Chapter 3:

How do minimum wages increase the NAIRU?

Summary

In Chapter 1, I found that higher levels of the minimum wage are associated with higher nominal wage growth and hence a higher NAIRU. In this chapter I investigate how this empirical relationship might be explained.

One interpretation that seems consistent with other evidence is that the minimum wage provides a safety net, allaying worker insecurity. When the minimum is low, other wages have further to fall should a worker lose his job. Fearful of large wage reductions, workers bargain less aggressively.

I also consider direct wage comparisons, labor demand, and social values; however evidence does not suggest that these channels of influence account for the effects I find.

3.1 Introduction

In Chapter 1, I found that there is a surprisingly strong partial correlation between the level of the minimum wage (relative to other wages) and nominal wage growth. Because higher unemployment can offset this inflationary effect, the minimum wage increases the Non-Accelerating Inflation Rate of Unemployment or NAIRU. In this chapter, I investigate possible explanations of this relationship. Aside from curiosity, this serves several purposes. If the apparent relationship is expected to arise from commonly observed behavior, the possibility that it is a statistical fluke is less credible. And interpretations suggest other relationships, permitting corroboration, refutation and extensions.

Discussions of why the NAIRU seems to be much lower in the 1990s than in previous decades often emphasize increased worker insecurity; so in Section 3.3 I discuss how this view may relate to the minimum wage. The empirical literature on the effect of the minimum wage on other wages emphasizes direct wage comparisons, which I discuss in Section 3.4. The literature on job losses arising from the minimum wage focuses on labor demand effects, which I discuss in Section 3.5. And in Section 3.6 I discuss whether the minimum wage serves as a proxy for underlying social attitudes.

There are many other possible interpretations of the relationship between the minimum wage and the NAIRU. For example, it could reflect labor supply effects, the effectiveness of labor market matching or the intensity of worker effort. However,

empirical evidence on these effects is harder to come by and I do not explore these possibilities here.

My assessment is that an effect through worker insecurity, in conjunction with some direct comparisons, is the most plausible and important interpretation of the evidence. This has important implications. Empirically, this conclusion implies that evidence that worker insecurity affects nominal wages would corroborate the importance of the minimum wage. In policy terms, this conclusion implies that other interventions affecting worker insecurity, such as job protection legislation, might have similar effects on the NAIRU. Because this effect seems to warrant further consideration, I discuss how it may be formalized in Chapter 4.

An objection that all suggested explanations must address is that very few workers receive the minimum wage. As I discuss, this objection seems fatal to the view that the effect of the minimum wage reflects labor demand (as well as to other hypotheses I do not discuss), but is not necessarily so threatening to interpretations stressing insecurity.

3.2 Impact effect

One aspect of the impact of minimum wages is straightforward. The legal requirement to raise the wage of covered workers to the new minimum contributes to an immediate change in the average wage. Gramlich (1976) examines this effect using data on the distribution of hourly wages from the Current Population Survey and allowing for under-reporting, incomplete coverage and compliance. He estimated that the 25 per

cent increase in the Federal minimum in 1974 would have directly accounted for an increase in the total wage bill of 0.4 per cent.

Gramlich estimates that the total immediate effect is twice as large as the direct legal impact. My estimates of the immediate impact effect are similar (though complicated by State minimum wage legislation). However, the overwhelming bulk of the effect of the minimum wage comes later, from the level term in my equation. The level effect exceeds the initial impact after about one year (depending on how far up the wage distribution the minimum wage was initially) and continues to raise wages steadily. Hence direct legal requirements account for very little of the long run effect.

3.3 Worker insecurity

One interpretation of the effect of minimum wages on nominal wage growth emphasizes the role of the minimum wage as a "safety net". Specifically, the subdued nature of wage claims over the last two decades has been attributed to a large increase in worker insecurity. This insecurity can in turn be attributed to an increase in the cost of job loss, the main element of which is a reduction in wages upon reemployment. The minimum wage influences this wage reduction because some workers are reemployed near the minimum wage. In short, when the "outside option" deteriorates (as the minimum wage has done), workers bargain less aggressively. Then, once wages closely related to the minimum wage decline, the outside option of other workers will decline; the effect will flow throughout the workforce.

Evidence on this chain of influence can be divided into a series of steps.

3.3.1 A large reduction in the NAIRU is attributable to increased worker insecurity

The New York Times (Passell, 1997) describes worker insecurity as the most widely cited explanation of the apparent decline of NAIRU over the last two decades. Some quotations convey the idea:

> "The rate of pay increase (in 1996) was markedly less than historical relationships with labor market conditions would have predicted. Atypical restraint on compensation has been evident for a few years now and appears to be mainly the consequence of greater worker insecurity".
>
> – Alan Greenspan (1997)

> "Wages are stuck because people are afraid to ask for a raise. They are afraid they may lose their job."
>
> – Robert Reich (1997a, see also 1997b)

> The new American jobs machine is built on a foundation of fear… "The success of what could be called 'the intimidation economy' depends on workers worrying more about security than wages. Being nice to the rich hasn't made much difference to the American economy, but being beastly to the poor does seem to increase efficiency".
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> – Paul Krugman (quoted in Passell, 1997; see also Krugman, 1997)

Similar views have been expressed by the Council of Economic Advisors (1998 p61), Alice Rivlin (1997), Laurence Meyer (1998) and Laura D'Andrea Tyson (1998).

