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THE BROTHER-IN-LAW EFFECT*

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When a firm is forced to pay abnormally high wages, hiring transfers rents. This effectively endows the employer with the ability to grant favors, and he may wish to do so even at some cost to efficient production. We refer to this as the *brother-in-law effect*. This article analyzes its consequences. When the brother-in-law effect is due to unionization, decisions regarding both the number and type of workers employed could be inefficient; overemployment could obtain even relative to the workforce that would be employed without unionization. We also identify cases in which nepotism improves efficiency.

1. INTRODUCTION

The assumption that for-profit firms, either public or private, minimize costs provides a reasonable benchmark in a myriad of applications. However, it sometimes becomes unpalatable. Does such an assumption make sense, for instance, when we see a firm simultaneously laying off a substantial proportion of its workers yet increasing output? This occurred in Chile when Codelco—a public copper company—faced competition from the privately owned copper mine La Escondida in the late 1980s.[2] There is also plenty of evidence of x-inefficiency after privatizations (see, e.g., Shleifer and Vishny, 1994; Galiani et al., 2005). Inefficiency nevertheless is not exclusive to public firms: Perhaps the best-documented case of private firm inefficiencies is that of iron ore production in the U.S. Midwest found in Galdon-Sanchez and Schmitz (2002).

In these cases, firms appear to employ less than competent workers and employ too many of them. This is puzzling for a private firm, as it implies that the hiring decisions are not profit maximizing. But it is also puzzling in the public sector, for it implies that more services and transfers could be provided with the same budget or that taxes could be cut without affecting the current level of services and transfers, whereby the ruling party could attract more support.

The goal of this article is to examine whether the presence of less than competent workers and overemployment can be explained by nepotism. Nepotism should be understood in the widest possible sense, that is, managers or public officials favoring family members, political party comrades, friends, or any person from whose gratitude they could benefit. We will use the term "brothers-in-law" in figurative reference to the class of favored individuals.

Nepotism may arise from many sources. Perhaps the first to come to mind are agency problems: The person in charge of hiring does not bear the cost of having incompetent workers while still benefits, say, from his political party's gratitude. Presumably, however, there are other ways in which the agent can appropriate his informational rents (e.g., they could simply agree on a higher wage), and it is by no means obvious why he would choose this one. The idea put forward in this article is that when for some extraneous reason the firm is forced to pay wages above the marginal worker's reservation wage (we refer to this as a wage gap), giving the agent the

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[2] See, for example, Tilton (2002).

ability to hire brothers-in-law could in fact be the cheapest way for the principal to pay for the informational rent.

If there is such a gap and the agent hires his "brother-in-law," then the brother-in-law receives a rent from employment, while the cost to the firm is the difference between the brother-in-law's and normal workers' productivity. If this ability to hire brothers-in-law is part of an optimal delegation contract, then the cost to the firm will be transferred to the agent in terms of expected wage: The agent's compensation would consist of his wage and the ability to hire a brother-in-law. If the brother-in-law is close in productivity to the marginal worker, the productivity loss is much smaller than the surplus received by the brother-in-law. If the agent finds it in his interest to make this favor to his brother-in-law—because of the expectation of future favors or simply because he likes his sister—then he would prefer to hire him even if his expected wage is reduced by the productivity differential. If this is the case, meritocracy fails and the firm hires the "wrong" workers in that sense, with the end result of output not being produced at the lowest cost, that is, x-inefficiency.

It can readily be seen that this argument holds even in the absence of agency problems. If the owner of the firm is forced to pay a wage gap, hiring his own brothers-in-law means transferring them money on a better than 1–1 basis and costs him just the productivity difference. Hence, in order to understand the phenomenon as straightforwardly as possible, we will focus on this case. By doing so we do not mean to say that the agency problem case is empirically unimportant, but merely that the delegation problem per se is not necessary to see most of the issues involved.

It follows that the key to nepotism lies not in whether the product market is monopolized, but rather circumstances in the labor market—which may or may not be correlated with product market monopoly. Specifically, we show that whenever there is a gap between the wage paid to the marginal worker and his reservation wage the incentives for nepotism are in place. The existence of a wage gap or rent to the marginal worker makes awarding employment a cheap method to the employer of making transfer payments. Consequently, if there are labor market frictions—either due to unionization or moral hazard, nepotism is possible.

