Garden Leave vs. Covenants Not to Compete

TIMOTHY J. PERRI[*]
Department of Economics, Appalachian State University

"Garden leave" (GL)---when workers are paid but do not work---may be preferred by firms since courts are more likely to enforce GL than "covenants not to compete" (CNCs). We consider when GL is more profitable than a CNC. Also, assuming it is optimal to offer GL or a CNC*, we find (1) the optimal length of either GL or a CNC is the same, (2) firms share fewer trade secrets with GL than with a CNC, and (3) the extent of innovation will be higher with a CNC than with GL.*

1. INTRODUCTION

Covenants not to compete (CNCs) have become a common feature for many workers. For example, LaVan (2000) believes approximately 80% of newly-hired information technology workers are asked to sign a CNC. Fear of workers being poached has apparently caused some large information technology firms---including Google, Yahoo, and Apple---to agree informally not to hire workers from firms they view as partners (Helft, 2009a, 2009b).

For centuries, employers in the U.K. and the U.S. have used CNCs in labor contracts, and courts have tended to view CNCs unfavorably (Callahan, 1985). In the U.S., California, Alabama, and Alaska forbid CNCs, and Texas and Michigan have restricted their use in the past (Den Hertog, 2003). CNCs are commonly used in two situations: when employees generate goodwill (e.g., a salesperson who is the face of the firm), and when trade secrets are divulged to employees (Shadowen and Voytek, 1984). In particular, a CNC is used when it is difficult to specify the extent of specialized information acquired by workers (Trebilcock, 1986). The case of trade secrets will be the focus herein.

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[*] Professor, Department of Economics, Appalachian State University, Boone, NC 28608, USA. Telephone: 828-262-2251; fax: 828-262-6105; e-mail: perritj@gmail.com. I thank the editor Francesco Parisi, an anonymous referee, and Kyung Baik for comments on earlier versions of this paper.

Beginning in the U.K. in 1986,[1] some firms have used an alternative to the usual CNC, employing what are called *garden leave* (GL) provisions. In a CNC, a worker is not allowed to work for a specified period for a competitor for whom the worker might use skills or trade secrets learned at the worker's recent employer. A contract with GL has a similar restriction regarding working for a competitor, and *may* prevent an individual from working at all, but the worker is paid his full salary (including benefits) by his soon-to-be ex-employer. Thus, with GL, the worker is essentially on a paid vacation.

Lembrich (2002) claims many U.S. firms have begun to use GL because they believe GL is more likely to be enforced than are CNCs.[2] The evidence from the U.K. and the U.S. supports this belief of U.S. firms. Klein and Pappas (2009) note U.K. courts have consistently supported contracts with GL, but are less supportive of CNCs. Few U.S. court cases have involved GL, but some cases in New York have dealt with CNCs that had provisions similar to GL. In these cases, "safety net" clauses in CNCs provide for payment to a worker who has attempted to quit and has failed to find alternative employment. In four such cases in New York,[3] the courts noted the significance of the payment to the employee in upholding the quasi-GL.

The purpose of this paper is to compare CNCs and GL when an employee who possesses some form of human capital or trade secrets obtained at a firm may be able to form a "spinout" company. We consider spinouts because they are more successful than other firms in both survival and performance, and are an important source of new firms in the information technology sector, including the following products: semiconductors, rigid disk drives, and laser printers (Franco and Mitchell, 2008). There are several questions we will address.

First, the profitability of GL relative to a CNC is considered. GL involves a higher cost because of the payment to a worker while on GL, but, if GL is more likely to be enforced than a CNC, the latter effect would make GL more profitable than a CNC.

Second, Lembrich (2002) notes it is more costly to extend the length of GL than it is for a CNC, given the payment to workers on a GL. Thus, we will analyze whether the optimal length of time for a GL differs from that for a CNC.

Third, we consider whether the extent of trade secrets shared with workers differs with GL versus a CNC. One might expect the extent of trade secrets

[1] The case was *Evening Standard Company v. Henderson*.

