative to the United States—and sought an explanation for this puzzle.

His 1986 paper with Ashenfelter [6] on why Canadian and U.S. unemployment rates diverged came up with largely negative findings. The time series evidence rejects simple explanations of the difference in unemployment rates in terms of minimum wages, unionization, output gaps, unemployment benefits, or divergent real wage trends. However, ensuing papers with Craig Riddell [26; 39] use micro data to go a long way toward answering the question in a surprising way. The first Card-Riddell paper [26] was delivered at an NBER Conference on differences

between the U.S. and Canadian economies in Ottowa, which David and I jointly organized. It was, I recall, the last paper to arrive at the conference, with coffee-stained computer prints dated a night or two before.[1]

Card and Riddell [26] show that much of the rise in Canadian unemployment is due to an increase in the proportion of persons without jobs who report themselves unemployed rather than to a decrease in employment. They attribute much of this to Canada's unemployment insurance system. Because Canadians become eligible for unemployment insurance with only 10–14 weeks of work, a sizable number of workers work the 10–14 weeks necessary for eligibility and then become unemployed for part of the year. During the period when U.S. and Canadian unemployment rates diverged, the relative number of Canadian unemployed workers on unemployment insurance increased to approximately 100 percent in Canada while the comparable ratio fell to 29 percent in the United States. The literature on unemployment insurance is dominated by studies that estimate the extent to which such insurance lengthens spells of unemployment (which it surely does). Card and Riddell show that unemployment insurance also has an important "entitlement effect," which leads to increased labor force attachment and employment. This effect, not the duration effect, accounts for much of the U.S.-Canadian difference in unemployment.

If the primary difference between U.S. and Canadian unemployment rates is that Canadians make greater use of unemployment insurance, the question arises next as to why they do that. One reason is that more of the unemployed are eligible for unemployment insurance under the Canadian system. But another reason is that in the United States, the proportion of unemployed Americans eligible for unemployment insurance who take up their benefits has trended downward, a development that David and Rebecca Blank explored in a 1991 paper [21]. About 75 percent of the eligible insured unemployed took unemployment insurance benefits in 1977, but only 66 percent of the eligible unemployed took such insurance in 1987. Part of this decline is due to the shift of employment and unemployment to southern and western states, where for various reasons (low unemployment insurance benefits, low unionization), take-up rates are low. Part of the decline, however, remains unexplained.

Immigration

David has focused on the responsiveness of the wages and employment of the existing workforce when an exogenous flow of immigrants augments the labor supply.

David's first analysis of this issue (written with Joseph Altonji) [19] contrasted

[1] Ever since, I have opposed penalties for late papers on the thought that if someone works long into the night pursuing an important finding, as in this case, they should be rewarded for failing to meet a grade-school type deadline, not penalized. Better to push on the frontier of knowledge until the last conceivable moment than to stop before you feel you've got the answer. Of course, not every late paper contains new nuggets of insight!

change in wages among metropolitan areas subject to more or less immigration using the 1970 and 1980 Censuses of Population. This paper delineates the market model for linking immigration to wages and employment in a particularly incisive way that has made the paper a favorite on graduate reading lists. As with most other studies that use cross-area variation in immigrant supplies to examine effects on natives, this study found little adverse effect of immigrants on potential native substitutes.[2]

David's second paper on immigration (which was published before [19]) was the Mariel boat lift paper [13], which is an exemplar of how to illuminate an issue by finding an appropriate "natural experiment." From May to September 1980, some 125,000 Cubans arrived in Miami in a flotilla of private boats, augmenting the area's labor force by roughly 7 percent. Using CPS files for the Miami area, David compared wages and employment of the low-skilled Miami workers likely to be most harmed by this change in supply before and after the boat lift, relative to changes in wages and employment for similar workers in four comparison cities. He found that the Mariel immigration had essentially no effect on the wages or employment of other workers in the labor market. Why? One possibility is that the new immigrants displaced other workers who would have migrated to Miami absent the boatlift; in fact, the population of Miami did not increase any more than was expected prior to the boatlift. Another possibility is that the jobs the immigrants filled complemented the work of even low-skilled Americans: Miami has an industry structure well suited to make use of unskilled labor, for instance in the apparel industry. Perhaps the relevant demand curves in those open economy sectors are highly elastic, requiring virtually no change in wages to absorb the influx of workers. The third paper (with Kristin Butcher) on immigration [20] used CPS data to examine the effect of immigration flows on the change in wages of persons in the lowest decile of earnings among major cities. Here, also, the analysis did not find a large or statistically significant effect of immigrant flows on the economic position of natives.

