Economic Research Initiative on the Uninsured
Working Paper Series

Employer-Based Health Insurance and Workers Skills

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ERIU Working Paper 34
http://www.umich.edu/~eriu/pdf/wp34.pdf

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March 2005

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Abstract

This paper examines the impact of labor market incentives on the probability that low-skilled workers will receive offers of employment-based health insurance. We demonstrate that firms are more likely to offer employment-based health insurance in entry-level jobs when the skills for which they are recruiting are in short supply relative to demand. Our empirical analysis supports this contention using two databases of California workers: the California Work and Health Surveys and the Bay Area Longitudinal Surveys. Our results suggest that policies designed to decrease uninsurance rates should focus on providing skills to individuals that might not be able to gain employment in a firm that offers health benefits.

The United States is unique among developed countries in its reliance on employment-based health insurance (EBHI) as the primary means of providing its citizens with insurance against medical care expenditures. However, mounting evidence indicates that this system is failing to deliver protection against medical care costs, particularly to those most in need. Between 2000 and 2004, the percentage of Americans with EBHI dropped from 63.6 to 60.4 (Gould, 2004) with relatively few low-wage workers having EBHI coverage. In 2003, workers in the highest quintile were more than three times as likely to have EBHI as workers in the lowest quintile (77.8 percent vs. 24.9 percent) with many new part-time workers precluded from EBHI by coverage restrictions such as minimum hours of work or minimum length of tenure with the firm. Even if low-skilled, part-time, or new labor market entrants are offered EBHI, their low wages may not provide sufficient discretionary income to pay the required cost sharing premiums (Lambrew, 2001).

The relatively low level of health insurance coverage among low-wage workers may result from profit maximizing firms deciding whether or not to offer workers EBHI as part of the compensation package. We argue that firms use the EBHI offer, coverage limitations, co-payment rates and eligibility restrictions placed on the EBHI offer to attract workers with desired skills. As a result, when exogenous market forces change a firm's ability to attract needed workers, the firm will alter its EBHI offer in order to obtain desired skills. If a firm is recruiting workers with skills in short supply, it will provide a more generous compensation package than if it is recruiting workers with skills in abundant supply.

Using two data bases unique to California's labor market, the California Work and Health Surveys (CWHS) and the Bay Area Longitudinal Surveys (BALS), we empirically show that low-skilled workers are more likely to be offered a position that includes health benefits if they have skills in high relative demand in the local labor market. Furthermore, when labor market conditions change and firms find it easier to attract workers with the requisite skills, firms alter their compensation package to reflect changing conditions.

Framework

Firms compensate workers for their labor services in many ways, including both wages and fringe benefits such as health insurance. Each component of compensation differs in its ability to adjust to labor market changes. Some components can be set in accordance with individual productivity differences with relative ease (e.g., wages) and some can be adjusted to labor market conditions with relative ease (e.g., hours of work). Although the nature of the EBHI offer provides some flexibility in responding to labor market conditions, it creates incentives that move the offer toward workers with higher levels of skills.

EBHI represents a relatively fixed payment for labor services because premiums are negotiated for an entire workforce, not an individual worker. As a result, firms that provide health insurance to their workers generally provide the same coverage to all workers that meet the eligibility criteria. Because firms can affect the number of workers provided coverage by limiting coverage eligibility (e.g., requiring a minimum number of hours worked per week or a minimum length of tenure with the firm), they can adjust the EBHI offer to different classes of workers (e.g., low-skilled workers may be hired only part-time or for a short period of time) or to different economic conditions (e.g., the eligibility restriction can be reduced in a tight labor market).

Still, firms have an incentive to offer EBHI to workers. Preferential tax treatment for firms with respect to health care costs induces substitution towards replacing wages with EBHI. Firms use pretax dollars to pay for EBHI and workers receive EBHI as nontaxed compensation, reducing the relative cost to the firm of offering EBHI. The offer extended becomes a fixed payment ($\overline{P_{HI}}$) in the total annual compensation (E) paid by a firm (f), with the individual's (i) wage (w) and annual hours worked (h) variable factors:[1]

1) $E_f = w_i * h_i + \overline{P_{HI}}$.

[1] Cutler and Madrian (1998) adopt a similar set of initial assumptions in specifying a firms' profit maximization function.

The unit price of labor ($\frac{E_f}{h}$), which we designate E_f^I, for a firm that offers EBHI includes both an hourly wage that varies by worker and a declining per unit cost of health insurance ($\frac{\overline{P}_{HI}}{h}$), which we designate P_{HI}^I, that is constant between workers but decreases with hours worked. If wages are exogenously determined, h becomes the endogenous variable that determines per unit labor costs.

Workers place a different valuation on the EBHI offer than employers, however. A worker who does not receive an EBHI offer will consider purchasing health insurance in the private market, going without coverage, or obtaining coverage through some other source (e.g. working spouse). If obtaining coverage through one's spouse is not an option, workers must use after tax dollars to purchase an individually-tailored insurance policy whose price does not capture either the economies of scale or risk pooling advantages available to firms. Premium differences, in addition to the pretax dollars used by firms and the after tax dollars used by individuals, create a wedge between the annual cost of EBHI to the firm and the annual cost to the worker of obtaining health insurance (C_{HI}) and between the earnings received by the individual and the compensation paid by the firm. The value of the compensation package to the worker offered EBHI consists of annual earnings plus the amount the worker would pay for private health insurance:

2) $E_i = w_i * h_i + C_{HI}$.

Firms can attract workers at a lower compensation than would be necessary without including EBHI in the offer because $C_{HI} > P_{HI}$, making $E_i > E_f$ and creating an incentive for firms to offer EBHI,[2] suggesting the offer of EBHI will be widespread. We note that while firms may not be able to control the relatively fixed nature of EBHI, they can alter its value to the worker by

[2] This inequality assumes that the cost of alternative insurance for the worker is positive. The cost would be zero if the worker can be covered by another family member's insurance (for example).

changing the fringe benefit package in terms of service coverage and employee co-payment rates (Cutler and Madrian, 1998).[3] As a result, firms can use EBHI as a means of attracting workers with needed skills to the firm (i.e., increase its value to the worker) or to lower compensation in the face of downward-sticky wages (i.e., decrease its value).

Still, the relatively fixed nature of EBHI creates incentives for the firm to vary the offer to different categories of workers. First, firms have an incentive to distinguish between the labor services of those eligible for EBHI and those not eligible. A profit maximizing firm will hire additional labor services (i.e., increase hours worked) as long as the marginal revenue gained from the services exceeds its marginal cost with the marginal cost depending upon whether the additional services make the worker eligible for EBHI. If the worker already has EBHI or if the hours worked after the increased services still leave the worker ineligible for EBHI, the marginal cost of increasing labor services is simply the wage. Using equation (3):

3a) $\frac{\delta E_f}{\delta h} = w$ since $\frac{\delta \overline{P_{HI}}}{\delta h} = 0$.

If, however, the increase in labor services makes the worker eligible for EBHI (e.g., the firm restricts health benefits to workers that work more than 30 hours per week and the worker in question currently works 29):

3b) $\frac{\delta E_f}{\delta h} = w + \overline{P_{HI}}$

since the firm must bear the cost of health insurance in addition to the wage when contracting for additional labor services. As a result, when the price of health benefits increases, the cost of hiring an additional worker that would receive health benefits also increases. At this point, firms that provide EBHI have the incentive to use already covered workers more extensively or to shift toward employment of workers who do not qualify for health benefits (e.g. part-time workers) (Gruber, 1994; Gruber and Krueger, 1991).

[3] Firms can also alter the premium that a worker pays for the benefit, however, this represents a noticeable change in compensation to the worker and is a change generally made to all workers, not just low-skilled workers.

Second, the firm has an incentive to distinguish between higher and lower-skilled workers if they offer EBHI. Because employer costs for health insurance are essentially the same for each employee of the firm,[4] increased health care costs are a larger per unit increase in the compensation of low-wage workers than high-wage workers. Increased EBHI costs will therefore cause firms providing EBHI to substitute away from low-skilled, low-wage workers or to reduce the compensation of those workers by shifting them to part-time status, outsourcing their jobs, etc.

4) $\frac{E_f^{ls}}{P_{HI}^{l}} < \frac{E_f^{hs}}{P_{HI}^{l}}$.