The prominence and popularity of this idea make it the obvious rival to any proposed explanation of the decline of the NAIRU. The views cited above are also relevant in that they provide evidence in the form of an appeal to authority. Given the difficulty of measuring insecurity and the NAIRU, most information on the link

between them is anecdotal, indirect and impressionistic. One way of synthesizing this evidence is to rely on the judgments of labor market observers.

A detailed exploration of the anecdotal evidence on which these judgements seem to be based is unlikely to be persuasive in either direction. However, in broad outline form, evidence seems consistent with the view that increased insecurity has reduced the NAIRU. This has two elements.

a) Job insecurity seems to have increased over the last two decades

An increase in worker insecurity has been proclaimed on the covers of many magazines and detailed in a larger number of media articles (Marcotte, 1994; and Neumark and Polsky, 1996, provide lists). The recurring theme is the observation of Senator Kennedy of Massachusetts: "When we go back home, all we hear is people are scared of losing their jobs and losing their incomes" (quoted in *The New Yorker*, 1998).

Less influential, but more easily summarized, are the results of opinion polls. The proportion of workers telling the International Survey Research Corporation (1997) that they agree with the statement "I am frequently concerned about being laid off" has increased from about 14 per cent in the early 1980s to 46 per cent in the mid 1990s. Polling by Princeton Survey Research finds similar results for workers claiming to be "very concerned" (Passell 1997). In a separate survey by Princeton Survey Research, 70% of workers say that they have less job security than they did 20 or 30 years ago (Belton, 1997).

Some economists have considered evidence of increased insecurity ambiguous. However, this seems to be because there is little evidence that job *instability* has

increased. As I discuss below, this is consistent with increased insecurity if the costs of losing a job increase.

b) Job insecurity has a substantial influence on wages

The media reports of increased insecurity often note its influence on wage negotiations. More formal studies, using different techniques and measures, tend to confirm this.

Attitudinal surveys show that when workers are insecure, they are less inclined to pursue wage increases. The 1977 Quality of Employment Study[8] (reported in Schmidt and Thompson, 1997) asked workers about the likelihood that they would lose their job over the next few years and whether they would rather have "a 10% pay raise or more job security?" 44% of those workers who believed they were somewhat or very likely to lose their jobs would have preferred more job security. Among those who believed they were not at all likely to lose their jobs, only 17% replied that job security was more valuable. The same survey asked unionized workers whether their union should put more effort into fighting for job security than wages or benefits. Again, workers in insecure positions were much more likely to answer yes.

Blanchflower (1991), using the British Social Attitudes Survey, estimates conventional cross-section wage equations augmented by worker perceptions of job loss. He finds that "workers in non-union workplaces who say they expect their plant to close earn 19% less than those who do not". (There is an insignificant penalty for unionized workers). Jacobsen, LaLonde and Sullivan (1993 p697ff) obtain a similar

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[8] The survey was conducted by the Survey Research Center at the University of Michigan. Results from the General Social Survey by the National Opinion Research Center give similar, though less clear results.

result using actual rather than expected terminations. They find that substantial wage reductions precede mass-layoffs. In principle, wage reductions such as these might arise from employers seeking to reduce their workforces through quits and reduced recruitment. However, the authors of both studies interpret their results as reflecting the effect of fear of job loss on wage bargaining.

Cappelli and Sterling's (1988) study of UAW ratification elections indicates that the more vulnerable workers are to layoff, the more likely they are to ratify contracts.

Consistent with these results, other variables that reflect the costs or likelihood of job loss appear to have significant effect on wages and the NAIRU. The importance of the unemployment rate and unemployment benefits are shown in the wage equation of Chapter 1. Strict job protection legislation is a prominent candidate in many explanations of the high NAIRUs of continental Europe (OECD 1994). The OECD (1993) and Lazear (1990) find termination pay and notice requirements to be strongly correlated with international differences in unemployment.

The evidence thus suggests that job insecurity has increased and that this is likely to have depressed wages. The question then becomes why has insecurity increased and the extent to which this might be attributable to the lower level of the minimum wage.

3.3.2 Increased insecurity is attributable to increased costs of job loss

Reports of increased insecurity strike many observers as paradoxical, given that measures of job stability do not indicate increased frequency of job loss.[9] For example,

[9] A range of measures are surveyed by the Council of Economic Advisors (1997 p149-157) or Diebold, Neumark and Polsky (1997). There are some indications that the composition of separations

median job tenure has increased slightly since 1983 and the unemployment rate has fallen. Consistent with this, opinion surveys that ask workers about the difficulty of finding work or the 'likelihood of' (as opposed to 'concern about') job loss do not show large increases (The Conference Board; Council of Economic Advisors, 1997 p156; Schmidt and Thompson, 1997).

A resolution of the paradox is that the consequences, rather than the likelihood, of job loss have changed.