Overall, David's work on the effects of immigration on the labor market confirms that there is little or no difference in native wages or employment across areas subject to greater or lesser immigration flows. The Mariel study makes the point in an especially memorable way.

Minimum Wage

The issue of how much increases in the minimum wage affect employment is a long-standing one in economic analysis. Professional priors on the issue are clear: nearly everyone expects some adverse effect, though there is no consensus prior

[2] This is true, except in some instrumental variable calculations that Card and Altonji present but do not stress much, presumably because they had no really good "exogenous" immigration shock on which to base their instrumental variable estimates.

on the magnitude of the effects. Few economists put much faith in the possibility that increases in the minimum raise employment, though we have monopsony models that predict such an outcome for certain imposed wage increases, which can be grounded on recruitment costs and turnover that many believe to be important. When David gave his first paper on the minimum wage [18] and reported that the employment rates of teenage workers in California rose in the wake of the July 1988 increase in the state's minimum wage, I was probably not alone in being highly skeptical of the results. After all, California is weird; teenagers put beans in their ears or worse; and state CPS files are subject to sampling problems. Rather than regarding this result as a fluke and rejecting the monopsony interpretation out of hand, David, ever the empiricist, began to look for other evidence on the response of employment in low-wage labor markets to changes in the minimum wage.

Expanding on the California result, he examined the effect of the 1990 increase in the federal minimum on teenage wages and employment across the country by comparing states in which the federal minimum had considerable bite on teenage labor with states in which it did not [24]. The rise in the minimum raised teenage wages markedly in low-wage states but had no apparent effect on employment or school enrollment patterns. California might be odd, but all of America?

Perhaps the most convincing work in the minimum area—and certainly the easiest to explain to your relatives—focuses on particular sectors likely to be greatly affected by the minimum, such as the fast-food industry. Building on an earlier literature that explored the effects of the minimum by comparing employment in sectors more and less affected by the minimum (southern sawmills, for instance), David and Alan Krueger developed new data on employment in fast-food stores before and after the 1992 increase in the New Jersey minimum [34] and contrasted employment changes in those stores with employment changes in stores in neighboring Pennsylvania, which did not increase its minimum. They found that employment in comparable minimum wage jobs did not fall in New Jersey relative to Pennsylvania despite the increased wage cost. This is one of the best-known empirical studies in labor economics today. I do not exaggerate by reporting that in any country that considers changing its minimum wage, someone is sure to ask about those New Jersey hamburger flippers.

One reason for the attention given to area studies of changes in minimum wages is that they use a transparent scientific methodology. First, you show that the wages of low-paid workers subject to the new minimum in fact increased. Then you examine employment of affected groups before and after the increase. Next, you find a "control group": workers in that area unaffected by the minimum or workers in a neighboring area where the minimum did not increase and compare changes in employment. The difference in differences in employment—the change in employment for the affected group minus the change in employment for the nonaffected group—measures the potential effect of the change in the minimum.

As most readers undoubtedly know, this work has been criticized in various ways. David Card and Alan Krueger's book *Myth and Measurement: The New Economics*

of the Minimum Wage [B2], which brought their results together, caused considerable controversy not only in the profession but outside, as well. Some economists, myself included, lauded the book for its careful empiricism, while others criticized it in a special symposium published in the July 1995 *Industrial and Labor Relations Review.* What has come from this debate? My assessment is that the Card-Krueger work is essentially correct: the minimum wage at levels observed in the United States has little or no adverse effect on employment. At the minimum, the book changed the burden of proof in debates over the minimum, from those who stressed the potential distributional benefits of the minimum to those who stress the potential employment losses.

The Effect of School Resources

Schools matter in educational outcomes—test scores vary considerably by school even after accounting for differences in student backgrounds—but it is difficult to determine which inputs make schools matter, at least in the range of variation in resources in the United States today. Some studies find that more spending per pupil, say due to cuts in class sizes, improve student test scores. But others find that conditional on family background, neighborhood characteristics and the like, spending does not matter in test scores. As economists, we are largely interested in the effects of school resources on the earnings of students later in life rather than on test scores per se. But given the long time lag between the resources spent on, say, elementary schooling and labor market earnings, the weak link between school resources and test scores, and the weak link between test scores and earnings, determining whether additional school resources pay off in increased earnings is a daunting task.

