

# Can Employee Benefits Ease the Effects of Nominal Wage Rigidity?: Evidence from Labor Negotiations\*

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## Abstract

Nominal wage rigidity presents a challenge to employers when market wages drop. In this paper, I consider the possibility that employer-provided benefits are not as rigid as wages and that benefits allow firms to build some flexibility into their compensation structure. I derive a simple model of firms using benefits as a hedge against decreases in nominal market wages when wages are downwardly rigid. I test the model using data on work stoppages from 1953-1977 and find results that are largely consistent with this justification for benefits. Most importantly, I show that labor disputes are much more likely to be related to benefits when inflation rates are low.

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“Aside from flexible hours, companies are offering subsidized transportation, child care, store discounts, free meals, family outings, tuition subsidies, and, in one case here, an \$80,000 softball field – everything, but significantly higher pay...‘These are soft labor costs that are much more easily absorbed than fixed wage increases and more easily shed’ [one employer] said.” – Uchitelle (2000) reporting on labor shortage in Kansas City.

## 1 Introduction

Labor cost savings often focus on reductions in benefits rather than reductions in wages. Consider three examples. In early 2000, General Electric Company went through difficult contract negotiations with fourteen unions representing 34,000 workers at a time when demand for these workers’ skills was easing due to international competition. Though this was not during a period of particularly high inflation for health care costs, the most contentious issue in these negotiations was GE’s attempt to get workers to pay a greater share of their health insurance expenditures. Similarly, during the widely publicized negotiations between large Southern California supermarkets and union workers ending in 2004, the stores wanted to reduce labor costs due to the threat of entry by Wal-Mart. The stores focused much of their effort to win concessions on attempts to lower health care benefits.<sup>1</sup> Finally, Stanford University imposed a school-wide wage freeze for the academic year 2003-2004. Required contributions to health care premiums increased during the wage freeze, so that employees who received health benefits suffered a reduction in nominal take-home pay. In this paper, I argue that these three examples are part of a broader pattern and that one of the reasons firms provide benefits to employees is to reduce the effects of nominal wage rigidity.

I first develop a simple model starting from the assumption that the costs, to the employer, of cutting benefits are lower than the costs of cutting wages. That is, wages are more downwardly rigid than benefits. In this case, benefits have an option value to the employer if there is some probability that market wages will drop. Even if employees would prefer to receive the cash the firm spends on benefits to receiving the benefits, the firm may find it profitable to “waste” some money by providing benefits so that they may be able to save on

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<sup>1</sup>Safeway Inc. also endured a strike in Northern California in 1995 when it attempted to reduce health benefits for store employees.

future compensation costs.

One underlying assumption of the model, that wages are downwardly rigid, seems non-controversial. There is ample empirical evidence suggesting that nominal wage reductions are rare and that zero nominal wage changes are much more common in the distribution of wage changes than they would be in the absence of wage rigidity.<sup>2</sup> In fact, nominal wage rigidity is so well accepted that Bewley (1999) took it as given and spent several years trying to understand its sources. The assumption that benefits are less rigid than wages is not as accepted, however, and is based on the premise that employers have more (and more subtle) ways to lower benefits than to lower pay. For example, they can require larger contributions to health plans, change to less generous insurance policies, cut back on work-related meals and snacks, or scale back some of the benefits noted in the quote at the start of the paper. I cannot directly resolve the validity of this assumption, so the empirical work in this paper can be interpreted as a test of that assumption.

Under the assumption that (except in extreme circumstances) firms cannot lower nominal wages, a key implication of the model is that firms will focus more on benefits costs when inflation is low. This is because nominal wage rigidity is more likely to be binding during such periods.<sup>3</sup> I test this implication using a dataset of work stoppages collected by the US Bureau of Labor Statistics (BLS). The dataset covers a period with widely varying inflation (1953-1977.) The evidence from these data largely supports the importance of wage rigidity in determining benefits. I show that a key issue in the negotiations related to these work stoppages is more likely to be benefits when inflation is low. I find mixed effects for the relationship between other economic factors and the extent to which negotiations focus on benefits, suggesting factors other than wage rigidity also play a role in determining labor negotiation issues.

While I argue that avoiding nominal wage rigidity is a contributing factor to the fact that employee benefits are a large and growing share of compensation costs, I certainly do not mean to suggest that this is the only (or even the leading) factor. A firm should purchase

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<sup>2</sup>See Card and Hyslop (1997), Kahn (1997), and Altonji and Devereux (2000) for US evidence, Smith (2000) and Nickell and Quintini (2003) for UK evidence, and Castellanos, Garcia-Verdu and Kaplan (2004) for a study of nominal rigidity in Mexico.

<sup>3</sup>Card and Hyslop (1997) and Nickell and Quintini (2003) document time-series relationships between inflation and nominal wage rigidity in the US and UK, respectively.

benefits for its employees, rather than pay strictly with cash, whenever it can purchase those benefits at a lower price than the employees would pay if they made the purchase directly and when employees value the benefits at more than the employer's cost. See Rosen (1986) and Brown (1980) for general background, Gruber (2000) for a survey of research on employer-provided health insurance, and Gruber and Lettau (2004) for evidence on the importance of tax treatment in firms' choices about benefits. Also, Oyer (2004a) and Rajan and Wulf (2005) conclude that benefits are provided by employers when they complement employee effort.

