# Business & Workers as Prisoners

[In a column some months back](http://commoncents.blogwyrm.com/?p=53), I presented the basic concept behind the Prisoner’s Dilemma and talked about some of the most common applications in economic circles. In this column I will discuss a somewhat discouraging application of these concepts to the relationship between business and workers (or firm and employee or management and labor, etc., as you prefer).

The particular type of business I will be talking about is a government contractor in the technical sector. Businesses like these depend on a highly-trained and technically savvy work force to be able to bid on and win new work. Central to the ability to credibly bid on new work is the idea that the firm and/or its workforce can set itself apart from its competitors in one or more of three distinct ways: 1) offering equal technical competency for a lower cost, 2) offering structured processes that lower risk and ensure delivery on cost and schedule, or 3) offering innovative solutions that enable new technology or a new opportunities. The application I will deal with is the last case, but the attentive reader can adapt this example to the other two.

Typically the ability to innovate new technology on government contracts is limited by two factors. The first is that government contracts with a specific research and development (R&D) focus are rare and becoming even rarer as federal spending on basic research drops. Second, unless otherwise negotiated, the intellectual property for any research done on a federal contract is typically owned by the government. Even in those cases where rights are granted for commercialization, the government retains limited ownership and exercising the ability to commercialize may be hard to do.

As a result, the general idea is to own the intellectual property itself and to leverage the intellectual property into increased profits. And therein lies the rub – who owns the intellectual property and who benefits from the increased profits?

From management’s point-of-view, the firm wants to produce a body of intellectual property by engaging the employees’ talents in creating innovative technologies for the good of the firm. The business: 1) provides the work environment in which the employee can tackle interesting problems, 2) actively pursues new business, 3) insulates the employee from the day-to-day hassle of running an enterprise, and 4) maintains the employee’s wage level even when profits decrease or disappear [(‘sticky wages’](http://en.wikipedia.org/wiki/Nominal_rigidity)).

Since the continued existence of the worker’s job is predicated on the health of the business, it is natural for management to expect that the worker will contribute to the overall health of the firm by shouldering some of the burden of making the company competitive. How then does the business encourage the worker to apply his talent to creating intellectual property that the business can own?

Likewise, an employee wants to produce his own intellectual property for continued advancement and increasing wages and compensation. The two main components of this capital are the technical skills required to perform the jobs in his sector and the external recognition that he can muster these skills to bring a complicated piece of work to fruition. The employee provides: 1) the technical expertise and education need to be able to innovate, 2) the dedicated time needed to concentrate on a problem and deliver solutions and 3) the perseverance and intellectual fortitude to find these solutions.

Since the continued health of the business depends on the condition of its workforce, it is natural for the worker to expect that the business will provide opportunities for the employee to develop innovative solutions to complicated and challenging technical assignments and will support and assist the employee in generating tangible proof that he actually developed intellectual property rather than just use the fruits of someone else’s labor (e.g. patents or papers). How then does the worker encourage the business to provide the infrastructure that benefits him?

If both sides could trust that the other will cooperate and compromise, then they each would get an attractive payoff. The problem is that the business worries that, after all their investment in securing interesting work, the employee will either shirk his responsibilities and just collect a paycheck or that he will take all the credit and then head off to greener pastures. Likewise the employee worries the business will keep all the intellectual property for itself and take credit for the hard work and talent that he mustered. The situation abounds with questions of trust and with structured payoffs that are directly related to the Prisoner’s Dilemma.

Consider first the payoff matrix from the perspective of the business. Its choices are either to trust the employee and invest in increased wages and/or improved infrastructure (e.g send the employee to a conference) or to safeguard against the employee shirking his responsibilities by keeping wages static and by avoiding infrastructure investments that benefit the employee, until the employee delivers. The payoffs are then described by the company as:

|  |  |  |
| --- | --- | --- |
|  | Business Trusts | Business Safeguards |
| Employee Delivers | * New business revenue * Higher wage/infrastructure costs | * New business revenue * Status quo wages |
| Employee Shirks | * No revenue growth or lost revenue * Higher wage costs | * Status quo revenue * Status quo wages |

Next consider the payoff matrix from the perspective of the employee. His choices are to invest extra hours of his own time to develop intellectual property that he then turns over to the firm in the hopes of a reward or to perform the minimal amount of work to meet expectations, until such time as the company begins to show concern for his needs. The payoffs are then described by the workers as:

|  |  |  |
| --- | --- | --- |
|  | Business Rewards | Business Ignores |
| Employee Invests | * Higher wages * Better Opportunities | * Status quo wages * Loss of intellectual property |
| Employee Meets Expectations | * Higher wages | * Status quo wages |

Both of these perspectives can be combined into one common payoff matrix where, for consistency with the original language of the Prisoner’s dilemma, the word ‘cooperate’ will mean either ‘trusts’ or ‘rewards’ for business and ‘delivers’ or ‘invests’ for the employee, depending on context. Similarly, the word ‘betray’ will mean either ‘safeguards’ or ‘ignores’ for business and ‘shirks’ or ‘meets expectations’ for the employee. Also the payoffs will simply be given a single letter value ‘C’, ‘L’, ‘S’, and ‘M’ with the relative ranking between these of the largest payoff  (L) > cooperative payoff (C) > mutually-betrayed payoff (M) > sap payoff (S). The payoff matrix now looks like:

|  |  |  |
| --- | --- | --- |
|  | Business Cooperates | Business Betrays |
| Employee Cooperates | * C for Business * C for Worker | * L for Business * S for Worker |
| Employee Betrays | * S for Business * L for Worker | * M for Business * M for Worker |

Ordinarily, if the employee and the business were engaged in a one-time only deal, the equilibrium solution of this game is for both sides to betray leading to lousy payoffs (M) for both sides. This is a well-known feature of the strategies for both players in the Prisoner’s Dilemma.

But the usual relationship between a business and an employee is one of repeatedly playing this game. This is the [iterated version of the Prisoner’s Dilemma](http://en.wikipedia.org/wiki/Prisoner%27s_dilemma#The_iterated_prisoners.27_dilemma) (with no known limit of turns) and the best strategy that has been currently discovered is the tit-for-tat approach. In this strategy, each player’s optimal response for the current turn is to perform the same action as the opposing player performed in the previous turn.

This observation then provides some insight into the employee/management scenario. It is obvious that once one side betrays, it starts a long line of subsequent betrayals by the other side unless one side decides to unilaterally cooperate. Thus once a business had been burned by a few bad employees it will have a tendency to not meet the goals of its employees. They, in turn, will be less willing to innovate and both sides suffer.

There is no easy way to extricate both sides from this vicious circle without one side risking a substantial loss. That said, there is an asymmetry between the two sides as management in these types of business are more consolidated and organized than the work force. So it is up to management to offer the first olive branch (and perhaps many more) when the situation gets into one of these downward spirals.