The wages at which displaced workers regain employment fell over the 1980s. Based on the Panel Study of Income Dynamics (henceforth PSID), Polsky (1996) estimates that the average real wage reduction accompanying job loss widened from 4 per cent in the late 1970s to 6 per cent in the late 1980s. Some estimates based on the Displaced Worker Survey (henceforth DWS) give similar results. For example, Farber (1993, Table 7) estimates that the average real wage loss associated with losing a full-time job then finding another widened from 7 per cent in 1984 to 11 per cent in 1992.[10]

Of greater concern to risk-averse workers may be the increased uncertainty of wages. Polsky estimates that the standard deviation of wage changes following a job loss increased from 16 per cent in the late 1970s to 21 per cent in the late 1980s.

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has changed, with lower quits and more involuntary terminations. However the results (e.g. Polsky, 1996) are generally small and not statistically significant.

[10] Controlling for education, age and so on, the average loss rose from 8 to 13 per cent. Farber's "difference-in-difference" estimates do not show such a change but these may be misprinted. In particular his estimate for $\gamma 3$ in 1992 in Table 9 does not add up. Comparisons over time based on DWS seem to be less reliable than those based on the PSID, due to changes in questions and the absence of surveys taken at similar points of different business cycles.

The lower level and increased variance together mean a much greater probability of receiving a large reduction in wages following loss of a job. This is shown in Table 3-1 below. The data, kindly provided by Dan Polsky, underpin Figure 2-A of Polsky (1999) and are described in detail there. They measure wages divided by the personal consumption deflator. The story is similar in terms of relative wages (comparing wages of job losers to those of job keepers).

Table 3-1: Job losers receiving lower wages

Size of wage reduction	**Percentage of job losers receiving this wage reduction**		
	late 1970s	**late 1980s**	**Increase**
greater than 10%	28%	38%	10%
greater than 30%	12%	20%	9%
greater than 50%	5%	10%	5%

The increased danger of large wage reductions is shown in the third column of the table. The proportion of job losers suffering substantial (greater than 10%) wage reductions increased by 10 percentage points. The proportion suffering huge wage reductions (greater than 50%) doubled. This increased risk provides a persuasive explanation for increased worker insecurity -- in contrast to the weak evidence on job stability.

As Polsky (1996) argues, it appears that workers now worry more about downsizing because it can be more painful, not because it is more likely. Deterioration in the consequences, rather than the likelihood, of job loss reconciles the seemingly

inconsistent responses to opinion surveys noted above. It also explains the unusually low flow into unemployment from quits over the last business cycle (Council of Economic Advisors, 1997, p157). Workers are more likely to quit jobs that seem likely to end anyway whereas they are more likely to stay if the potential costs of job loss are high.

3.3.3 The costs of job loss have risen because the relative minimum wage has fallen.

If the minimum wage reduces labor demand, it would lower the prospects of finding another job should a worker find himself unemployed. Thus the minimum wage can increase the costs of job loss and exacerbate worker insecurity. I discuss the disemployment effect of the minimum wage, and its contribution to the NAIRU, in Section 3.5. In this section, I discuss a competing explanation: how the minimum wage may increase the NAIRU if disemployment effects are negligible. Some (though not all) of the research discussed in Section 3.5, suggests that this possibility is an important one.

The ratio of the minimum wage to average hourly compensation fell by about 30 per cent over the 1980s. This would directly account for the deterioration in reemployment wages of those workers who fall to the bottom of the wage distribution. This group is a small proportion of the workforce. Using data from the 1992 Displaced

Worker Survey, I estimate that 7 per cent of displaced workers who were reemployed in February 1992 received the minimum wage (then $4.25) or less[11].

The low probability of landing on the minimum wage does not necessarily imply that its effect on aggregate wage growth is unimportant. Although the probability is low, it is not zero; and the estimated effect on quarterly wage growth is low also. (A 10 per cent increase in the relative level of the minimum wage raises aggregate wage growth by only 0.084 per cent a quarter). And, to put these numbers in context, the proportion of the workforce on the minimum wage is about the same as the proportion that is unemployed, yet unemployment has a well-established effect on wages.

Nevertheless, these direct effects are limited. To explain widespread worker insecurity, it seems necessary to consider indirect effects of the minimum wage. These can take several forms.

As discussed section 3.4 below, wages immediately above the minimum wage appear to closely follow the minimum wage. A much larger proportion of displaced workers fall to *near* the minimum. I estimate that 21 per cent of reemployed displaced workers received less than $5.78 an hour, which Spriggs and Klein (1994) argue was the average wage in 1992 of the cluster of jobs with a nexus to the minimum wage[12]. These effects are most pronounced among lower paid workers. Considering just the

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[11] Although the PSID provides a more consistent basis for time series comparisons, the Displaced Worker Survey provides more representative cross-sections. I take adult workers displaced from full-time jobs who reported positive hours and earnings from both the original job and a current (i.e. February 1992) job then divide usual weekly earnings on the current job by hours worked.