The rest of this paper proceeds as follows. In the next section, I sketch a model where firms distribute benefits to employees to counter the costly effects of nominal wage rigidity. In Section 3, I test the model using data from work stoppages and labor negotiations. I conclude and discuss ideas for further related research in Section 4.

## 2 A Simple Model

Nominal wages are generally thought to be downwardly rigid. Though the exact sources of wage rigidity are unclear (see Bewley (1999) for a discussion), there is ample evidence that wages are rarely lowered in a variety of countries. Given this reluctance or difficulty in lowering nominal wages, employers are faced with a difficult problem when macroeconomic changes reduce workers' marginal product. Firms may feel the need to fight with workers to lower nominal wages or they may even have to cut jobs.<sup>4</sup>

These consequences may be at least partially avoided, however, if employee benefits do not face the same level of rigidity as cash compensation. When market wages drop, if firms can cut back on, for example, meals at work or if they can demand that workers contribute more to the costs of their health plans, then at least some of the friction associated with nominal wage rigidity can be overcome. It is difficult to directly justify the assumption that benefits can be more easily cut than wages.<sup>5</sup> Firms with a variety of benefits have more

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<sup>4</sup>See Weitzman (1984) for an argument that policy makers should encourage firms to tie compensation to performance in order to reduce job loss.

<sup>5</sup>Lebow, Saks and Wilson (2003) and Dwyer and Leong (2000) provide some support for this idea using data from the U.S. and Australia, respectively. They show that nominal reductions in total costs of employing workers (that is, pay and benefits) are more common than nominal reductions in pay.

ways (and more subtle ways) of cutting benefits than they do of cutting wages.<sup>6</sup> By the same token, if wages are highly rigid, then firms have an incentive to purposely choose benefits that employees value, but do not value *too much*. Employees will not resist cuts in these benefits to the same degree as they would resist nominal wage cuts.

I now look at the implications of firms using benefit reductions to overcome nominal wage rigidity. There is no production efficiency from non-cash benefits in this model. In fact, I assume that benefits are wasteful because a typical employee values the benefits less than the cost to the firm of supplying those benefits. However, benefits serve a useful purpose in terms of allowing total compensation costs to more closely track reservation wages when cash compensation is downwardly rigid.<sup>7</sup>

Consider an employment relationship that can last for up to two periods. There can be two components to the compensation package each period – a wage,  $w_t$ , and a set of benefits that costs the firm  $b_t$ . At the beginning of each period, both the firm and employee observe the market wage for the employee’s services for the period. This market wage is  $\bar{w}_t$  where  $t \in 1, 2$ .<sup>8</sup> The market wage is drawn from a distribution with density  $f_t(\bar{w}_t)$  and cumulative density  $F_t(\bar{w}_t)$ . The period 1 and 2 distributions are similar except that the wage is “inflated” in period 2 such that the expected (and median) second period wage is  $\delta$  times the actual first period wage. That is,  $E(\bar{w}_2) = \delta\bar{w}_1$ . If  $\delta > 1$ , wages are expected to inflate between periods while  $\delta < 1$  indicates expectations of deflation.

The employee’s utility function is  $u_t = w_t + v(b_t)$  where  $v(b_t) \leq b_t$ ,  $v'(b_t) \leq 1$ , and  $v''(b_t) < 0$ . That is, holding cost to the employer constant, the employee weakly prefers money to benefits and the marginal utility of a dollar’s worth of benefits is decreasing in the

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<sup>6</sup>See Economist (2001) and Raghavan (2003) for anecdotal evidence on reductions in benefits when labor markets softened.

<sup>7</sup>For a related model where firms are willing to pay a cost to gain employment cost flexibility, see Oyer (2004b). In that model, the firm must compensate the employee for risk costs so that he will accept a form of pay that is correlated with market wages. In this model, the firm wastes some money on benefits the employee does not value at their full cost in order to have more flexibility to adjust costs if market wages decrease.

<sup>8</sup>I am assuming that the market wage is exogenous. That is, it is not affected by the level of benefits chosen by individual firms. If the fluctuation in benefits is not too great, this is probably a reasonable assumption. However, benefits have grown as a share of compensation. At some level of benefits, it may be necessary to use a general equilibrium approach in this model.

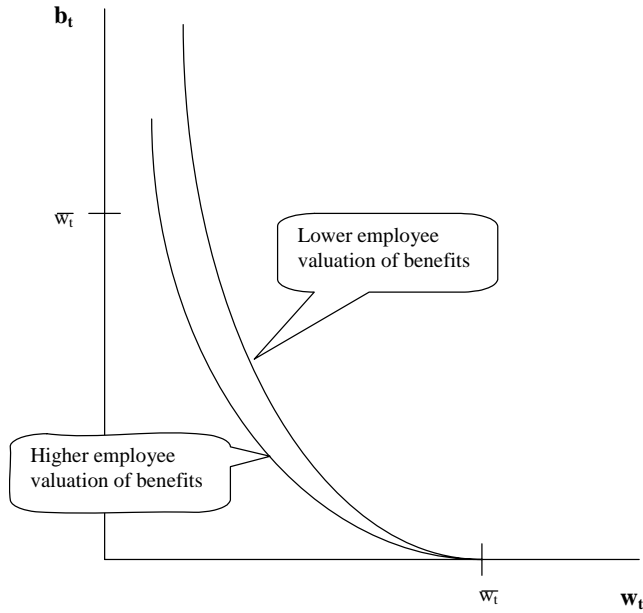


Figure 1: Wage/benefits indifference curves

level of benefits. I further assume that  $v'(0) = 1$ . Intuitively, the firm invests in any benefits where the employee values them above firm cost and goes beyond this level of benefits only if there are potential wage rigidity savings. Figure 1 shows potential indifference curves for  $b_t$  and  $w_t$  when  $w_t + b_t = \bar{w}_t$ .