In an exciting set of papers, David and Alan Krueger have sought to crack this difficult empirical problem by linking educational resources in a state when a worker was in school to earnings in later life. Consider the earnings of workers educated in a state that spends a lot on schooling and the earnings of workers in a state that spends little. All else the same, if school resources raise earnings in later life, the wages of a more-educated worker ought to exceed those of a less-educated worker in the high-spending state than in the low-spending state. The problem is to parse the data so that all else *is* the same. Since differences in earnings by education will vary with labor market conditions, one problem is to differentiate the effect of school resources in a state from state labor market conditions. Another problem is to differentiate between the effects of school resources and the effects of simply being brought up in a state: it isn't the New York city schools that make New York youngsters so worldly wise.

David and Alan's solution is to compare earnings differentials by education among persons working in the same labor market but educated in states with different resources to schooling. Assume a world where the residents of Iowa and Montana migrate to New York, and where Iowa spends more resources on education than does Montana. Now compare the ratio of the wages of high school to grade school graduates from Iowa and Montana working in New York. If the additional

Iowa school resources have a positive payoff on the return to schooling, the high school/grade school wage ratio will be higher among Iowans than among Montanans. This procedure controls for pure state-of-birth effects on earnings and state-of-residence labor market effects on earnings. It is not a perfect estimate. One problem is a potential selectivity bias in cross-state migration: migrants to New York are unlikely to be randomly chosen from the relevant high school and grade school populations. If, for example, only Montanans who obtain Iowa-level skills in high school migrate to New York, estimates of the effect of schooling on earnings using this procedure will understate the school resource effect.

To undertake such an analysis requires large data sets: with just a few thousand observations, there would be far too few Montanans and Iowans working in New York to yield reliable conclusions. In [23], David and Alan use 1,018,477 individual observations on white men in the 1980 Census to estimate the effect of school resources and find a substantial difference in earnings by education in response to differences in pupil-teacher ratios at the state level. In [22], they use observations on 728,284 individuals in the 1960, 1970 and 1980 Censuses to examine differences in the earnings of blacks and whites educated in the South with very different resources. They find that about 20 percent of the narrowing of the black-white earnings gap between 1960 and 1980 was due to improvements in the quality of black schools in earlier years. In [47] they show that gaps in earnings and education by race mirror gaps in school resources in the Carolinas: there is something to learn from southern states as well as from New Jersey.

Potential problems remain with the use of state data on schooling and Census of Population data on migrant earnings—the measures of school quality, their effect on the level of schooling, and so on—which David and Alan recognize [40]. These problems have generated a host of further studies, some supportive and some critical. That the massive differences in the educational resources given to black and white children in the old South substantially affected the future earnings of the two groups is the strongest empirical finding in this work. The more controversial findings on the effects of the moderate (though still noticeable) differences in school spending on earnings provide a strong antidote to the claims that school spending simply doesn't matter.

Social Programs and Outcomes

No one seems to obtain a Ph.D. from Princeton in labor economics without examining training or social programs using administrative or experimental data. David's first paper on social programs (written jointly with Orley Ashenfelter) [4] contrasted the longitudinal structure of the earnings of Comprehensive Employment and Training Act trainees using administrative data with the earnings of a control group using Current Population Survey files. This paper showed that analysts must consider the permanent, transitory and trend changes in earnings of the two groups to make sensible inferences, and it concluded that there was strong evidence that CETA training benefited women but not men. In [11], David (with Dan Sullivan) reported positive effects of CETA participation on employment,

which were larger for classroom than on-the-job training. In both of the CETA papers, David and his coauthors use several overidentified models to fit the data and to assess the effects of the programs. This approach is probably about the best that one can do with nonexperimental data, and it may also be needed in the imperfect experimental data that even our best training experiments generate.