The incentive to shift away from low-skilled, low-wage (ls) to higher-skilled, higher-wage (hs) workers operates in the same way as a fixed unemployment insurance cap on pay levels (Levine, 1997). More formally, profit maximizing firms will hire high and low-wage workers up to a point at which:

5a) $\frac{MRP^{hs}}{E_f^{hs}} = \frac{MRP^{ls}}{E_f^{ls}}$

Should the price of health insurance increase, the percentage increase in compensation will be larger for low-skilled workers than for high-skilled workers such that:

5b) $\frac{MRP^{hs}}{E_f^{hs}} > \frac{MRP^{ls}}{E_f^{ls}}$.

As a result, profit maximizing firms will extend an EBHI offer to individuals with needed skills, reduce compensation (e.g., eliminate the EBHI offer by manipulating h) to those without needed skills, or substitute away from low-skilled workers.

Our compensation framework for the EBHI offer yields four testable behavioral implications for firms. First, firms will offer EBHI at high rates because they can attract workers at

[4] The firm's price of insurance varies with factors such as the age structure of its workforce (Hadley and Reschovsky, 2002). Although the firm's price of EBHI varies for each worker, firms do not know the price per individual at the time of hire and cannot legally discriminate in employment on its basis once the price is known.

a lower rate of compensation, since $E_i > E_f$ when health benefits are included in compensation. Second, firms will change the nature of benefits in response to market changes that affect wages or the price of health benefits. Third, firms will use health benefits to attract workers with needed skills. Fourth, high-skilled workers are more likely to receive EBHI offers than are low-skilled workers. If these behavioral implications are empirically supported, increasing rates of uninsurance can be attributed to changes in market forces such as increased cost of EBHI or increasing demand for labor market skills that favors workers possessing those needed skills.

Data and Estimation

We test the behavioral implications of our model using two databases that contain information on health benefit offers and skills within California. The first, the California Work and Health Survey of 2000 (CWHS), contains a sample of California adults. The second is the Bay Area Longitudinal Survey (BALS) that consists of a random sample of employers in the San Francisco Bay Area. By confining analysis to one state, factors such as state health policy (e.g. Medicaid eligibility, Worker Compensation programs), state unemployment, welfare and education policies, state tax policies, and other factors that might vary by state are held constant. Because the BALS data covers a single local labor market, our study design also enables us to hold constant the many factors that might vary between labor markets even within a given state. For example, much of the existing research on the firms' decision to offer health insurance focuses on the price of insurance and the costs that workers would face in the individual market (Hadley and Reschhovsky, 2002; Feldman et al., 1997). Examining EBHI within one market area controls for many of these exogenously-determined factors that would affect the firm's price for insurance. Second, medical care prices and medical practice patterns, which affect the value workers place on a given health benefit package, are held constant in a single labor market area.

Third, the available labor pool, product competition, and workforce public policies that affect benefits (e.g., domestic partner laws) are the same for all firms.[5]

Our two Californian databases allow us to examine the health benefit offers made to workers by employers. The CWHS uses the individual worker as the unit of analysis and enables us to examine the determinants of whether workers are offered EBHI by their employers. The BALS data uses an entry-level position with one employer as the unit of analysis and enables us to examine the relationship demanded by employers and the EBHI offer and over-time changes in the EBHI offer. The two data bases are complementary because they enable us to examine both the factors associated with a worker's receipt of EBHI and the factors associated with whether or not an employer includes health benefits in a compensation package for a specific entry-level position.

The CWHS is a telephone-based, longitudinal survey of California adults designed by faculty and staff at the Institute for Health Policy Studies at the University of California, San Francisco. The survey contains considerable information on the insurance status of the California population, both at the time of the survey and over the past year, and information on EBHI offers and acceptances. Although the survey was fielded annually from 1998 through 2000, we exploit the cross sectional information from the 2000 survey in our analysis. The 2000 CWHS was administered between May 1 and July 9, 2000 and includes 2,168 California adults, of whom 627 were part of the 1998 and 1999 CWHS, 638 were part of the 1999 CWHS and 903 were new respondents.[6] 441 of the new respondents were selected with random-digit dialing and the

[5] A modest literature supports the strength of using local areas to examine compensation by showing the strength of demand and supply forces in employment and wages determination within local areas (e.g., Eberts and Stone, 1992; Toppel, 1986). In fact, the local labor market shocks associated with job creation and destruction at the level of individual plants (Davis et al., 1996) leave wage and employment differentials between local labor markets that are slow in adjusting to an inter-labor market equilibrating wage.

[6] The first round of CWHS surveys was conducted in June 1998 and included 1,771 respondents over the age of 18. 85 percent were selected through random digit dialing. The remaining respondents were selected from over-sampling three population subgroups: African Americans, Asian Americans and persons with disabilities. The 1999 survey was administered between May 1 and July 9, 1999 and included 2,044 individuals, of which 913 had been interviewed in round one. The sample of new respondents in 1999 was composed of 700 adults from a random digit

remainder consisted of over-sampling of African Americans, Asian/Pacific Islanders and Latinos. Weights available with the CWHS data enable one to generate statewide estimates of EBHI to different worker groups and to identify the population groups at risk of not having EBHI.

The BALS research project was designed to uncover the knowledge and skills that employers require and those that individuals supply in low-skilled, entry-level jobs in three counties in the San Francisco Bay Area. Low skilled was defined as a position in which employers required no more than a high school education and no more than one year of work experience at entrance. Surveys administered to employers were fielded in two waves. In Wave I (time t), 405 firms hiring entry-level workers were interviewed on-site for information about one specific entry-level job (*Employer Survey*). Wave I surveys were administered from June 1998 to October 2002. In Wave II (time t+1), BALS reinterviewed the firms via telephone to determine changes in wages and job requirements (*Longitudinal Survey*) that occurred between t and t+1. Wave II surveys were administered from October 2002 through October 2003 (averaging about 23 months after initial surveying).[7] In March 2002, BALS expanded surveying to include individuals (*Household Survey)*, allowing for a comparison between the skills supplied by entry-level workers to those defined as essential by local employers (Appendix A).[8]

At the core of the BALS data collection is a series of questions about skills, with questions posed to employers about the skills required of workers in a particular entry-level job. The 53 skills were grouped into six areas: reading and writing in English (eight specific skills), math (nine specific skills), communication (eight specific skills), problem solving (11 specific skills),

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dialing sampling of the state's adult population. The remaining sample consisted of African-Americans, Asian/Pacific Islanders, persons with disabilities and persons aged 45-70.

[7] Surveys for employers were fielded in San Francisco, Alameda, and San Joaquin counties with 21.4 response rate for firms eligible to participate in Wave I surveying. 92.4 percent of the firms surveyed in Wave II had a positive disposition, meaning they completed the survey or were no longer in business by t+1. A description of the methods used in Wave I surveying, which includes a comparison of firms in the BALS data set with those in the three-county area, is available at www.hire.csuhayward.edu/hire/discpap/abstracts/D04-06-04.pdf. This report shows that jobs used in this study represent a smaller proportion of construction jobs than in the three-county area, consistent with the BALS restriction that jobs be available through an open application process.

[8] Only partial overlap exists between the fielding of the *Employer Surveys* and *Household Surveys.* 19.3 percent of the *Employer Surveys* were in the field at the same time as the *Household Surveys*, 66.2 percent were fielded a year prior to the *Household Surveys*, and 14.6 percent were fielded about 3.5 years prior.

equipment use (seven specific skills), and computer software use (ten specific skills). Focus groups with local employers identified these skills as important in a wide range of entry-level positions. A factor analysis on each skill grouping identified 15 skill sets used in entry-level jobs. Factor analysis assumes the existence of a system of underlying constructs in our measures of skills and uses their correlations to uncover patterns in the skill groupings (as assumed in the underlying constructs). These patterns, called factors, were developed into skill sets by identifying the most highly correlated skills on each factor loading. This analysis identified different skill sets within each of the six original broad groupings of skills posed to employers.[9] We used the factor scores estimated from the factor loadings in each broad skill group to measure 15 specific skill sets required in entry-level jobs in the BALS local labor market:[10] two sets of reading and writing in English (simple and complex), three math skill sets (algebra, applied math, and measurement), two communication skill sets (customers and coworkers), three problem-solving skill sets (prioritizing, evaluating, and leading), three computer software skill sets (productivity enhancers, multimedia, and financial), and two sets of equipment skills (office and production).