The employee and firm both observe  $\bar{w}_1$ , then the firm offers the employee a contract that specifies  $w_1$  and  $b_1$ . At the beginning of period 2, the employee receives a verifiable outside offer that promises utility of  $\bar{w}_2$ . The period 1 employer always wishes to retain the worker.

The key to this model is to consider cases where it is less costly to lower  $b$  than  $w$ . To focus on this issue, I assume that  $w$  cannot be decreased, so  $w_2 \geq w_1$  and that  $b$  can be decreased costlessly. As a result, the firm will always choose  $b_2 = 0$ . The firm selects  $b_1$  such that it finds the most profitable trade-off between the waste from providing benefits instead of paying cash in period 1 and the possibility that it will have to pay the employee more than his reservation utility in period 2 (if  $w_1 > \bar{w}_2$ ). As suggested by Figure 1, it is possible to define a function  $b_1(w_1)$  such that  $w_1 + b_1(w_1) = \bar{w}_1$ . Then the firm's problem is to choose a first period wage so as to minimize expected compensation costs over the two periods, which is the sum of the first period wage ( $w_1$ ), the costs to the firm of first period benefits ( $b_1(w_1)$ ), and the expected second period wage. That is, the firm will solve

$$\min_{w_1} w_1 + b_1(w_1) + w_1 F_2(w_1) + \int_{w_1}^{\infty} \bar{w}_2 f_2(\bar{w}_2) d\bar{w}_2. \quad (1)$$

The firm will choose  $w_1$  such that

$$F_2(w_1) = -(b_1'(w_1) + 1). \quad (2)$$

Note that  $b_1'(w_1)$  is the slope of the indifference curves in Figure 1 and will always be less than or equal to  $-1$ . Under the maintained assumption that  $v'(0) = 1$  (that is, if the employee is indifferent between cash and benefits when benefits are zero), then an interior solution to (2) exists.

Two comparative statics emerge from this problem. First and obviously, if benefits become less valuable to employees relative to wages (that is, if  $b'$  becomes more negative), the firm will pay higher wages. This prediction is difficult to test empirically, however.

The implication of more empirical interest is that anything that increases  $F_2(w_1)$  will lead the firm to decrease  $w_1$  and increase  $b_1$ . That is, if the probability of a low second period market wage ( $\bar{w}_2$ ) increases, the firm will “waste” more money on first period benefits because the option value of lowering second period compensation is more valuable.  $F_2(w_1)$  is decreasing in the expected wage inflation rate ( $\delta$ ), so higher expected wage inflation will lead firms to use more cash pay and fewer benefits.

While the inflation rate seems like the most natural empirical proxy for  $\delta$ , other factors affect the degree to which wages rise or fall. These might include changes in productivity (which may increase  $\delta$  even in the absence of price inflation), economic growth (which may increase demand for labor), and unemployment (which would be negatively related to  $\delta$  because it indicates lower demand for labor.) That is, when unemployment is below average or “natural” rates, one might expect market wages to soften and firms may want to use forms of compensation that can be more easily lowered. These interpretations of  $\delta$  suggest an association between benefits and macroeconomic cycles.

Another factor that affects  $F(w_1)$  is the variance of wages. The relationship between benefits and the variance of  $F$  depends on the exact form of the  $F$  distribution. However, if  $\bar{w}$  is drawn from a normal or similar distribution, then it can be shown that an increase in the variance of  $F$  will lead to an increase in benefits relative to wages. That is, as the market wage a firm faces becomes more variable, the option value of being able to lower costs through decreasing benefits becomes more valuable.

The implications of this model can therefore be summarized as follows:

- When inflation is high (or market wages are rising rapidly for other reasons), firms will be less likely to try to cut benefits because nominal wage rigidity is less likely to be binding.
- Consider the ratio of cash pay to total costs of employment (the “cash pay ratio”). Changes in this ratio will be counter-cyclical. That is, benefits will be a higher proportion of employment costs when transient economic shocks are favorable than when they are unfavorable.
- In industries or firms where market wages are more variable, benefits will make up a relatively large fraction of compensation costs.

In principle, the second implication, which makes a prediction about the cyclicity of the ratio of cash pay to total costs of employment, is empirically testable and might seem like the most direct way to assess the model. However, there are challenges associated with analyzing total employment cost (at least in the US where benefits expenses are driven largely by health insurance.). For example, one seemingly sensible empirical strategy would be to use indexes of various components of employment costs to test the model. Alternatively, the GE, Safeway, and Stanford examples in the Introduction suggest that it might be sensible to look at how employee contributions to health care premiums change with the business cycle. Both these strategies are rendered useless, however, by the fact that there is a strong positive correlation between inflation *in medical costs* and unemployment over the last thirty years. As a result of this correlation, when labor markets are unfavorable (that is, when unemployment is high), health care premiums tend to be high. If firms are bound by contracts or agreements such that they cannot fully transfer this burden to their employees, then, even if they push employees on this dimension and act as predicted by the model, the predictions of the model will not be empirically validated when looking at benefits as a function of total employment costs. Also, even if employers bear much of the increase in insurance premiums but pass some amount on to employees, the predictions of the model when looking at employee contributions will appear to confirm the model even though employers are not acting as predicted. I avoid these issues by looking at a period when health care inflation and unemployment were not correlated. Unfortunately, this requires using data before reliable benefits cost indexes or

measures of employee contributions to health premiums were available. The third prediction suffers from the same weakness because it also focuses on the ratio of benefits costs to total employment costs.

