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Distributional impacts of a local living wage increase with ability sorting

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ABSTRACT

I develop a model of ability sorting of low-wage workers across multiple markets when one market substantially increases its wage floor using a living wage. The wage floor increase can increase or decrease employment probabilities in both covered and uncovered markets.

1. Introduction

The living wage movement in the US has caught on in over 140 cities since 1994. These ordinances usually require covered firms[1] to pay workers 50%–150% higher wages than the federal minimum wage. As a living wage ordinance is a sharply increased wage floor, one could expect economic outcomes to follow the classical minimum wage theory of Mincer (1976), with the living wage sector as the covered, and the minimum wage sector as the uncovered sector[2]: workers in the covered sector who earn the higher wage benefit, but all other workers are hurt. Studies have found contradictory employment and wage effects.[3]This disagreement mirrors the controversy surrounding the impact of minimum wage increase.[4]

Because the two sectors operate in close geographic (or industrial) proximity, workers and firms should be able to change sectors with ease. When firms and workers are mobile, relative employment change in the covered sector after a policy change may be driven in part by the interaction with the uncovered sector.

In a two-sided, two-sector search model with endogenous labor demand and supply that allows for ability sorting, workers and firms locate optimally to maximize expected returns yielding more complex results. A match generates revenue dependent only on worker ability and is split according to a Rubenstein bargaining game in the absence of a binding wage floor. A living ordinance "prices out" low-ability workers as matches are rejected by firms. These workers are driven to the uncovered sector, changing the employment probability and expected revenue from a match in both markets, inducing further moves by other workers and firms. The sorting of workers hinges on the knowledge of their ability ex ante. Workers anticipate whether they will be paid their share of the revenue (high, mid-ability), the wage floor (low ability), or be priced out of the market (very low ability). Workers consider their employment probability and wage conditional on matching, and move to maximize expected wage. Firms, while unable to observe worker ability prior to the match, can predict average ability level in each sector. Firms enter/exit both markets until expected zero profit holds.[5]

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1 Covered firms conduct business with city governments or in some cases, is the government.

2 This framework applies to any large disparity in wage floors in multiple markets, such as minimum wage in the European Union. As of 2010, Luxembourg has the highest minimum wage at 1683 EUR and Bulgaria has the lowest at 123 EUR, an almost 14-fold difference. (Normalizing purchasing power reduces the difference to 6-fold.)

3 See Brenner (2005) and Neumark and Scott (2003, 2005), among others.

4 While considerable controversy exists (see Neumark and Wascher, 2000), the evidence for strong negative employment effect predicted by traditional economic theory is weak.

5 The jobs considered are primarily low-level service jobs in the fast food industry (minimum wage) or janitorial, cleaning, and home-care industries (living wage).

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How each sector responds to a living wage change depends crucially on which sector had the higher employment probability prior to the policy change. I find that if the covered sector initially had the higher employment probability, a wage floor increase has ambiguous employment effects in the covered sector but increases employment in the uncovered sector. If the covered sector has the lower employment probability, a wage floor increase leads to lower employment levels and probabilities in the covered sector and increased employment levels and ambiguous change in employment probability in the uncovered sector.[6] In both cases, the one segment of the working population that is unequivocally hurt is the low-ability workers originally in the covered sector.

2. The model

There are two sectors. Sector A initially has a higher wage floor compared to Sector B.[7] Workers are risk neutral and differentiated by ability, $\delta_i, \delta \in [0, 1]$. Workers in Sector A (B), numbering N_A (N_B) search for vacancies posted by identical firms in Sector A (B), numbering J_A (J_B).[8] Searching workers sum to $\overline{N}$ and entry by firms is endogenous. As in Pissarides (1992), the number of matches in Sector k is Cobb–Douglas on the interior:

$$x_k = \min\{\gamma J_k^{\alpha} N_k^{1-\alpha}, J_k, N_k\} \tag{1}$$

where $\alpha \in (0, 1)$ and γ is a normalizing constant. Workers (firms) within a sector have the same probability of finding a match, $P_k = x_k/N_k$ ($q_k = x_k/J_k$).[9]

A match generates revenue equal to worker i's ability, δ_i. When wage floor does not bind, the worker receives $\beta\delta_i$, and the firm receives $(1-\beta)\delta_i$, with $\beta \in (0, 1)$.[10] When wage floor binds, the match pays at least $\underline{W}$, such that worker i receives $W_i = \max\{\beta\delta_i, \underline{W}\}$. Workers search in the sector that maximizes expected wage.