[2] Stone (2002) asserts there has been a significant increase in court cases involving CNCs in the U.S., but she does not provide any data to support this claim.

[3] The cases are *Lumex Inc v. Highsmith and Life Fitness* (1996), *Ticor Title Insurance Co. v. Cohen* (1999), *Natsource LLC v. Paribello* (2001), and *Estee Lauder Companies Inc. v. Batra* (2006).

shared would be higher with GL if, again, a contract with GL is more likely to be enforced than is a CNC.

Fourth, the extent of innovation with GL and a CNC is compared. Innovation should depend on the expected length of time a spinout exists and the amount of trade secrets shared with workers.

CNCs continue to receive a good deal of academic interest. Posner, Triantis, and Triantis (2004) compare CNCs with the alternative remedies of specific performance and liquidated damages. Franco and Mitchell (2008) consider when regions with CNCs will lead to more innovation with spinouts. Kräkel and Sliwka (2009) consider when *not* imposing a CNC may be profitable (because the ability to quit induces a worker to invest in more human capital). Since these issues have already been considered, we ignore them and focus on a firm that may have a spinout, and that is either allowed to write a contract with GL or a CNC.

2. OUTLINE OF THE MODEL

The model to be used herein is outlined in this section. We do so by listing the basic assumptions of the model.

> *Assumption One*. There are two periods of length one. Discounting is ignored. At the beginning of the first period, a firm, F1, chooses an amount of trade secrets, s, to divulge to an employee and the length of GL or a CNC, t, with $t \leq 1$. The employee works for F1 for the first period. After one period, there is an exogenous probability, q, that the employee has an opportunity to quit and form a spinout. If the employee quits, F1 receives an immediate judicial decision which tells the firm if the GL or CNC is valid. If a CNC is upheld, for a length of time t, the employee can work only for a firm that does not use the knowledge embodied in s. If a GL is upheld, the employee can work for no one for a length of time t, but continues to be paid by F1 for the period of garden leave.[4]

> *Assumption Two*. F1 cannot renegotiate compensation when an individual announces a quit. Otherwise, given the revenue assumptions herein,

[4] Lembrich (2002) suggests GL might allow someone to work, although not for a firm that would use the knowledge s. However, Klein and Pappas (2009) suggest one reason U.S. courts upheld GL provisions (in the few decisions regarding GL that have been rendered) is courts are more willing to allow a firm to dictate to an employee than they are to a former employee. Also, if the wage paid plus the value of leisure received exceeds the wage in alternative employment, then the individual would not choose to work while on GL.

http://www.bepress.com/rle/vol6/iss2/art2
DOI: 10.2202/1555-5879.1408

there would be no quits. In order to have both renegotiation and a positive probability of quits with GL or a CNC, we would have to allow revenue to be a random variable as in Posner, Triantis, and Triantis (2004). This would distract from our focus on the differences between GL and CNCs in a world where individuals may quit to form a spinout.

Assumption Three. When the individual is employed at F1, revenue per period is $R = R(s)$, $R(0) = R_0 > 0$, $R' > 0$, and $R'' < 0$, where primes denote partial derivatives. If the individual is on a GL or a CNC, revenue at F1 is R_0. If the individual operates in a spinout, the additional competitor reduces F1's revenue to $R_0 - \delta \geq 0$. Since the employee at F1 increases revenue by the amount $R - R_0$, it is assumed the spinout's revenue, R_2, is this amount minus the reduction due to having a competitor (F1), so $R_2 = R - R_0 - \delta$. We further assume $R_2 > 0$. The cost to a firm of imparting trade secrets (training the individual) is $\kappa = \kappa(s)$, $\kappa(0) = 0$, $\kappa' > 0$, and $\kappa'' \geq 0$.

Assumption Four. The probability a court will uphold a contract with GL is $P_G = f(t), f' < 0$. Presumably $f(1) = 0$ and $f(0) = 1$, but we only require $f(t) < 1$ for $t > 0$. The probability a court will uphold a CNC is $P_C = \phi f(t)$, $\phi < 1$; for any t, a CNC is less likely to be enforced than is GL.

