

Volume 117

Issue 3

2012

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Reprinted from

ECONOMICS LETTERS

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ARTICLE INFO

Article history:

Received 16 January 2012

Received in revised form

29 May 2012

Accepted 1 June 2012

Available online 21 June 2012

JEL classification:

D21

I38

J21

J61

K31

L51

Keywords:

Employer sanctions

Illegal migrant workers

Natives' welfare

The formation of public policy

ABSTRACT

In response to the imposition of steep enough sanctions for employing illegal migrants, the firm reassigns managers from supervision of production to verification of the legality of its workforce. This impedes production efficiency, reduces wages, and hurts the native workers.

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1. Introduction

In the US, employer sanctions were introduced in 1986 as part of the Immigration Reform and Control Act (IRCA), prohibiting employers to hire illegal aliens. Two decades later (in 2007), the US government mandated all federal agencies to use E-verify, an internet-based system that compares information from an employee's Form I-9 with governmental data in order to check employment eligibility.¹ In 2009, the mandate to use E-verify was extended to all federal contractors. By 2011, individual States such as Arizona, Utah, Georgia, Alabama, Mississippi, and South Carolina enacted E-verify mandates for all employers. In June 2011, a bill to

mandate all employers in the US to use E-verify was introduced in the US House of Representatives. The new immigration laws create stricter requirements for businesses hiring workers, and harsher punishments for anyone who employs an illegal immigrant. It is noteworthy that the US government has been switching to an enforcement policy based less on raids targeting workers, and more on I-9 audits of employers, which is very costly to the firm. It is also worth noting that more than 5% of the US workforce is unauthorized, and in some industries (agriculture, leisure and hospitality, and other services) this share is much larger. Needless to add, the new regulations are especially costly in industries with short-term contracts, with high turnover, and with seasonal employment of short duration. On the other side of Atlantic, the European Union legislature too is considering employer sanctions. In a Directive from June 2009, the European Parliament and the Council of the European Union admit that “*a key pull factor for illegal immigration into the EU is the possibility of obtaining work in the EU without the required legal status. Action against illegal immigration and illegal stay should therefore include measures to counter that pull factor.*” A proclaimed remedy to the said factor is “*general prohibition on the employment of third-country nationals who do not have the right to be resident in the EU, accompanied by*

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¹ Every employer in the US has to fill in Form I-9 for every employee. The Form consists of information and supporting documents provided by the employee. Although employers are required to collect information, filling in the I-9 Form is distinct from verifying the validity of the information. E-verify provides employers with a tool that helps them refrain from hiring illegal workers.

sanctions against employers who infringe that prohibition” (Directive 2009/52/EC of the European Parliament and of the Council of 18 June, 2009).

Studies of the impact of employer sanctions on the welfare of native workers do not yield an unequivocal verdict. For example, in the general equilibrium model of Hill and Pearce (1990), employer sanctions can make employers more reluctant to employ workers at all; the fear of employing illegal migrants can decrease the wages and/or employment of natives or of legal migrants when the risk that an illegal will “slip through” the recruitment procedure is taken into account. Katz and Stark (1985) derived the same result albeit in a partial equilibrium setting. Empirical work by Cobb-Clark et al. (1995) reveals that the wages of low-skilled natives fell after the US government introduced sanctions for employing non-legal migrants in 1986, when IRCA was enacted. Fry et al. (1995) divide the sanctions imposed by IRCA between “paperwork fines” (fines for not complying with the requirements to document the legality of each employed worker) and “hiring fines” (fines for knowingly employing illegals). They find that “paperwork fines” lower average metropolitan wages because the bureaucratic burden constitutes an added cost of hiring. Additionally, imposition of the sanctions was reported to result in wage- and employment-discrimination of legal workers from ethnic groups perceived by employers to be “at risk” of being “contaminated” by illegal migrants (see, for example, Lowell et al. (1995), and Bansak (2005)).