BALS also includes information on the benefits that firms offer to workers in a particular entry-level position and the restrictions firms put on those benefits. The benefits offered was obtained by asking human resource managers to identify which of the 24 benefits listed were offered, including an open-ended "other" category. A factor analysis of the benefits potentially offered by the firm in low-skilled, entry-level positions (Appendix B) identified seven benefits that

[9] A factor loading is an *n* by *m* matrix of correlations between the original variables and their factors, where *n* is the number of variables and *m* is the number of retained factors. The interpretation of the (rotated) factors is inferred from the size of the variable's loading (akin to the size of a simple correlation coefficient). Because we had no a priori expectation of the number of patterns in any of the original skill groups, we allowed the factor analysis to determine the number of factors that accounted for the observed covariation within each. We specified an oblique factor solution, which produces correlated extracted factors, since it seemed reasonable to assume correlation between the skills in each grouping. We identify only factors with eigenvalues exceeding one (see Appendix A Table 1).

[10] We used the criterion of .5 as a significant loading to identify skills in each set. Although a typical "rule of thumb" for identifying patterns in the factors is a loading greater than .30, we chose the more stringent criteria so as to bundle only the most closely related skills. Because a factor is a latent continuum, we can locate data points according to the varying amount of skills needed (or possessed). These factor scores quantify individual cases on a latent continuum using a z-score scale that ranges from approximately -3.0 to +3.0.

constituted a “health” factor: paid vacation, paid sick leave, retirement, medical, dental, vision, and life insurance. These components define the health benefit package in our analyses. Although a paid vacation is not technically a health benefit, it allows the worker flexibility in taking paid time from work when health concerns arise. Restrictions on receiving benefits was obtained through open-ended questioning of the employers with responses lending themselves to coding in terms of the number of hours per week that must be worked before benefits are offered and the number of months (or weeks) that must be worked before benefits begin.

Analysis of BALS data helps uncover the heterogeneity in health insurance coverage among those most likely to be uninsured, workers with low levels of skills, by examining the relationship between the skills required in low-skilled jobs and the offer of health benefits. Using descriptive analysis, we provide an overview of the EBHI offers and their relationship to labor market forces. We examine the frequency with which firms offer health benefits in low-skilled positions, the restrictions placed on their offer, and the changes in the offer associated with a loosening of the BALS labor market. BALS surveyed firms during the dot.com and dot.bust eras thereby providing for a discrete defining of tight (2.2 percent to 4.2 percent county unemployment rate) and loose (greater than 7.0 percent unemployment) labor markets.

Our multivariate investigation of the relationship between skills and EBHI offer uses the 15 measures of skill sets as independent variables in multivariate estimations of determinants of whether or not the low-skilled position offered health benefits:

6) $Offer_j = \alpha_0 + JobSkill_j\alpha + Firm_j\beta + \alpha_1 Unemp_t + \alpha_2 Wage_j + \varepsilon_2$

where:

$Offer_j$ = A measure of health benefits offered in job (j);
JobSkill = A vector skills sets required in the job;
Firm = A vector of characteristics of the firm housing the job;
$Unemp_t$ = County unemployment at the time of surveying (t); and
$Wage_j$ = Wage offered to workers in the job
ε = the error term.

The EBHI offer can be defined in several ways, however. Firms can simply offer EBHI and no other fringe benefit or they can offer an array of health benefits. We examine the different dimensions of the EBHI offer by estimating equation (6) with three different dependent variables: the factor score for health benefits offered in the job (Appendix B), the number of health benefits offered, and whether or not medical benefits were offered. Because the dependent variable in each of these estimations provides a slightly different measure of an EBHI offer, our estimations provide a sensitivity analysis to ensure that our results are robust with respect to definition of EBHI. We use ordinary least squares analysis to estimate equation (6) when the dependent variable is continuous (factor score and number of health benefits) and a logit analysis when the dependent variable is binary (offering medical benefits). Table 7 provides a definition of the variables used in the analysis. We anticipate that the skills with a high relative demand in the local labor market (see Appendix A for quantification) will be positively related to an EBHI offer.

We estimate equation (6) in two stages to determine the sensitivity of our coefficient estimations to model specification. Our initial estimation contains only skill constructs to examine the total effect of skills on a firm's health benefit offer. We enter institutional variables (Firm) and wages into the next estimation to determine if part of the effect of skills on making an offer operates through the firm characteristics or wages. This would be shown by a reduction in the size of the coefficients on the skill variables in the second stage.

We confirm the relationship between skills and the EBHI offer found in the BALS data with data from CWHS to estimate a modified version of equation (6). In this logit estimation of whether or not a worker was offered EBHI, we use broad-based measures of skill (education, English language) and firm characteristics[11] to determine if skills increase the probability that a worker has received an EBHI offer.

[11]Wage information is not available in the CWHS. The data set contains information on annual earnings, which reflects both wage and labor supplied.

Results

Employment is the primary source of health insurance in California, as in the rest of the country, but employment does not guarantee that workers will receive offers of EBHI (Table 1). Only two-thirds of the workers with less than a high school education received an offer of EBHI compared to over 80 percent of workers with more than a high school education. Among workers whose primary language was other than English, only 63.9 percent received offers of EBHI compared to over 80 percent whose primary language was English. Hispanics and foreign born workers were considerably less likely than non-Hispanics and U.S. born workers to receive offers of EBHI. Less than 40 percent of part-time workers received offers of EBHI compared to 82 percent of full-time workers. Less than 70 percent of workers who had been with a firm for less than one year received EBHI offers compared to nearly 80 percent of workers who had been with the firm at least one year. Workers employed by small firms were much less likely to receive an offer of EBHI than workers of large firms. Less than 30 percent of workers employed by firms with fewer than 10 employees received an offer of EBHI compared to over 90 percent of workers employed by firms with more than 100 employees. Finally, and perhaps most importantly, less than half of workers earning less than $20,000 in 2000 received an offer of EBHI compared to over 90 percent of those workers earning more than $40,000.

Skills may be the lynchpin in explaining differences in EBHI offer rates, with large differences existing in the skills of workers with EBHI, other private health insurance, workers without insurance, and nonworkers (Table 2). In the BALS labor market, few skill differences exist between workers with EBHI and workers with private insurance. However, workers with EBHI have a significantly higher level of skills than either workers without health insurance or nonworkers. Workers without insurance have lower reading and writing, math, communication, and priority skills as compared to workers with EBHI and nonworkers have lower levels of skills along all dimensions than workers with EBHI.

Still, if low-skilled workers find employment, they are likely to have a position with health benefits (Table 3) since about 80 percent of the low-skilled positions carry medical benefits and paid vacation and about two-thirds carry dental benefits and paid sick leave. Somewhat fewer positions carry vision, retirement, and life insurance benefits, although over half the positions offer these benefits. Even if the low-skilled position carries an EBHI offer, the worker may not be eligible to receive it. Over 94 percent of the firms place restrictions on their offer (Table 3). Benefits can start immediately in only 16.6 percent of the positions, even if workers meet the minimum hours worked per week requirement. Over half the positions (56.3 percent) require the entry-level worker to work 30 hours a week before receiving benefits, with over one-third requiring full time work (35 hours a week). Nearly 40 percent (39.0 percent) of the positions extend the EBHI offer only after the worker has three to five months tenure, with nearly five percent making the low-skilled worker wait one year before the offer is extended.

Descriptive analysis supports our compensation framework for the EBHI offer to low-skilled workers by showing the frequency with which the offer is extended, albeit with restrictions, and with skill differences existing between workers with EBHI, and workers without EBHI, and nonworkers. Our framework also posits that firms will change the nature of the EBHI offer with changes in labor market conditions, a prediction supported by our descriptive analysis of the over-time changes in benefits offered (Table 4). This analysis shows little over-time change in whether or not an EBHI offer was made to low-skilled workers, but it does show changes in the nature of the offer extended in tight and loose labor markets.

