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The Minimum Wage in the Dominant Firm Model

Andrey Shilov
Boris Tourovsky

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Andrey Shilov (IAB)
Boris Tourovsky (Department of Mathematics, LMU University, Munich)

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Abstract

This paper examines the impact of minimum wage in a dominant firm model. It is shown that in a labor-intensive market, the introduction of a binding minimum wage creates an entry barrier in the short run and increases unemployment in the long run.

Zusammenfassung

In diesem Aufsatz gehen wir der Frage nach, wie sich die Einführung eines Mindestlohns in einem „Dominante-Firma-Modell“ auswirken wird. Wir haben gezeigt, dass in einer arbeitsintensiven Industrie, die von einem Großunternehmen dominiert wird, die Einführung eines Mindestlohns kurzfristig zu negativen Folgen für den Markteintritt neuer Unternehmen und langfristig zu höherer Arbeitslosigkeit in der Branche führen kann.

JEL classification: C23; J31; J38; D43

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1 Introduction

The minimum wage is a highly controversial topic in economic research. According to neo-classical theory, the introduction of a minimum wage either causes unemployment to rise or has no effect. On the other hand, many researchers argue that the labor market is not a perfect market. One important variation is that employers have some monopsony power over employees (Manning 1995, 2003; Boal and Ransom 1997; Stigler 1946; Card 1992). Another strand of research on this problem comes from efficiency wage theory, which introduces the idea of substituting "bad" jobs for "good" jobs (Shapiro and Stiglitz 1984; Rebitzer and Taylor 1995; Acemoglu 2001; Cahuc et al. 2001).

In present-day minimum wage theory, monopsony is assumed to describe the labor market but not the goods market. In this paper, we discuss the introduction of a minimum wage to a goods or service market with a dominant firm and a competitive fringe. Our goal is to show that the outcome of this policy decision differs significantly from results obtained under the full monopsony or efficient wage assumptions.

We employ the standard dominant firm model described by Scherer and Ross (1990) and Cherry (2000), using the Cobb-Douglas Production Function (Cobb and Douglas, 1928). Section 2 presents this model, and Section 3 discusses our results. Finally, the Appendix provides a simple numerical example of minimum wage introduction in the dominant firm model. Before continuing, however, we shall conduct a brief literature review.

1.1 Earlier studies of minimum wages

Current discussions on the introduction of minimum wages are mainly based on two ideas: labor market monopsony (Manning 1995, 2003; Boal and Ransom 1997; Stigler 1946; Card 1992) and the efficiency wage model (Acemoglu 2001; Rebitzer and Taylor 1995; Shapiro and Stiglitz 1984; Cahuc et al. 2001). In both models the goods market is assumed to be competitive. The monopsony model assumes that companies have some market power over their employees, so the introduction of a minimum wage will improve both welfare and employment (Manning 1995, 2003; Boal and Ransom 1997; Stigler 1946; Card 1992). The efficiency wage assumption states that a minimum wage operates in the same way as the no-shirking condition of the Shapiro-Stiglitz model (Rebitzer and Taylor 1995; Shapiro and Stiglitz 1984; Cahuc et al. 2001). In this case the minimum wage has a positive effect on employee welfare and may also be positive for employment in the long run. The reason is that introducing a minimum wage causes the companies to gradually shift from "bad" jobs, which become inefficient and expensive under a minimum wage restriction, to "good" jobs which are efficient and profitable (Acemoglu 2001).

In this essay, we would like to describe the introduction of minimum wages in a third context: the dominant firm model. In two previous studies of dominant firm behavior (Richards 1983; Williamson 1968), wage increases were modeled as an endoge-

nous strategy of the dominant firm. The result was a spill-over of wages from the dominant firm to the competitive fringe, increasing the costs of competitors and driving them out of the market. In our case this decision is assumed to be exogenous, for example when state law decrees a binding minimum wage.

2 Model description and assumptions

We discuss the impact of minimum wages in a service market composed of one large firm and a competitive fringe of newly emerging companies. One example of such a market is the postal service in Germany, which was once a state monopoly but is now evolving towards a competitive market. Our model is based on the dominant firm model (Scherer and Ross 1990; Cherry 2000) and a Cobb-Douglas production function (Cobb and Douglas 1928). We will show that a minimum wage in this model impacts the development of competition in the short run, and also make some suggestions regarding its effect on unemployment in the long run.

In order to simplify our theoretical model, we make several assumptions. First, we assume that the dominant firm has a labor-intensive production function (for example, a postal delivery service). In this we differ from the “good” versus “bad” jobs theory, which assumes capital-intensive production (Acemoglu 2001). We do not need to distinguish between skilled and unskilled labor as efficiency wage models do (Cahuc et al. 2001), because we assume that the efficiency gains from skilled labor are not large service firms The dominant firm and the competitive fringe are assigned different Cobb-Douglas production functions in order to model the dominant firm’s cost advantage (i.e., it still reaps benefits from the historical monopoly). In the case of a mail delivery company, this advantage could be derived from a well-established network, advanced logistics, and/or superior knowledge accumulated over the years.

The production functions are as follows:

$Y = AN^{0.5}$, $A>1$ for the dominant firm, and

$Y = N^{0.5}$ for the competitive fringe.

The important variables are defined below.

