KDI SCHOOL

WORKING PAPER SERIES

KDI 국제정책대학원
KDI School of Public Policy and Management

KDI SCHOOL WORKING PAPER SERIES

Interindustry Differentials in Health Coverage and Dynamic Employment Substitution

Youjin Hahn
School of Economics, Yonsei University

Myungkyu Shim
School of Economics, Sogang University

Hee-Seung Yang
KDI School of Public Policy and Management

December, 2017
Working Paper 17-13

KDI 국제정책대학원
KDI School of Public Policy and Management

Interindustry Differentials in Health Coverage and Dynamic Employment Substitution*

Youjin Hahn[a]
Myungkyu Shim[b]
Hee-Seung Yang[c]

Abstract

Using data on the U.S., we study the effects of employer-provided health insurance on dynamic employment substitution between 1990 and 2007 by exploiting the interindustry variation in health care coverage. We find that industries with a high health benefit structure in 1990 have experienced slower employment growth of part-time workers relative to full-time workers, in particular part-time *routine* workers, while the relative wage of part-time to full-time workers and capital per worker have increased more in such industries. We suggest that this can be explained as firms' and workers' optimal responses to the benefit structure.

***JEL* codes**: I13, J21, J22, J23, J32

Keywords: Employer-provided health insurance; Employment substitution; Part-time employment; Routine occupation; Labor supply and demand

* Acknowledgments: We thank Jaesung Choi, Do Won Kwak and Haishan Yuen for helpful comments. Lisa Chan provided excellent research assistance. We gratefully acknowledge financial support from the Department of Economics at Monash University.
[a] School of Economics, Yonsei University. Email: youjin.hahn@yonsei.ac.kr
[b] School of Economics, Sogang University. Email: mkshim@sogang.ac.kr
[c] Corresponding Author. KDI School of Public Policy and Management. Email: heeseung.yang@kdischool.ac.kr

1. Introduction

Over the last 20 years, the share of individuals working part-time has steadily increased in the United States, reaching around 20% (the U.S. Bureau of Labor Statistics, henceforth BLS).[1] Over the same period, the cost of health insurance has also risen (Figure 1), which has aroused controversy over the effects of such changes on the labor market. In particular, it is usually argued that as employer-provided health insurance is typically tied to full-time employment, firms who face higher health care coverage are likely to replace those workers with part-time workers to minimize the cost of labor (Buchmueller et al. 2011; Baicker and Chandra 2005; Lettau 1997; Buchmueller 1999).

<Figure 1>

This paper examines whether the initial level of employer-provided health insurance can explain dynamic employment substitution between full-time and part-time workers. Employer-provided health insurance constitutes the largest portion of fringe benefits (around 7% of total compensation),[2] and the employer contribution to insurance premiums as well as the share of beneficiaries vary across industries. The standard incidence theory indicates that workers bear the full incidence of employer-provided health insurance in the form of lower wages. But nominal wage rigidity partially redistributes the incidence of rapidly rising insurance premiums (Sommers 2005): rather than decreasing workers' wages, growing health care costs may force firms to bear some of the burden of employer-provided health insurance.[3] As firms might not be able to lower wages, the usual argument against providing generous employment benefits to full-time workers is that firms with high benefit costs might have an incentive to change the composition of workers toward more part-time workers.

The effect of health insurance benefits on employment substitution is, however, theoretically ambiguous when we further consider the labor supply channel; given the high costs of obtaining health coverage, health insurance could be a critical factor in labor supply decisions

[1] The BLS defines part-time workers as those who work fewer than 35 hours per week.
[2] Total fringe benefits as a proportion of total compensation were around 30% between 1991 and 2003 (the BLS). Health insurance comprises the largest portion of fringe benefits, followed by paid leave and retirement benefits.
[3] One might raise a concern that high health benefits are associated with low wages so that overall employer-provided health insurance is not a burden for firms. Most studies that attempt to find trade-off between wage and employer-provided health insurance find a positive correlation, as high-paying jobs often pay generous health benefits (Currie and Madrian 1999).

and a higher share of full-time workers with health care coverage would attract employees to work full-time rather than part-time.[4] Thus, the labor supply curve of full-time relative to part-time workers would shift out (Buchmueller and Valletta 1999). Past findings about the effects of employer-provided health insurance on employment substitution between full-time and part-time employees are mixed (see Cutler and Madrian (1998) for a review). Our study extends the insights of the existing literature by using industry-level data that span over 17 years, allowing us to examine the long-term effects of health coverage on employment of full-time versus part-time labor.

We begin by providing theoretical predictions about the effects of interindustry health benefit differentials on labor market dynamics using a simple labor market model. In particular, we show that the prediction of the model with dynamic effects of labor supply can be very different from that of the model considering only labor demand. In our empirical framework, we first document that different industries are likely to face different levels of health insurance benefits both in terms of coverage and costs, and this difference is persistent over time. Using U.S. data between 1990 and 2007, we find that the *relative* employment of full-time to part-time workers has increased more in industries that had a high share of health coverage in 1990. These findings are consistent with the prediction of our model that reflects labor supply as well as labor demand, emphasizing the importance of considering workers' incentives when evaluating labor market effects. We further show that, consistent with the recent literature on job polarization (Acemoglu and Autor 2011; and Autor et al. 2003), this adjustment of relative employment has been associated with reduced employment of routine occupations among part-time workers. This is because routine workers are more easily replaced by other production factors or outsourced (Autor et al. 2003), in particular, by Information, Communication and Technology (ICT) capital (Shim and Yang 2015).

2. Theoretical Considerations

This section introduces a simple labor market model to study how the interindustry differentials in health care coverage are related to subsequent changes in composition of full-time and part-time workers.[5] All markets are assumed to be perfectly competitive. There is a representative

[4] 66% of those aged 16–64 has private health insurance that comes through employment (March Current Population Survey, 2001–2010).
[5] See Appendix A for derivation.

firm that uses only labor in the production; full-time and part-time workers. Results are robust to the addition of capital in the production function. All variables are in per capita terms so that h_{it} (resp. $\tilde{h}_{it}$) is the employment share of full-time (resp. part-time) workers in industry *i* at time *t*. The firm's problem is:

$$\max p_{it} f(h_{it}, \tilde{h}_{it}) - w_{it} h_{it} - \tilde{w}_{it} \tilde{h}_{it} \tag{2.1}$$

subject to the production function[6]

$$y_{it} = \lambda_{it} h_{it}^{\alpha} \tilde{h}_{it}^{1-\alpha}, \tag{2.2}$$

where p_{it} is the price of consumption good, λ_{it} is the industry-specific shock, and w_{it} is the wage rate of full-time workers including health benefits in industry *i* at time *t*. On the other hand, $\tilde{w}_{it}$, the wage rate of part-time workers, does not include health benefits. We obtain the following relative demand equation of which implication is summarized in Proposition 1.

$$\log\left(\frac{h_{it}}{\tilde{h}_{it}}\right) = \log\left(\frac{\alpha}{1-\alpha}\right) - \log\left(\frac{w_{it}}{\tilde{w}_{it}}\right). \tag{2.3}$$

Proposition 1 (The effect of the industry's higher health insurance benefits on relative employment: Demand only). *Suppose that the relative health insurance benefit of industry i is different from that of industry j so that* $w_{it}/\tilde{w}_{it}$ *differs from* $w_{jt}/\tilde{w}_{jt}$. *Then the relative employment of full-time workers is lower in industries with high health care coverage.*

This is the usual argument based on the static model that generous benefits lead firms to substitute away from full-time employees toward part-time employees, to whom firms do not have much obligations to provide health insurance. This argument holds as long as the two types of workers are not perfect complements.

