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INDEXATION OF THE MINIMUM WAGE WITH RATIONAL EXPECTATIONS

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ABSTRACT

Indexation of the Minimum Wage with Rational Expectations

This paper considers the possible employment effects of reforming minimum-wage policy to incorporate indexation of the nominal minimum wage. The analysis assumes that both the demand for the labor services of minimum-wage workers and the setting of the nominal minimum wage rate under existing policy depend in part on rational expectations of future average wage rates. The analysis implies that, if the indexation ratio of the nominal minimum wage to the recent-past average wage rate were large relative both to the level and trend of the expected rate of average wage inflation and to the existing relative minimum-wage target, indexation would decrease the average level over time of minimum-wage employment. The analysis also implies that, if the year-to-year variation in expected wage inflation were large relative to the year-to-year variation in unexpected wage inflation, indexation would increase the year-to-year variation in minimum-wage employment.

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This paper considers the possible employment effects of reforming minimum-wage policy to incorporate indexation of the nominal minimum wage. A feasible indexation scheme would involve periodic adjustment in the minimum wage in accord with a wage or price index. The specification of an indexation scheme would require designation of the periodicity of adjustment, of the relevant index, and of the factor of indexation that determines the quantitative relation between the minimum wage and the designated index. As a relevant example, the Congress has recently considered an indexation scheme that would specify annual adjustments of the federal minimum wage to make it a fixed fraction of the average wage rate of the preceding year. The purpose of the analysis in this paper is to identify theoretically the factors that would determine how, if at all, the effects of a minimum-wage policy involving such an indexation scheme would differ from the effects of the existing minimum-wage policy.

The analysis develops a theoretical model that incorporates the following distinctive and important elements:

(1) Employer demands for labor services in the subset of labor markets in which the minimum wage is an effective constraint depend on the expected relative minimum wage rate in the near and distant future, as well as on the current relative minimum wage rate and other variables.

(2) Employers base their demand behavior on "rational" expectations about future average wages and future minimum-wage policy, and, hence, about future relative minimum wages.

(3) Existing minimum-wage policy involves presetting of the nominal minimum wage, but the policy objective is to make the average level of future relative minimum wages equal a constant target.

(4) Policymakers base their behavior on "rational" expectations about future average wages.

These assumptions mean that both policymakers and employers behave as if they know the true mathematical expectations of

relevant future variables implied by current and past data and by the economy's stochastic structure.

In a recent econometric study, "The Federal Minimum Wage, Employment, and Inflation," John Boschen and I find that the data do not reject the hypothesis that average wage rates and aggregate employment are independent of the form of minimum-wage policy. This result is policy invariant, in the sense of Lucas. The main implication of this hypothesis for the present analysis is that the only important effect of minimum-wage policy is on the amount of employment in the subset of markets in which the minimum wage is an effective constraint. Consequently, in considering the possible effects of indexing the minimum wage, the present analysis focuses on the amount of employment in the subset of constrained markets relative to aggregate employment, taking actual and expected changes in average wages as well as in aggregate employment to be determined by other factors. The presumption that the subset of constrained markets is not empty is based on the observation that the wage distribution has continually exhibited a cluster at the level of the current federal minimum wage.

Actual employment in the subset of markets in which the minimum wage is an effective constraint is equal to demand and is less than supply. The determination of labor demand and, hence, of employment in this subset of constrained markets involves the determination of behavior in the representative market in this subset and, also, the determination of the size of this subset. The analysis assumes that the ratio of employment in the representative constrained market to aggregate employment depends on the current ratio of the average wage rate to the minimum wage, on the expected ratio of the average wage rate to the minimum wage in the near and distant future, and on other variables. The importance of expected future relative wages
results from a variety of adjustment and training costs. The other variables, which can include technological factors,

taken to be exogenous, and past ratios of employment in that market to aggregate employment, are not essential to the analysis. The number of constrained markets depends on the current ratio of the minimum wage to the average wage and on other variables, such as the current ratio of employment covered by the minimum wage to aggregate employment, which we also take to be exogenous.

Incorporating these assumptions into a log-linear demand function for the subset of constrained markets yields the basic employment equation.

$$(1) \qquad N_t = n_1(W_t-\Omega_t) + n_2E_t(W_{t+1}-\Omega_{t+1}) + n_3E_t(W_{t+2}-\Omega_{t+2}) + Z_t,$$

where the variables are defined as follows:

N is the log of the ratio of employment in the subset of constrained markets to aggregate employment.

W is the log of the average wage rate.

Ω is the log of the minimum wage rate.