Firm expected zero-profit conditions are

$$q_A E(\max\{\min\{(1-\beta)\delta_i, \delta_i - \underline{W}\}, 0\}|A) - C = 0 \tag{2}$$

$$q_B(1-\beta)E(\delta_i|B) - C = 0 \tag{3}$$

where $E(\delta|k)$ is the expected revenue of matching conditional on Sector k. Sector A firms reject matches where $\delta_i < W_i$.[11]

Two initial conditions are considered:

1. $P_A > P_B$.
2. $P_B > P_A$.

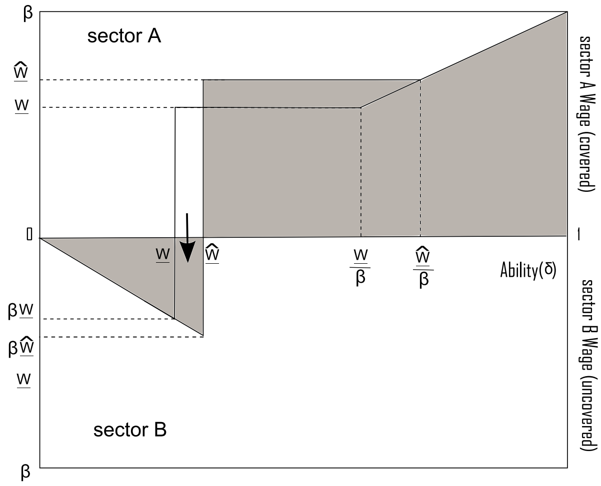

Fig. 1. Distribution of workers and wages when $P_A > P_B$.

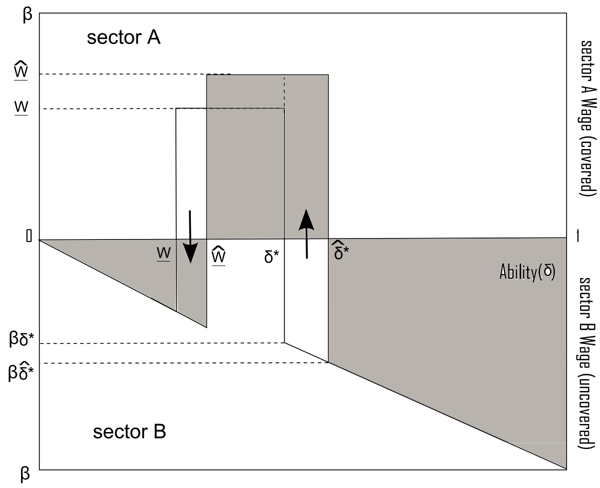

Fig. 2. Distribution of workers and wages when $P_B > P_A$.

2.1. When $P_A > P_B$

When employment probability is higher in the covered sector, all workers except $\delta_i < \underline{W}$ move to Sector A. Workers with ability $\underline{W} < \delta_i < \frac{\underline{W}}{\beta}$ receive $\underline{W}$. All other matched workers receive $\beta\delta_i$. See Fig. 1.

2.2. When $P_B > P_A$

When employment probability is higher in the uncovered sector, all workers except $\underline{W} < \delta_i < \delta^*$ move to Sector B. δ^* represents the worker who is indifferent between Sector A (higher wage and lower employment probability) and Sector B:

$$P_A\underline{W} = P_B\beta\delta^*. \tag{4}$$

See Fig. 2. A sub-game perfect equilibrium exists in $P_A > P_B$ and $P_B > P_A$ scenarios.[12]

Proposition 1. *Given Eqs. (1)–(4), parameter vector* $\{\underline{W}, \overline{N}, C_A, C_B, \beta\}$, *and* $\delta \sim U(0, 1)$ *there exists a unique sub-game perfect equilibrium in* $\{N_A, N_B, J_A, J_B\}$.

Ability should be interpreted broadly to include qualities such as conscientiousness, punctuality, and positive attitude. (See Card and Krueger, 1995 and Chapman and Thompson, 2006.) It seems reasonable that workers know their ability prior to job-match, and firms are able to judge after matching.

6 If workers do not observe their own productivity, the potential positive impacts of sorting by ability level go away, and the primary effect of a wage floor hike in one sector would be a large increase in unemployment due to match rejection by firms.

7 For notational simplicity in the model, I normalize wage floor in Sector B to zero. However, a model in which the two sectors have different wage floors above zero does not qualitatively change the model. There would now be a segment of workers with ability level $\delta_i < \min\{\underline{W}_A, \underline{W}_B\}$, who are unemployable in either sector.

8 Allowing simultaneous search in both sectors and introducing a search effort that must be optimally distributed across the two sectors would leave the qualitative results unchanged (but significantly complicates the model).