To get around this measurement issue, I take a somewhat less direct approach and focus on the first prediction. I look at how firms try to *change* the salary/benefits mix, given current macroeconomic conditions, rather than looking at the level of the salary/benefits mix at a given moment. To do this, I start with the assumption that something can be inferred about an employers' preferred mix of salary and benefits by looking at how firms negotiate compensation. I interpret the first implication of the model to suggest that, when wages are rising, firms are willing to provide benefits as part of compensation. But, assuming cash wages are downwardly rigid, then when market wages are falling, firms will attempt to cut benefits. As a result, in employment contract negotiations, the key bargaining issue is likely to be pay levels when market wages are rising and benefits when market wages are dropping.

Before performing the formal empirical analysis, it is worth noting that the wage rigidity model is consistent with the early development of the institution of employer-provided health insurance. Ironically, however, the connection is based on a time of *upwardly* rigid wages. During World War II, US wages were controlled and labor markets were tight. In order to attract workers, firms added benefits such as health insurance to skirt this wage rigidity (Scofea (1994)).

### **3 Empirical Analysis**

I now explore the empirical implications of the wage rigidity model by examining key issues in wage negotiations. The wage rigidity model suggests that firms should be relatively generous with benefits when wage costs are increasing so that they can reduce those benefits when market wages decrease. Also, the model suggests that firms will be less likely to engage in a dispute over benefits when inflation is high because nominal wage rigidity will be less of a constraint. I test these ideas by exploring how macroeconomic factors affect the sticking point in labor disputes and using data on the key issues in labor negotiations.

### 3.1 Data

I use US Bureau of Labor Statistics (BLS) data on work stoppages in the US between 1953 and 1977.<sup>9</sup> For each work stoppage during this period, I gathered the year it began, the industry of the firm, and the major issue. Admittedly, there are several reasons why using a dataset of work stoppages is not ideal. The disputes are especially contentious situations that may not be representative of labor negotiations more generally. In addition, the issue provided by the BLS is not very specific, which could introduce measurement error. Finally and perhaps most importantly, if factors that affect what issue drives a dispute also drive the likelihood of a dispute occurring in the first place, then I may pick up factors related to general labor contentiousness rather than the wage/benefits trade-off. Nonetheless, it is difficult to find other datasets that code issues in labor negotiations and that can test predictions of the wage rigidity model directly.

Some of the BLS’s “major issues” include wages, benefits, job classifications, union status, job security, and other choices. I only consider those work stoppages where the major issue is pay or benefits related (many include both pay and benefits as major issues.) I separate stoppages into two categories – those that are benefits related (which means the BLS lists benefits as a major issue, though pay may be as well) and those that are entirely pay related. I then run a series of logits where the dependent variable is one if the stoppage is benefits related and zero otherwise.

To test the relationship between benefits and expected wage growth, I use the US inflation rate at the time of the dispute as an explanatory variable.<sup>10</sup> While I will also look at the relationship between benefits and other macroeconomic variables, I focus on the inflation rate because Card and Hyslop (1997) and Nickell and Quintini (2003) show there is a strong relationship between national inflation rates (in the US and UK) and the degree to which nominal wage rigidity affects pay. The wage rigidity model suggests that it is costly to provide benefits, but these costs can be outweighed by the option value of reducing benefits

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<sup>9</sup>The data can be downloaded from the Inter-University Consortium for Political and Social Research website ([www.icpsr.umich.edu](http://www.icpsr.umich.edu)) where it is study #8156.

<sup>10</sup>A potentially more direct test of the model than looking at the general inflation rate would be to see if benefits are more likely to be the issue in cases where the eventual contract leads to a zero nominal wage change (as these would likely be cases where nominal rigidity was binding.) However, the dataset does not include information on the terms of the contract.

when nominal wages cannot be lowered. When inflation is high, the market wage is more likely to be increasing in nominal terms and the firm is less likely to be trying to reduce costs through lowering benefits. Therefore, I expect fewer benefits-related disputes when inflation is high.

A related prediction of the wage rigidity model is that, when macroeconomic conditions are unfavorable, firms will try to lower their compensation expense. Due to nominal rigidity, they will have to do this through reductions in benefits. Therefore, I expect more benefits-related disputes during relatively slow economies. As proxies for economic indicators that could affect wage negotiations, I use the unemployment rate (national and state), the economic growth rate (that is, annual growth in GDP), and the growth rate in employment for the firm's 2-digit SIC code.<sup>11</sup>

Summary statistics for the issues in the disputes and the macroeconomic variables are displayed in Table 1. For the entire sample, 44% of the disputes have benefits as a major issue. Because I only include disputes based on pay and benefits, 56% of disputes list pay as the only major issue. Note that the fraction of disputes related to benefits is higher when limiting the sample to 1961 and later. In 1961, the BLS changed the way it coded the major issues in disputes and the fraction that reported benefits as a major issue rose. I control for this change in the empirical analysis below. Benefits are the sole major issue in only 2.5% of disputes.