Assumption Five. Alternative earnings per period of ω are always available. F1 sets a wage so expected compensation for an individual just equals 2ω.

3. THE FIRM'S CHOICE PROBLEM

Consider the choice problem for the firm, F1, when the firm can adjust its wage so the individual's expected compensation for two periods---including possible earnings in a spinout---just equals 2ω. It will be shown s is not the same with GL and a CNC, so, it is not clear whether profit is larger with GL or a CNC. Later in this section, we will compare profit with GL and a CNC. For now, we compare the expected wage bills with GL and a CNC, respectively EWB_G and EWB_C, and, since we will require these terms to determine the profit terms to be maximized, we first find the wages with GL or a CNC, respectively W_G and W_C, and then find EWB_G and EWB_C.

Consider the individuals expected utility with a CNC, U_C. For the first period, and for the second period with a probability of $1 - q$, the individual is paid W_C. With a probability of qP_C, the individual quits and is able to earn ω elsewhere during a CNC for a period of t (not using the trade secrets, s, acquired at F1).

With the same probability the individual earns $R_2 = R - R_0 - \delta$ for a period $1 - t$. With a probability of $q(1 - P_C)$, the CNC is not upheld, and the individual earns R_2 for the entire second period. Thus we have:

(1) $$U_C = (2 - q)W_C + qt\omega P_C + (1 - t)qP_C R_2 + (1 - P_C)qR_2.$$

Setting $U_C = 2\omega$:

(2) $$W_C = \frac{(2 - qtP_C)\omega - qR_2(1 - tP_C)}{2 - q}.$$

Note, $W_C|_{q\to 0} = \omega$, and W_C is inversely related to q:

(3) $$\frac{\partial W_C}{\partial q} = (+)(1 - tP_C)(\omega - R_2) < 0,$$

since no one would quit for a spinout if $\omega > R_2$; the individual would go elsewhere and earn ω. Since F1 pays W_C for an expected length of time of $2 - q$, EWB_C is simply the numerator of W_C:

(4) $$EWB_C = (2 - qtP_C)\omega - qR_2(1 - tP_C).$$

The determination of U_G is similar to that of U_C, except the individual is paid W_G and receives leisure worth v while on GL. Thus:

(5) $$U_G = [2 - q(1 - tP_G)]W_G + qtvP_G + qR_2(1 - tP_G).$$

Setting $U_G = 2\omega$:

(6) $$W_G = \frac{2\omega - qtvP_G - qR_2(1 - tP_G)}{2 - q(1 - tP_G)}.$$

We find $W_G|_{q\to 0} = \omega$, and W_G is inversely related to q:

(7) $$\frac{\partial W_G}{\partial q} = (+)[(1 - tP_G)(\omega - R_2) - tvP_G] < 0.$$

DOI: 10.2202/1555-5879.1408

Now F1 pays W_G in the first period, in the second period for the entire time with a probability of 1 - q, and for t of the second period with a probability of qP_G. Thus the expected length of time W_G is paid is $2 - q(1-tP_G)$, so EWB_G is the numerator of W_G:

$$(8) \qquad EWB_G = 2\omega - qtvP_G - qR_2(1 - tP_G).$$

For $q > 0$, both W_C and W_G are less than ω. The wage bill is higher with GL than with a CNC because the individual is paid while on GL. However, the value of leisure, v, received on a GL implies F1 can pay a lower wage with GL. We have $EWB_G > EWB_C$ if:

$$(9) \qquad (1-\phi)R_2 + \phi\omega > v.$$

With $R_2 > \omega$, the minimum value for the LHS of *ineq.*(20) = ω. However, $\omega \geq v$ or no one would work. Thus, $EWB_G \geq EWB_C$, with the strict equality holding if either $\omega > v$ or $\phi < 1$. Thus, even though the firm can reduce W_G due to the leisure an individual would receive on GL, the fact one is paid with GL and is not paid on a CNC dominates, and the expected wage bill is never smaller on GL than with a CNC.