Although no significant over-time differences exist (between t and t+1) in the percentage of positions with general or specific EBHI benefits or in the percentage with hours restrictions, significant differences ($p \leq .05$) do exist in the hours restrictions on the offers made in tight and loose labor markets. Firms in loose labor markets are more likely to have positions with hours restrictions on their EBHI offer than firms offering positions in a tight labor markets. We also note that, in the BALS labor market, once firms offer EBHI they continue the offer. Of course, 8.3

percent of the firms implicitly discontinued the offer of EBHI to low-skilled workers between t and t+1, either by ceasing operation or by ceasing to hire low-skilled workers. No firms that continued in operation or continued the position changed health benefits. Instead, firms made less radical changes in the offer by changing the restrictions needed to receive benefits. We assess the nature of these changes by examining the availability of each health benefit in t and t+1 and changes in the restrictions to receive benefits.[12]

Our compensation framework is also supported with our multivariate analysis of the relationship of skills with the EBHI offer (equation 6). Low-skilled workers are more likely to receive an EBHI offer if their skills have a high relative demand in the local labor market (Table 5). The finding that skills, particularly skills in demand in the local labor market, underlie the probability of low-skilled workers receiving a job that includes an EBHI offer is robust to model specification, including the definition of health benefit (a high factor score, the number of health benefits offered, an offer of medical benefits). In the BALS labor market, positions requiring simple English skills, skills in working with coworkers, and productivity enhancing software skills have an increased probability of offering EBHI. Simple English skills and an ability to work with coworkers are skill sets with a high relative demand and productivity enhancers have some skill components with a high relative demand in the BALS labor market. The coefficient size and significance on simple English and productivity enhancing skill sets does not diminish when institutional variables are entered into the model. Positions requiring multimedia skills, which have a low relative demand in the BALS labor market, are less likely to have an EBHI offer attached to them, although results are somewhat sensitive to model specification.

[12] In the second wave of interviewing, respondents were read the list of benefits and whether they were offered at the time of the first surveying and were asked if the benefit status had changed. Respondents were also told of the original set of restrictions placed on the benefits and asked if they changed. If the restrictions had changed, they were asked if they became more or less restrictive and were asked to describe the new set of restrictions.

We further test for the robustness of the positive skill-EBHI relationship using the CWHS data. We examine whether or not California workers'[13] skills are correlated with whether or not they receive a health insurance offer from their current employer (Table 6). Analysis shows that less-skilled workers are less likely to receive an employment-based offer of health insurance, ceteris paribus. Individuals with a high school education or less are less than half as likely as those with more than a high school education to receive a health insurance offer from their employer and those whose primary language at home is English are twice as likely to be offered EBHI as those whose primary language is not English. Analysis also suggests that employers can eliminate their offer of insurance by placing restrictions on the offer. Part-time workers and workers with less than one year of tenure with the firm are significantly less likely to EBHI than workers who work full-time and have greater tenure, consistent with our descriptive analysis of the benefit offer.

Summary and Discussion

Our study developed a framework in which firms use the employment-based health insurance offer as part of a compensation package to attract workers with needed skills. Our framework shows how firms might vary the EBHI offer with the conditions of the local labor market and how changes will most likely affect low-skilled workers. Our empirical analysis of both the California Work and Health Surveys and Bay Area Longitudinal Surveys data finds support for a compensation-based framework of the EBHI offer. Firms are more likely to offer EBHI in low-skilled positions requiring skills with a high relative demand in the local labor market and, when the overall labor market is loose, firms increase the hours needed to work before making an EBHI offer.

Research on EBHI to date often has largely focused on identifying groups of workers that are most disadvantaged with respect to health insurance in order to target policies such as outreach (Schur and Feldman, 2001; Quinn, 2000). This may be a useful, albeit short-run,

[13] Because workers aged 18 to 24 are frequently covered under their parents' health plan and may be both working and attending school full-time, we restrict the analysis to workers ages 25 and over.

response to the problems facing those without health insurance. Immigrants, racial and ethnic minorities, and low-wage workers are appropriately identified as having low access to EBHI. These same population subgroups also have relatively low levels of skills and education. While workers cannot change race, ethnicity, immigrant status or short-run earnings potential, they can, through human capital acquisition, improve skill levels. Results of this study suggest that any effort to improve short-term access to EBHI through outreach must also be teamed with efforts to raise the skill levels of currently disadvantaged workers if we are to have any long-run positive effect on improving access to our employment-based health insurance system among our current workers.

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Table 1: Offering of EBHI to California Workers Aged 25-64

	Percent Distribution	Percent Offered EBHI
Age	100.0	
25 - 34 years	31.5	79.4
35 - 44 years	35.8	78.0
45 - 54 years	22.9	72.9
55 - 64 years	9.8	77.4
Race	100.0	
White	68.6	77.0
Black	6.2	84.1
Asian/Pacific Islander	10.5	89.1
Other	14.7	67.7
Ethnicity	100.0	
Hispanic	23.7	69.2
Non-Hispanic	76.3	79.8
Immigration Status	100.0	
Foreign born	26.7	68.3
U.S. born	73.3	80.4
Language at Home	100.0	
Foreign	18.8	63.9
English	81.2	80.3
Education	100.0	
High school or less	22.6	66.6
More than high school	77.4	80.4
Firm Tenure	100.0	
Less than one year	13.6	68.7
One year or more	86.4	79.0
Hours of Work	100.0	
Part-time (less than 30 hours)	11.9	39.3
Full-time (30 hours or more)	88.1	82.6
Earnings	100.0	
Less than $20,000	21.7	46.4
$20,000 - $39,999	34.2	77.7
$40,000 - $59,999	23.3	93.2
$60,000 - $79,999	9.6	95.3
$80,000 - $99,999	5.0	89.5
$100,000 or more	6.2	85.9
Firm Size	100.0	
Less than 10 workers	19.8	28.4
10 – 49 workers	17.0	80.3
50 – 99 workers	7.6	81.4
100 - 499 workers	17.2	91.4
500 or more workers	38.5	94.1
Number (in thousands)	12,717	--
Percent offered EBHI	74.2	--

Table Notes: Data are from the 2000 CWHS and reflect weighted analysis.

Table 2: Skills and Health Insurance

	WORKERS WITH OWN-EBHI	WORKERS WITH PRIVATE INSURANCE (NOT OWN EBHI)	WORKERS WITHOUT HEALTH INSURANCE	NON-WORKERS
Percent of population	42.9	12.4	9.0	33.4
English Skills				
Read simple written instructions	85.6	81.4	70.6**	67.7**
Read forms, memos and letters	86.4	81.4	68.6**	67.7**
Read manuals, computer printout, contracts and agreements	69.5	60.0	54.9	47.6**
Write simple sentences, short notes and/or simple memos	63.4	55.7	37.3**	44.4**
Write letters using correct structure and sentence style	61.7	54.3	35.3**	41.7**
Proofread	58.4	64.3	43.1**	43.9**
Fill out forms, record data, time, etc. into log or chart	69.5	74.3	49.0**	52.4**
Organize information into a brief written report	52.2	54.3	27.5**	34.4**
Math Skills				
Use ratios, fractions, decimals, or percents	54.3	52.9	49.0	34.9**
Estimate or round off numbers	77.4	74.3	66.7	54.5**
Solve simple equations	61.3	60.0	60.8	41.8**
Make change	92.2	94.3	86.3	85.7**
Compute/figure discounts, markups, or selling price	70.8	65.7	56.9	50.3**
Interpret data from graph, tables, or charts	60.5	55.7	41.2**	37.0**
Perform simple measurements (e.g., lengths, volumes)	82.7	82.9	72.5	66.7**
Use measurement instruments (e.g., ruler, scale)	82.7	85.7	74.5	65.6**
Use equipment (e.g., calculator, cash register, business machine)	84.8	87.1	76.5	66.1**
Communication Skills				
Give spoken instructions in the workplace	75.6	71.4	54.9**	54.5**
Make and receive business phone calls	75.6	78.6	54.9**	57.1**
Deal with customers	71.5	78.6	58.8	56.6**
Be perceptive of verbal and non-verbal cues from others	69.8	81.4**	58.8	56.6**
Explain products and services	66.5	71.4	58.8	54.0**
Handle complaints	62.4	70.0	51.0	47.1**
Interact with co-workers to accomplish a task	80.2	87.1	64.7**	65.1**
Sell a product or service to a customer	53.3	60.0	49.0	44.4
Prioritizing Skills				
Prioritize tasks	70.7	68.6	60.8	63.5
Gather information	76.1	77.1	60.8**	63.5**
Sort and categorize information	72.8	81.4	64.7**	57.7**
Identify work-related problems	78.2	74.3	60.8	59.8**
Identify potential solutions to problems	74.5	70.0	54.9**	52.9**
Identify barriers to solutions	69.1	64.3	54.9	47.1**
Implement solutions	74.9	74.3	62.7	58.2**
Evaluate results	72.0	72.9	58.8	53.9**
Team work/collaborative problem solving	86.8	92.8	66.7**	76.7**
Make decisions independently	87.2	88.6	82.4	76.7**
Leadership oriented problem solving	78.6	77.1	64.7	59.3**
Equipment Skills				
Telephone systems	65.0	58.6	64.7	54.0**
Answering machines	74.9	85.7**	70.6	67.2
Copiers	78.2	81.4	76.5	61.9**
Fax machines	67.5	70.0	52.9	50.3**
Windows or DOS-based computers	52.3	55.7	47.1	31.2
Production machinery	31.3	28.6	27.5	26.5**
Heavy equipment	30.0	15.7**	21.6	19.6**
Computer Software Skills				
Word processing programs	47.3	47.1	41.2	33.3**
Spreadsheet programs	35.8	34.3	31.4	21.1**
Database software	27.6	27.1	25.5	21.7
Email	65.0	61.4	54.9	42.3**
Internet browsers	58.0	52.9	51.0	39.1**
Webpage design/authoring	14.0	18.6	9.8	11.1
Multimedia authoring and editing software	9.5	10.0	11.8	11.1
Graphics software	15.6	10.0	17.6	10.5
Desktop publishing programs	15.6	22.9	15.7	12.2
Financial inventory software	15.6	18.6	15.7	6.8**
N	243	70	51	189