We now turn to the supply side of the labor market in order to consider the full equilibrium effect of interindustry differentials in health care coverage. We assume that the dynamic labor supply equation of full-time workers is as follows:

[6] One can alternatively use the CES production function, which yields similar implications.

$$\log h_{it} = \log h_{it-1} + \theta[\log w_{it-1} - \log \bar{w}_{it-1}] + \varepsilon_{it}, \tag{2.4}$$

where $\theta > 0$ and $\bar{w}_{it-1}$ is the average wage (health insurance benefit) for full-time workers in $t-1$. The first term, $\log h_{it-1}$, captures the persistence of the labor. The second term captures the idea that the supply of full-time workers increases with the level of health insurance benefits relative to the average benefits in the previous period. This dynamic labor supply equation can be obtained under the assumptions that (1) it takes time for workers to obtain information on health benefits of other industries and (2) the benefits are highly persistent as in data.[7]

We obtain the following two laws of motion for employment and hourly wage for full-time workers. Proposition 2 summarizes the implication of equation (2.5), which is of our interest.

$$\Delta\log h_{it} = \theta[\log w_{it-1} - \log \bar{w}_{it-1}] + \varepsilon_{it}, \tag{2.5}$$

$$\Delta\log w_{it} = -\frac{\theta\eta}{\alpha+\eta(1-\alpha)}[\log w_{it-1} - \log \bar{w}_{it-1}] + \nu_{it}, \tag{2.6}$$

where $\nu_{it} = \frac{\theta\eta}{\alpha+\eta(1-\alpha)}\left(\frac{1}{\eta}\Delta\log \phi_{it} - \frac{(1-\alpha)(1-\eta)}{\eta}\Delta\log \tilde{w}_{it} - \varepsilon_{it}\right)$.

Proposition 2 (The effect of higher health insurance benefits on relative employment: Supply and Demand). *The relative employment of full-time workers increases over time in industries with high initial health benefits.*

As a result, Proposition 1, which is obtained without consideration of the labor supply channel, that generous benefits increase the relative employment of part-time to full-time workers, may not hold in the dynamic setup. Instead, as long as labor is mobile across industries, workers have incentives to supply more full-time labor in industries with high health insurance benefits.

We finally note that part-time workers are not directly compensated by health benefits, which makes employees reluctant to work part-time when the level of those benefits rises. Hence, if we estimate equation (2.5) with $\tilde{h}_{it}$ (*share* of part-time employment rather than the level), we will obtain negative θ for part-time workers, which is the opposite to the full-time workers. As a

[7] The share of workers with health insurance is higher among full-time employees than part-time employees (66% vs. 7% based on 1991 March Current Population Survey) and is persistent over time (Figure 3).

result, the ratio between full-time and part-time workers will increase more in high benefit industries.

Figure 2 summarizes our discussion graphically. Let E_o be the original equilibrium. As health insurance benefits increase, the relative demand for full-time workers decreases (Proposition 1) resulting in the equilibrium E_d. However, it also attracts workers to work full-time so that the relative supply shifts to the right, moving the equilibrium to E_f (Proposition 2).

<Figure 2>

3. Data and Empirical Strategy

We use the Census, March Current Population Survey (CPS), and EU KLEMS data between 1990 and 2007, and thus, our data cover the period before the global financial crisis. Our main analysis focuses on this period as health insurance premiums show a notable increase since the late 1980s (Cutler and Madrian 1996; Gutowski et al. 1997). Age is restricted to 16−64 years and we only consider full-time or part-time employees in wage-and-salary sectors excluding those who are in military. We follow the BLS's definition of part-time workers as those who work fewer than 35 hours per week. The Census and March CPS provide information on employment, hours worked, types of health insurance, employer contribution to health insurance, occupation and union membership, while the EU KLEMS data provide information on productivity, capital and real output for 30 industries. Information on the proportion of employer-provided health insurance to total compensation is not available in the data. Instead, we use (1) the share of full-time workers covered by employer-provided health insurance in each industry and (2) the amount of employer contribution to health insurance as proxies for the benefit cost since industries with the higher share of beneficiaries or with higher employer contribution are more likely to bear the burden of rising health insurance costs than other industries.[8]

Table 1 shows the share of full-time workers, the share of full-time workers with employer-provided health insurance, and employer contribution to health insurance among full-time workers across industries. EU KLEMS data provide information of 30 industries based on the North American Industry Classification (NAICS) and thus, we follow the the structure of the

[8] The information on the share of full-time workers with health benefits is available from 1980, while the information on employer contribution is available from 1991.

NAICS in this paper as well.[9] The mean share of full-time workers is 86%: the retail trade industry has the lowest share at 60%, while the transportation equipment industry has the highest share at 96%. The extent of the health care coverage among full-time workers also shows a great deal of variation across industries although the mean is 69%: the lowest share is observed in the agricultural industry (24%) whereas the highest share of workers with benefits is 87% in the industry of post and telecommunications industry. Employer contribution has a similar distribution: it varies from $497 (agriculture) to $2,953 (transport equipment), and the mean is $1,874. We note that cross-industry variation is much greater in the share of health coverage than the full-time employment rate. The standard deviation across industries is 0.165 for health care coverage while that for the share of full-time workers is 0.098. Since our measures for the burden of health benefits are calculated among full-time workers, the variation is not driven by industry difference in the share of full-time workers.

<Table 1>

The first graph in Figure 3 presents a scatter plot of the fraction of full-time workers with health benefits between two periods of time; 1990 and 2007. The second graph also depicts the relationship of employer contribution in 1991 and 2007. They show that industries that provided relatively high health insurance benefits in 1990 (or 1991) still provided high benefits in 2007, which indicates persistence in health care coverage across industries.

<Figure 3>

To identify the effects of health coverage on employment substitution over 17 years, we estimate the following equation, which is usually used in the growth literature that analyzes convergence in economic growth (Barro and Sala-i-Martin 1992; Mankiw et al. 1992).

$$\Delta y_{it,t+k} = \theta b_{it} + \beta x_{it} + \varepsilon_{it}, \tag{3.1}$$

[9] The Census system up to the 1990 Census was based on the structure of the Standard Industrial Classification (SIC). This classification was replaced in 1997 by the NAICS and the 2000 Census industrial classification system was therefore based on the structure of the NAICS.

where y_{it} is the variable of interest in industry i at time t such as employment and wage, and $\Delta\, y_{it,t+k}$ is the average annual growth rate of the variable y_{it} between t and $t+k$ (i.e., between 1990 and 2007). b_{it} is the share of full-time workers with employer-provided health insurance or employer contribution to health insurance in industry i at time t. x_{it} includes industry-specific variables that that can affect the subsequent labor market outcomes. In each regression, we weight the regression by the initial (i.e., 1990) employment of each industry.