The advantage of using the 1950's, 1960's, and 1970's for this analysis is that there was substantial variation in the level of inflation and economic growth during this time. Also, inflation, growth, and unemployment peaked and dropped somewhat independently of one another, so it is feasible to separate the effects of each factor. While inflation averaged 3.4%

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<sup>11</sup>The national GNP growth (except for 1953-1958), inflation, and unemployment data are from the *Economic Report of the President*. The national growth rate for 1953-1958 and the SIC employment growth data are from the Bureau of Economic Analysis (BEA) website. The BEA did not provide data on a few industries, so those disputes are dropped from analyses that include industry employment growth. State unemployment rates are from the *Manpower Report of the President*. In some of the earlier years, the rates reflect those receiving unemployment insurance rather than the unemployment rate. The regressions control for the distinction in the two unemployment measures. In unreported regressions, I also looked at the effect of productivity growth. However, this variable is not available over the whole period studied and is highly correlated with economic growth. Controlling for productivity growth whenever feasible does not materially affect the results below.

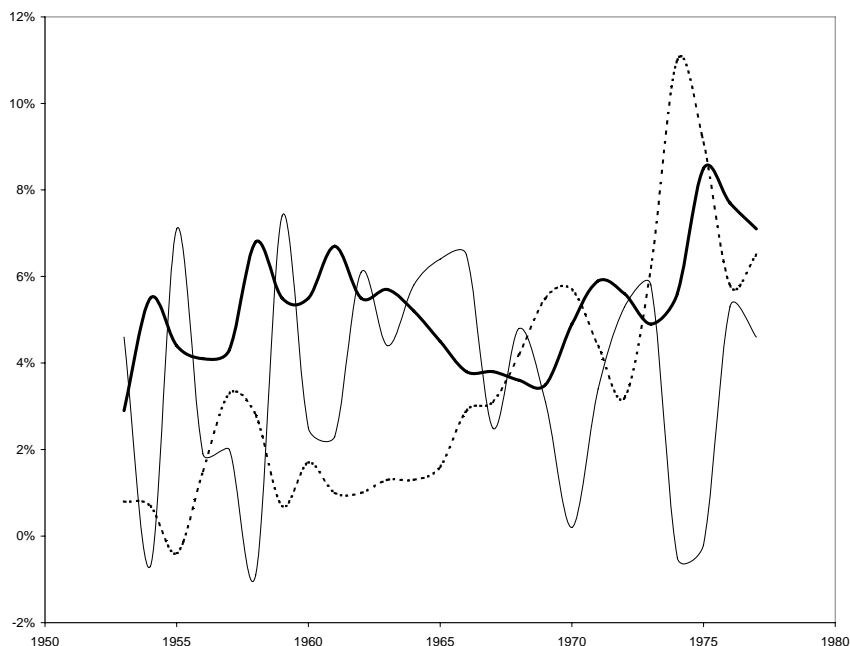


Figure 2: Macroeconomic Conditions

during the sample years, it went as high as 11%. Economic growth varied from negative one percent to over seven percent. Unemployment also varied substantially, starting at under 3% in 1953 and reaching 8.5% in the mid-70's. Table 1 provides a summary and Figure 2 shows the year-to-year fluctuations. As Table 1 suggests, the industry-level and state-level statistics vary more than the national statistics.

### 3.2 Results

Figure 3 shows the time trends of the most important dependent and explanatory variables. The dark line at the bottom of the graph is the fraction of disputes (among those that relate to pay and/or benefits) where the major issue is benefits only. This is clearly a very small fraction of disputes throughout the entire period. The dotted line is the fraction of disputes where the major issues include both pay and benefits. In addition to the one sudden jump in 1961 (due to changes in BLS coding methodology), there is a slight upward trend in the 1960's. The formal empirical work below will control for time trends and BLS methodology. The other solid line in the graph shows the annual US inflation rate. This rate jumps in the

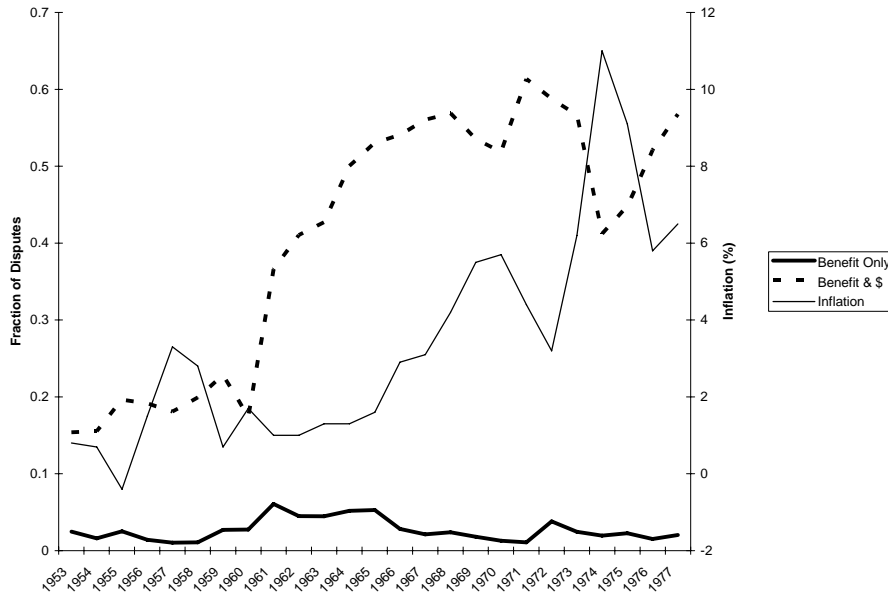


Figure 3: Time Trends in Dispute Issues and Inflation

late 1950's and then varies significantly from year to year in the mid 1960's through 1977. The graph makes it immediately apparent that the time series patterns in the inflation rate closely mirrors the fraction of disputes that are based on money alone (that is, one minus the dotted line.) In the years when inflation jumps (such as 1974), disputes are much less likely to be based on benefits. In the years where inflation slows (such as 1971 and 1972), benefits become a much more important issue. This graph supplies some informal support for the idea that firms cut benefits when low inflation causes nominal wage rigidity to be a binding constraint on pay rates. The rest of this section investigates that idea more formally.