9 Qualitative results remain unchanged if higher ability workers are more likely to match.

10 See Ahn et al. (2011) for the rigorous derivation.

11 C, the cost of posting a vacancy, is bounded between $0 < \underline{C} \leq C \leq \overline{C} < 1$ to ensure the existence of both sectors. I also assume $C_A = C_B = C$ for simplicity; however, qualitative results remain unchanged if $C_A \neq C_B$.

12 Proofs of all propositions are at: http://sites.google.com/site/tomsyahn/.

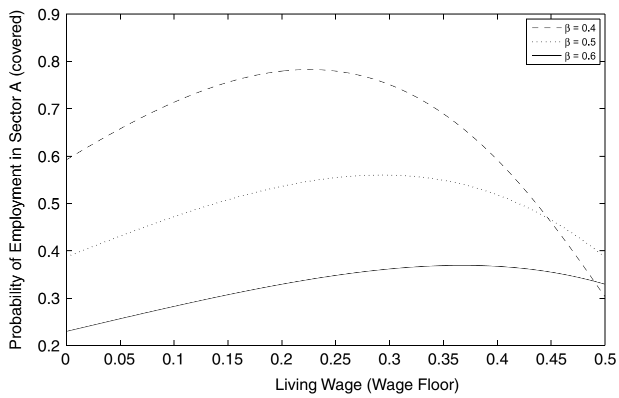

Fig. 3. When $P_A > P_B$: relationship between P_A and $\underline{W}$. (Parameter values used in simulation: $\alpha = 0.7$, $\gamma = 0.45$, $C_A = C_B = 0.12$, $\overline{N} = 100$.)

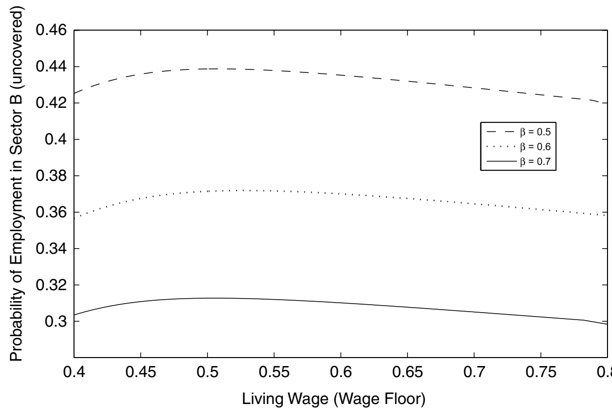

Fig. 4. When $P_B > P_A$: relationship between P_B and $\underline{W}$. (Parameter values used in simulation: $\alpha = 0.4$, $\gamma = 0.45$, $C_A = C_B = 0.1$, $\overline{N} = 100$.)

3. Comparative statics

3.1. When $P_A > P_B$

Proposition 2. *When Sector A increases its wage floor:*

1. *conditions exist where x_A and P_A increase;*
2. *x_B and P_B increase;*
3. *low-ability workers originally in Sector A are hurt.*

Fig. 1 illustrates the following. The impact on P_A and x_A depends on β and $\underline{W}$. A large β will decrease profits for the firm, leading to lower firm entry and thus lower P_A. If β is greater than a critical value (defined in the appendix), workers retain too much of the revenue, pushing firms out. This decreases P_A and x_A as $\underline{W}$ increases. If β is smaller than the critical value, losses in match probability is offset by gains in expected ability draw, attracting firm entry.

A Sector A wage floor hike decreases the number of searching workers (N_A) and increases the expected revenue of the match ($E(\delta|A)$), pulling expected profit in opposite directions. Firms search in Sector A despite a smaller N_A if $E(\delta|A)$ is high enough. This holds when $\underline{W}$ is initially low because the number of workers who receive $\underline{W}$ (those with ability $\underline{W} \geq \delta_i \geq \frac{\underline{W}}{\beta}$), is small, and an increase in the small chance of encountering such a worker is offset by the increase in $E(\delta|A)$ due to movers to Sector B. As $\underline{W}$ increases, expected revenue declines, and entry is deterred. This is demonstrated in a numerical simulation in Fig. 3. P_A and x_A decreasing may seem similar to the classical minimum wage model, but this occurs as N_A *decreases*. In Sector B, N_B and $E(\delta|B)$ increase, leading to a large increase in J_B. This leads to an increase in P_B. Unlike the classical minimum wage model, workers originally in the "uncovered sector", benefit from the excess labor supply because of the higher ability of the new entrants.