[12] Calculations as in previous footnote. 15 per cent received $5.00 an hour or less, the range identified by Card and Krueger (1995) as being influenced by immediate spillover effects. The $5.00 benchmark is also interesting for representing the level the minimum wage would have been in 1992 had it maintained its level relative to average compensation since the late 1970s.

lower half of the wage distribution[13] 33 per cent of reemployed displaced workers fell below $5.78 an hour, while 24 per cent received $5.00 an hour or less. Thus a substantial minority of the workforce could realistically expect to be reemployed at wages linked to the minimum wage.

Because worker insecurity affects wages, and hence the outside options of other workers, it will have a cumulative effect, spreading throughout the workforce. A low minimum wage may initially only concern unskilled workers. But if they accept lower wages, this will worry semi-skilled workers, leading them to also accept lower wages. Eventually, the reemployment prospects of skilled workers will deteriorate. If all workers worry about the wage immediately below them, and adjust their own wage accordingly, then the minimum wage will eventually affect the highest wage. A long, indirect chain of influence is consistent with the long lags on changes in minimum wages implied by my wage equation.

The transitions in the Displaced Worker Survey probably understate worker fears. Those workers who most fear landing on the minimum are most likely to avoid this through wage restraint. As Farber (1993 p77) argues, the selective sample of workers who lost their jobs presumably took fewer precautions because they were less worried about large wage reductions. So while few workers may get reemployed at very low wages, a larger number could do so if they bargain too aggressively or shirk. Viewing the minimum wage as a threat helps explain how it can have large macroeconomic effects even when very few workers are legally bound by it. In equilibrium the threat

[13] Deflating wages on the original job by the CPI of the year of displacement, then considering all workers below the median ($414 a week in 1992 dollars).

is not realized – because workers accept lower wages and avoid shirking rather than lose their job. Furthermore, considerations of salience (Akerlof, 1991) and risk-aversion will increase the weight of the minimum wage in worker perceptions.

The considerations suggest that many workers *could* (and arguably *should*) worry about the prospect of very low wages. They do not, however prove that workers actually *do* worry about it. However, increased worker insecurity is otherwise difficult to explain. Hypothesized explanations in the literature are speculative and unconvincing.[14] The only other cost of job loss that appears to have risen is the expected duration of unemployment of displaced workers (Polsky, 1996). However, the duration of unemployment does not appear to have any impact on wage determination; it has a p-value of 48% when included in my wage equation (see Table 1-3).

3.3.4 An aside: Inequality and the costs of job loss

Wages fall after involuntary job losses because workers move from a job that suited them well to one that does not (assuming it is not a compensating differential). There are two broad reasons why this might be. The initial job may have paid high wages from the beginning, in which case the worker might be considered lucky to have found it. Then the high wage represents the return to search. (For an example of a model generating returns to search, see Burdett and Mortensen, 1998). Alternatively, the initial wage may have been ordinary in the beginning, but becomes more attractive than

[14] For example, increased obsolescence of human capital is inconsistent with increasing returns to experience. Increased openness to trade has been more dramatic in Europe, where it has spectacularly

others over time, perhaps because of the acquisition of match-specific information or human capital. Then the higher wage represents the return to tenure.

Thus, consistent with the results in Table 3-1, the variation in wages due to tenure and due to random dispersion both appear to have increased. Violante (1996 p39) estimates the return to tenure (as measured by the average annual rate of change in real wages of workers surveyed by the PSID remaining in the same job) rose from 2.7 per cent a year in the 1970s to 3.7 per cent a year in the 1980s. Gottschalk (1997, Figure 7) shows that variance in the residuals from cross-section wage equations has risen considerably since the 1960s and 70s.

There is a large literature on the apparent tradeoff between jobs and inequality. As I discuss in Chapter 1, this may reflect a causal effect of inequality on the NAIRU. The above arguments suggest however that only specific types of wage inequality will affect the NAIRU; that is, wage variation due to randomness or tenure. Loss of a job does not entail a change in demographic characteristics, nor a loss of returns to education, nor a loss of returns to general experience. These dimensions of inequality need not show any relationship with the NAIRU.

A large part of the widening of wage differentials – particularly at the bottom of the wage structure – is attributable to, if not measurable as, the decline in the relative level of the minimum wage. However, the above argument implies that other factors that contribute to variation in wages due to tenure and randomness should also affect the NAIRU. Changes in technology, international trade, unionization and incomes

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failed to dampen inflationary pressure.

policy are possible examples, though I have not been able to find large quantifiable impacts of such developments on recent US wage determination.

3.3.5 Recapitulation

While it takes several steps, a strong connection can be drawn between the minimum wage and the NAIRU. A reduction in the minimum wage increases wage dispersion, which reduces the level and increases the variance of wages following job termination; this increases the cost of job loss, which increases worker insecurity, which reduces wage growth. In other words, when the minimum is low, wages have further to fall if workers lose their jobs. Hence workers worry more about their job security and bargain less aggressively.

More formally, a low minimum wage makes workers' outside options bleaker and less certain, hence lowering their reservation wages. In Chapter 4, I construct a model of wage determination that includes this effect.

While the effect of worker insecurity is commonly interpreted as a matter of wage bargaining, a similar effect operates through effort incentives. As Bulow and Summers (1986, p409) argue, if workers believe they can gain reemployment at a high minimum wage then they will have an incentive to shirk. Employers who are not able to costlessly dismiss shirkers will counteract this by restoring wide relativities – passing the increase in the minimum wage on to higher paid workers.