For instance, we regress the average employment growth rate of full-time and part-time workers (i.e., $\Delta E_{i1990,2007} = [\log(E_{i2007}) - \log(E_{i1990})]/17$, where E_i is the number of workers in industry i) on share of full-time workers with health insurance benefits in 1990 as well as other control variables. By using the share of *full-time* workers with benefits instead of the share of all workers with benefits, we capture industry-level health benefits that are not driven by share of full-time workers across industries. Since the burden of health benefits in each industry has not changed much over time, we use industry-level growth rates as dependent variables and the initial health care coverage as a main regressor instead of using industry fixed effects.[10]

As control variables, we include the labor unionization rate in 1990 and capital per worker in 1990.[11] For instance, a labor union can affect both the number of health insurance beneficiaries in the initial period and the dynamic changes in the labor market (Alder et al. 2014). In addition, if workers' abilities are different from each other and they are positively associated with the capital-labor ratio, the high ratio of beneficiaries can be the compensation for their abilities and the subsequent labor market changes can be also related.

One potential concern for identification is an endogenity of the main regressor b_{it}. In particular, industries with more generous health benefits may correlate with other unobservable factors that affect employment growth. That is, more generous health benefits could signal workers' productivity which, in turn, could affect employment growth. We capture this effect directly by controlling for the initial wage ratio between full-time and part-time workers. In order to address the potential endogeneity, we also use the previous decade's (i.e., 1980) share of full-

[10] Standard deviation of insurance coverage (1981–2008) ranges from 0.14–0.17 depending on the year chosen. After taking out average health insurance benefits across years, the standard deviation reduces to 0.0–0.04, suggesting that within industry variation over-time is very small.

[11] For the union membership database, see Hirsch and Macpherson (2003) for details.

time workers with health insurance benefits as an instrumental variable (IV) for the initial level of health benefits.[12]

4. Results

In panel A of Table 2, we report the results for how the initial level of employer-provided health insurance affects the growth rate of employment and wage. Column 1 in panel A shows that the initial share of full-time workers with health benefits has a negative but not statistically significant relationship with the subsequent total employment growth between 1990 and 2007. Columns 2 and 3 show that the average full-time employment growth rate is not significantly related to the initial share of beneficiaries while that of part-time workers is negatively related to it: the average growth rate of part-time workers decreases by 5.8% when the share of beneficiaries in 1990 increases by 1%.[13] Figure 4 shows this relationship. The slope for part-time workers is negative and steeper than that for full-time workers. Columns 4 and 5 show that high-beneficiary industries have experienced lower subsequent real wage growth for full-time than for part-time workers.[14] As Figure 2 suggests, an increase in labor supply of full-time workers lowers the wage of full-time workers relative to part-time workers. These findings on employment and wage support our hypothesis that labor supply is an important factor; consistent with the prediction of our model, the part-time employment growth is lower in industries with a high share of beneficiaries and that adjustment is associated with more labor supply toward full-time employment.

<Table 2>

<Figure 4>

The IV estimates using the previous decade's share of beneficiaries are reported in Appendix Table B1. Both the OLS and IV regressions yield nearly identical coefficients,

[12] Due to data availability, we use the IV for the regressor of share of full-time workers with health benefits only, we have data from 1980. For the regressor of employer contribution, we cannot use the lagged term as an IV since the information is available from 1991.

[13] When we use the changes in employment *share* of full-time and part-time workers as dependent variables, the part-time share declines by 3.3%, while the full-time share increases by 3.3% between 1990 and 2007.

[14] The results in columns 4 and 5 show the negative effect of initial union membership on the subsequent wage growth, indicating that the average growth rate of real output per worker is lower in industries with high union membership rates, which will be discussed below.

suggesting endogeneity may not be a huge concern. The first stage F-statistics for the IV estimation is high at 161.65.

Panel B in Table 2 presents estimates of employment and wage growth using employer contribution to employer-provided health insurance. The results are similar to those in panel A when we use the share of full-time workers with health benefits. Total employment growth decreases by 1.1% when employer contribution increases by $1,000. In particular, the average growth rate of part-time employment declines by 2.2% when employer contribution rises by $1,000. Figure 5 depicts that part-time employment growth responds more to employer contribution than full-time growth. Columns 4 and 5 also show that the relative wage growth of part-time to full-time workers is higher in industries with a high burden of providing health insurance.

<Figure 5>

Since the mid-1980s, employment has become polarized, with employment shifting away from routine occupations toward non-routine (cognitive and manual) jobs (Autor et al. 2003). Table 3 shows that the decrease in part-time employment is mostly driven by reduction in routine workers, which is consistent with the phenomenon of job polarization.[15] The routine occupations include "sales," "office and administrative support," "production, craft and repair," and "operator, fabricator and labourer," which are more substitutable for (ICT) capital than non-routine occupations (Acemoglu and Autor 2011).[16] When the initial share of beneficiaries increases by 1%, the average growth rate of part-time routine employment declines by 8.0% (column 2 in panel A), while that of non-routine workers decreases by 2.0% (column 4 in panel A, not significant at the 10% level).[17] The intuition behind this result is as follows: the higher ratio of full-time to part-time workers increases the production cost of firms as the fraction of full-time workers with health care benefits remains similar over time. Hence, firms with a high burden are more likely to employ new technology to increase production efficiency. The price of (ICT)

[15] The IV results are similar to the OLS and are reported in Table B2, Appendix B.
[16] Cognitive occupations include "managers," "professionals," and "technicians." Manual occupations include "protective services," "cooking, building and grounds cleaning," and "personal care and personal services."
[17] This result is consistent with Mathur et al. (2015): the employment of manual workers has not been affected by the Affordable Care Act which requires medium and large employers to provide health insurance to employees working at least 30 hours per week.

capital has dropped significantly over the sample period and it is the routine occupations that are easily substituted for this type of capital. As a result, the decline of the number of part-time workers has been supplemented by the adoption of more capital.[18] Column 5 in panel A shows that capital per worker increases 5.7% when the initial fraction of beneficiaries increases by 1%. Given that fringe benefits comprise 30% of total compensation and about a quarter of fringe benefits are employer-provided health insurance,[19] this result indicates that a small fraction of compensating differentials between full-time and part-time workers can provide firms with an incentive to adopt new technology. The last column in panel A shows that the growth rate of real output per worker rises, consistent with the finding of an increase in real wages of both full-time and part-time workers in Table 2.

<Table 3>

We now interpret the negative relationship between the subsequent wage growth and initial union membership in columns 4 and 5 of Table 2. It directly follows from the observation that the average growth rate of real output per worker (i.e., labor productivity) decreases by 7.5% when the union membership rate increases by 1% (column 6 in panel A, Table 3): as argued by Alder et al. (2014) and Bradley et al. (2013), the existence of labor union might lower firms' incentive to innovate, which also lowers the productivity growth. As long as the wage is positively associated with the labor productivity, the subsequent wage growth would be negatively related to the level of union membership in the initial year.

When we use employer contribution as a main regressor, the results are similar. Panel B shows similar patterns to those in panel A in Table 3. The negative employment growth comes from routine workers: when employer contribution increases by $1000, the annualized employment growth rates of full-time routine and part-time routine workers decrease by 1.1% and 2.5%, respectively. Consistent with the job polarization literature, the average growth rate of capital per worker increases by 1.4% and that of real output per worker also rises by 2.1% between 1991 and 2007.