In ongoing research we inquire whether employer sanctions can be detrimental to the welfare of the native workers who are the intended beneficiaries of the policy. We address this problem by analyzing the response of employers to the introduction of such sanctions. Here, we report our first results, obtained when conducting the analysis in conditions of full employment. We find that firms consider it optimal to apply measures aimed at verifying the legal status of their workers if the sanction for employing illegal migrants is steep enough. We show that the cost of applying the measures (in terms of falling production efficiency) lowers the returns to labor and, consequently, also the wage paid to workers (natives and illegal migrants alike). In the next section, we conduct an exploratory analysis for the full employment configuration in the host country labor market, and we unearth the mechanism through which employer sanctions trigger a “defensive” response by firms such that the welfare of the native workers suffers. In Section 3 we conclude.

2. A benchmark case – full employment in the host economy

Consider a “host” country, H , with a workforce that consists of native workers (including possibly legal migrants), and illegal migrants. Each worker is endowed with one unit of efficiency labor (skill-wise, the workforce is homogeneous). There are n identical firms, using each a constant-returns-to-scale Cobb-Douglas production technology to produce a single consumption good, the price of which is normalized at one. The firms employ two production inputs: labor, and management.² Management input is measured in units of time devoted to supervising the production process. There is an upper limit to this time which, to begin with, is met. Thus, if another task requires management’s attention, that will have to come at the expense of supervision time. The output of a single firm employing L_i , $i = 1, \dots, n$, workers (efficiency units of labor) and M_i units of management time to supervise production is

$$Y_i(L_i, M_i) = L_i^\alpha M_i^{1-\alpha},$$

where $\alpha \in (0, 1)$ is the output elasticity of labor.

² As the inflow of illegal workers is unlikely to change the stock of capital in country H , we omit it from the production function, treating it as a constant normalized to one.

From the properties of the constant-returns-to-scale Cobb-Douglas production function, the aggregate demand of production inputs and the output of n firms in a competitive economy are the same as those of a single firm employing all the workers, using the entire available management input, and yielding the entire output. Therefore, the behavior of producers in H can be analyzed using this “representative” firm, and production can be described as

$$Y(L, M) = L^\alpha M^{1-\alpha},$$

where $L = \sum_{i=1}^n L_i$ and $M = \sum_{i=1}^n M_i$. We assume that without (costly) verification of the legal status of workers, a firm has no way of recognizing whether a worker it employs is legal or illegal.

Let the government of H impose sanctions on the employment of illegal workers. The rationale of applying these measures is to protect the native workers from being hurt by the inflow of illegal workers, either in terms of a decrease in their wages as a result of the increased supply of labor, or in terms of an increase in unemployment. Let a parameter $T > 0$ measure the severity of the penalty imposed on a firm for each illegal worker found on its premises.³

In the setting studied in this paper we assume that the entire labor force, $\bar{L} = \bar{L}_N + \bar{L}_M$ where \bar{L}_N and \bar{L}_M are, respectively, the numbers of native workers and illegal migrants, is employed.⁴ Then, if the firm does not apply any measure to verify the legal status of the workers that it hires, the fines paid for all the employed illegal workers will amount to $\bar{L}_M T$. An optimizing firm will, however, try to avoid being burdened by this penalty. We assume that the firm can reallocate some of its management input from supervising production to verification of workers’ legal status. The fraction of management time devoted to this task is measured by the parameter $v \in [0, 1]$. To concentrate on essentials, we assume that the number of illegal migrants employed by the firm then falls to $(1 - v)\bar{L}_M$, namely, that there is a one-to-one relationship between the fraction of management time assigned to verification of the workers’ legal status and the efficiency of this verification. This implies that $v\bar{L}_M$ of the firm’s illegal employees are “filtered” out. Correspondingly, verification results in fines of only $(1 - v)\bar{L}_M T$.

We analyze the optimal behavior of the firm. The firm has to decide how to divide its management time optimally between the two tasks. The firm’s output when $(1 - v)M$ management time is devoted to supervising production is

$$Y[L(v), M, v] = [L(v)]^\alpha [(1 - v)M]^{1-\alpha},$$

where $L(v) = \bar{L}_N + (1 - v)\bar{L}_M$ is the input of labor after the “filtering” out of $v\bar{L}_M$ illegal migrants. The function of the profits of the firm is

$$\begin{aligned} \pi &= Y[L(v), M, v] - w(v)L(v) - mM - (1 - v)\bar{L}_M T \\ &= [L(v)]^\alpha [(1 - v)M]^{1-\alpha} \\ &\quad - w(v)L(v) - mM - (1 - v)\bar{L}_M T, \end{aligned} \quad (1)$$

where $w(v)$ is the wage paid to a worker, and m is the wage payment to a unit of management time. To further concentrate on essentials, we assume that the wage payment to a unit of management is given exogenously (for example, as a result of collective bargaining), whereas the wage payment to a worker is

³ To be closer to the real-world implementation of an immigration policy based on employer sanctions, we can interpret T as the penalty times the (perceived by employer) probability of being inspected by the immigration agency. However, to concentrate on essentials, we measure the severity of the policy using only one parameter.