Table Notes: Data are from the BALS *Household Survey (*Supply Side) and includes individuals under age 65 that were not retired. The question generally reads, "How well can you" with the numbers representing the percent saying they can execute the skill "very well". Item-specific nonresponse sometimes lowered the N in each population. The 13 (2.2 percent) of the workers with public insurance were excluded from the table. ** indicates a significant ($p \leq .05$) difference between mean values of workers with own EBHI and others.

Table 3: Benefits Offered and Restrictions: Descriptive Analysis

BENEFITS (Percent offering)	
Medical	79.8
Paid vacation	79.0
Dental	72.8
Paid sick leave	64.2
Retirement	61.5
Overtime	60.0
Vision	55.6
Life insurance	52.3
Employee discounts	42.2
Flexible hours	39.3
Bonuses	34.6
Tuition reimbursement	33.8
Flexible spending	27.2
Paid maternity leave	23.2
Profit sharing	16.8
Transportation aids	12.4
Paid paternity leave	10.6
Stock options	10.4
Child care assistance	9.4
Job sharing	9.4
Paid child care	3.7
Piece rates	1.7
N	405

RESTRICTIONS (Percent requiring)	
No restrictions	5.7
No benefits	13.8
Hours restrictions (Percent with:)	
No restrictions on hours worked	4.9
Full time work (35 or more hours a week)	36.8
30 or more hours per week	19.5
20 or more hours per week	17.6
10 or more hours per week	1.7
Months delay (Percent with:)	
Benefits start immediately	16.6
1-2 months delay before benefits begin	9.2
3-5 months delay before benefits begin	39.0
6-9 months delay before benefits begin	11.3
12 months delay before benefits begin	4.5
24 months delay before benefits begin	0.3
N	405

Table Notes: Data are from the BALS *Employer Survey*. Shading indicates the items included in the health factor (Appendix B Table 1). Restrictions for medical benefits were used, if multiple restrictions existed. If benefits began within a month of starting, we counted them as started immediately. Percentages do not round to 100 because of rounding.

Table 4: Changes in the Benefit Offer between Tight and Loose Labor Markets

	TOTAL		UNEMPLOYMENT TIGHT TO LOOSE LABOR MARKET		LOOSE LABOR MARKET	
	t	t+1	t	t+1	t	t+1
Offers						
Percent *Not* offering benefits	13.8	14.8	14.8	15.9	13.1	14.1
Percent with *No* restrictions	5.7	3.8	5.1	2.9	6.1	4.4
Health Benefits Offered						
Percent Medical	79.8	80.2	80.7	80.4	79.0	80.1
Percent Paid vacation	79.0	80.5	77.3	79.7	80.3	81.1
Percent Dental	72.8	74.4	71.0	73.2	74.2	75.2
Percent Paid sick leave	64.2	65.1	63.6	64.5	64.6	65.5
Percent Retirement	61.5	61.9	58.5	58.0	63.8	64.6
Percent Vision	55.6	58.1	50.6	52.9	59.4	61.7
Percent Life insurance	52.5	53.3	46.0	44.2	57.5**	59.5**
Hours worked per week restrictions						
Percent no hours restrictions	5.0	3.8	9.1	6.5	1.7**	2.0
Percent requiring full time work (35 or more hours a week)	36.8	30.9	40.4	37.7	34.1	34.4
Percent requiring 30 or more hours	19.4	20.6	14.3	18.2	23.6**	22.3
Percent requiring 20 or more hours	17.6	18.9	14.8	16.7	19.6	20.4
Percent requiring 10 or more hours	1.9	2.4	1.8	2.1	1.7	2.5
N	405	374	176	156	229	218

Table Notes: Data are from the BALS *Employer* and *Longitudinal* Surveys. ** indicates statistical significance ($p \leq .05$) exists between tight and loose labor markets. T and t+1 distributions within each of the stratified analyses did not differ ($p \leq .05$). Ns were sometimes lowered by one with item-specific nonresponse. Ns were also lowered when firms that discontinued the position were eliminated from the analysis (Health Benefit Offers and Restrictions).

Table 5: Determinants of Health Benefits in Low-Skilled Positions: Demand-Side Analysis

	SKILLS ONLY			ALL		
Skill Sets	HEALTH FACTOR	NUMBER BENEFITS	MEDICAL BENEFITS	HEALTH FACTOR	NUMBER BENEFITS	MEDICAL BENEFITS
High Relative Demand						
Simple English	0.176***	0.443***	0.343**	0.143**	0.370**	0.334*
	(0.064)	(0.164)	(0.162)	(0.058)	(0.148)	(0.179)
Coworkers	0.175***	0.436***	0.308**	0.103*	0.227	0.208
	(0.060)	(0.154)	(0.146)	(0.055)	(0.139)	(0.171)
Prioritize	0.036	0.114	0.175	0.031	0.106	0.227
	(0.064)	(0.164)	(0.172)	(0.057)	(0.146)	(0.184)
Low Relative Demand						
Complex English	-0.003	-0.091	-0.168	-0.036	-0.186	-0.219
	(0.070)	(0.178)	(0.187)	(0.063)	(0.160)	(0.211)
Applied Math	-0.071	-0.147	-0.006	-0.012	-0.004	0.088
	(0.064)	(0.164)	(0.172)	(0.059)	(0.150)	(0.191)
Algebra	0.085	0.202	0.285	0.029	-0.080	0.156
	(0.065)	(0.167)	(0.192)	(0.060)	(0.151)	(0.209)
Measurements	-0.031	-0.069	-0.179	-0.005	0.000	-0.167
	(0.056)	(0.143)	(0.151)	(0.051)	(0.129)	(0.171)
Leadership	-0.138**	-0.338**	-0.206	-0.072	-0.178	-0.107
	(0.057)	(0.145)	(0.160)	(0.052)	(0.131)	(0.180)
Production equipment	0.055	0.194	0.118	-0.028	-0.008	-0.066
	(0.055)	(0.140)	(0.158)	(0.052)	(0.131)	(0.177)
Multimedia	-0.112**	-0.256*	-0.156	-0.099**	-0.225*	-0.147
	(0.051)	(0.130)	(0.145)	(0.046)	(0.117)	(0.169)
Financial	-0.010	-0.047	0.141	0.013	0.021	0.167
	(0.050)	(0.129)	(0.195)	(0.045)	(0.115)	(0.203)
Mixed Demand						
Customers	-0.132*	-0.352*	-0.296	-0.086	-0.258	-0.318
	(0.074)	(0.189)	(0.207)	(0.069)	(0.175)	(0.237)
Evaluate	0.037	0.099	0.078	0.053	0.134	0.149
	(0.059)	(0.151)	(0.162)	(0.053)	(0.136)	(0.183)
Office equipment	-0.011	-0.060	-0.346	0.006	0.019	-0.259
	(0.084)	(0.216)	(0.227)	(0.078)	(0.197)	(0.259)
Productivity enhancers	0.152*	0.450**	0.567**	0.121*	0.376**	0.521**
	(0.078)	(0.201)	(0.233)	(0.071)	(0.181)	(0.260)