In the union case, the reduction in costs as perceived by the employer due to the existence of brothers-in-law—on account of their nonpecuniary benefit outweighing their inefficiency as workers—can lead him to employ too many workers. This employment effect can be so strong that there could be even overemployment relative to the workforce that would have been employed without unionization.

We explore also the consequences for welfare. We find that banning nepotism may lead to a welfare decrease. Since brothers-in-law are cheaper per unit of output for the firm to employ, the firm will produce more output with a union of brothers-in-law than a union of normal workers. Hence, banning nepotism will reduce output, reducing welfare. If brothers-in-law are almost as productive as normal workers, this output effect will more than offset the effect of replacing inefficient workers with efficient ones, and welfare will decline. If brothers-in-law are inefficient workers—so that the firm is near indifference between employing them and normal workers, then the output effect is small, and welfare is improved by banning nepotism. We show that similar considerations apply to the moral hazard case, where banning nepotism may lead to contracts that reduce effort and reduce welfare.

This article studies nepotism in the broad sense. This phenomenon has been previously studied by Becker (1959), Goldberg (1982), and Prendergast and Topel (1996). Becker studies the behavior of unions; he finds that when the rents they create are not appropriated by, say, entrance fees, nepotism and discrimination are possible outcomes. Although his paper is about the effect of rents on union behavior, ours is on firm behavior. Goldberg examines how racial wage differentials can survive in competitive equilibrium in the long run and short run. By way of contrast we focus on market frictions, and not on perfect competition; Prendergast and Topel examine how favoritism has an impact on the flow of information within an organization and can lead to bureaucratic structures.

2. THE CERTAINTY MODEL WITH UNIONS

2.1. *The Model.* There is a single firm that employs two types of worker: normal workers (L_1) and brothers-in-law (L_2). We assume that both sets of would-be workers are large enough so that it is always possible to hire more workers of each kind[3] and all workers have the same reservation wage w.

The brother-in-law is distinguished by being a person whose income figures positively into his employer's utility. This includes such things as managers or public officials caring about family members, political party comrades, friends, or any person or institution whom they value, or from whose gratitude they could benefit. In particular, we assume that each dollar that a brother-in-law gets increases the utility of the employer by $\beta \in (0, 1)$. Note that we assume $\beta < 1$, meaning that the employer will never transfer money on a 1–1 basis to the brother-in-law.[4] Here the employer is willing to give up a dollar provided the brother-in-law receives at least $1/\beta$ dollars. We note also that this model of a brother-in-law assumes that the benefit to the employer comes at no cost to the brother-in-law. In many cases—an actual brother-in-law, the employment of individuals who are already political supporters—this is the right assumption. We do not consider the case of "kickbacks" in which the benefit to the employer comes at some cost to the brother-in-law. We also suppose that the only consumption externality is between the employer and the brother-in-law.

The brother-in-law may be a less efficient worker than a normal worker: We normalize the labor supply of a normal worker to 1 and assume that the brother-in-law can provide only $\eta \leq 1$ units of labor. The production function for output q is

$$q = f(L_1 + \eta L_2),$$

where f is strictly increasing.

Let p be the output price and W the wage paid. In general, price is a nonincreasing function of output $p = p(q)$. The wage $W \geq w$ may be greater than the reservation value of workers—for example, due to a union contract or due the presence of informational rents in the face of private information. We initially take W as exogenous. Hiring is left to the firm.[5] The objective function for the firm is then

$$\Pi = \max_{\{L_1, L_2, q\}} (p(q)q - W(L_1 + L_2)) + \beta(W - w)L_2,$$

which can be written as follows:

$$\Pi = \max_{\{L_1, L_2, q\}} p(q)q - WL_1 - (W(1 - \beta) + \beta w)L_2.$$

Define $W^* = W(1 - \beta) + \beta w$ to be the "perceived" wage paid to brothers-in-law, and $\bar{L}_2 = \eta L_2$ the productivity-adjusted equivalent labor (in comparison to normal workers) of the brothers in law. Thus, the objective function can be thought of as a regular profit function

$$\Pi = \max_{\{L_1, L_2\}} p(f(L_1 + \bar{L}_2)) f(L_1 + \bar{L}_2) - WL_1 - \left(\frac{W^*}{\eta}\right) \bar{L}_2,$$

where $\bar{L}_2$ and L_1 are perfect substitutes.