⁴ We assume that the number of illegal workers or an approximate estimate of that number is public knowledge.

determined according to the marginal product of labor.^{5,6} This usage is

$$w(v) = \frac{dY[L(v), M, v]}{dL(v)} = \alpha [L(v)]^{\alpha-1} [(1-v)M]^{1-\alpha} \\ = \alpha [\bar{L}_N + (1-v)\bar{L}_M]^{\alpha-1} [(1-v)M]^{1-\alpha}. \quad (2)$$

From (1) and (2) we get that the firm's optimization problem is

$$\max_{v \in [0,1]} \pi = \max_{v \in [0,1]} \{Y[L(v), M, v] \\ - w(v)L(v) - mM - (1-v)\bar{L}_M T\} \\ = \max_{v \in [0,1]} \{(1-\alpha) [\bar{L}_N + (1-v)\bar{L}_M]^\alpha [(1-v)M]^{1-\alpha} \\ - mM - (1-v)\bar{L}_M T\}. \quad (3)$$

From (3) we have that

$$\frac{d\pi}{dv} = \bar{L}_M T - (1-\alpha)M [(1-\alpha)\bar{L}_N + (1-v)\bar{L}_M] \\ \times [\bar{L}_N + (1-v)\bar{L}_M]^{\alpha-1} [(1-v)M]^{-\alpha}, \quad (4)$$

and from (4) that

$$\frac{d^2\pi}{dv^2} = -\frac{(1-\alpha)^2 \alpha \bar{L}_N^2 M [\bar{L}_N + (1-v)\bar{L}_M]^{\alpha-2} [(1-v)M]^{-\alpha}}{1-v} < 0$$

for $v \in [0, 1)$. We denote the (negative of the) second term in (4) as

$$F(v) = (1-\alpha)M [(1-\alpha)\bar{L}_N + (1-v)\bar{L}_M] \\ \times [\bar{L}_N + (1-v)\bar{L}_M]^{\alpha-1} [(1-v)M]^{-\alpha}.$$

We can interpret $F(v)$ as the marginal loss in productivity experienced by the firm as a result of shifting v fraction of management time from supervising production to verification activities. The amount $\bar{L}_M T$ in (4) is the marginal gain from avoiding the penalty. We note that

$$F(0) = (1-\alpha)M [(1-\alpha)\bar{L}_N + \bar{L}_M] (\bar{L}_N + \bar{L}_M)^{\alpha-1} M^{-\alpha} \\ \equiv F_0 > 0,$$

that

$$\lim_{v \rightarrow 1} F(v) = \infty, \quad (5)$$

and that

$$F'(v) = -\frac{d^2\pi}{dv^2} > 0 \quad \text{for } v \in [0, 1). \quad (6)$$

We can see that for $T < \frac{F_0}{\bar{L}_M}$, the equation $\frac{d\pi}{dv} = 0$ has no solution, namely, the marginal gain from avoiding the penalty is lower than the marginal loss in productivity from reallocating the management input, and therefore we postulate a border solution $v = 0$ for $T \in (0, \frac{F_0}{\bar{L}_M})$. In such a case, the sanction is neutral for the firm's behavior, that is, the firm finds it optimal to pay a small fine and keep all its managers supervising production.

For $T \geq \frac{F_0}{\bar{L}_M}$, however, the equation $\frac{d\pi}{dv} = 0$ has exactly one solution (c.f. (5) and (6)). We denote this solution by $v(T)$. We note

that $v(T)$ is a function such that

$$v'(T) > 0 \quad (7)$$

for $T > \frac{F_0}{\bar{L}_M}$, $v(\frac{F_0}{\bar{L}_M}) = 0$, and $\lim_{T \rightarrow \infty} v(T) = 1$ (c.f. (5), (6), and the continuity of $F(v)$ for $v \in [0, 1)$). In this case then, the firm finds it optimal to reassign some of its management from supervising production to verification activities, which bears negatively on the firm's production efficiency.