3.4 Wage comparisons

Worker insecurity can lead to a gradual restoration of wage relativities as a higher minimum puts upward pressure on other wage rates. In this section I discuss more direct channels of influence by which the minimum may affect other wages. As these different effects can be difficult to distinguish empirically, I group them together as "direct wage comparisons", also called "spillover" or "ripple" effects.

Interviews of employers (Blinder and Choi, 1990) indicate that considerations of fairness are very important in wage determination. In particular, reductions in relative wages are considered unfair and are strongly resisted by employees (a point emphasized in Keynes' *General Theory*). Consistent with this, previous studies of the effect of the minimum wage on other wages, such as Grossman (1983), Gramlich (1976) and Farber (1981), have emphasized equity effects.

The argument (formalized by Grossman, 1983) is that workers form strong views as to the fairness of their wage by comparing it with similarly placed workers. When the minimum wage represents a 'reference wage' then changes in it will tend to flow on to other workers, particularly those near the minimum. As higher paid workers seek to maintain their relative position, the increase will gradually percolate up the wage hierarchy.

The same effect can arise if employers wish to maintain wage relativities. This could be for motivational reasons (rewarding effort with promotion or performance bonuses), to reduce turnover (rewarding tenure) or to recruit higher quality workers

(offering a premium above other wages). It may also arise through substitution of skilled labor for newly expensive unskilled labor.

I summarize several empirical studies of these effects below. They provide strong evidence of direct wage comparisons at the bottom of the wage distribution, though it is not clear that higher wages are affected much. The tying of other wages to the minimum thus accounts for some of the overall affect of the minimum on aggregate wages – but evidence that the contribution is large is more speculative. The effect may be more important in reinforcing other arguments, such as the effect on worker insecurity discussed in the previous section.

Direct wage comparisons seem most pronounced for workers being paid the minimum even where that is not legally required. Fritsch (1981) found that many retail establishments that were exempt from the minimum wage legislation because their sales volumes were too low tended to pay the minimum wage anyway. Card and Krueger (1995 p158) found the same result for firms that did not deduct Social Security taxes, who typically are not compelled to pay minimum wages. Card and Krueger (1995 p166) also find that provisions for paying below the minimum wage to students and teenagers are rarely used.

These groups of workers presumably receive wage increases that equal and coincide with changes in the minimum wage, magnifying its impact. This behavior is not important in aggregate. However it does affect how changes in the minimum wage are modeled. In particular, information on the legal coverage of the minimum is an unreliable guide to the practical extent of its coverage.

For the preservation of wage relativities to have large macroeconomic consequences, it also needs to apply to workers receiving well above the minimum wage. Evidence on the extent to which this occurs can be obtained from surveys of employers, from time series on occupational wages and from data on the distribution of wages. A discussion of these sources of information indicates the extent to which the relationships evident in the macroeconomic data are also evident in various microeconomic data sets. It is also informative about the processes by which wage interactions may occur.

A survey of employers conducted for the Minimum Wage Study Commission (Converse, 1981) found that 7 per cent of all employees earning more than the minimum wage received wage increases in 1980 "in order to maintain a wage differential" relative to the minimum wage. The extent of these "ripple effects" is similar to the share of the workforce on the minimum wage (6 per cent in 1980). Of those firms reporting straight percentage increases, the mean increase was 9.5 per cent. This is larger than the 7 per cent increase in the minimum, perhaps because the data are noisy and censored (negative and zero increases being omitted) or because respondents disregarded instructions about omitting the effects of inflation.

The survey indicated that these increases were predominantly, but not exclusively, in the bottom of the wage structure. 47 per cent of establishments reported that ripple effects stopped below $4.00 an hour, with another 40 per cent stopping below $6.00. 39 per cent of firms that employed minimum wage workers reported some ripple effect. Recent surveys of fast-food restaurants by Katz and Krueger (1992, Table 3), Card and Krueger (1995) and Spriggs (1994) have likewise found large minorities of low paid

workers receiving ripple effects. In Spriggs' study, the ripple effect added three quarters as much to the restaurants' wage bill in the month of the change as the impact of the minimum wage change.

A difficulty with survey evidence is that it requires employers to give mono-causal explanations of multicausal events. For example, the above results may be partly due to inflation and hence over-state ripple effects. Or they may fail to detect ripple effects when they are indirect, delayed or a secondary influence. For example, it seems unlikely that employers would describe effects operating through worker insecurity as a direct minimum wage effect. Multivariate analysis can address some of these problems.

Farber examines wages negotiated in 19 ongoing collective bargaining relationships from 1957 to 1979. He finds that changes in the minimum wage since the last contract agreement have a small, but precisely estimated direct effect on the wages of low paid union members. The elasticity of wages with respect to the minimum wage is .034 for wages 10 per cent above the minimum, declining to zero for wages double the minimum. These effects would be distributed over the three years or so it takes contracts to be renegotiated. In addition, minimum wages would have indirect effects through their effect on average earnings in durable goods manufacturing (a separate variable Faber controls for). The finding that direct ripple effects on union wages are small is consistent with the survey by the Minimum Wage Study Commission. Only 6 per cent of the establishments reporting ripple effects attributed these to union influence. Ripple effects appear to originate in the non-unionized sector.