[3] This assumption is better suited to the case where brothers-in-law are political party comrades.

[4] There is a large literature on altruism—discussed, for example, in Andreoni and Miller (2002)—suggesting that while 1–1 transfers are not common, many people are willing to make transfers on a better than 1–1 basis, that is, give up a dollar so that the recipient will receive more than a dollar.

[5] Becker (1959) analyzes the case in which hiring is left to the union, in which case nepotism may arise within the union.

We assume that the revenue function $p(f(L))f(L)$ is concave in the aggregate labor employed L, so that this problem has a unique solution characterized by first-order conditions. We further assume that the optimal output is positive.

2.2. *Employment and Overemployment.* Our first goal is to study when brothers-in-law will be employed, and if so, how many are employed. Our ultimate goal is to study the phenomenon of *overemployment*, where more workers are employed when there is a wage gap than when there is not. Without the brother-in-law effect, a wage gap necessarily reduces employment. With brothers-in-law this is no longer the case.

We start by determining when brothers-in-law will be employed.[6]

THEOREM 1. *Set* $\eta^* = 1 - \beta\frac{W-w}{W}$.
If $\eta > \eta^*$ *the firm prefers to hire brothers-in-law; that is, the optimum is* $L_1 = 0$, $L_2 > 0$, *and conversely if* $\eta < \eta^*$ *the firm prefers not to hire brothers-in-law; that is, the optimum is* $L_1 > 0$, $L_2 = 0$.

REMARK. The importance of this theorem is that as soon as the wage gap is positive, $W - w > 0$, then sufficiently productive brothers-in-law will be exclusively employed, despite the fact that they are less productive than normal workers. By way of contrast, in the absence of a gap, brothers-in-law would not be employed. An implication of the theorem is that a necessary condition for brothers-in-law to be employed is $\eta \geq 1 - \beta$.

We next want to consider the impact of the availability of brothers-in-law to the firm. That is, we compare the case where brothers-in-law can be hired to the case where they cannot be—perhaps due to laws against nepotism.

THEOREM 2. *If* $W > w$, *banning nepotism cannot increase output.*

Making available brothers-in-law, then, weakly increases output, and since brothers-in-law are weakly less productive workers, this weakly increases employment. Can it increase employment so much that more workers are actually employed than if there was no wage gap at all? That is, can the combination of a union and nepotism result in more employment than competition?

Suppose that $\eta > \eta^*$, and let L_2^* be the optimal number of brothers-in-law employed. Let L_1^C be the optimal number of normal workers employed when there is no wage gap, that is, $W = w$. By *overemployment* we mean $L_2^* > L_1^C$; that is, when the wage gap is eliminated, for example, because the union is busted, the number of workers employed declines. Note that without the brother-in-law effect, the elimination of a wage gap will necessarily increase employment.

The possibility of overemployment can be shown by considering a simple example with linear demand $p = a - bq$ and constant returns to scale so that suitably normalized, $f(L) = L$.

THEOREM 3. *Suppose demand is linear and there are constant returns to scale. Define*

$$\eta^+ = \frac{a + \sqrt{a^2 - 4(a-w)W^*}}{2(a-w)}$$

$$\eta^- = \frac{a - \sqrt{a^2 - 4(a-w)W^*}}{2(a-w)}$$

Then there is overemployment if $\eta^+ > \eta > \max\{\eta^*, \eta^-\}$.

REMARK. The condition is not vacuous. If the reservation wage $w = 0$ and the firm cares for his brothers-in-law as much as for himself, so that $\eta^+ = 1$, $\eta^- = 0$, $\eta^* = 0$, and if the brothers-in-law are neither completely unproductive so that $\eta > 0$, nor as productive as normal workers so that $\eta < 1$, then certainly $\eta^+ > \eta > \max\{\eta^*, \eta^-\}$. Since the inequality is strict and η^+, η^-, η^* are

[6] All proofs are relegated to Appendix.

continuous functions of the parameters, the inequality must continue to hold for small values of w and values of β smaller than but close to one.