Now consider expected profit with either GL or a CNC, respectively π_G and π_C, with P_i the probability GL or a CNC is upheld, $i = G$ or C. The firm has revenue of R for the first period, and also has R with a probability of $1-q$ for the second period. With a probability of $q(1-P_i)$, the individual quits and immediately works in a spinout; F1's revenue is then $R_0 - \delta$ for the second period. With a probability of qP_i, the individual quits and the CNC or GL is upheld. In this case, F1's revenue is R_0 for t of the second period (because F1 then does not have competition from the spinout), and is $R_0 - \delta$ for $1- t$ of the second period (when the spinout is active). Profit is simply expected revenue minus the expected wage bill minus κ, so, we have:

$$(10) \qquad \pi_C = R(2 - tqP_C) + q[tP_C(R_0 + \omega) - 2\delta(1 - tP_C)] - 2\omega - \kappa,$$

$$(11) \qquad \pi_G = R(2 - tqP_G) + q[tP_GR_0 - 2\delta(1 - tP_G) + vtP_G] - 2\omega - \kappa.$$

Let $\xi_{f,t}$ equal the elasticity of f with respect to t. First consider the necessary conditions for a maximum of π_C:

(12) $$\frac{\partial \pi_C}{\partial t} = q\phi(\delta + \omega - R_2)\,(tf' + f) = q\phi f(\delta + \omega - R_2)(1 + \xi_{f,t}) \le 0,$$

(13) $$\frac{\partial \pi_C}{\partial s} = (2 - tqP_C)R' - \kappa' = 0.$$

The FOC for *s* simply balances the expected gain from increasing the level of trade secrets shared, which depends on the expected length of time one is expected to be employed, with the marginal cost of imparting these secrets. In the FOC for *t*, the term $\delta + \omega - R_2$ is independent of *t*, and only by chance would equal zero. Thus, an interior solution for *t* requires $\xi_{f,t} = -1$.

Now consider the necessary conditions for a maximum of π_G:

(14) $$\frac{\partial \pi_G}{\partial t} = q(\delta + v - R_2)(tf' + f) = qf(\delta + v - R_2)(1 + \xi_{f,t}) \le 0,$$

(15) $$\frac{\partial \pi_G}{\partial s} = (2 - tqP_G)R' - \kappa' = 0.$$

In the FOC for *t* with a GL, the term $\delta + v - R_2$ is independent of *t*, and, as in the FOC for *t* with a CNC, only by chance would equal zero. Again an interior solution for *t* requires $\xi_{f,t} = -1$, so, if there is an interior solution for *t* with either GL or a CNC, *t* is identical in either case. The FOC for *s* with GL is similar to that with a CNC, and the difference in *s* in the two cases will be discussed in *Proposition Two*.

Recall Lembrich's (2002) suggestion (Section 1 herein) that it is costlier to extend a GL than it is to extend a CNC since those on GL are paid. However, as explained in the paragraph after the proof of *Proposition One*, as long as $\delta + \omega - R_2 < 0$, a firm with a CNC does not prefer the corner solution with $t = 0$. If this is true, the firm would like to extend the expected length of the CNC as far as possible. A similar argument holds for a firm with a GL if $\delta + v - R_2 < 0$. What limits the optimal choice of *t* is the tradeoff from altering *t*, which is reflected in the term $1 + \xi_{f,t}$. When *t* is increased by one unit, the direct effect is to increase the expected length of GL or a CNC by one, and the indirect

http://www.bepress.com/rle/vol6/iss2/art2
DOI: 10.2202/1555-5879.1408

effect is to decrease the expected length of GL or a CNC by reducing the likelihood of enforcement by a court. The latter effect is captured in the negative elasticity term $\xi_{f,t}$. Thus, the value of t that maximizes the expected length of GL or a CNC is that for which $\xi_{f,t} = -1$.