[18] Similar arguments that the high production cost gives firms the incentive to adopt the new technology or to use other production factors can be found in Borjas and Ramey (2000) and Shim and Yang (2015).
[19] Source: U.S. Bureau of Labor Statistics, "Employer costs for employee compensation historical listing (annual), 1986-2001." http://www.bls.gov/ncs/ect/home.htm (accessed in February 2015).

So far, we have examined the effects on annualized growth between 1990 and 2007. In Tables 4 to 7, we report the estimates for periods between 1990 and 2000 and between 2000 and 2007 to discern whether the effects of the initial share of health benefits (or the initial share of employer contribution) are different across time. Results in Table 4 indicate that the decrease in part-time employment in industries with high health care costs was more pronounced for the period between 2000 and 2007 than between 1990 and 2000. One possible explanation is that health insurance premiums grew faster during the later period (Figure 1). Also, employer contribution to health insurance shows a steep increase since the late 1990s, which may put additional financial burden to firms (Figure 6). The wage growth is higher for part-time workers than for full-time workers for both periods, although the part-time wage growth is not significant between 2000 and 2007 in Table 4. When employer contribution is used as a main regressor (Table 5), the results show similar patterns to when the share of workers with employer-provided health insurance (Table 4) is instead used. In particular, when employer contribution increases by $1,000, part-time employment decreases by 3.7% between 2000 and 2007, which is much greater than the 1.1% decline between 1991 and 2000. Table 5 also shows that the wage growth of part-time employment is greater than that of full-time employment for both periods.

<Table 4>

<Table 5>

<Figure 6>

Consistent with the previous results, column 2 in Tables 6 and 7 shows that the decrease in part-time employment is driven by the decline in routine workers. Part-time non-routine workers also decreased between 2000 and 2007, but size of the decline for routine workers is much smaller. Overall, the results from Tables 4 to 7 show that the relationships observed in the baseline sample period are also present when we split the sample period, but at a different magnitude.

<Table 6>

<Table 7>

5. Conclusion

This paper examines the effects of employer-provided health insurance on employment substitution between 1990 and 2007 by exploiting large variation in health care coverage across industries. Past studies have examined the link between health insurance and labor market outcomes. This paper contributes to this broader literature on the relation between health insurance and its implication on the labor market.

The analysis of labor market responses to the benefit structure may inform about the effects of recent federal health care reforms in the United States. Since the Affordable Care Act (ACA) of 2010 requires employers with at least 50 full-time workers to provide those working at least 30 hours per week with health insurance, it could be argued that employers that operate on the margin have an incentive to hire more part-time workers to minimize the cost of expanded coverage. But this study shows that this argument is not necessarily the case. The study finds that high-benefit industries have experienced slower employment growth of part-time workers relative to full-time workers, while the relative wage of part-time to full-time workers has increased. With a simple labor market model, we show that this phenomenon can be explained as firms' and workers' optimal responses to the benefit structure. Our results are consistent with recent studies (Mathur et al. 2015; Garrett and Kaestner 2015) which find little evidence that the ACA has caused a shift toward part-time employment.

Reference

Acemoglu, D. and Autor, D.H. 2011. Skills, tasks and technologies: implications for employment and earnings. *Handbook of Labor Economics* 4, 1043–171.

Alder, S., Lagakos, D., and Ohanian, L. 2014. Competitive pressure and the decline of the Rust Belt: a macroeconomic analysis. *NBER Working Paper No. 20538*

Autor, D.H., Levy, F., and Murnane, R.J. 2003. The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics* 118(4), 1279−333.

Baicker, K. and Chandra, A. 2006. The labor market effects of rising health insurance premiums. *Journal of Labor Economics* 24(3), 609–33.

Barro, R.J. and Sala-i-Martin, X. 1992. Convergence. *Journal of Political Economy* 100(2), 223–51.

Borjas, G.J. and Ramey V.A. 2000. Market responses to interindustry wage differentials. *NBER Working Paper No. 7799*.

Bradley, D.J., Kim, I., and Tian, X. 2013. The causal effect of labor unions on innovation. *Working Paper*, http://dx.doi.org/10.2139/ssrn.2232351.

Buchmueller, T.C., DiNardo, J., and Valletta, R.G. 2011. The effect of an employer-provided health insurance mandate on health insurance coverage and the demand for labor: evidence from Hawaii. *American Economic Journal: Economic Policy* 3, 25–51.

Buchmueller, T.C. 1999. Fringe benefits and the demand for part-time workers. *Applied Economics* 31, 551−63.

Buchmueller, T.C. and Valletta, R.G. 1999. The effect of health insurance on married female labor supply. *Journal of Human Resources* 34(1), 42−70.

Currie, J. and Madrian, B.C. 1999. Health, health insurance and the labor market. *Handbook of Labor Economics* 3, 3309–416.

Cutler, D. and Madrian, B.C. 1998. Labor market responses to rising health insurance costs. *Rand Journal of Economics* 29(3), 509−30.

Garrett, B. and Kaestner, R. 2015. Recent evidence on the ACA and employment: has the ACA been a job killer? *ACA Implementation–Monitoring and Tracking*, Urban Institute.

Gruber, J. 1994. The incidence of mandated maternity benefits. *American Economic Review* 84(3), 622−41.

Gutowski, M., Rivera-Lowitt, C., Dicken, J., and Bonin, P. 1997. Private health insurance: Continued Erosion of coverage linked to cost pressures U.S. General Accounting Office (GAO/HEHS-97-122), Washington, D.C.

Hirsch, B.T. and Macpherson, D.A. 2003. Union membership and coverage database from the Current Population Survey: Note. *Industrial and Labor Relations Review* 56(2), 349–54.

Lettau, M.K. 1997. Compensation in part-time jobs versus fulltime jobs: what if the job is the same? *Economics Letters* 56(1), 101−6.