How well does this result generalize to nonlinear demand and nonconstant marginal cost? We identified the case w near zero and β near one as a case in which there will be overemployment. This result generalizes.

THEOREM 4. *For any demand that is not perfectly elastic there exists* $\underline{w} > 0$ *and* $\bar{\beta} < 1$ *such that if* $w < \underline{w}$, $\beta > \bar{\beta}$ *and* $0 < \eta < 1$ *there is overemployment.*

REMARK. In other words, if altruism β is high and the ratio of union to competitive wages W/w is high, then there will be overemployment.

Theorem 4 leaves out perfectly elastic demand, that is, the case in which output markets are perfectly competitive. We do not have a general result in this case.[7]

2.3. *Efficiency.* Finally, we examine the issue of efficiency. In particular, what are the consequences of eliminating unions or passing laws against nepotism?

We first consider the conceptual experiment of eliminating the union, that is, the wage drops to $W = w$. Our Pareto analysis runs as follows. Suppose that $\eta > \eta^*$ so that by Theorem 1 the employer prefers to employ brothers-in-law, and let L_2^* be the number of brothers-in-law employed. Suppose instead that the union is eliminated so that $W = w$ and that a lump sum $(W - w)L_2^*$ is taken from the employer and given to the brothers-in-law who were formerly employed. The regular employees are indifferent, since they get their opportunity wage under either arrangement; the brothers-in-law are indifferent since their lump sum gives them exactly what they received with the union. Profits to the firm under unionization are

$$\Pi_2 = p_2 q_2 - W L_2^* + \beta(W - w)L_2^*,$$

although under competition they are

$$\Pi_1 = p_1 q_1 - w L_1 + \beta(W - w)L_2^*.$$

It can be shown that

$$\Pi_1 - \Pi_2 > 0,$$

that is, the employer is better off simply paying the brother-in-law and dumping the union. This is so because the transfer to the brothers-in-law is the same in both cases, although under competition the firm is paying lower wages and hiring the workers that maximize net revenue, both in number and type.

Notice, however, that even without the brother-in-law effect, abolishing the union would lead to a welfare improvement. So the question arises, is there an additional welfare loss from the brother-in-law effect beyond that from unionization itself? In order to answer this, we compute welfare under unionization when nepotism is not allowed with welfare under unionization where brothers-in-law can be hired. Note that this is only interesting if the firm chooses to hire brothers-in-law, so that we restrict attention to that case.

A pure welfare analysis does not make much sense here. Banning nepotism makes the employer and brothers-in-law worse off but the normal workers better off. However, transfer payments are not neutral, so we should look at a specific welfare criterion. It does not make sense, however, to assign equal weight to everyone. In this model, a dollar taken from the employer and given to a brother-in-law generates $1 + \beta$ dollars of benefits—one dollar to the brother-in-law and β dollars to the employer. So we would conclude that we should simply transfer as much

[7] For example, with a competitive demand $p(q) = p$ and $f(L) = L^\alpha$ there cannot be overemployment, i.e., $L_2^* \leq L_1^C$.

as possible from employer and normal workers to brothers-in-law. In particular, competitive equilibrium is not efficient in this setup. If we want to work with particular welfare weights, as implicit in the usual consumer plus producer surplus shorthand, we should take the weight on the brother-in-law to be $1 - \beta$ so that transfers to the brother-in-law are welfare neutral. Under these weights, the perfectly competitive benchmark is efficient.

Whether banning nepotism is a good or bad idea relative to this welfare criterion turns out to depend on the productivity of the brothers-in-law. There are two effects. First, the effective cost of labor to the employer is smaller with brothers-in-law, so he chooses to increase output if he can hire brothers-in-law. This partially counteracts the output-reducing effect of the union. Second, brothers-in-law are less productive and have the same opportunity cost than normal workers, so the social cost of production is higher when they are employed.