Comparing the FOC for s with GL and a CNC, s is largest when t is smallest, and s is the same with GL or a CNC if $t = 0$. Thus, when $t = 0$, $R_2 = R - R_0 - \delta$ is the largest it can be, and is identical with either contract. The value of R_2 used in *Proposition One* is for when $t = 0$.

PROPOSITION ONE. Assuming $tf'' + 2f' < 0$ and $\omega > v$:

I. if $\delta < R_2 - \omega$, $t = 0$ with GL or a CNC;

II. if $R_2 - \omega < \delta < R_2 - v$, $t = 0$ with GL, and t is the solution to $\xi_{f,t} = -1$ with a CNC;

III. if $R_2 - v < \delta$, t is the solution to $\xi_{f,t} = -1$ with either GL or a CNC.

Proof of Proposition One. Consider the FOC for t, *ineqs.*(12) and (14). In both these expressions, the first term in parentheses is independent of t and only by chance would equal zero. Thus, an interior solution for t requires $\xi_{f,t} = -1$. Using the SOC for t with a CNC[5], if $tf'' + 2f' < 0$, the SOC requires $\delta + \omega - R_2 > 0$ or $\delta > R_2 - \omega$. If $\delta < R_2 - \omega$, $\frac{\partial^2 \pi_C}{\partial t^2}$ is positive, so an interior solution for t would be at a minimum of profit, and we would have a corner solution with $t = 0$. With GL, the SOC[6] for t, holds only if $\delta + v - R_2 > 0$, or if $\delta > R_2 - v$. □

For corner solutions for t, with a CNC, the reason the firm chooses $t = 0$ and not $t = 1$ is simple. If a quit occurs and $t = 0$, F1 loses δ by having a competitor for the entire second period, but gains $R_2 - \omega$ because it can lower the expected wage bill by that amount since that is the gain to an individual from a spin out versus alternative earnings. Thus, if $\delta < R_2 - \omega$, $t = 0$ is optimal. With GL, if a quit occurs and $t = 0$, F1 loses δ by having a competitor and gains W_G by not paying during GL, but the firm gains $R_2 - v - W_G$ because it can lower the expected wage bill by that amount since that is the gain to an

[5] We have: $\frac{\partial^2 \pi_C}{\partial t^2} = q\phi(\delta + \omega - R_2)(tf'' + 2f')$.

[6] We have: $\frac{\partial^2 \pi_G}{\partial t^2} = q\phi(\delta + v - R_2)(tf'' + 2f')$.

individual from a spin out versus leisure and being paid while on GL. Thus, with GL, the firm prefers $t = 0$ if $R_2 - v - W_G > \delta - W_G$, or if $R_2 - v > \delta$.

When a firm sets its wage, it takes account of the effect of GL or a CNC on the expected compensation of one it hires. The gain to the firm in lower wages when there is no CNC or GL implies it is not always optimal to choose a CNC or GL. If $\omega > v$, the net gain to the firm from not choosing GL exceeds that for not choosing a CNC, $R_2 - v$ versus $R_2 - \omega$. Thus, GL is even less likely to be profitable to a firm than is a CNC. If a CNC or GL is used, we found the optimal length to be the same.

PROPOSITION TWO. The level of trade secrets shared with an individual, s, is the highest with a CNC: $s_C > s_G$.

Proof of Proposition Two. With either GL or a CNC, both FOC for s ---*eqs.*(13) and (15)---have $(2 - x)R' - \kappa' = 0$, where $x = tqP_C$ with a CNC and $x = tqP_G$ with GL. Differentiating the FOC for s, $\frac{ds}{dx} = \frac{R'}{SOC} < 0$ (by the SOC). Thus, s is largest when x is smallest, so, with $P_C < P_G < 1$, $s_C > s_G$. □

The reason for this result is a higher s raises R and R_2, thereby lowering what F1 must pay to attract an individual. Since a CNC is less likely to be upheld than GL, an increase in s lowers the wage with a CNC more than it does with GL because the individual is more likely to earn R_2 for the entire second period with a CNC. Thus, raising s is more profitable with a CNC than with GL.[7]