Denoting the new wage floor as $\widehat{\underline{W}} > \underline{W}$, and new employment probabilities in Sectors A (B) as $\widehat{P_A}$ ($\widehat{P_B}$), when Sector A raises its wage floor, workers originally in Sector B benefit, since relatively high-ability workers (from Sector B's perspective) move from Sector A, increasing the $E(\delta|B)$, leading to more vacancies and $\widehat{P_B} > P_B$. In Sector A, high-ability workers with $\delta_i \geq \frac{\widehat{\underline{W}}}{\beta}$ who remain may be better off if $\widehat{P_A} > P_A$. Workers with $\delta_i < \frac{\underline{W}}{\beta}$ may benefit if $\widehat{P_A}\widehat{\underline{W}} \geq P_A\underline{W}$, and workers with $\frac{\underline{W}}{\beta} \leq \delta_i \leq \frac{\widehat{\underline{W}}}{\beta}$ may benefit if $\widehat{P_A}\widehat{\underline{W}} \geq P_A\beta\delta_i$. Low-ability workers with $\underline{W} \leq \delta_i \leq \widehat{\underline{W}}$, who are forced to move to Sector B are unequivocally worse off.

3.2. When $P_B > P_A$

Proposition 3. *When Sector A increases its wage floor:*

1. *x_A and P_A decrease;*
2. *x_B increases and conditions exists where P_B decreases;*
3. *low-ability workers originally in Sector A are hurt.*

Fig. 2 illustrates the following. When $\underline{W}$ increases, higher ability workers move to Sector A, as δ^* increases, and lower ability workers are pushed out to Sector B. The net result is that N_A decreases and $E(\delta|A)$ increases. The former effect dominates the latter, leading to firm exits in Sector A. This translates to lower x_A and P_A. Sector B accepts an influx of relatively low-ability workers from and loses relatively high-ability workers to Sector A. While the $E(\delta|B)$ declines, the increase in q_B from the increase in N_B is enough to entice entry by firms. As both J_B and N_B increase, x_B, increases. Because the rate of firm entry will depend on β, P_B can increase or decrease, which is illustrated in a numerical simulation in Fig. 4.

Low-ability workers from Sector A are forced into Sector B as before, and high-ability workers from Sector B move to take advantage of the higher wage floor. As $\widehat{P_B} \lesssim P_B$, low-ability workers with $\delta_i < \underline{W}$ are worse off. Denoting $\widehat{\delta^*}$ as the new indifferent ability level, high-ability workers with $\delta_i > \widehat{\delta^*}$ in Sector B are worse off. Low-ability workers originally in Sector A with $\underline{W} \leq \delta_i \leq \widehat{\underline{W}}$, who move to Sector B are worse off because they must accept a lower wage. Workers paid the wage floor who remain in Sector A and collect $\widehat{\underline{W}}$ may benefit if $\widehat{P_A}\widehat{\underline{W}} \geq P_A\underline{W}$. Workers with $\delta_i \leq \widehat{\delta^*}$ move to Sector A and may benefit if $P_B\beta\delta_i < \widehat{P_A}\widehat{\underline{W}}$.

4. Discussion

I examined the employment level and probability impacts of a wage floor hike in a multiple markets setting, specifically in the context of a living wage ordinance. The analysis shows that the difference in probability of employment across sectors is critical in determining the initial distribution of workers and wages and the impact of a wage floor hike. A local living wage ordinance will have complex employment consequences in both sectors, with changes in employment probabilities, wages, and distribution of workers. Whether workers in the covered and uncovered sectors benefit is determined by the sectoral difference in employment probabilities.

The results are more nuanced than the classical minimum wage analysis, which results in lower employment levels and higher wage in the covered sector, and higher employment and lower wages in the uncovered sector. When the sector with higher wage floor (Sector A) has the lower unemployment rate, it forces its low-ability workers into the adjacent sector (Sector B). This has the effect of increasing the expected ability draw of both sectors, which can raise the employment level and the employment probability in both sectors. When Sector B has the lower unemployment rate, a wage floor hike in Sector A has mostly negative consequences for Sector A workers and ambiguous impact for Sector B workers.[13]

While positive employment effects in Sector A may be observed, workers initially in the covered sector with low ability are unequivocally hurt. They are pushed out of the sector where they were earning more than the market share of their ability since, $\underline{W} > \beta\delta_i$. Ultimately, the intuition that a wage floor hike hurts those who most need the additional income holds in a multiple market setting with endogenous labor and firm mobility.

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[13] Interestingly, in either case, productivity in Sector A increases, a strong empirical observation in many living wage studies. See Chapman and Thompson (2006).