First, suppose that brothers-in-law are just as productive as normal workers, so $\eta = 1$. In this case, the only consequence of allowing nepotism is a welfare neutral transfer from normal workers to brothers-in-law, and an increase in output. This is welfare improving, since with the union output is inefficiently low.

On the other hand, when the productivity of brothers-in-law makes the employer exactly indifferent between hiring them or normal workers, output is the same whether normal workers or brothers-in-law are hired, so there is a welfare neutral transfer and no welfare improvement from increased output. Banning nepotism simply forces the firm to hire the more productive workers instead, increasing welfare.

2.4. *Worker Heterogeneity and the Political Economy of Unions.* We have assumed that all normal workers are identical. This simplifying assumption does not have important economic consequences. In order to see this, suppose that in addition to normal workers, there is a limited supply of "highly productive" workers who are more productive than normal workers. If the productivity gap is large enough, highly productive workers might not get replaced with brothers-in-law even though normal workers do. In other words, the effect of worker heterogeneity is that normal workers are gradually replaced as the union wage increases or productivity gap decreases, instead of being abruptly replaced.

Worker heterogeneity does, however, have political consequences for the union. Consider first the case in which normal workers are homogeneous. Suppose that $\eta \geq 1 - \beta$, so that it is possible for brothers-in-law to be hired. From Theorem 1, if the union wage satisfies

$$W \geq \frac{\beta w}{\eta + \beta - 1},$$

then the normal workers will be replaced with brothers-in-law. Naturally, a union of homogeneous normal workers will not choose to set the wage this high. In other words, the presence of brothers-in-law may cause the union to be less aggressive in its demands. Notice also that brothers-in-law face no such constraint, and the employer may prefer not to have a union of brothers-in-law who will not be so restrained in their wage demands.

With heterogeneous normal workers, the situation changes. Again, consider a limited supply of "highly productive" workers. If they constitute more than half the work force, then they will happily vote the wage high enough that normal workers will be replaced by brothers-in-law, but not so high that they will be replaced themselves. In general, we would not expect a union subject to majority rule to push the wage so high that more than half the workforce would be brothers-in-law. In practice then, we are likely to see the employment of brothers-in-law, but also that their presence has a disciplining effect on union wage demands.

3. COMPETITION AND INFORMATIONAL RENTS

The analysis so far refers to a wage gap created exogenously, for example, by a union. There are other sources of rents as well. We turn now to the case of rents originating in a moral hazard problem.

3.1. *The Model.* We consider the traditional principal agent problem, with moral hazard and limited liability.[8] We assume that both the firm (principal) and worker (agent) are risk neutral. For simplicity, we now assume that a single worker will be employed, that there are two levels of effort $e \in \{e_L, e_H\}$ and two possible levels of output $q \in \{q_0, q_1\}$ and that the probability of output is given by

$$q = \begin{cases} q_1 & \text{with probability } \eta_i \pi(e), \\ q_0 & \text{with probability } 1 - \eta_i \pi(e), \end{cases}$$

where i indexes the type of worker (normal and brother-in-law) and $\eta_i = 1$ for normal workers and $\eta_i = \eta < 1$ for brothers-in-law.

We assume that output price p is independent of whether q_0 or q_1 is produced, and is sufficiently high that the principal will choose to produce output—we focus then on cost minimization.

Denote by π_L, π_H, respectively, the probability of high output for a normal worker with a low and high level of effort. High level of effort implies higher probability of reaching the high level of output, so $\pi_L < \pi_H$. This is why the principal is interested in implementing e_H. However, e_H has an additional cost for the agent of ψ. Recall that the opportunity wage is w. We assume limited liability: The principal cannot pay less than $\theta \leq w$ regardless of the level of output. When the employee has no assets this represents the subsistence wage. If the employee has assets, it represents the difference between the subsistence wage and his assets and may be negative if the employee has enough assets to live on.