Z is a vector of other exogenous and predetermined variables.

The subscripts t, t+1, and t+2 indicate, respectively, the current year, the near future, and the distant future.

E_t is an operator that designates a currently formed rational expectation.

The analysis assumes that the elasticity coefficients, n_1, n_2, and n_3, are all positive. The only difficulty with this assumption involves n_1, because an increase in the current ratio of the average wage rate to the minimum wage rate increases demand in the representative constrained market but decreases the number of constrained markets.

With regard to existing minimum-wage policy, the history of federal minimum-wage legislation suggests the following observations:

(a) The law has specified future time paths for the nominal minimum wage. (b) The law has been amended at intervals ranging from four to seven years. (c) These amendments have raised the relative minimum wage to between 46.2% and 55.6% of the average manufacturing wage rate. (d) Between amendments, the relative minimum wage has declined to between 39.3% and 47.3% of the average manufacturing wage rate.

It is not clear why the law has specified the minimum wage in nominal terms rather than as a percentage of the recent average wage, but the above observations suggest, nevertheless, that a long-run policy objective has been to avoid large variation in the relative minimum wage. In light of these observations, the following representation of existing minimum-wage policy would seem to be appropriate: First, the current and near-future minimum wage, Ω_t and Ω_{t+1}, are currently predetermined. Second, in the longer run, amendments to the Fair Labor Standards Act preset the nominal minimum wage to equate on average the expected relative minimum wage to a target level, which we can treat as a constant. The expectations on which this policy is based are "rational," but the carrying out of policy is subject to a random error.

Specifically, this representation of existing minimum-wage policy assumes that

$$\Omega_{t+2} = E_{t+1} W_{t+2} + y + \omega_{t+2}, \tag{2}$$

where y is the long-run policy target for the log of ratio of the minimum wage to the average wage rate and ω is a random variable with zero mean.
The policy target, y, does not represent the level at which the relative minimum wage is set when the Fair Labor Standards Act is amended. Rather, it is the mean over time of the level of the nominal minimum wage relative to expectations of the average wage. It also turns out to be,

as we see in equation (3) below, the expected long-run value of the minimum wage relative to the average wage. The random error, ω, results from stochastic factors that affect either the timing of amendments to the law or the level at which the minimum wage is set when the law is amended.

Taking expectations of equation (2) yields

$$(3) \qquad E_t(W_{t+2} - \Omega_{t+2}) = -y.$$

Backdating equation (2) yields

$$(4) \qquad \Omega_{t+1} = E_t W_{t+1} + y + \omega_{t+1} \quad \text{and}$$

$$(5) \qquad \Omega_t = E_{t-1} W_t + y + \omega_t.$$

The essential assumption involved in the use of the same expectations operator, E, in equations (1-5) is that employers and policymakers have the same (rational) expectations about average wages.

Substituting equations (2-5) into equation (1) yields the following solution for relative employment in the subset of constrained markets in terms of minimum-wage policy variables, unexpected wage inflation, and other variables:

$$(6) \qquad N_t = -(n_1 + n_2 + n_3)y - n_1\omega_t + n_1(w_t - E_{t-1}w_t) + z_t$$

where $w_t \equiv W_t - W_{t-1}$ measures current wage inflation and $E_{t-1}w_t \equiv E_{t-1}W_t - W_{t-1}$ measures last year's expectation of this year's wage inflation. For present purposes, the important implications of equation (6) are that relative employment in the subset of constrained markets is negatively related to the target level for the relative minimum wage, given by y, and to the amount, given by ω_t, by which the setting of the current relative minimum wage exceeds this target level, and is positively related to the amount, given by $w_t - E_{t-1}w_t$, by which current wage inflation exceeds last

year's expectation. This difference measures the amount by which unexpected inflation erodes the relative minimum wage.

The indexation scheme considered in this paper would differ in two important ways from existing minimum-wage policy: First, with indexation, adjustment of the minimum wage would be an automatic response to changes in average wages rather than depending on a revision of expectations about average wages on the part of policymakers. Second, with indexation, the setting of the minimum wage would be a backward looking reaction to last year's average wages rather than a forward looking anticipation of next year's average wages.