Grossman (1983) examined the effect of changes in the minimum wage on seven occupational wages across 16 SMSAs over the period 1960-1975. She found that wages in low paid occupations partially emulated changes in the minimum. For example, after one quarter, the elasticity of typists wages (in the third decile of the wage distribution) with respect to the minimum was 0.3. However, there was little apparent impact on wages near the median, such as those of laborers, receiving clerks or order fillers. Unfortunately, the standard errors on Grossman's estimates are large (typically greater than the reported coefficients) and it is difficult to draw further inferences. For example, it is unclear how large overall effects are or how they evolve over time.

Spriggs and Klein (1994) examine effects on 'starting wages' by focusing on workers with a high school or lower education and less than five years experience. They separate these workers into a hundred industry-by-occupation cells; then, using cluster analysis, they determine which of these cells have wages that track the minimum wage discernibly more closely than they track the average wage of nonsupervisory and production workers. They identify these cells as 'the minimum wage contour'. While 10 to 25 per cent of workers in their sample were at or under the minimum wage (depending on the time period), between 50 and 60 per cent were on the minimum wage contour. The average wage of workers on this contour was $5.78 in 1992 (compared to a minimum wage of $4.25). This wage moved by $0.68 for every dollar change in the minimum wage, holding average wages, unemployment and employment growth constant.

Spillover effects can also be measured by comparing the distribution of wages after minimum wage increases with assumptions regarding the distribution in the absence of an increases. For example, the proportion of workers at certain wage rates might be assumed to change gradually over time, in line with inflation. Following this approach, Card and Krueger (1995 p120) find that the fraction of teenagers earning below certain thresholds above the new minimum dropped noticeably at the time of minimum wage increases. Following the minimum wage increase to $4.25 in 1991, the fraction of teenagers earning less than $4.50 fell 6 percentage points below trend, while the fraction earning up to $5.00 fell by 2 to 3 percentage points below trend. These changes could be due to reductions in labor demand, though Card and Krueger suggest that they arise because workers initially receiving more than the minimum wage obtain extra wage increases to maintain differentials relative to minimum wage workers. Such spillover effects would account for an increase in aggregate wages that is similar to the contribution from workers actually on the minimum. One limitation of this analysis, however is that it only applies to spillover effects that are immediately apparent. Further spillover effects could occur over time, a possibility suggested by the apparent lags in the response to minimum wage changes (Card and Krueger p120) and the absence of a discernible bulge in the distribution of wages above the minimum (see for example, Card and Krueger's histograms on p. 290)

Each of the above studies indicates that increases in the minimum wage flow on to other workers. The detected effects are most visible among non-unionized workers at the bottom of the wage distribution. The studies differ in the location, scope and magnitude of spillover effects that they find. Accordingly, synthesizing them is

difficult. My rough assessment however, would be that the contribution of the first round of spillover effects to the aggregate wage bill is similar to the contribution from workers actually on the minimum. This is consistent with the employer surveys or the observed changes in the distribution of wages. The research of Spriggs and Klein suggests that spillover effects could be somewhat more important than the effect from workers on the minimum while that of Grossman and Farber suggests it might be somewhat less important.

These conclusions relate to *immediate* effects on other workers at very low wages. The logic of this effect does not suggest that spillovers end with them. If wages in the second decile of the wage distribution track wages in the first decile, then wages in the third decile might be expected to follow the second, followed by wages in the fourth …. and so on. Such a pattern would be consistent with the view of Galbraith (1997) that the structure of wage relativities is determined by social conventions and that shocks to specific wages are distributed throughout the structure.

The studies above indicate that such second and third round effects do not occur immediately. Otherwise, I am not aware of evidence of their significance. Extrapolating first round effects gives conflicting results. If workers received wage increases that were similar to those received by workers in similar positions, as suggested by the results of the Minimum Wage Study Commission Survey or Spriggs and Klein, then the minimum wage would have large "domino effects"; maintenance of relativities could largely account for my econometric results. Alternatively, if each increase is a small fraction of the one before, as in the results of Grossman and Farber, then the effect would fade out quickly.

One "spillover" effect that is necessarily lagged is wage differentials based on tenure and experience. These are often called "cohort" or "starting wage" effects. In a survey of Texas fast-food restaurants, Katz and Krueger (described in Card and Krueger p162-163) found that, following an increase in the minimum wage, there was usually little change to the timing or level of the worker's first wage increment. That is, the minimum wage typically increases the level, but does not change the shape, of wage-tenure profiles. In suggesting that minimum wage increases will "ratchet up … the entire wage structure" Card and Krueger imply that the minimum wage has a major impact on the NAIRU. This may seem ironic (though no inconsistency is involved), given their argument that it has little direct impact on unemployment.