David has also examined the economic effects of four other social programs: unemployment insurance taxes (with Philip Levine) [31], workers' compensation (with Brian McCall) [44], the 1964 Civil Rights Act (with Alan Krueger) [27] and an earnings subsidy program, the Self-Sufficiency Project, in Canada (with Philip Robins) [46]. In the unemployment insurance paper [31], data on unemployment insurance tax costs for firms in five major industries in 36 states is combined with CPS data (a characteristic of a Card analysis) on temporary layoffs to discover that experience rating has a substantial effect on the probability of layoffs. Persons who worry about the unintended consequences of incomplete experience rating on layoffs will find this paper to their liking. In the workers' compensation paper [44], Card and McCall use a 10 percent random sample of first reports of injuries filed with the Minnesota Department of Labor and Industry to test the popular claim that workers fraudulently report injuries incurred at home as occurring on the job on Mondays. Card and McCall show that the proportion of injuries disputed by employers are no different on Mondays than on other days, and the proportion does not differ between workers with and without medical coverage. Persons who believe that fraud is rampant in social programs will not like this paper. In [27], Card and Krueger use Social Security earnings data to follow cohorts before and after 1964 to see if the 1964 Civil Rights Act affected racial differences in earnings. They contrasted median black workers with 25th percentile white workers as a crude adjustment for the possibility that any improvement in relative black earnings might simply be reflecting compression of the overall wage structure that would benefit the average black more than the average white. Persons who believe that antidiscrimination programs are unimportant in improving the black economic position will not like their conclusion that in fact the legislation mattered mightily. Finally, the analysis of the Canadian Self-Sufficiency Project [46] uses the program's randomized design experimental features to examine its effect on labor force attachment and welfare participation. The finding that supplementing the earnings of long-term welfare recipients in a way that gives a big bonus for getting a full-time (30 hours per week) job greatly increases work effort and reduces welfare rolls provides evidence that labor supply incentives are significant for this population. Persons who favor welfare reform that provides a high safety net for traditional recipients who get jobs will find this result to their liking.

Overall, these papers show that artful empirical analysis can readily yield results all over the political spectrum. The point of David's work is to get the best evidence on the effects—be it CPS data, information from state Labor Departments, Social Security earnings files, or experimental data—to analyze that evidence with care and report the results, however they come out. I found it especially stimulating to

consider these papers as a group, given their different data, issues and findings.

Wage Structures and Differentials

The structure of U.S. wages has widened substantially in the past 20 or so years. The pay of the more-educated, older and higher skilled increased relative to the less-educated, younger and lesser skilled. In addition, the dispersion of earnings within virtually every skill group also widened. In [28], David and Rebecca Blank examined how the dispersion of wages, unemployment and the level of hourly wages affect the distribution of family incomes using a regional panel data set constructed from CPS files. They find that family income and poverty are closely related to the widening wage inequality and slow growth of average wages, and that cyclical decreases in unemployment did not benefit the low-income families relative to other families.

In a very different analysis of inequality [43], David explored the effect of the decline of U.S. unionization on the distribution of wages. I have a vested interest in this issue, having estimated that unions substantially reduce inequality within and across establishments and between blue-collar and white-collar labor. My best estimate is that about 20 percent of the U.S. rise in inequality during the 1980s and 1990s is due to the fall in union density. Thus, when I received an early form of this paper several years ago, I read it with more than the usual attentiveness. If the paper reported something similar to my findings, the odds were that I would inadvertently gloss over any problems; if the paper found that the fall in unions had no effect on inequality, my critical antennae would be aroused. Using 12 monthly samples from the 1987 and 1988 CPS, David constructed a matched panel of observations on men aged 24–66 (no easy task, as anyone who has used the sample design of the CPS knows). He then used this longitudinal file to explore union effects on the wage distribution, paying particular attention to measurement error in union status and the potential selectivity of better workers into union jobs. The final step applies the estimated effects of unionization on variances of earnings and wage differentials by quintile to assess the aggregate effect of changing union density on inequality. For reasons that escape reason, the *Econometrica* version of the paper eliminated the evidence on the change in the wage structure, so that the full force of the evidence is best seen in the earlier NBER working paper. Still, the conclusion that (p. 42) "changes in unionization account for one-fifth of the increase of the variance of adult male wages between 1973 and 1987" seems just right to me.

In two papers with Tom Lemieux, David has examined the rise in wage dispersion and returns to skill in the 1980s, treating both men and women workers and black and white workers. In [48], they ask whether a model that posits that earnings vary along a single latent dimension of skill can explain the rise in differentials among measured attributes of workers and the rise of inequality within those groups, and show that, gender aside, some of the rise in residual wage variation within age and education cells in CPS data can be attributed to an increase in the price of a single unobserved skill. In [33] they report further that in PSID data the

black-white male wage gap rose, which is inconsistent with a single-factor skill story about this change in the wage structure: since black men are lower in the wage distribution than are whites, their earnings should have fallen in a period of rising inequality. The conclusion of this work is that the wage structure cannot be understood in terms of a single unobservable measure of skill, much as that would simplify the lives of economists.