Table 2 displays the results of logit regressions where the dependent variable takes the value one for all disputes where one of the major issues was benefits. Column 1 includes only the three national macroeconomic variables. Though I will control for other variables in this section and when doing robustness checks, the logit in column 1 includes all the variables that have a consistent relationship to dispute issues and the relationships in this column generally hold up under the following specifications.<sup>12</sup>

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<sup>12</sup>All regressions include an indicator for being in the period before the BLS changed its method for coding issues (1953-1960) and separate linear trends for the periods of 1953-1960 and 1961-1977.

As column 1 shows, the inflation rate is highly significantly negatively related to benefits being a major issue in labor disputes. The coefficient indicates that when the inflation rate goes up by one percentage point, the probability that a given labor dispute is based on benefits goes down by three percentage points. A one standard deviation increase in inflation (2.8%) lowers the probability of a dispute being benefits related by over one-fifth (given an unconditional probability of 44%.) The coefficient indicates that disputes are much less likely to be related to benefits in periods of high inflation.

Though the relationship is not as strong, disputes are also less likely when the economy is growing quickly. A one standard deviation increase in GDP growth decreases the likelihood of a dispute being benefits-related by less than one-tenth. This effect is marginally significant in column 1, though it is more significant in specifications that control for industry. The growth and inflation results are consistent with wage rigidity affecting the provision of benefits.

However, when unemployment is relatively high, which is likely to indicate that firms would be in a position to put downward pressure on employment costs, disputes are more likely to be wage related. The coefficient is roughly equal to that for inflation. Given that unemployment varies less than inflation, unemployment is associated with less of the variation in dispute issues than inflation. Nonetheless, this result contradicts the wage rigidity model.

Column 2 introduces controls for 2-digit industry. All the results in column 1 are slightly stronger with this control added and the conclusions are unchanged.

Column 3 shows the results when using industry employment growth and state unemployment as measures of the condition of the economy. The idea is to see if the condition of the local economy, as well as the health of the specific industry in which a firm operates, affects the issues in labor negotiations. Firms in slow growth industries or states with high unemployment are likely to be seeking concessions from workers and, according to the wage rigidity model, should be trying to do this through reduction of benefits. The results in column 3 do not support this idea, however. The signs on both coefficients contradict the model, though only the state unemployment coefficient is significant. The coefficient on state unemployment is small compared to the national unemployment effect in columns 1 and 2.

Column 4 combines the national macroeconomic conditions with the industry and state measures. The national economic variables continue to have similar effects as they had in columns 1 and 2, while the more specific variables are not significant. This suggests that the

major issues in labor negotiations are driven more by labor market competition at a broad level than by the specific conditions in the local area or in a particular industry. While this may seem surprising at first, this result is similar to the finding in Card and Hyslop (1997) that wage stickiness is affected more by national macroeconomic conditions than regional conditions.

Overall, these results provide evidence in favor of the wage rigidity model. The results are consistent with the strongest prediction of the wage rigidity model – that high inflation causes nominal wage rigidity to be less binding and, therefore, fewer disputes to focus on benefits. However, the connection between the strength of the economy (as measured by growth and unemployment) is more tenuous.

One possible reason for the fact that negotiations become more focused on pay issues, relative to benefits, when labor markets get tight is that, when times are very difficult, workers may make benefits concessions but fight against pay decreases. That is, liquidity constraints and wealth effects could make pay particularly contentious when times are particularly difficult. Also, firms may get more aggressive in attempts to cut pay when workers face the potential of a painful spell of unemployment. However, given the data available, I cannot confirm these explanations. It seems safe to conclude therefore, that the strength of the inflation/benefits connection (which is the strongest prediction of the model) provides considerable support for wage rigidity playing some role in the salary/benefit split. But, because of the robust connection between benefits-related negotiations and favorable labor market conditions, there are clearly other important forces driving the use of benefits.

### **3.3 Robustness Checks**

In this section, I test the robustness of the basic findings connecting benefits as an issue in negotiations with macroeconomic conditions. I look at an alternative assumption about *when* macroeconomic conditions will affect negotiations and then I explore the effects of various limitations in the BLS data.

One conceptual issue to address is what timing to use on the macro variables. For example, if inflation affects wage negotiations, is it current inflation or expected inflation over the life of the next contract that matters? If employers and unions use current conditions as estimates of the future, then the current conditions used in Table 2 would capture all possible effects. However, if employers and unions have some expectations of the future state of the

economy, that could affect negotiations. Under the assumption that these parties have an unbiased estimate of the next year's conditions, I reran the regression in column 2 of Table 2 including the macroeconomic variables from the year after the dispute began. The results, which are displayed in column 1 of Table 3, lead to the same conclusions as the earlier analysis.