Large starting wage effects have been found in other studies. For example, Macurdy and Mroz (cited in Gottschalk and Smeeding 1997 n30) find that the steepening of the cross-sectional experience profile is the result of downward shifts in the profiles of recent cohorts, not the steepening of cohort-specific profiles. Beaudry and Green (1997) find the same result in Canadian panel data. Similarly, in a panel study of managerial employees of one firm, Baker, Gibbs and Holstrom (1994 p935) found that "much of the variation between cohort wages seems to come from the starting wages and to persist from that point on".

If the minimum wage determines the level, but not the shape of wage-tenure profiles, then aggregate wages could rise slightly faster than I estimate. New additions to the labor force (the sum of quarterly labor force turnover and growth) represent about 1 per cent of total employment. If these workers all start on a wage profile that is 10 per cent higher but the same shape, then aggregate wage growth would be boosted

by 0.1 per cent a quarter. This initial effect would fade out, disappearing after about 40 years, once the workforce has "turned over". In comparison, my aggregate wage equation suggests that aggregate wages would initially be boosted by 0.084 per cent a quarter.

However, the evidence for substantial effects of 'starting wages' is mixed. Violante (1996), finds that wage-tenure profiles of individuals in the PSID steepened substantially over the 1970s and 1980s as starting wages declined. This effect of starting wages on the return to tenure is an important element of the safety-net interpretation discussed in the previous section. And in contrast to the Texas experience above, New Jersey fast-food restaurants surveyed by Card and Krueger (1995, p51) delayed the time to payment of the first raise by roughly the same proportion as the increase in the minimum wage. While Card and Krueger (pp. 51, 163) appear to believe that the Texas experience is more representative, the basis for this conclusion seems weak[15].

To sum up, there is a lot of microeconomic evidence that increases in the minimum wage directly flow on to *some* workers above the minimum. However, for restoration of relativities to explain my econometric results, it would need to apply to *many* workers. While I cannot reject this possibility, the evidence in support of it is not strong.

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[15] they dismiss the New Jersey results as 'insignificant", retaining a null hypotheses of no change in the shape of the wage-tenure profile. However, the results are also insignificantly different from (indeed, more consistent with) the hypothesis that profiles flatten substantially.

3.5 Labor demand

The link between wage inequality and unemployment is often thought to represent movement along a demand curve for labor. As wages at the bottom of the distribution are increased relative to their levels in the absence of institutional impediments, fewer workers are employed. Arguments along these lines are presented by the OECD Jobs Study (1994b p3), Wachter (1977 p459), Krugman (1994) and Murphy (1995).

One difficulty with this interpretation of the relationship between minimum wages and the NAIRU is that direct employment and unemployment consequences of the minimum wage appear to be too small. Labor demand is too inelastic, the unskilled are too few and the changes in the NAIRU appear to be too large to be accounted for by disemployment effects. Some simple calculations can show this.

The survey of Brown, Gilroy and Kohen (1982, Tables 3 and 6 and p524) suggests that a 10 per cent increase in the minimum wage could increase teenage unemployment by up to 3.6 percentage points and unemployment of workers aged 20-24 by up to 0.3 percentage points. But given the small share of these age groups in the total labor force (5% and 10% respectively), these increases would contribute up to 0.2 percentage points to total unemployment. These estimates are the upper limits of the studies surveyed by Brown, Gilroy and Kohen, who conclude that the likely effect is much smaller.

These *unemployment* estimates are qualitatively consistent with the more detailed and numerous studies of the impact of the minimum wage on *employment* of young workers. Brown, Gilroy and Kohen suggest that a 10 per cent increase in the minimum

wage would reduce employment of teenagers by 1 to 3 percent and of workers aged 20-24 by up to 0.75 per cent. Weighting these by labor force shares accounts for a reduction in total employment of zero to 0.2 per cent. The subsequent studies of Brown (1988), Wellington (1991), Card and Krueger (1995) and Neumark and Washer (1995) suggest an employment effect at the bottom of this range while Deere, Murphy and Welch (1995) suggests an effect nearer the top. Assuming that the minimum wage does not cause a substantial increase in labor supply, these employment estimates are consistent with a 10 per cent increase in the minimum wage increasing total unemployment of between zero to 0.2 percentage points coming from workers aged less than 25.

I am unaware of estimates of the impact on adult unemployment, which is unfortunate as half of all minimum wage workers are aged over 25[16]. But assuming the number of unemployed adults rises by as much as the number of unemployed workers aged under 25, the combined increase lies between zero and 0.4 percent of the total workforce. (Noting again the judgment of Brown, Gilroy and Kohen that it is more likely to lie in the bottom of this range). This is less – probably much less – than my estimate of a 0.6 percentage point increase in the NAIRU arising from a 10 per cent increase in the minimum wage.

International evidence is consistent with the view that large increases in the NAIRU cannot be attributed to displacement of unskilled workers by high minimum wages. Such displacement would be reflected in increased shares of youth and the

[16] Card and Krueger (1995 p282)

uneducated in total unemployment in those countries where wages have been compressed and the NAIRU has increased. In fact, the share of youth in total unemployment has fallen in most European countries, both absolutely and relative to the United States (Gottschalk and Smeeding pp658-660). The share of uneducated workers has shown little clear trend. Nickell and Bell (1995 p46) conclude that there seems to be no evidence that it has risen more on those countries where wages have been compressed. Most European countries have seen large increases in the unemployment rates of skilled workers (Nickell and Bell, 1995, Table 2a), indicating that their increases in the NAIRU are not simply a matter of displacement of unskilled workers.