The model can be summarized in the form of a maximization problem for the principal who wants to implement high effort from a type i worker using payment t_0, t_1 when output is low and high, respectively. Let $\beta_i = 0$ if the normal worker is chosen and $\beta_i = \beta \in (0, 1)$ if the brother-in-law is chosen. The maximization problem is as follows:

Maximize over t_0, t_1, i

$$\eta_i \pi_H (q_1 - t_1) + (1 - \eta_i \pi_H)(q_0 - t_0) + \beta_i(\eta_i \pi_H t_1 + (1 - \eta_i \pi_H) t_0 - w - \psi)$$

subject to

$$\eta_i \pi_H t_1 + (1 - \eta_i \pi_H) t_0 - \psi \geq \eta_i \pi_L t_1 + (1 - \eta_i \pi_L) t_0 \quad [\text{IC}]$$

$$\eta_i \pi_H t_1 + (1 - \eta_i \pi_H) t_0 - \psi \geq w \quad [\text{P}]$$

$$t_1, t_0 \geq \theta \quad [\text{LL}]$$

The employment of brothers-in-law requires that the cost of effort be high relative to the gap between the reservation wage and the limited liability wage. In particular, if the limited liability constraint does not bind, then the worker earns no rent, and there is no incentive to hire the brother-in-law. Specifically, we have the following result on employing brothers-in-law:

THEOREM 5. *Set*

$$\bar{\psi} = \frac{(w - \theta)(\pi_H - \pi_L)}{\pi_L},$$

$$\bar{\eta} = 1 - \frac{\pi_L \beta \psi}{(\pi_H - \pi_L)(q_1 - q_0)\pi_H} + \frac{\beta(w - \theta)}{\pi_H(q_1 - q_0)}, \quad \textit{and}$$

[8] See, for example, Laffont and Martimont (2001, p. 155).

$$\bar{\bar{\eta}} = \frac{\pi_L}{\pi_H} + \frac{(\pi_H - \beta\pi_L)\psi}{(\pi_H - \pi_L)(q_1 - q_0)\pi_H} - \frac{(w - \theta)(1 - \beta)}{\pi_H(q_1 - q_0)}.$$

(*i*) *If* $\psi \leq \bar{\psi}$ *, brothers-in law are never employed, while*
(*ii*) *If* $\psi > \bar{\psi}$ *and* $\eta \geq \max\{\bar{\eta}, \bar{\bar{\eta}}\}$ *, the firm prefers to hire brothers-in-law instead of normal workers. Moreover, if in addition* $\bar{\eta} < \bar{\bar{\eta}}$ *, the firm induces high effort even though it would not without the presence of brothers-in-law.*

Checking that the bounds are not vacuous, take $\theta = w$ so that the limited liability constraint is quite strong, take $\pi_H = 0.75,\ \pi_L = 0.25,\ \beta = 0.5,\ \psi = 0.1$ and suppose that $q_1 - q_0 = 1$. Then we can compute $\bar{\psi} = 0,\ \bar{\eta} = 29/30,\ \bar{\bar{\eta}} = 17/30$, so provided that brothers-in-law are relatively efficient, that is, $\eta > 29/30$, the employer prefers his brother-in-law. Note that if we make the cost of effort ψ larger, then less efficient brothers-in-law will be employed.

It is interesting to observe that the firm would never want to hire a brother-in-law to have him exert low effort. The key intuition to this result lies at the heart of the brother-in-law effect: without a wage gap (rent), favoring brothers-in-law is too expensive for the entrepreneur. It is the informational rent that makes it possible to prefer brothers-in-law. Hence, we have

THEOREM 6. *If inducing low effort is optimal for the principal, then no brother-in-law is hired.*

One consequence of this result is that to hire brothers-in-law it is necessary that their productivity with high effort is higher than that of normal workers with low effort. Otherwise it would not be optimal to induce brothers-in-law to exert a high effort, and if they exert low effort, Theorem 6 shows that they will not be employed. Note also that brothers-in-law are paid more in the high-output state than normal workers. This is necessary if they are to exert high effort, because the difference in the probability of getting the high pay, between high and low effort, is smaller than the one of normal workers. Their expected wage is, however, the same.

Similar results are obtained when output is not verifiable and the game between employer and employee is repeated. In this case, the underlying moral hazard problem leads to an efficiency wage of the type considered in Shapiro and Stiglitz (1984) in which the employee is paid a premium so that being fired represents a punishment.