We can specify this indexation scheme as

$$(7) \qquad \Omega_t = W_{t-1} + x,$$

where x is the factor of indexation. Updating equation (7) and taking expectations yields

$$(8) \qquad E_t\Omega_{t+1} = W_t + x \quad \text{and}$$

$$(9) \qquad E_t\Omega_{t+2} = E_tW_{t+1} + x.$$

Substituting equations (7-9) into equation (1) yields the following solution for relative employment in the subset of constrained markets in terms of the revised minimum-wage policy variables, expected wage inflation for the near and distant future, and other variables:

$$(10) \qquad N_t = -(n_1 + n_2 + n_3)(x - E_tw_{t+2}) + n_1(w_t - E_tw_{t+2}) + n_2(E_tw_{t+1} - E_tw_{t+2}) + z_t,$$

where $E_tw_{t+2} = E_tW_{t+2} - E_tW_{t+1}$ measures currently expected long-run wage inflation and $E_tw_{t+1} = E_tW_{t+1} - W_t$ measures currently expected near-future wage inflation. For present purposes, the important implications of equation (10) are that

relative employment in the subset of constrained markets is negatively related to the factor of indexation minus currently expected long-run wage inflation, a difference given by $x - E_t w_{t+2}$, and is positively related to the amount, given by $w_t - E_t w_{t+2}$, by which current wage inflation exceeds expected long-run wage inflation and to the amount, given by $E_t w_{t+1} - E_t w_{t+2}$, by which expected near-future wage inflation exceeds expected long-run wage inflation. Expected long-run wage inflation plays a critical role in this case because it determines the extent of the expected future erosion of the relative minimum wage that results from the backward-looking nature of the indexation scheme.

Comparison of equations (6) and (10) indicates that with an indexed minimum wage the selection of the factor of indexation, x, relative to the expected long-run rate of wage inflation, $E_t w_{t+2}$, would have the same effect on relative employment in the subset of constrained markets that the selection of the relative minimum-wage target, y, has under present policy. However, the nature of the factors that either erode or reinforce the effects of these key policy variables differs drastically in the two cases. Under present policy, which we characterize as forward looking, these other relevant factors include the unexpected part of the current rate of wage inflation and randomness in the carrying out of policy. In any particular year, these factors can have a significant effect, but, given that expectations and policy execution are accurate on average, the average effect of these factors over time is zero. In the long run, the effect of present minimum-wage policy depends on the level of y.

With an indexed minimum wage, which by its nature would be backward looking, the other relevant factors would include deviations of the current and expected near-future rates of wage inflation from the expected long-run rate of wage inflation. In any particular year, these deviations could have a significant effect. Moreover, if, for example, the expected rate of wage inflation were trending upward, these deviations

would be chronically negative, and their effect would be to depress employment further in the subset of constrained markets. If, however, the expected rate of wage inflation had no trend, the average effect of these deviations over time would be zero. In this case, the long-run effect of an indexed minimum wage would depend only on the level of the factor of indexation relative to expected long-run wage inflation.

Suppose that minimum-wage policy were changed to incorporate this indexation scheme with the factor of indexation, x, set equal to the sum of the present relative minimum-wage target, y, and the expected long-run rate of wage inflation, $E_t w_{t+2}$. The preceding discussion implies that, if the expected rate of wage inflation has no trend, the average effect over time of this indexed minimum-wage policy on relative employment in the subset of constrained markets would be the same as the average effect over time of present policy. These effects, however, would not necessarily be the same in each and every year because of the influence of the other relevant factors--unexpected wage inflation and policy randomness in the present case and variations in expected wage inflation in the indexation case. Moreover, if, for example, the expected rate of wage inflation were trending upward, x would have to be less than the sum of y and $E_t w_{t+2}$ to make the average effect over time of an indexed minimum wage the same as the average effect over time of present policy.

An important general implication of this analysis is that we cannot draw any a priori conclusions about how, if at all, the effects of an indexed minimum wage would differ from the effects of existing minimum-wage policy. How, if at all, the average level over time of employment in the subset of constrained markets would change with the adoption of indexation would depend on the size of the chosen factor of indexation relative to the present relative minimum-wage target and the expected pattern of the rate of average wage inflation.

Specifically, this average level of employment would decline if the indexation ratio of the federal minimum wage to recent-past average wage rates were large relative to the level and trend of the expected rate of average wage inflation and the present relative minimum-wage target. How, if at all, the amount of year-to-year variation in employment in the subset of constrained markets would change with the adoption of indexation would depend on the amount of year-to-year variation in expected wage inflation relative to the amount of year-to-year variation in unexpected wage inflation and in policy execution. Specifically, this year-to-year variation in employment would increase if the year-to-year variation in expected wage inflation were large relative to the year-to-year variation in unexpected wage inflation.

Reference

J.F. Boschen and H.I. Grossman, "The Federal Minimum Wage, Employment, and Inflation," NBER Working Paper, March, 1981.