Table 5: Determinants of Health Benefits in Low-Skilled Positions: Demand-Side Analysis (continued)

	SKILLS ONLY			ALL		
	HEALTH FACTOR	NUMBER BENEFITS	MEDICAL BENEFITS	HEALTH FACTOR	NUMBER BENEFITS	MEDICAL BENEFITS
Institutional						
Small	--	--	--	-0.681****	-1.720****	-1.460****
				(0.110)	(0.279)	(0.394)
Large	--	--	--	0.083	0.141	-0.289
				(0.118)	(0.299)	(0.486)
Service sector	--	--	--	0.099	0.541	0.194
				(0.148)	(0.377)	(0.469)
Manufacturing sector	--	--	--	0.275*	0.801**	0.526
				(0.159)	(0.404)	(0.584)
Retail trade sector	--	--	--	0.281*	0.995***	0.992**
				(0.146)	(0.371)	(0.490)
Business services	--	--	--	-0.016	0.087	-0.068
				(0.164)	(0.416)	(0.534)
Education and medical	--	--	--	0.030	0.205	-0.402
				(0.159)	(0.402)	(0.560)
Unionized	--	--	--	0.254**	0.906***	1.442***
				(0.117)	(0.298)	(0.545)
Local Labor Mkt						
Unemployment rate	0.027	0.066	-0.040	-0.029	-0.075	-0.157**
	(0.026)	(0.066)	(0.068)	(0.024)	(0.062)	(0.079)
Wage						
Wage	--	--	--	0.054***	0.136***	0.140*
				(0.018)	(0.046)	(0.079)
Mean Dependent Variable	-0.002	4.651	.796	-0.002	4.651	.796
Intercept	-0.139	4.310	1.743	-0.289	3.723	1.394
R^2	.136	.134	--	.328	.340	--
F	3.69	3.62	--	7.18	7.56	--
N	392	392	398	392	392	398

Table Notes: Data are from the BALS *Employer Surveys*. Numbers represent coefficients from Ordinary Least Squares (Health Factor, Number of Benefits) or logit (Medical Benefits) estimations of equation (6). Table 7 provides a definition of the variables.

****$p \leq .001$

***$p \leq .01$

**$p \leq .05$

**$p \leq .10$

Table 6: Determinants of the EBHI Offer: A Supply-Side Analysis

	LOGIT	ODDS RATIO
Skills		
High School or Less Education	-.827***	.438
	(.287)	
English spoken at home	.693**	2.001
	(.318)	
Less than one year at firm	-1.093****	.335
	(.318)	
Part time worker	-1.763***	.172
(less than 30 hours a week)	(.308)	
Age		
35-44	-.303	.739
	(.314)	
45-54	-696**	.499
	(.309)	
55-64	.137	1.147
	(.397)	
Firm Size		
Less than 10 employees	-3.452****	.032
	(.337)	
10 to 49 employees	-1.033***	.356
	(.356)	
50-99 employees	-.999**	.368
	(.451)	
100-499 employees	-.489	.614
	(.410)	
Industry		
Government/utilities	.390	1.477
	(.653)	
Trade/services	-.593*	.553
	(.316)	
Medical/dental	.157	1.169
	(.431)	
Manufacturing	.255	1.291
	(.482)	
Education/day care	-.631	.532
	(.395)	
Union Coverage	1.979****	7.232
	(.506)	
Mean Dependent Variable	.776	
Intercept	2.909	
N	835	

Table Notes: Data are from the CWHS. Numbers represent logit coefficients (and standard errors) and log odds from logit estimations. The dependent variable is a 0, 1 binary variable with 1 indicating a worker that was offered health insurance by their current employer. All independent variables are binary measures with 1 taking the indicator listed. Table 1 shows the frequency distribution of the independent variables.

****$p \leq .001$
***$p \leq .01$
**$p \leq .05$
**$p \leq .10$

Table 7: Definition of Variables used in the BALS Employer Analysis

Dependent Variables

Health Factor	A factor value from a factor analysis of benefits offered by the firm in the low-skilled position. The benefits loading high on the health factor include 1) paid vacation; 2) paid sick leave; 3) retirement; 4) medical; 5) dental; 6) vision and 7) life insurance.
Number Benefits	A 0-7 numeric variable designating the number of health benefits the firm offers in the low-skilled position. The seven benefits are those identified by the factor analysis as offered as loading high on the health benefit package.
Medical	A 0, 1 binary variable with 1 indicating a firm that offers medical benefits in the low-skilled position.

Independent Variables

Skills

Simple English	The factor score from a factor analysis of the English reading and writing skills needed in the position. Skills loading high include reading written instructions, labels, schedules, journals; general memos, letters, and forms; technical materials; writing simple sentences and paragraphs; and completing forms, logs, charges, or labels.
Complex English	The factor score from a factor analysis of the English reading and writing skills needed in the position. Skills loading high include using correct spelling, grammar, and style; proofreading; and writing complex or creative materials or reports.
Applied math	The factor score from a factor analysis of the math skills needed in the position. Skills loading high include making change; taking discounts and markups of selling price calculations; using equipment (e.g., calculator or business machine).
Algebra	The factor score from a factor analysis of the math skills needed in the position. Skills loading high include using ratios, fractions, decimals, or percents; estimating or round off numbers; solving simple equations; and interpreting data from graph, tables, or charts.
Measurement	The factor score from a factor analysis of the math skills needed in the position. Skills loading high include using simple measurements; and measurement instruments.
Customers	The factor score from a factor analysis of the communication skills needed in the position. Skills loading high include making and receive business phone calls; dealing with customers; explaining products and services; handling complaints; and selling a product or service to a customer.
Coworkers	The factor score from a factor analysis of the communication skills needed in the position. Skills loading high include choosing words and manner of expression appropriate to the workplace; picking up on verbal and non-verbal cues from others; and interacting with co-workers to accomplish a task.
Prioritize	The factor score from a factor analysis of the problem solving skills needed in the position. Skills loading high include prioritizing tasks; gathering information; sorting and categorizing information; and identifying work-related problems.
Evaluate	The factor score from a factor analysis of the problem solving skills needed in the position. Skills loading high include identifying potential solutions to problems; identifying barriers to solutions; and evaluating results.
Leadership	The factor score from a factor analysis of problem solving skills needed in the position. Skills loading high include applying solutions to problems; working in teams; making decisions independently; and providing leadership in problem solving.
Productivity enhancers	The factor score from a factor analysis of the software/program skills needed in the position. Skills loading high include the ability to use word processing programs; spreadsheet programs; database software; email; and Internet browsers.
Multimedia software	The factor score from a factor analysis of the software/program skills needed in the position. Skills loading high include the ability to use web page design/authoring programs; multimedia authoring and editing software; graphics software; and desktop publishing programs.
Financial software	The factor score from a factor analysis of the software/program skills needed in the position. Skills loading high include the ability to use financial inventory software.
Office equipment	The factor score from a factor analysis of the equipment skills needed in the position. Skills loading high include the ability to operate telephone systems (multiple lines); telephone answering machines; copiers; fax machines; and DOS based computers.
Production equipment	The factor score from a factor analysis of the equipment skills needed in the position. Skills loading high include the ability to operate production machinery; and heavy equipment (e.g., forklifts, cranes).