N - Employment

A - Cost advantage of the dominant company

K - Capital. This constant is set to one, since we are dealing with service company

p – Price

w – Wage

$Q = a – bp$ - Total market demand (a and b are constants)

$\pi = pY-wN$ - Profit

wN – Total employment cost

Note that employment is the only cost for service companies in our model

2.1 Model solution

For the competitive fringe, the profit is given by

$$\pi = pY - wN = pY - wY^2 . \quad (1)$$

As the price *p* is set by the dominant firm, the competitive fringe can consider this variable fixed. The profit maximization conditions are as follows:

$$p = 2wY \quad (2)$$

$$Y = p/2w \quad (3)$$

For the dominant firm the production is

$$Y_{dom} = Q - Y = a - bp - p/2w, \quad (4)$$

so they set a price of

$$p = (a - Y_{dom})2w/(2wb + 1). \quad (5)$$

Its profit function is then

$$\pi_{dom} = pY_{dom} - wY^2/A^2 = Y_{dom}(a - Y_{dom})2w/(2wb + 1) - wY^2/A^2 \quad (6)$$

The corresponding maximization conditions for the dominant firm are

$$aw/(2wb + 1) - Y_{dom}(2w/(2wb + 1) + w/A^2) = 0 \quad (7)$$

$$Y_{dom}^* = aA^2/(2A^2 + 2wb + 1) \quad (8)$$

and the price set by the dominant firm is

$$p^* = \frac{2\left(a - \frac{aA^2}{2A^2 + 2wb + 1}\right)w}{2wb + 1}. \quad (9)$$

The total market demand at price p^* is

$$Q^* = a - \frac{2b\left(a - \frac{aA^2}{2A^2 + 2wb + 1}\right)w}{2wb + 1}. \quad (10)$$

After simplifying, the market share of the dominant firm is

$$Sh_{dom} = \frac{(2wb + 1)A^2}{2A^2wb + 2A^2 + 2wb + 1}. \quad (11)$$

If we differentiate the market share with respect to *w*, we obtain

$$\frac{dSh_{dom}}{dw} = \frac{2A^4b}{(2A^2wb + 2A^2 + 2wb + 1)^2}. \quad (12)$$

This term is significantly positive, meaning that any wage increase (for example, the introduction of a minimum wage above the current market wage) increases the market share of the dominant company and decreases the market share of the competitive fringe. As the minimum wage increases, the market share of the dominant firm approaches an upper limit that depends on its cost advantage factor:

$$\lim_{w\to\infty} Sh_{dom} = \frac{A^2}{A^2+1} \qquad (13)$$

Thus, under the assumption of cost advantage the market share of the dominant firm will increase. In the short run the dominant firm's profits will decrease, but the profits of competitive fringe will decrease even more due to their cost disadvantage (Rebitzer and Taylor 1995). In the long run the number of small firms in the market will decrease (Rebitzer and Taylor 1995), and the share of the competitive fringe will continue to decline. The minimum wage also establishes an entry barrier for new companies in the market (Rogerson 1984; Williamson 1968). Thus, we can expect an increase in unemployment in the industry due to the shift of production to the dominant firm with a cost advantage. The "worst" case will be the re-monopolization of the market.

Apparently, a binding minimum wage reinforces the position of the dominant firm in the long run. In the short run it will tend to increase unemployment in the industry. So the policy decision to introduce a binding minimum wage in a market with a dominant firm could be rather harmful.

3 Conclusion

This analysis has tried to establish a new point of view on minimum wages. Rather than assuming a perfect labor market or some degree of monopsony, we consider a market with one dominant firm. Our goal was to show that a minimum wage restriction increases the difficulty of establishing a competitive market. Empirical research using data from various labor and goods markets is still needed to support this theory. Some interesting and typical markets with this structure are the European postal delivery markets.

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Appendix 1 (Numerical Example):

To understand how the introduction of a minimum wage affects a dominant firm market, it is helpful to look at the following numerical example.

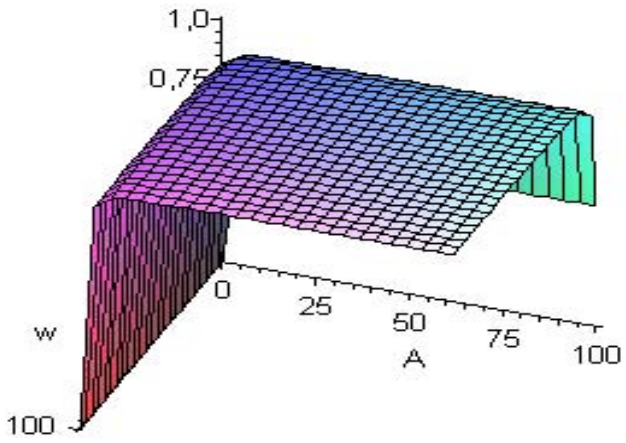
We assume a cost advantage factor of A = 2 for the dominant firm, while the market price sensitivity *b* is set to unity. The market share equation then becomes

$$Sh_{dom} = \frac{8w + 4}{10w + 9}. \qquad (1)$$

When the minimum wage rises above the market clearing wage, the dominant firm's market share will increase. If the wage increase is due to the introduction of a minimum wage, the value of the market share increment is also defined by the exogenously set level of minimum wages. If this level is sufficiently high, the dominant firm can take up to 80% of the entire market.

If the cost advantage factor is higher, the increase in the dominant firm's share in response to a wage increase will be more dramatic. High cost advantage combined with a high level of minimal wages allow the dominant firm to virtually monopolize the market. Graph 1 depicts the market share function with *A* (cost advantage factor) and *w* (wage level) as the independent variables.

Figure 1



As seen in Figure 1, under these theoretical assumptions a new minimum wage could make it impossible to establish a competitive market. In the long run, a new monopoly could form.

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of the Federal Employment Agency
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For further inquiries contact the author:

Andrey Shilov
Phone +49.911.179 8270
E-mail andrey.shilov@iab.de