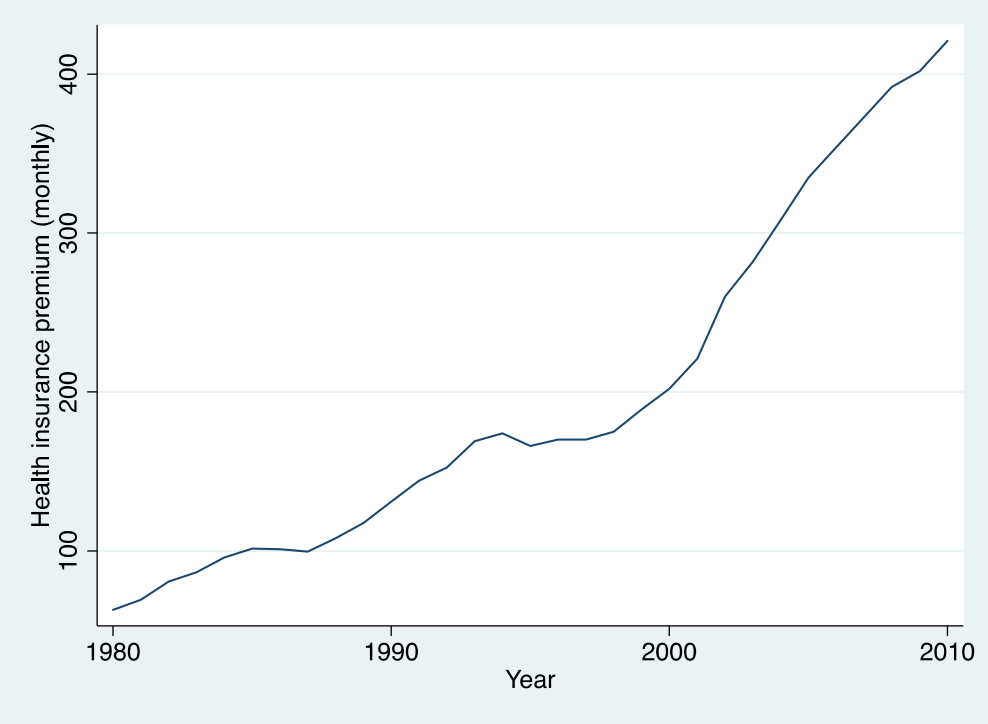
Mankiw, N.G., Romer, D., and Weil, D.N. 1992. A contribution to the empirics of economic growth. *Quarterly Journal of Economics* 107(2), 407–37.

Mathur, A., Slavov, S.N., and Strain, M.R. 2015. Has the Affordable Care Act increased part-time employment? *Applied Economics Letters*, http://dx.doi.org/10.1080/13504851.2015.1066483.

Sommers, B.D. 2005. Who really pays for health insurance? The incidence of employer-provided heath insurance with sticky nominal wages. *International Journal of Health Care Finance and Economics*, 5, 89–118.

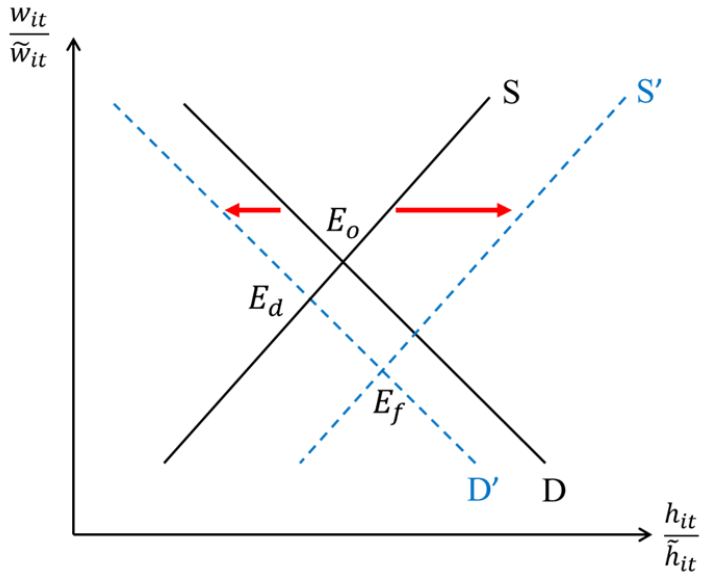
Shim, M. and Yang, H-S. 2015. Interindustry wage differentials, technology adoption, and job polarization. *Working Paper*, http://dx.doi.org/10.2139/ssrn.2474931.

Figure 1: Trend of monthly health insurance premiums for singles (1980-2010)



Note: The unit is measured in thousands of 1999 U.S. dollars.
Source: U.S. Department of Commerce, U.S. Bureau of Labor Statistics, U.S. General Accounting Office, Kaiser Family Foundation, U.S. Department of Health and Human Services. See Appendix C (Data Appendix) for details.

Figure 2: Labor market dynamics



Note: $h_{it}/\tilde{h}_{it}$ is the relative employment of full-time to part-time workers and $w_{it}/\tilde{w}_{it}$ is the relative wage of full-time to part-time employees.

Figure 3: Health coverage benefits by industry between 1990 (1991) and 2007

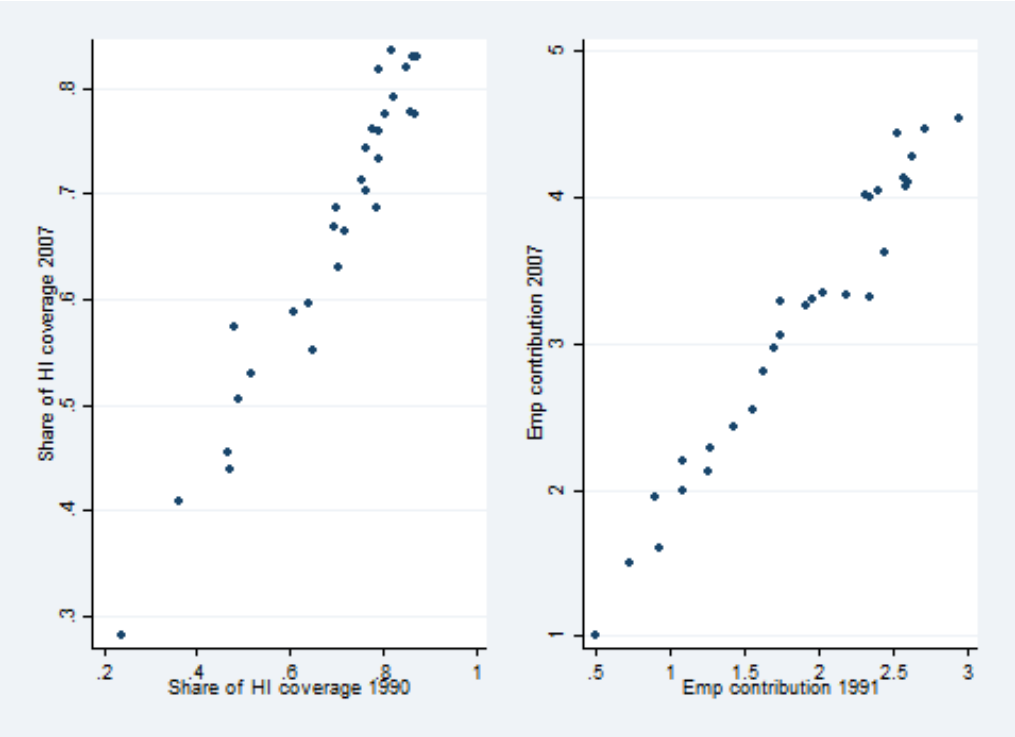


Figure 4: Full-time and part-time employment growth against the initial level of beneficiaries