Table 7: Definition of Variables used in the BALS Employer Analysis (continued)

Firm Characteristics	
Small	A 0, 1 binary variable with 1 indicating a small (50 or fewer employees) firm.
Large	A 0, 1 binary variable with 1 indicating a large (300 or more employees) firm.
Service	A 0, 1 binary variable with 1 indicating firm in the service sector (1987 SIC code of 70-72, 74-79, 81, 83-86, 88-89).
Manufacturing	A 0, 1 binary variable with 1 indicating a firm in the manufacturing sector (1987 SIC of 20-40)
Business Services	A 0, 1 binary variable with 1 indicating a firm in the business service sector (1987 SIC of 73 or 87, which includes engineering, accounting, research, management, and relates services as business services).
Education and Medical	A 0, 1 binary variable with 1 indicating a firm in the education or medical sector (1987 SIC of 80 or 82).
Retail	A 0, 1 binary variable with 1 indicating a firm in the education or retail sector (1987 SIC of 52 to 60).
Union	A 0, 1 binary variable with 1 indicating that the incumbent in the position is represented by a union.
Unemployment	Unemployment rate in the county during the month of surveying.
Wage	Starting hourly rate of pay in position (average if the position pays a range).

Appendix A: Quantifying Demand and Supply

We want to approximate the level of excess demand in the BALS local labor market for a skill in order to examine its influence on EBHI. Although we do not have job vacancy and applicant flow information from our firms, the BALS data contain information about the skills required of workers in a particular entry-level job (described in the text), allowing for a crude measure of demand, and about individuals' ability to execute similarly defined skills-based tasks, allowing for a crude measure of supply.

To obtain supply-side information on skills, BALS administered 766 *Household Surveys* face-to-face to randomly-selected individuals in one zip code in the San Francisco Bay Area.[14] The community, often described as "working class", is an ideal setting for a survey on skills held by entry-level workers (no more than a high school education and one year of work experience). Because of its location in "the heart of the Bay", employers in the three-county BALS area rely heavily on the community for workers. 25 percent of all workers in the BALS counties reside in the zip code's county and 63.9 percent of the workers living in the county work in the BALS local labor market.[15]

The factor loadings from the employer-determined skill sets (described in the text) were used to construct supply-side measures of an individual's skill set. [16] The parallel constructs of skills needed in jobs and possessed by entrants into the labor market were used to approximate the level of relative demand for each skill using the crude measures of demand (employer requirements) and supply (skills of entrants) to determine the *relative demand* for each skill (sk) using t-tests to compare the percentage of jobs (j) requiring a particular skill (d_j^{sk}) to the percentage of the entry-level individuals (i) in the BALS sample holding the same skill (s_i^{sk}). Statistically significant differences between d_j^{sk} and s_i^{sk} suggest that a high relative demand ($d_j^{sk} > s_i^{sk}$ or $hd^{sk} = 1$ and 0 otherwise) or low relative demand ($d_j^{sk} < s_i^{sk}$ or $ld^{sk} = 1$ and 0 otherwise) exists *for a particular skill*. Skills with no significant difference in the proportions may be close to in balance in the local labor market ($d_j^{sk} = s_i^{sk}$ or $e^{sk} = 1$ and 0 otherwise).

Clearly, few individuals enter the market with only one skill and few jobs require only one skill. Instead, jobs require a set of skills and individuals bring an array of skills to the labor market and the relative demand for a particular set of skills may contain some skills with a high relative demand and some with a low relative demand. We determine the relative demand for each *skill set* and classify each skill set into mutually exclusive categories, high (relative) demand, low (relative) demand and mixed demand, based on the dominance of skills of a given level of demand within each skill set:

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[14] The *Household Survey* was administered in the 94544 zip code in Hayward California and had a 37.3 percent response rate. For a fuller description of the community see www.hire.csuhayward.edu/hire/discpap/abstracts/F04-01-01.pdf or www.hire.csuhayward.edu/hire/discpap/abstracts/D03-11-08.pdf. A description of the methods used for the *Household Survey* is available at www.hire.csuhayward.edu/hire/discpap/abstracts/D04-06-04.pdf. Included in this report is a socio-demographic comparison of BALS survey respondents to the population living in the area as identified in the 2000 Census. This analysis illustrates the similarity in the demographics and characteristics (e.g., renters, level of education) between the BALS *Household Survey* data and that of the Census.

[15] Numbers are the authors' computations from the U.S. Census 2000 Public Use Microdata Sample (PUMS), the five percent sample.

[16] If individuals stated that they could execute a task using the skill very well, they were said to possess the skill. The number of skills possessed in each skill set was summed to measure the respondent's skill set. For example, the (math) measurement skill set contains two skills: performing simple measurements and using measurement instruments. If a respondent said they performed both skills very well, they had a two on the skill set. If they could only perform one of the skills very well, they received a one. If they could do neither very well, they received a zero.

1a) High D: $\frac{\sum_{1}^{n} hd^{sk}}{\sum_{1}^{n} ld^{sk} + \sum_{1}^{n} e^{sk}} \geq 1,$

High D =1 if (eqn.) ≥ 1,
= 0 if otherwise;

1b) Low D: $\frac{\sum_{1}^{n} ld^{sk}}{\sum_{1}^{n} hd^{sk} + \sum_{1}^{n} e^{sk}} \geq 1,$

Low D =1 if (eqn.) ≥ 1,
= 0 if otherwise;

1c) Mixed D: $\frac{\sum_{1}^{n} e^{sk}}{\sum_{1}^{n} hd^{sk} + \sum_{1}^{n} ld^{sk}} \geq 1,$

Mixed D =1 if (eqn.) ≥ 1 or High D = 0 and Low D = 0,
= 0 if otherwise;

where n is the number of individual skills in a particular skill set.

Appendix A Table 1 defines each of the individual skills and shows the factor analysis of BALS *Employer Survey* data of skills used to classify skill sets and quantify level of demand.

Appendix A Table 1A: Factor Analysis of Reading and Writing English Skills

	Simple English	Complex English	Communality Estimates
Read written instructions, safety warnings, labels (product or shipping), invoices/work orders, logs and journals	0.636	-0.060	0.408
Read forms, memos and letters	0.677	0.337	0.572
Read manuals, computer printout, contracts and agreements	0.779	0.192	0.644
Write simple sentences, short notes and/or simple memos	0.748	0.224	0.610
Write letters using correct structure and sentence style	0.132	0.861	0.759
Proofread	0.132	0.877	0.786
Fill out forms, record data, time, etc. into log or chart	0.772	0.227	0.648
Organize information into a brief written report	0.222	0.710	0.554
Variance explained by factor	2.709	2.270	4.980
Percent variance explained	33.9	28.4	62.3
N		402	

Table Notes: Data are from BALS. The question reads, “What types of materials are employees in this position expected to read?” or ”What types of writing skills are employees in this position expected to use?”. Numbers in the second and third columns are the rotated factor patterns computed using an oblique (nonorthogonal) rotation. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The boxed numbers show factor loadings exceeding .5.

Appendix A Table 1B: Factor Analysis of Math Skills

	Algebra	Applied Math	Measure-ment	Communality Estimates
Use ratios, fractions, decimals, or percents	0.743	0.286	0.177	0.666
Estimate or round off numbers	0.674	0.366	0.175	0.619
Solve simple equations	0.730	0.158	0.213	0.604
Make change	0.012	0.867	0.137	0.770
Compute/figure discounts, markups, or selling price	0.233	0.740	0.047	0.604
Interpret data from graph, tables, or charts	0.709	0.012	0.022	0.505
Perform simple measurements (e.g., lengths, volumes)	0.127	0.100	0.914	0.862
Use measurement instruments (e.g. ruler, scale)	0.217	0.061	0.889	0.841
Use equipment such as a calculator, cash register, business machine	0.310	0.730	0.013	0.629
Variance explained by factor	2.259	2.086	1.755	6.100
Percent variance explained	25.1	23.2	19.5	67.8
N			402	

Table Notes: Data are from BALS. The question reads, “What types of math skills are employees in this position expected to use?”. Numbers in the second, third, and fourth columns are the rotated factor patterns computed using an oblique (nonorthogonal) rotation. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The boxed numbers show factor loadings exceeding .5.