3.2. *Informational Rents and Efficiency.* In a principal–agent model, the utility of the principal is always maximized subject to the constraints of the problem. In the usual case—no choice of whether to employ brothers-in-law—in this risk neutral setting, maximizing the principal's utility could induce the agent to exert low effort when high effort is socially optimal.

With the welfare weight under which transfer payments are neutral—one for the principal and normal worker and $1 - \beta$ for the brothers-in-law—the situation changes. Here the employment of brothers-in-law involves a transfer payment—but that is by assumption welfare neutral. In addition, an efficient normal worker is replaced by an inefficient brother-in-law, leading to a reduction in expected output at the same social cost of employing the one worker. However, banning nepotism is not always a good idea. Since it is cheaper to motivate brothers-in-law to induce high effort—again on account of their nonpecuniary benefit—the firm will induce high effort, hiring a brother-in-law in cases that would induce low effort with a normal worker. Hence, banning nepotism will switch the effort, reducing welfare. In this case this effect will always more than offset the effect of replacing an inefficient worker with an efficient one, and welfare will decline. This is because the principal always has the option to hire a normal worker—implementing low effort—and getting all the surplus. If he decides, instead, to hire a brother-in-law—implementing high effort—his utility cannot be lower and the brother-in-law is better off. The fact that the brother-in-law is only hired to provide high effort is interesting as well: It appears that the stereotype of the lazy brother-in-law who does little or no work is not the consequence of moral hazard.

4. CONCLUDING REMARKS

Competition in the labor market prevents nepotism. When there are labor market frictions—either due to unionization or informational rents, we have shown how nepotism can lead to an x-inefficiency resulting in lower output per worker. Strikingly, the inefficiency in per worker productivity that occurs if unionization is combined with nepotism can also be accompanied by an increase in employment over the competitive level.

Note that nepotism can only induce overemployment when the marginal worker is a brother-in-law. If there were few brothers-in-law and all were already employed, the marginal worker would not be a brother-in-law and nepotism would not increase output: It would just be a replacement of efficient workers by inefficient ones. The number of available brothers-in-law has to be large for overemployment to occur, so it naturally applies better to political party comrades than family members or friends. Political parties are typically much larger than regular companies. Nevertheless, it is conceivable that every division manager may well be partly paid through some hiring control, so that the organization is filled with brothers-in-law—just not the owner's or the CEO's, but those of the set of executives with some power to hire.

It is interesting to observe that the phenomenon of nepotism can also arise as part of an optimal delegation contract. Suppose the owner does not have a brother-in-law, but the manager does. Two contracts could be written between them: (1) paying the manager an amount of money slightly over his reservation wage, or (2) compensating him with less money, but giving him the power to hire his own brothers-in-law. The second contract may be preferred, since it may be cheaper for the firm. Hence, nepotism is not necessarily something that the principal would want to fight, provided that the labor market has a previous distortion.

Rent-driven nepotism, what we call the brother-in-law effect, is certainly not restricted to the labor market, but extends to any market or economic activity where there are rents that cannot be appropriated directly, for instance, those created by the government when setting prices at noncompetitive levels or by some other means. Rent control, import quotas, preferential rate loans, and public notaries in civil law countries come to mind.

APPENDIX: PROOFS

PROOF OF THEOREM 1. Since L_1 and $\bar{L}_2$ are perfect substitutes, the firm will prefer to hire brothers-in-law if and only if

$$W > \left(\frac{W^*}{\eta}\right).$$

Replacing and solving for η yields $\eta > \eta^*$. ■

PROOF OF THEOREM 2. If brothers-in-law are preferred but *nepotism is banned*, the "equivalent cost of labor" to the employer would rise from W^*/η to W, decreasing output. In that sense, output is higher when brothers-in-law are available. If W^*/η were higher than W, normal workers would have been preferred in the first place (Theorem 1), and there would have been no nepotism altogether. ■