We can compare profit with a CNC and with GL, π_C and π_G respectively. For a meaningful comparison, assume $R_2 - v < \delta$ when $t = 0$, so t is the same with either a CNC or with GL (*Proposition One*). With t identical and positive, from *Proposition Two*, $s_C > s_G$. Thus R is larger with a CNC than with GL, $R_C > R_G$. Using *eqs.*(10) and (11), $\pi_C > \pi_G$ if:

$$(16) \qquad 2(R_C - R_G) + qtfR_0(\phi - 1) + 2qtf\delta(\phi - 1) + tqf(R_G - \phi R_C) + qtf(\phi\omega - v) > 0.$$

In *ineq.*(16), the first term is positive, the second and third terms are negative if $\phi < 1$, and the fourth and fifth terms are of ambiguous sign. If $\phi \rightarrow 1$, so a CNC is just as likely to be enforced as is GL, $s_G \rightarrow s_C$, so $R_G \rightarrow R_C$, and the LHS of *ineq.*(16) becomes $qtf(\omega - v)$, which is positive if alternative earnings

[7] Note, if the wage is based on rent sharing with the individual, it can also be shown s is larger with a CNC than with GL.

http://www.bepress.com/rle/vol6/iss2/art2
DOI: 10.2202/1555-5879.1408

exceeds the value of leisure. The reason for this result was explained in the last paragraph before *Proposition Two* and involves the choice of a GL or a CNC versus choosing neither ($t = 0$). There it is shown, if $v < \omega$, the net gain to the firm from not choosing GL exceeds that for not choosing a CNC. Thus, for this reason, a GL is less likely to be profitable than is a CNC, so $\pi_C > \pi_G$.

As ϕ is reduced from one, s_C and R_C increase, $s_G < s_C$, $R_G < R_C$, and it is more likely $v > \phi\omega$. Since a decrease in ϕ will increase R_C, the fourth term in *ineq.*(16) is of uncertain sign. The first term is positive, the second and third terms are negative, and the fifth term is negative if $v > \phi\omega$. The advantage of GL relative to a CNC is the latter is less likely to be upheld by the courts, $\phi < 1$. Intuitively, the larger is this advantage---the smaller is ϕ---the more likely it is GL will be more profitable than a CNC, but, without specific functional forms for R, f, and κ, we do not unambiguously find $\pi_G > \pi_S$ for small enough values for ϕ.

In the Appendix, we use specific functional forms to consider when $\pi_G > \pi_S$, and do find this is more likely the smaller is ϕ. We also find GL is more likely to be more profitable than a CNC the larger are δ, v, and the marginal cost of imparting trade secrets. A larger δ implies a firm gains more from not having a competitor for the length of GL or a CNC. Since GL is more likely to be enforced than is a CNC, a larger δ means GL is more likely to be more profitable than a CNC. A larger v lowers the expected wage bill with a GL, making GL more profitable (with no effect on the profitability of a CNC). Finally, a larger marginal cost of imparting trade secrets negatively impacts a CNC more than a GL since the optimal value of s is higher with a CNC than with GL.

4. INNOVATION

As noted in Section One, spinouts are an important source of new firms in the information technology sector (Franco and Mitchell, 2008). One might expect the extent of innovation to be a positive function of 1) the amount of trade secrets shared with individuals who may spinout, s, and 2) the expected length of time a spinout exists, L. We do not consider the optimal amount of innovation. Rather, we simply focus on any differences in innovation between GL and CNCs.

First, consider L. Assuming there is an interior solution for t with either GL or a CNC, then t is the same with GL or a CNC With $P_G = f$ and $P_C = \phi f$, a spinout with a CNC occurs if there is a quit, which has a probability of q, and lasts for the entire second period with a probability of $1\text{-}P_C$ and for $1\text{-}\ t$ of the second period with a probability of P_C. Similar logic follows for GL, so:

(17) $L_C = q[1 - P_C + (1\text{-}t)P_C] = q[1 - tf\phi]$,

(18) $L_G = q[1 - P_G + (1\text{-}t)P_G] = q[1 - tf]$.