Appendix A Table 1C: Factor Analysis of Problem Solving Skills

	Prioritize	Evaluate	Leadership	Communality Estimates
Prioritize tasks	**0.782**	0.135	0.183	0.663
Gather information	**0.802**	0.125	0.191	0.696
Sort and categorize information	**0.635**	0.351	0.117	0.541
Identify work-related problems	**0.615**	0.371	0.107	0.527
Identify potential solutions to problems	0.381	**0.763**	0.120	0.742
Identify barriers to solutions	0.370	**0.783**	0.159	0.775
Implement solutions	0.170	0.395	**0.701**	0.677
Evaluate results	0.155	**0.720**	0.243	0.602
Team work/collaborative problem solving	0.330	-0.292	**0.728**	0.725
Make decisions independently	0.210	0.231	**0.715**	0.609
Leadership oriented problem solving	-0.028	0.422	**0.637**	0.585
Variance explained by factor	2.526	2.481	2.133	7.140
Percent variance explained	23.0	22.6	19.4	64.9
N		402		

Table Notes: Data are from BALS. The question reads, "What types of problem solving skills are employees in this position expected to use?". Numbers in the second, third, and fourth columns are the rotated factor patterns computed using an oblique (nonorthogonal) rotation. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The **boxed numbers** show factor loadings exceeding .5.

Appendix A Table 1D: Factor Analysis of Communication Skills

	Customers	Coworkers	Communality Estimates
Choose words and manner of expression appropriate at work	0.321	**0.664**	0.544
Make and receive business phone calls	**0.725**	0.203	0.566
Deal with customers	**0.795**	0.219	0.680
Be perceptive of verbal and non-verbal cues from others	0.208	**0.731**	0.578
Explain products and services	**0.826**	0.165	0.710
Handle complaints	**0.772**	0.243	0.655
Interact with co-workers to accomplish a task	0.002	**0.774**	0.599
Sell a product or service to a customer	**0.755**	0.026	0.570
Variance explained by factor	3.150	1.751	4.902
Percent variance explained	39.4	21.9	61.3
N		402	

Table Notes: Data are from BALS. The question reads, "What types of communication skills are employees in this position expected to use?". Numbers in the second and third columns are the rotated factor patterns computed using an oblique (nonorthogonal) rotation. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The **boxed numbers** show factor loadings exceeding .5.

Appendix A Table 1E: Factor Analysis of Computer Software Skills

	Productivity Enhancers	Multimedia	Financial	Communality Estimates
Word processing programs	0.866	0.114	0.041	0.765
Spreadsheet programs	0.859	0.012	0.097	0.748
Database software	0.525	0.042	0.392	0.431
Email	0.849	0.151	0.062	0.747
Internet browsers	0.783	0.197	0.083	0.659
Webpage design/authoring	0.076	0.724	0.304	0.622
Multimedia authoring/editing software	-0.002	0.744	-0.080	0.561
Graphics software	0.136	0.800	0.135	0.677
Desktop publishing programs	0.227	0.570	-0.223	0.427
Financial inventory software	0.162	0.037	0.910	0.855
Variance explained by factor	3.200	2.121	1.169	6.490
Percent variance explained	32.0	21.2	11.7	64.9
N		402		

Table Notes: Data are from BALS. The question reads, "Which software/computer programs are employees in this position expected to use?". Numbers in the second and third columns are the rotated factor patterns computed using an oblique (nonorthogonal) rotation. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The boxed numbers show factor loadings exceeding .5.

Appendix A Table 1F: Factor Analysis of Job-Specific Skills

	Office Equipment	Production Equipment	Communality Estimates
Telephone systems (multiple lines)	0.708	-0.222	0.550
Answering machines	0.829	-0.166	0.715
Copiers	0.903	-0.076	0.821
Fax machines	0.918	-0.106	0.855
Windows or DOS-based computers	0.791	-0.094	0.634
Production machinery	-0.115	0.820	0.685
Heavy equipment	-0.135	0.804	0.664
Variance explained by factor	3.503	1.420	4.924
Percent variance explained	50.0	20.3	70.3
N		402	

Table Notes: Data are from BALS. The question reads, "Do employees in this position need to be familiar with any of the following equipment?". Numbers in the second and third columns are the rotated factor patterns computed using an oblique (nonorthogonal) rotation. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The boxed numbers show factor loadings exceeding .5.

Appendix B: Identifying a Health Care Benefit Package

We identify the components of a health benefit package using a factor analysis of the 23 benefits in the BALS *Employer Survey* that were potentially offered to low-skilled workers in the entry-level positions. Factor analysis helps identify patterns in the benefits offered by the firms. Factor analysis assumes the existence of a system of underlying constructs in our measures of benefits and uses their correlations to uncover patterns in the benefit groupings (as assumed in the underlying constructs). These patterns, called factors, were developed into different benefit packages sets by identifying the most highly correlated benefits on each factor loading. The factor loadings from this analysis provide a relative ranking of benefit offers in the seven empirically-determined factors, with the highest relative loadings in each construct (i.e., factor) used to identify benefit packages.

Our factor analysis of the benefits offered in low-skilled jobs suggests that firms tend to group benefits in packages, including a package of health benefits (Appendix B Table 1). When examining patterns in benefits offered, four different benefit packages emerge: health benefits, leave benefits, child care benefits, and flexibility benefits. Analysis suggests that when firms offer low-skilled workers health benefits, they offer workers paid vacation, paid sick leave, retirement, medical, dental, vision, and life insurance. When they offer workers “leave” benefits, they provide paid maternity and paid paternity leave. When they offer child care benefits, they offer paid child care and child care assistance. When they offer workers flexibility, they offer job sharing and flexible hours.

Appendix B Table 1: Benefits Offered: Factor Analysis

BENEFIT	ROTATED FACTOR PATTERN						COMMUNALITY
	HEALTH FACTOR	MERIT FACTOR	LEAVE FACTOR	RETAIL FACTOR	FLEXIBLE FACTOR	CHILD CARE FACTOR	
Paid vacation	**0.766**	0.132	0.024	0.326	0.125	0.028	0.728
Paid sick leave	**0.757**	0.141	0.142	0.036	0.047	0.067	0.621
Retirement	**0.748**	0.039	0.142	0.043	0.040	0.042	0.587
Medical	**0.794**	0.112	0.025	0.317	0.185	-0.020	0.778
Dental	**0.819**	0.121	0.056	0.225	0.145	0.002	0.759
Vision	**0.665**	0.022	0.027	0.197	0.077	0.002	0.489
Life insurance	**0.728**	0.090	0.128	-0.021	0.002	0.116	0.568
Tuition reimbursement	0.556	0.092	0.202	-0.212	0.083	0.218	0.458
Paid child care	0.037	0.129	0.015	0.086	0.001	**0.836**	0.724
Child care assistance	0.195	-0.057	0.213	-0.108	0.167	**0.697**	0.612
Job sharing	0.072	0.027	0.070	-0.104	**0.758**	0.129	0.614
Flex hours	0.297	0.200	-0.063	0.089	**0.627**	0.015	0.533
Flex spending (pre-tax)	0.517	0.120	0.062	-0.424	0.228	0.053	0.519
Bonuses	0.167	0.470	0.004	0.209	0.164	0.131	0.336
Paid maternity leave	0.221	0.210	**0.821**	0.088	0.007	0.018	0.774
Paid paternity leave	0.131	0.058	**0.816**	0.021	0.069	0.193	0.730
Piece rates	-0.117	0.636	0.026	0.104	0.174	0.202	0.500
Profit sharing	0.238	**0.633**	0.073	-0.085	-0.182	-0.064	0.508
Stock options	0.165	**0.678**	0.108	-0.100	0.008	-0.097	0.518
Overtime pay	0.387	-0.094	0.138	**0.634**	0.105	-0.210	0.635
Employee discounts	0.239	0.132	0.070	**0.649**	-0.018	0.128	0.518
Transportation aids	0.089	-0.128	0.419	0.116	0.482	-0.009	0.446
Variance explained by factor (ignoring other factors)	5.106	1.733	1.718	1.479	1.475	1.443	--
Percent factor variance explained	23.2	7.9	7.8	6.7	6.7	6.6	58.9

Table Notes: Data are from the BALS *Employer Survey*. Question reads: "Please look over the list of employee benefits to determine which, if any, are offered to employees in this job. Numbers in columns three through eight are the rotated factor computed using an oblique (nonorthogonal) rotation, which represent the loadings used to compute the health factor score used as the dependent variable in some analysis. The communality reflects the proportion of the variation of each variable involved in the pattern (sum of squared factor loadings). The total variance is the sum of the communalities divided by the number of variables and tells the percent of the variation among all the variables explained by the factor patterns. The boxed numbers highlight factor loadings exceeding .6.