I also reran the analysis looking at what factors are associated with negotiations that focus on benefits only. That is, I redefined the dependent variable to take the value one if a dispute listed benefits as the *only* major issue and to take the value zero if the major issue was pay or pay and benefits. As the results in Table 3 suggest, this leads to very different conclusions. Disputes that are specifically about benefits are much more common when labor conditions are unfavorable and when growth is high. That is, the previous results for growth and unemployment are reversed, while there is now no effect of inflation. This is a very small set of disputes (2.5%) and they may be very unusual circumstances, so it is difficult to know how much weight to place on this result.

As mentioned above, the BLS changed the way it coded the major issues in disputes in 1961. Though the earlier regressions control for the affected time period, column 3 of Table 3 drops this earlier period from the prior analysis. This has almost no effect on the coefficients.

The macroeconomic variables are measured annually and can take on only 25 different values (one for each year.) One could argue that I really only have 25 distinct observations. The standard errors of the earlier regressions control for this clustering of the macro variables. However, in column 4 of Table 3, I take an even more conservative approach and redefine an observation as a year. The dependent variable is the fraction of disputes in a given year that are benefits related. As the results show, this also has no effect on the conclusions. The coefficients are almost exactly the same as in the dispute-level logits, though the growth effect loses statistical significance. Column 5 shows that the results are unchanged when using only annual observations from the period after the BLS changed the way it classified dispute issues.

Finally, the BLS data include some disputes that are for public employees (though this is under five percent of the sample.) Negotiations with public entities could be inherently different from those with private companies due to greater agency issues and/or the fact that the employer's objective functions may differ. However, in unreported regressions, I

found that the results in Table 2 are essentially unchanged when dropping disputes involving government employers.

The results in Table 3 suggest that the conclusions from the earlier analysis are robust to changes in the timing of the macroeconomic data relative to the dispute data and to the sample period. The one concern raised is that patterns in the small set of disputes that are based solely on benefits are difficult to reconcile with other results.

## 4 Conclusions and Further Research

I have argued that one factor that contributes to firms use of fringe benefits is nominal wage rigidity. Because firms find it difficult to lower employees' nominal wages, they provide employees with benefits that can be more easily taken away when reservation wages drop. I derived a simple model of the salary/benefit trade-off under these assumptions and developed testable hypotheses of this model. The primary hypotheses that I tested related macroeconomic conditions to whether the issue in labor negotiation is wages or benefits. Using a dataset of work stoppages from the US Bureau of Labor Statistics, I found that disputes are more likely to be related to benefits when inflation is low and economic growth is slow. However, other forces appear to influence these negotiations.

Prior work has pointed out the efficiency enhancing value of inflation when wages are nominally rigid. The results in this paper suggest that firms may be able to get around some of the effects of rigidity, though at a cost in terms of wasting money on benefits. Some increase in inflation would allow firms to moderate real wages directly, without the distortions that might be introduced by using benefits to hedge against wage decreases.

The model also suggests a connection between the condition of the business cycle and the fraction of employment costs that are related to benefits. As noted above, it is difficult to test this relationship with recent US data because health care cost inflation has been highly counter-cyclical for the past few decades. One potential way to further explore the relationship between benefits and nominal rigidity is to find benefits cost data from a country that did not have the same health inflation patterns as the US. Alternatively, such data from further back in US history, when health cost inflation was negligible, could be used to test this prediction of the model.

## References

- Altonji, J. G. and Devereux, P. D.: 2000, The extent and consequences of downward nominal wage rigidity, *Research in Labor Economics* **19**, 383–431.
- Bewley, T. F.: 1999, *Why Wages Don't Fall During a Recession*, Harvard University Press, Cambridge, MA.
- Brown, C.: 1980, Equalizing differences in the labor market, *Quarterly Journal of Economics* **95**, 113–134.
- Card, D. and Hyslop, D.: 1997, Does inflation grease the wheels of the labor market?, in C. Romer and D. Romer (eds), *Reducing Inflation: Motivation and Strategy*, University of Chicago Press, Chicago.
- Castellanos, S. G., Garcia-Verdu, R. and Kaplan, D. S.: 2004, Nominal wage rigidities in Mexico: Evidence from Social Security records, *Working Paper 10383*, National Bureau of Economic Research.
- Dwyer, J. and Leong, K.: 2000, Nominal wage rigidity in Australia, *Research Discussion Paper 2000-08*, Economic Research Department, Reserve Bank of Australia.
- Economist: 2001, The unkindest cuts of all. April 5.
- Gruber, J.: 2000, Health insurance and the labor market, in A. J. Culyer and J. P. Newhouse (eds), *Handbook of Health Economics, Volume 1a*, North-Holland, New York.
- Gruber, J. and Lettau, M.: 2004, How elastic is the firm's demand for health insurance?, *Journal of Public Economics* **88**, 1273–1293.
- Kahn, S.: 1997, Evidence of nominal wage stickiness for microdata, *American Economic Review* **87**, 993–1008.
- Lebow, D. E., Saks, R. E. and Wilson, B. A.: 2003, Downward nominal wage rigidity: Evidence from the employment cost index, *Advances in Macroeconomics* **3**.
- Nickell, S. and Quintini, G.: 2003, Nominal wage rigidity and the rate of inflation, *Economic Journal* **113**, 762–781.
- Oyer, P.: 2004a, Salary or benefits? Stanford Graduate School of Business.