Now $L_C > L_G$ with $\phi < 1$. Thus, if GL or a CNC exists, the expected length of a spinout is longer with a CNC because a CNC is less likely to be upheld by the courts. However, from *Proposition One*, we are less likely to have a GL than we are to have a CNC if alternative earnings exceed the value of leisure, $\omega > v$. Thus, the expected length of a spinout is not unambiguously longer with a CNC than with GL.

Since $s_C > s_G$, and, *if* there is a CNC or GL, $L_C > L_G$, there would be more innovation with a CNC than with GL for two reasons. However, as noted, a CNC is more likely than is GL, so, for this reason, the expected length of a spinout will be longer in a world in which GL is available (but a CNC is not) than it would be in a world when a CNC is available (but GL is not). This fact alone implies GL will lead to more innovation than would a CNC. Additionally, from *eqs.*(13) and (15), the marginal benefit from raising s is larger when t is zero than it is when $t > 0$. Thus, since a GL is less likely to occur than is a CNC, for this reason, the expected level of s will tend to be higher with GL than with a CNC.

In sum, it is unclear whether a CNC or GL will lead to more innovation.

5. CONCLUSION

Garden leave has become more common in the U.S. in recent years (Lembrich, 2002; Klein and Pappas, 2009) because courts are believed to be more likely to enforce garden leave than they are to enforce a covenant not to compete. The greater likelihood of enforcement must be balanced by the fact a firm continues to pay an individual on garden leave. If the likelihood of enforcement of garden leave is significantly higher than it is with a covenant not to compete, the former *may* be more profitable than the latter. However, even though garden leave may be more profitable than a covenant not to compete, garden leave produces results that may not be desirable. Conditional upon a firm desiring either garden leave or a covenant not to compete, we find the former is never associated with either the sharing of more trade secrets or more innovation. Thus, the social benefits of garden leave versus covenant not to compete may be questionable and should be examined if garden leave will continue to be a part of employment contracts.

http://www.bepress.com/rle/vol6/iss2/art2
DOI: 10.2202/1555-5879.1408

APPENDIX

To determine when $\pi_C < \pi_G$, we use *ineq.*(16) from the text, and see when that inequality (which is for when $\pi_C > \pi_G$) is reversed. Simplifying as much as possible in order to get unambiguous results, let $q = 1$, $f = 1 - t$, $\kappa = as$, with a being a positive constant, $R = R_0 + s^{1/2}$, and $v = \omega$. Thus $P_G = 1 - t$, $P_C = \phi(1 - t)$, the optimal value of $t = ½$ with GL or a CNC, and we find:

$$\text{(A1)} \qquad s_C = \frac{\left(2 - \frac{\phi}{4}\right)^2}{4a^2},$$

$$\text{(A2)} \qquad s_G = \frac{49}{64a^2}.$$

Now $s_C > s_G$ for $\phi < 1$. Substituting in *ineq.*(16) using $t = ½$ and *eqs.*(A1) and (A2), we have (for $\pi_C > \pi_G$):

$$\text{(A3)} \qquad \frac{1-\phi}{4a} + \frac{\delta}{2}(\phi - 1) + \frac{1}{4}\left[\frac{7}{8a} - \frac{\phi\left(2 - \frac{\phi}{4}\right)}{2a}\right] + \frac{1}{4}v(\phi - 1) > 0.$$

Suppose $\phi = ½$. Then, for *ineq.*(A3) to *not* hold---that is for $\pi_C < \pi_G$---we must have $\delta > \frac{37}{32a} - \frac{v}{2}$. If $\phi = 0$, we must have $\delta > \frac{30}{32a} - \frac{v}{2}$. Thus, the smaller is ϕ, and the larger are δ, v, and a, the more likely it is garden leave is more profitable than a covenant not to compete.

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DOI: 10.2202/1555-5879.1408