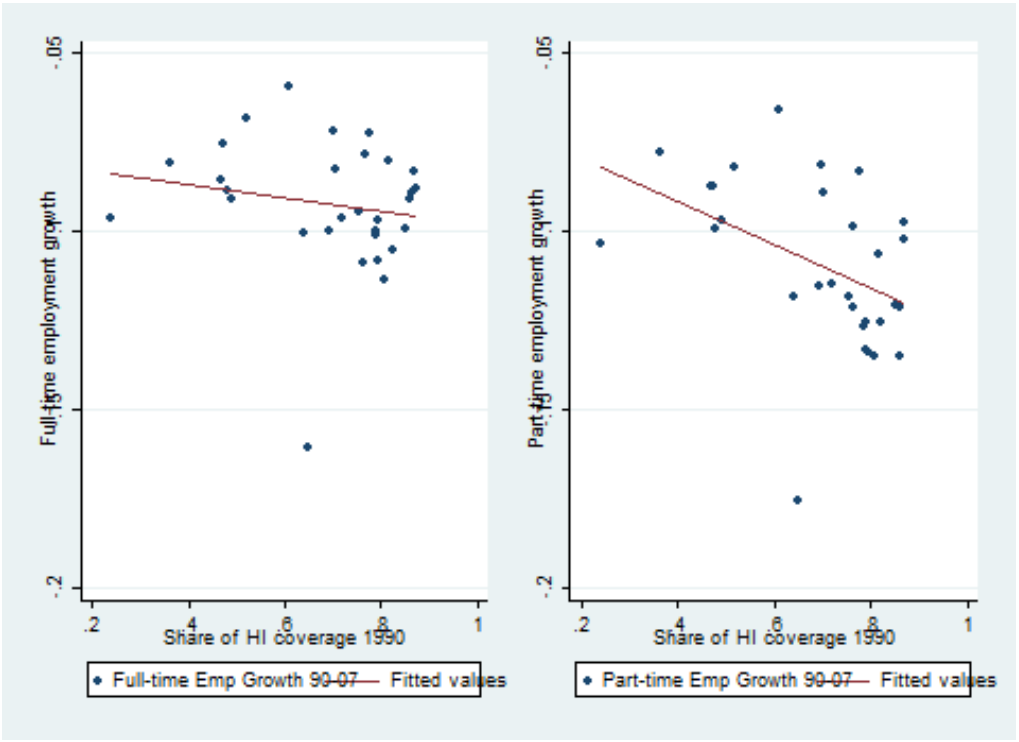


Figure 5: Full-time and part-time employment growth against the initial employer contribution

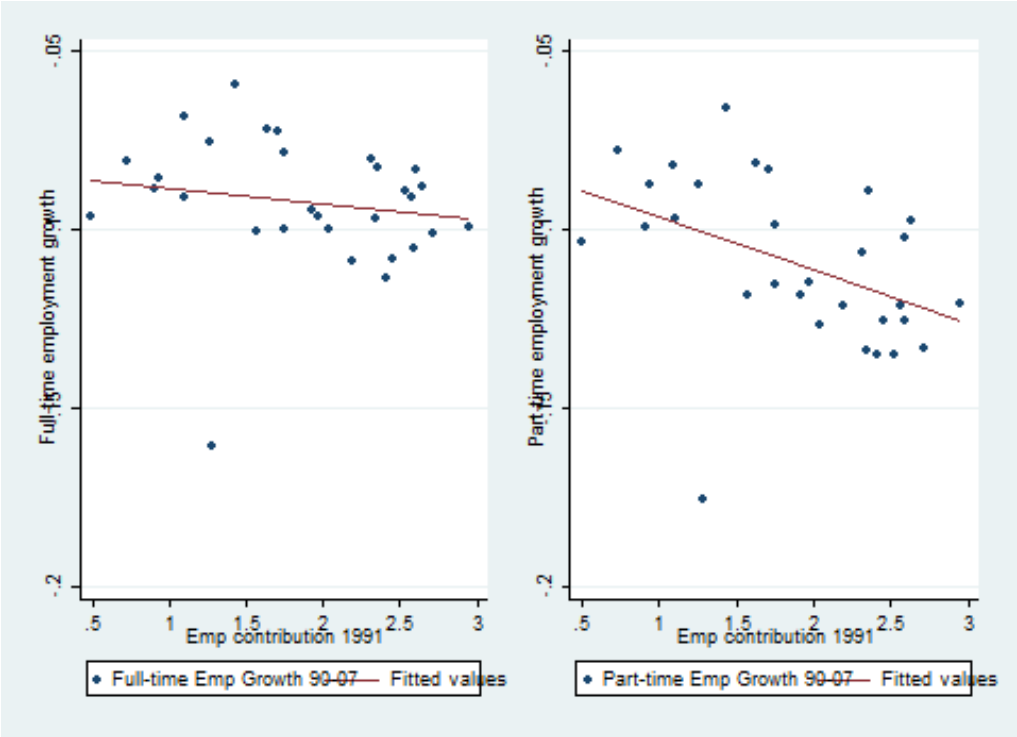
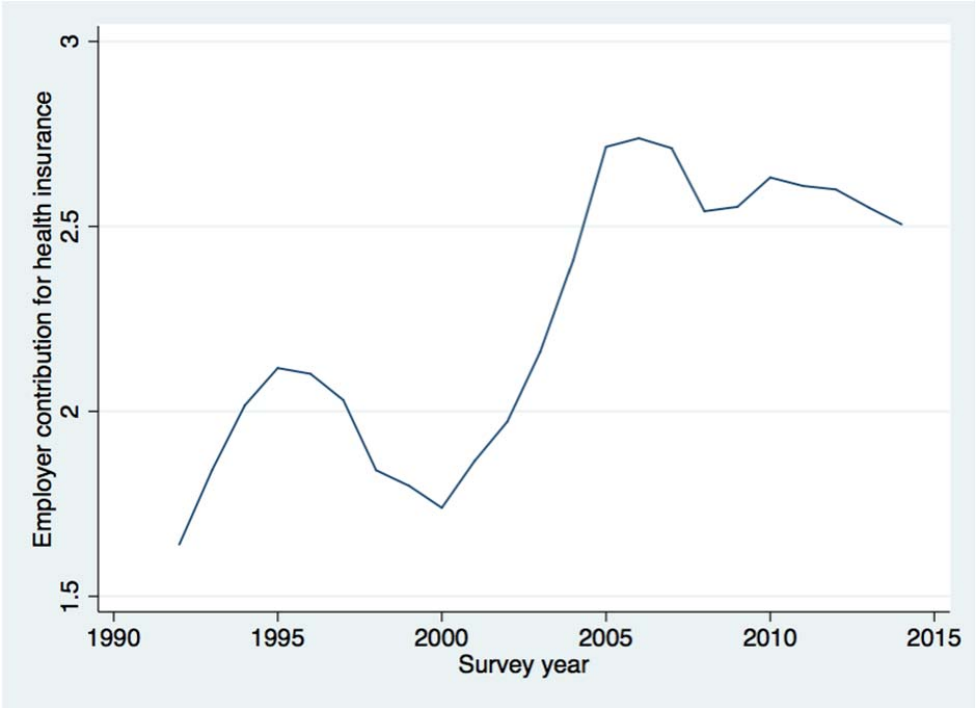


Figure 6: Employer contribution to health insurance over time (1992-2014)



Source: March Current Population Survey 1992–2014. The unit is measured in thousands of 1999 U.S. dollars.