- Oyer, P.: 2004b, Why do firms use incentives that have no incentive effects?, *Journal of Finance* **59**, 1619–1649.
- Raghavan, A.: 2003, Nickel and dime: Wall Street sweats the small stuff, *New York Times* p. A1. October 27.
- Rajan, R. G. and Wulf, J.: 2005, Are perks purely managerial excess?, *Journal of Financial Economics* . Forthcoming.
- Rosen, S.: 1986, The theory of equalizing differences, in O. Ashenfelter and R. Layard (eds), *Handbook of Labor Economics, Volume 1*, Elsevier, New York.
- Scofea, L. A.: 1994, The development and growth of employer-provided health insurance, *Monthly Labor Review* **117**, 3–10.
- Smith, J. C.: 2000, Nominal wage rigidity in the United Kingdom, *Economic Journal* **110**, C1767–C195.
- Uchitelle, L.: 2000, Companies try dipping deeper into labor pool, *New York Times* p. 1. March 26.
- Weitzman, M. L.: 1984, *The Share Economy*, Harvard University Press, Cambridge, MA.

**Table 1: Summary Statistics**

	Entire Sample			1961-1977 only		
	mean	st. dev.	sample size	mean	st. dev.	sample size
Benefits-related issue	44.0%	na	64,576	51.4%	na	50,049
Benefits only	2.5%	na	64,576	2.6%	na	50,049
Inflation	3.4%	2.8%	25	4.3%	2.9%	17
GNP Growth	3.6%	2.6%	25	3.9%	2.3%	17
Unemployment	5.3%	1.4%	25	5.4%	1.4%	17
State Unemployment	5.1%	2.0%	1,100	5.3%	1.9%	778
2-digit SIC employment growth	1.6%	4.6%	1,307	2.0%	4.3%	1,006

Sample includes 64,576 work stoppages between 1953 and 1977 from a Bureau of Labor Statistics dataset. Stoppages are classified as “benefits-related issue” if the Bureau of Labor Statistics dataset lists one of the major issues as benefits. “Benefits only” indicates that benefits were the sole major issue in the dispute. Inflation, GNP Growth, and Unemployment are national rates and were gathered from the *Economic Report of the President*. State unemployment rates are from the *Manpower Report of the President*. Industry employment growth was calculated based on data from the *Bureau of Economic Analysis*.

**Table 2: Labor Negotiation Issues**

BLS data on work stoppages

	(1)	(2)	(3)	(4)
Inflation	-0.0336 (0.0057)	-0.0358 (0.0047)		-0.0344 (0.0046)
GDP Growth	-0.0062 (0.0033)	-0.0086 (0.0028)		-0.0070 (0.0035)
Unemployment	-0.0334 (0.0045)	-0.0342 (0.0047)		-0.0387 (0.0069)
Industry Employment Growth			0.0028 (0.0018)	-0.0011 (0.0015)
State Unemployment Rate			-0.0087 (0.0039)	0.0039 (0.0025)
Year (post-1961 only)	0.0247 (0.0030)	0.0255 (0.0026)	0.0048 (0.0034)	0.0251 (0.0026)
2-digit SIC indicators	No	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.069	0.082	0.084	0.090
Sample Size	64,576	64,226	58,065	58,065

Each column reports the results of a logit. Each observation is a work stoppage between 1953 and 1977 for which the BLS reports that a “major issue” in the dispute was pay or benefits. Dependent variable equals one if the BLS reports that one of the major issues in the dispute was benefits. All regressions include an indicator variable for pre-1961 (because the BLS changed the way it coded issues that year) and a linear time trend for before 1961. Standard errors, adjusted for correlation across observations in the same year, are in parentheses. Coefficients are marginal effects on the probability that the dispute is benefits-related. The mean of the dependent variable is 0.440.

**Table 3: Sensitivity Analyses**  
 BLS data on work stoppages

	(1)	(2)	(3)	(4)	(5)
Inflation	-0.0156 (0.0060)	0.0012 (0.0016)	-0.0383 (0.0048)	-0.0312 (0.0071)	-0.0331 (0.0072)
GDP Growth	-0.0037 (0.0023)	0.0022 (0.0007)	-0.0096 (0.0031)	-0.0063 (0.0042)	-0.0052 (0.0052)
Unemp.	-0.0197 (0.0069)	0.0030 (0.0009)	-0.0376 (0.0051)	-0.0323 (0.0065)	-0.0372 (0.0059)
Inflation – t+1	-0.0070 (0.0063)				
GDP Growth – t+1	-0.0014 (0.0043)				
Unemp. – t+1	-0.0292 (0.0066)				
2-digit SIC	Yes	Yes	Yes	No	No
Observation	Stoppage	Stoppage	Stoppage	Year	Year
Specification	Logit	Logit	Logit	OLS	OLS
Dependent Var	Broad	Narrow	Broad	Broad	Broad
Years	1953-1977	1953-1977	1961-1977	1953-1977	1961-1977
R <sup>2</sup> /Pseudo-R <sup>2</sup>	0.091	0.039	0.037	0.970	0.880
Sample Size	64,576	64,576	50,044	25	17

The specification in columns (1)-(3) are similar to Table 2. Columns (4) and (5) report the results of an OLS regression where the dependent variable is the percentage of work stoppages in a given year where benefits were a “major issue”. Columns (3) and (5) limit the analysis to 1961 and later because the BLS changed the way it coded issues that year. The variables marked “t+1” are macroeconomic conditions in the year following the work stoppage. The dependent variable is considered “broad” if it defines stoppages as benefits related if the major issue is benefits only or if it is pay and benefits. “Narrow” restricts the dependent variable to be one exclusively in cases where benefits are the only issue.