PROOF OF THEOREM 3. We work out the demand for labor when brothers-in-law are hired:

$$L_2^* = \frac{a\eta - W^*}{2b\eta^2}.$$

By way of contrast, if the labor market is perfectly competitive, $W = w$, so no brothers-in-law are hired, and

$$L_1^C = \frac{a - w}{2b}.$$

Solving for $L_2^*/L_1^C = 1$ yields a quadratic in η with the two positive roots $\eta^+ > \eta^-$. Moreover, if η lies in between the two roots, than it must be that $L_2/L_1 > 1$. This implies that the condition for overemployment is that η is between both roots and large enough that the firm wishes to hire brothers-in-law, that is, $\eta > \eta^*$. ■

PROOF OF THEOREM 4. From Theorem 1 $w = 0$ and $\beta = 1$ imply that $\eta^* = 0$. Since demand is not perfectly elastic, output is determined by the first order condition

$$(p'(q)q + p) f'(L_1 + \eta L_2)\eta = 0.$$

This is true regardless of whether or not brothers-in-law are available: If they are unavailable, $L_1 > 0$, $L_2 = 0$, while if they are available, since $\eta^* = 0$, $L_1 = 0$, $L_2 > 0$. Since the first-order condition holds if and only if q is chosen to maximize revenue $p(q)q$, the same output is produced regardless of the availability of brothers-in-law. Since output is the same in both cases and since $\eta < 1$ brothers-in-law are less efficient workers strictly more brothers-in-law must be employed to attain the target output. The result now follows for $w < \underline{w}$, $\beta > \bar{\beta}$ by continuity. ■

PROOF OF THEOREM 5.

(a) The incentive constraint [IC] sets a lower bound for the difference between the payment in the high level of output against the low one, that is,

$$t_1 - t_0 \geq \frac{\psi}{\eta_i(\pi_H - \pi_L)},$$

whereas the participation constraint [P] sets a lower limit to the average payment

$$\eta_i \pi_H t_1 + (1 - \eta_i \pi_H) t_0 \geq w + \psi.$$

The solution is to choose t_1 so that the incentive constraint exactly binds and choose t_0 as small as possible. It is easy to check that the participation constraint will be binding if

$$\psi \leq \frac{(w - \theta)(\pi_H - \pi_L)}{\pi_L} = \bar{\psi}.$$

In that case, the agent is not getting rents, so the principal would choose only the most productive agents.

(b) When $\psi > \bar{\psi}$, it is the limited liability constraint that binds (the participation constraint does not), and the solution is $t_0 = \theta$ and

$$t_1 = \theta + \frac{\psi}{\eta_i(\pi_H - \pi_L)}.$$

This solution implies rents to the worker above opportunity cost of

$$\frac{\pi_H \psi}{\pi_H - \pi_L} + \theta - (w + \psi),$$

and with $\beta_i = 0$ a profit to the firm of

$$\Pi = \eta_i \pi_H q_1 + (1 - \eta_i \pi_H) q_0 - \theta - \frac{\pi_H \psi}{\pi_H - \pi_L}.$$

Differentiating this with respect to η_i we find that—absent any brother-in-law effect—

$$\frac{d\Pi}{d\eta_i} = \pi_{\mathrm{H}}[q_1 - q_0] > 0,$$

implying the firm would always prefer to hire the normal worker instead of the brother-in-law.

In contrast, when $\beta_i = \beta > 0$, it is easy to see that the optimal contract remains the same, but the maximized profit becomes

$$\eta_i \pi_{\mathrm{H}} q_1 + (1 - \eta_i \pi_{\mathrm{H}}) q_0 - \theta - \left(\frac{\pi_{\mathrm{H}} \psi}{\pi_{\mathrm{H}} - \pi_{\mathrm{L}}}\right)(1 - \beta) - \beta(w + \psi - \theta).$$

From the comparison of the profit functions for $\beta = 0$ and $\eta_i = 1$ with $\beta > 0$ and $\eta_i = \eta$, both with high and low effort, we obtain the cutoff points $\bar{\eta}$ and $\bar{\bar{\eta}}$. ■

PROOF OF THEOREM 6. Simply observe that the profit with low effort is $\Pi = \eta_i \pi_{\mathrm{L}} q_1 + (1 - \eta_i \pi_L) q_0 - w$. The strength of the externality β plays no role in it because there is no wage gap. Hence, brothers-in-law have lower productivity and represent no benefit to the firm. ■

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