Table 1: Summary statistics by industry

Industry	Share of full-time workers in 1990	Share of full-time workers w/ EHI in 1990	Employer contribution to EHI in 1991
Agriculture	0.796	0.240	0.497
Mining and quarrying	0.944	0.791	2.717
Food, beverages and tobacco	0.904	0.755	1.923
Textiles, textile, leather and footwear	0.883	0.649	1.278
Wood and of wood and cork	0.904	0.640	1.567
Pulp, paper, printing and publishing	0.867	0.765	2.193
Coke, refined petroleum and nuclear fuel	0.958	0.863	2.528
Chemicals and chemical products	0.945	0.860	2.572
Rubber and plastics	0.938	0.793	2.344
Other non-metallic mineral	0.931	0.788	2.038
Basic metals and fabricated metal	0.948	0.792	2.452
Machinery, nec	0.945	0.824	2.595
Electrical and optical equipment	0.949	0.806	2.408
Transport equipment	0.959	0.852	2.953
Manufacturing, nec; recycling	0.896	0.719	1.970
Electricity, gas and water supply	0.954	0.872	2.641
Construction	0.877	0.472	1.260
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel	0.858	0.489	1.097
Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.891	0.694	1.746
Retail trade, except of motor vehicles and motorcycles; repair of household goods	0.605	0.469	0.933
Hotels and restaurants	0.737	0.479	0.908
Transport and storage	0.863	0.704	2.355
Post and telecommunications	0.915	0.871	2.599
Financial intermediation	0.875	0.765	1.746
Real estate, renting and business activities	0.782	0.518	1.095
Community social and personal services	0.616	0.363	0.730
Public admin and defence; compulsory social security	0.910	0.817	2.318
Education	0.726	0.777	1.708
Health and social work	0.763	0.700	1.633
Other community, social and personal services	0.749	0.611	1.433

Note: Employer contribution to EHI is in thousands of dollars.

Table 2: Estimates of employment and wage growth

	(1)	(2)	(3)	(4)	(5)
	Total employment growth	Full-time growth	Part-time growth	Full-time wage growth	Part-time wage growth
Panel A: Using share of full-time workers with EHI (1990–2007)					
Share of full-time workers w/ EHI	-0.022	-0.020	-0.058**	0.020***	0.046***
	(0.020)	(0.020)	(0.024)	(0.005)	(0.016)
Union membership	0.016	0.016	0.024	-0.036***	-0.043**
	(0.026)	(0.027)	(0.032)	(0.006)	(0.018)
Capital/worker ratio	0.001	0.001	0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
R^2	0.037	0.032	0.152	0.614	0.376
Panel B: Using employer contribution to EHI (1991–2007)					
Employer contribution to EHI	-0.011**	-0.011**	-0.022***	0.003*	0.016***
	(0.005)	(0.005)	(0.005)	(0.002)	(0.004)
Union membership	0.032	0.034	0.047*	-0.032***	-0.058***
	(0.023)	(0.024)	(0.024)	(0.010)	(0.013)
Capital/worker ratio	0.001	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
R^2	0.097	0.095	0.259	0.463	0.565

Notes: There are 30 industries. Regressions are weighted by number of employees by industry. Explanatory variables are measured in 1990. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Estimates of routine employment and capital/worker growth

	(1)	(2)	(3)	(4)	(5)	(6)
	Full-time & routine	Part-time & routine	Full-time & non-routine	Part-time & non-routine	Capital per worker	Real output per worker
Panel A: Using share of full-time workers with EHI (1990–2007)						
Share of full-time workers w/ EHI	-0.035	-0.080***	0.004	-0.020	0.057**	0.061**
	(0.021)	(0.023)	(0.024)	(0.026)	(0.022)	(0.025)
Union membership	0.016	0.021	0.001	0.004	-0.012	-0.075**
	(0.020)	(0.028)	(0.031)	(0.032)	(0.028)	(0.028)
Capital/worker ratio	0.001	0.001	0.001	-0.000	-0.002**	-0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
R^2	0.100	0.342	0.015	0.030	0.355	0.266
Panel B: Using employer contribution to EHI (1991–2007)						
Employer contribution to EHI	-0.011**	-0.025***	-0.005	-0.010	0.014**	0.021***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.005)	(0.007)
Union membership	0.025	0.037	0.018	0.018	-0.013	-0.094***
	(0.017)	(0.022)	(0.031)	(0.030)	(0.033)	(0.022)
Capital/worker ratio	0.001	0.001*	0.001	-0.000	-0.003**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
R^2	0.130	0.394	0.036	0.075	0.304	0.373

Notes: There are 30 industries. Regressions are weighted by number of employees by industry. Explanatory variables are measured in 1990 except for employer contribution to EHI which is measured in 1991 U.S. dollars of thousands. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Estimates of employment and wage growth for separate periods (using share of full-time workers with EHI)

	(1)	(2)	(3)	(4)	(5)
	Total employment growth	Full-time growth	Part-time growth	Full-time wage growth	Part-time wage growth
Panel A: Growth between 1990 and 2000					
Share of full-timer w/ EHI in 1990	-0.028	-0.029	-0.031**	0.010	0.043***
	(0.018)	(0.020)	(0.013)	(0.006)	(0.007)
R^2	0.060	0.065	0.075	0.630	0.623
Panel B: Growth between 2000 and 2007					
Share of full-timer w/ EHI in 2000	-0.021	-0.012	-0.117**	0.035***	0.060
	(0.028)	(0.029)	(0.049)	(0.010)	(0.040)
R^2	0.038	0.041	0.234	0.473	0.166

Notes: Explanatory variables are measured in 1990 and 2010, respectively. There are 30 industries. Regressions are weighted by number of employees by industry. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Estimates of employment and wage growth for separate periods (using employer contribution to EHI)

	(1)	(2)	(3)	(4)	(5)
	Total employment growth	Full-time growth	Part-time growth	Full-time wage growth	Part-time wage growth
			Panel A: Growth between 1991 and 2000		
Employer contribution in 1991	-0.011**	-0.012**	-0.011***	0.001	0.012***
	(0.004)	(0.005)	(0.004)	(0.002)	(0.002)
R^2	0.127	0.143	0.111	0.589	0.621
			Panel B: Growth between 2000 and 2007		
Employer contribution in 2000	-0.011*	-0.009	-0.037***	0.007**	0.022***
	(0.006)	(0.006)	(0.009)	(0.003)	(0.007)
R^2	0.105	0.093	0.399	0.302	0.380

Notes: Explanatory variables are measured in 1990 and 2010, respectively. There are 30 industries. Regressions are weighted by number of employees by industry. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Estimates of routine employment and capital/worker growth for separate periods (using share of full-time workers with EHI)

	(1)	(2)	(3)	(4)	(5)	(6)
	Full-time & routine	Part-time & routine	Full-time & non-routine	Part-time & non-routine	Capital per worker	Real output per worker
			Panel A: Growth between 1990 and 2000			
Share of full-timer w/ EHI in 1990	-0.047**	-0.049***	0.004	0.012	0.051*	0.058*
	(0.022)	(0.015)	(0.021)	(0.016)	(0.029)	(0.029)
R^2	0.183	0.252	0.042	0.043	0.298	0.179
			Panel B: Growth between 2000 and 2007			
Share of full-timer w/ EHI in 2000	-0.023	-0.148***	0.001	-0.078	0.066***	0.073**
	(0.031)	(0.043)	(0.039)	(0.049)	(0.017)	(0.028)
R^2	0.167	0.517	0.145	0.131	0.324	0.443