More fundamentally, changes in labor demand relate most directly to actual unemployment, rather than to the NAIRU. Many workers who lose their jobs because of an increase in the minimum wage will seek work elsewhere. This makes recruitment easier, placing downwards pressure on other wages and increasing employment. It is not obvious that any change in the NAIRU would be involved. If these unemployed workers have the same effect on wages as workers unemployed for other reasons, then the minimum wage would involve a temporary movement along an unchanged Phillips curve.

That said, it seems plausible that changes in relative labor demand would have some effect on the NAIRU. Because they are less skilled and have less experience of higher-paid employment, unemployed minimum wage workers are imperfect substitutes for other workers. Assuming that employers prefer workers who previously had higher paying jobs to those whose experience was on the minimum wage, then the

unemployment of minimum wage workers will count for less; they will exert less downward pressure on wages. So, the composition of unemployment will matter as well as its level. Arguments along these lines has been made in reference to demographic effects (Perry, 1970) and the long-term unemployed (Layard, Nickell and Jackman, 1992).

In the limit, if minimum wage workers were incapable of filling higher paid jobs, their unemployment would have no effect on other wages. More unemployment for the same wage outcome means that the NAIRU would shift by the same amount as the direct unemployment effect. But this case is extreme. Workers in minimum wage jobs and workers in higher paid jobs are substitutable, even if imperfectly. Smith and Vavrichek (1992) report that 63% of minimum wage earners earn 20 per cent more than the minimum wage within 12 months. As shown in Table 3-1, there is also a substantial flow of workers down the wage hierarchy. Given this substitutability, workers who lose their job because of the minimum wage are able to – and presumably do – seek higher paying jobs. They may be less effective in competing for jobs than other workers, but their unemployment will still facilitate recruitment and hence depress wages.

Furthermore, if minimum wage workers were completely incapable of getting higher paying jobs, they would not expend resources in search and would not be classified as unemployed. Either way, the increase in the NAIRU will be less than the job losses arising from the minimum wage. An increase in the minimum wage would raise the NAIRU by some fraction of the job losses directly arising from the minimum

wage. Because these initial job losses are small in any case, labor demand effects appear to be less important than other channels of influence.

3.6 The minimum wage as a proxy

Changes in minimum wages are partly due to changes in social values, such as sympathy for the poor and readiness to intervene in the market. If these pressures directly influence wage determination then the significance of the minimum wage might simply reflect its role as a proxy. While this would not affect the model's use for forecasting, it would make policy inferences more complicated.

Transfer payments appear to reflect similar changes in underlying sentiment. If the above argument is correct, then they might be expected to play a similar role in the wage equation estimated in Chapter 1 as the minimum wage. A test of this is given by the statistical significance of other elements of the social safety net and their effect on the coefficient on minimum wages when included in the wage equation. Table 3-2 below reproduces for convenience the first few rows of Table 1-3. Each variable comes from Table 2.1 of the Survey of Current Business, via the DRI database, and is measured as a share of personal income in logarithms. P-values reflect F-tests on the inclusion of the current and one lagged value, which allows for both level and change effects.

Table 3-2: Effect of other safety net measures

Included Variable	P-value of inclusion	Effect on Minimum Wage Coefficient x100	Effect on Minimum Wage Std. error x100	DRI mnemonic
None (baseline)		0.84	0.16	
Aid to families	85%	0.80	0.20	GPTAID/GPY
OASDHI benefits	10%	0.76	0.17	GPTOAS/GPY
"Other transfer payments"[17]	8%	0.82	0.17	GPTOTH/GPY
total transfer payments	17%	0.78	0.16	GPT/GPY

If the minimum wage was simply a proxy for social values, then other proxies should provide further information about the "true" explanatory variable and capture some of its effect. Including them in the equation should reduce the coefficient on the minimum wage and its significance. But instead, the coefficient and its standard error are barely affected.

The strongest statistical support of an extra effect comes from "other transfer payments". But even so, this is a change effect, the sum of the coefficients is essentially zero. Other variables are insignificant in both statistical and economic terms. This suggests that the social values supporting such measures do not have a direct influence on the NAIRU.

[17] In 1996 about half this category comprised medical care provided by state and local governments. Another quarter came from food stamps, supplemental security income and the earned income tax credit. The remainder comprised miscellaneous small programs.

The two significant safety net measures in my wage equation are the minimum wage and unemployment benefits. This has a moral hazard interpretation. If workers bargain too aggressively, they run the risk of becoming unemployed or being relegated to a low-paid job. Protection against these dangers facilitates workers running greater risks; that is, claiming higher wages. Protection against the dangers of old age, disability or single-parenthood may be equally valuable to workers, however these risks are not affected by wage behavior. So no moral hazard effects from these elements of the safety net are evident in the wage data. This moral hazard interpretation seems consistent with the discussion of worker insecurity in Section 3.3.