A later paper with Lemieux and Francis Kramarz [41] contains a more surprising result. This paper uses micro data sets for the United States, Canada and France to contrast changes in wage differentials among workers with different levels of skill with changes in their employment. The relative wages of the low skilled fall the most in the United States, then in Canada, and least in France. All else the same, this pattern of wage changes might be expected to generate greater relative increases in employment for the low skilled in the United States than in France, with Canada in between. However, the data do not support this demand-side interpretation: the relative decline in employment rates is similar across countries. This finding is, you will note, consistent with the evidence that changes in the U.S. minimum wage had little impact on employment.

A final paper in this category, by David and Dean Hyslop [42], shows that micro-empirical analysis can speak to macroeconomics. Many economists believe that moderate levels of inflation facilitate real wage cuts because employers are loathe to cut nominal wages. If so, the dispersion of changes in real wages should differ greatly between periods of high and low inflation. A period of high inflation would allow an unconstrained distribution of real wage changes: an employer that gave a 0 or 1 percent increase would in fact be cutting real pay. But in a period of low inflation, failure to reduce nominal wages would produce a truncated distribution of changes in real wages, with too few workers experiencing sizable drops in real wages. Using panel data on hourly paid workers in the CPS and PSID, David and Dean compare the dispersion of real wage changes over various periods with differing levels of inflation. Yes, they find spikes in nominal wage changes at zero that seem best explained by the hypothesis that real wage cuts were limited by nominal wage rigidity, and yes, the proportion of observations at the zero spike falls with the level of inflation. But the magnitude of the effect appears to be weaker than strong adherents of the notion that we need inflation to grease the wheels of adjustment might have liked. Perhaps the effect of inflation on real wage flexibility is less than David anticipated as well. But, as I noted at the outset, the empiricist sets up his study and reports his results.

Techniques and Data

The believability of empirical findings depends on the way the investigator develops them. Sometimes this requires finding the right data or natural experiment. Sometimes it requires sophisticated econometrics. Sometimes it requires the researcher to simplify theories developed with little attention to the

requirements of data. Sometimes it requires imaginative use of existing data sets. Sometimes it requires developing new data. It always requires detailed knowledge of the ins and outs of the data, which involves considerable investment of time and effort, often on mundane and intrinsically unexciting things.

David is a master of all of these modes of empirical analysis. In his work he has used many different data sets, ranging from the CPS and PSID, to U.S. Censuses of Population, to the Canadian Labor Force Survey data, to bargaining pairs in Canadian collective bargaining contracts, to surveys of workplaces in New Jersey/Pennsylvania, to 1880s strike data, and many more. More often than not, he uses longitudinal data so as to eliminate the fixed effects that can always confound cross-section analysis. In the papers I like best, he finds the right experiment and uses relatively little econometrics to tell the basic story (the Mariel boatlift paper, some of the minimum wage papers). If you have the right "pseudo-experiment," simply comparing summary statistics gives the answer. In other work, the econometrics is more central, because there are problems of heterogeneity or selectivity or measurement error and factors that must be controlled for to isolate the behavior of interest. In either type of paper, the analysis is carried out with consummate skill and attention to the details, where truth is often found.

But Will He Get to Heaven?

One of the virtues of writing an honorary is the freedom to say something about that person's personal characteristics. It is a pleasure to report to those of you who do not know David Card that not only is he an outstanding economist, but he also stands high in the world of human beings.

True, he drinks (lots of coffee). True, he has interests outside of economics (he watches *Pinky and the Brain* on Saturday morning TV). True, he's been to Graceland (among other cultural high spots throughout the world). True, he journeys often to Canada (and other exciting tourist paradises). These flaws aside, however, he has the attributes that you'd like in a friend, relative, colleague or teacher. His mentors and colleagues swear by him. His coauthors (of which there are many) swear by him. Perhaps more importantly, his graduate students swear by him, not at him, even after he has signed their dissertations.

In the United Kingdom, the biggest compliment one can pay a fellow economist is to say that you'd like to write a paper on something really important with him or her and then go to a pub afterwards. Hey David, next time you're in London, how about working on ...? Then heading to the *Slug and Lettuce* or *Frog and Toad* or, better yet, *The Invisible Hand*? David is a counterexample to yet another bit of received wisdom: nice guys do sometimes finish first.