Notes: Explanatory variables are measured in 1990 and 2010, respectively. There are 30 industries. Regressions are weighted by number of employees by industry. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Estimates of routine employment and capital/worker growth for separate periods (using employer contribution to EHI)

	(1)	(2)	(3)	(4)	(5)	(6)
	Full-time & routine	Part-time & routine	Full-time & non-routine	Part-time & non-routine	Capital per worker	Real output per worker
	Panel A: Growth between 1991 and 2000					
Employer contribution in 1991	-0.018***	-0.019***	-0.006	0.003	0.013*	0.020**
	(0.005)	(0.005)	(0.006)	(0.005)	(0.007)	(0.009)
R^2	0.313	0.379	0.072	0.040	0.276	0.249
	Panel B: Growth between 2000 and 2007					
Employer contribution in 2000	-0.004	-0.034***	-0.001	-0.026***	0.015***	0.020***
	(0.007)	(0.008)	(0.008)	(0.009)	(0.004)	(0.005)
R^2	0.162	0.503	0.146	0.253	0.289	0.516

Notes: Explanatory variables are measured in 1990 and 2010, respectively. There are 30 industries. Regressions are weighted by number of employees by industry. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A

Firms' first order conditions are:

$$w_{it} = \alpha \frac{p_{it} y_{it}}{h_{it}}, \tag{A.1}$$

$$\widetilde{w}_{it} = (1-\alpha) \frac{p_{it} y_{it}}{\tilde{h}_{it}}. \tag{A.2}$$

Then the inverse demand function is assumed: $p_{it} = \xi_{it} y_{it}^{-\eta}$. Substituting the inverse demand function into the first order conditions yields:

$$w_{it} = \alpha \phi_{it} h_{it}^{\alpha(1-\eta)-1} \tilde{h}_{it}^{(1-\alpha)(1-\eta)}, \tag{A.3}$$

$$\widetilde{w}_{it} = (1-\alpha) \phi_{it} h_{it}^{\alpha(1-\eta)} \tilde{h}_{it}^{(1-\alpha)(1-\eta)-1}, \tag{A.4}$$

where $\phi_{it} \equiv \xi_{it} \lambda_{it}^{1-\eta}$ which represents the sector-specific shock. Taking logs and combining the two first order conditions yield:

$$\log \tilde{h}_{it} = \log w_{it} - \log \widetilde{w}_{it} - \log\left(\frac{\alpha}{1-\alpha}\right) + \log h_{it}. \tag{A.5}$$

Arranging this equation yields equation (2.3). We now substitute (A.5) into (A.3) and obtain:

$$\log h_{it} = \Omega + \frac{1}{\eta} \log \phi_{it} - \frac{\alpha + \eta(1-\alpha)}{\eta} \log w_{it} - \frac{(1-\alpha)(1-\eta)}{\eta} \log \widetilde{w}_{it}, \tag{A.6}$$

where $\Omega \equiv \frac{1}{\eta}\left[\log \alpha - (1-\alpha)(1-\eta) \log\left(\frac{\alpha}{1-\alpha}\right)\right]$. Rearranging (A.6) provides equation (2.6).

Appendix B

Table B1: IV Estimates of employment and wage growth during 1990–2007

	(1)	(2)	(3)	(4)	(5)
	Total employment growth	Full-time growth	Part-time growth	Full-time wage growth	Part-time wage growth
Share of full-time workers w/ EHI	-0.029	-0.027	-0.067**	0.017***	0.050**
	(0.024)	(0.024)	(0.030)	(0.006)	(0.019)
Union membership	0.021	0.021	0.030	-0.034***	-0.045**
	(0.028)	(0.030)	(0.035)	(0.007)	(0.020)
Capital/worker ratio	0.001	0.001	0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
R^2	0.034	0.028	0.148	0.609	0.374

Notes: The IV is the previous decade's (i.e., 1980) share of beneficiaries. There are 30 industries. Regressions are weighted by number of employees by industry. Explanatory variables are measured in 1990. *** p<0.01, ** p<0.05, * p<0.1.

Table B2: IV Estimates of routine employment and capital/worker growth during 1990–2007

	(1)	(2)	(3)	(4)	(5)	(6)
	Full-time & routine	Part-time & routine	Full-time & non-routine	Part-time & non-routine	Capital per worker	Real output per worker
Share of full-time workers w/ EHI	-0.038*	-0.088***	-0.001	-0.022	0.056**	0.072***
	(0.021)	(0.023)	(0.027)	(0.031)	(0.021)	(0.022)
Union membership	0.018	0.026	0.004	0.005	-0.011	-0.082***
	(0.019)	(0.027)	(0.033)	(0.035)	(0.027)	(0.027)
Capital/worker ratio	0.001	0.001	0.001	-0.000	-0.002**	-0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
R^2	0.100	0.339	0.013	0.030	0.355	0.259

Notes: The IV is the previous decade's (i.e., 1980) share of beneficiaries. There are 30 industries. Regressions are weighted by number of employees by industry. Explanatory variables are measured in 1990. *** p<0.01, ** p<0.05, * p<0.1.

Appendix C (Data Appendix for Figure 1)

The data are spliced from a variety of sources to form one continuous time series. Real health premiums are constructed by dividing nominal health insurance premiums by the Consumer Price Index (CPI).

1980–1985: U.S. Department of Commerce, Statistical Abstract of the United States, 1994 and 1999 editions, Washington D.C., available from https://www.census.gov/prod/www/statistical_abstract.html.

Average health insurance premium per capita is calculated by dividing health insurance income by population (also from the Statistical Abstract). Missing years (1981 and 1985) are interpolated by first deflating the data by the Bureau of Labor Statistics' CPI to account for inflation. The CPI data are from U.S. Bureau of Labor Statistics (2015) Washington D.C., CPI Detailed Report, Table 24, accessed in August 2015, http://www.bls.gov/cpi/#tables.

1986–1988: U.S. Bureau of Labor Statistics, Office of Compensation and Working Conditions (2002), Employer Costs for Employee Compensation Historical Listing (Annual), 1986-2001, Table 3, p. 12, Washington D.C., available from: http://www.bls.gov/ncs/ect/sp/ecechist.pdf.

1989–1995: U.S. General Accounting Office (February 1997), Employment-Based Health Insurance, Costs Increase and Family Coverage Decreases, Report to the Ranking Minority Member, Subcommittee on Children and Families, Committee on Labor and Human Resources, GAO/HES-97-35, U.S. Senate, Washington D.C., Appendix II, p. 33, available from: http://www.gao.gov/assets/230/223812.pdf.

1996: The Henry J. Kaiser Family Foundation (2012) California, U.S., Employer Health Benefits Annual Survey Archives, various issues, accessed in January 2015, http://kff.org/health-costs/report/employer-health-benefits-annual-survey-archives.

1997: U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality (2013) Rockville, Maryland, Medical Expenditure Panel Survey, accessed in January 2015, http://meps.ahrq.gov/mepsweb/survey_comp/Insurance.jsp.

1998–2010: Kaiser (2012). Kaiser (2015) California, U.S., Premiums and Worker Contributions Among Workers Covered by Employer-Sponsored Coverage, 1999-2014, accessed in January 2015, http://kff.org/interactive/premiums-and-worker-contributions.