In sum, the optimal fraction of management time devoted to verification as a function of the penalty T , $v^*(T)$, is

$$v^*(T) = \begin{cases} 0 & \text{for } T \in (0, \frac{F_0}{\bar{L}_M}), \\ v(T) & \text{for } T \geq \frac{F_0}{\bar{L}_M}. \end{cases} \quad (8)$$

The aggregate welfare of the native workers, W , can be measured by their wage earnings,

$$W[v^*(T)] = \bar{L}_N w[v^*(T)]. \quad (9)$$

From (2) we know (writing for brevity $w(v)$ as w) that

$$\frac{dw}{dv} = -(1-\alpha)\alpha \bar{L}_N M [\bar{L}_N + (1-v)\bar{L}_M]^{\alpha-2} [(1-v)M]^{-\alpha} \\ < 0 \quad (10)$$

and making use of (7), (8) and (10), we also get (writing for brevity $v^*(T)$ as v^*) that

$$\frac{dW}{dT} = \frac{dw}{dv} \frac{dv^*}{dT} = \begin{cases} 0 & \text{for } T \in (0, \frac{F_0}{\bar{L}_M}), \\ \frac{dw}{dv} v'(T) < 0 & \text{for } T > \frac{F_0}{\bar{L}_M}. \end{cases} \quad (11)$$

Joining (9) and (11) yields

$$\frac{dW}{dT} = \bar{L}_N \frac{dw}{dT} = \begin{cases} 0 & \text{for } T \in (0, \frac{F_0}{\bar{L}_M}), \\ \bar{L}_N \frac{dw}{dv} v'(T) < 0 & \text{for } T > \frac{F_0}{\bar{L}_M}. \end{cases}$$

We therefore conclude that in conditions of full employment, employer sanctions in the form of a penalty to the firm for engaging illegal workers are either neutral to the welfare of the native workers (when the penalty is too low to trigger a reaction by the firm), or they decrease the welfare of the native workers (as when the firm finds it optimal to sacrifice some production efficiency in order to reduce the fines that it would be required to pay). Interestingly, although the verification of the workers' legal status reduces the supply of labor (from $\bar{L}_N + \bar{L}_M$ to $\bar{L}_N + [1 - v^*(T)]\bar{L}_M$), and, in general, a reduction in the supply of labor could have been expected to have a positive effect on wages, the loss in production efficiency due to the reallocation of management time is too high to allow the positive labor supply effect to dominate.

3. Conclusions

We presented a model of the response of an optimizing firm to the introduction of employer sanctions of varying degrees of severity under full employment in the host country. We found that when the sanction is set at a high enough level, a defense mechanism is triggered, causing the firm to sacrifice production efficiency and shift managers' time from supervising production to verifying the legality of employees. This response leads to a reduction in the returns to labor (wages), and the sanctions fail to benefit the native workers in this setting. We thus identified a

⁵ Even when the firm undertakes verification measures, it cannot wage-discriminate between native and migrant workers; the $(1-v)\bar{L}_M$ illegal migrants who "slip through" the verification cordon are indistinguishable from the natives.

⁶ The firm could perceive the penalty for employing illegals as an additional cost of labor: it could lower wages so as to factor the expected penalty into the cost of labor. Due to the complexity of the calculations that follow, in the evaluation of the marginal product of labor we disregard this effect. However, because this effect leads to a reduction in wages, it only exacerbates the deleterious impact of sanctions on the welfare of the natives.

state of the host country's economy in which employer sanctions have consequences that fly in the face of the very aim of their introduction. The next steps in the analysis will be to investigate the effects of sanctions in other possible labor market conditions in the host economy such as voluntary unemployment, and involuntary unemployment in conjunction with minimal wage setting, and to do so under alternative assumptions with regard to the efficiency of the verification technology. We are taking these steps in our ongoing research.

Acknowledgment

We are indebted to an anonymous referee for constructive advice and kind words.

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